



$$I(J^P) = \frac{1}{2}(0^-)$$

Quantum numbers not measured. Values shown are quark-model predictions.

See also the  $B^\pm/B^0$  ADMIXTURE and  $B^\pm/B^0/B_s^0/b$ -baryon ADMIXTURE sections.

See the Note “Production and Decay of  $b$ -flavored Hadrons” at the beginning of the  $B^\pm$  Particle Listings and the Note on “ $B^0-\bar{B}^0$  Mixing” near the end of the  $B^0$  Particle Listings.

### $B^0$ MASS

The fit uses  $m_{B^+}$ ,  $(m_{B^0} - m_{B^+})$ , and  $m_{B^0}$  to determine  $m_{B^+}$ ,  $m_{B^0}$ , and the mass difference.

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>5279.72±0.08 OUR FIT</b>				
<b>5279.63±0.20 OUR AVERAGE</b>				
5279.74±0.30±0.10		1 AAIJ	19U LHCB	$pp$ at 7, 8, 13 TeV
5279.6 ±0.2 ±1.0		2 AAD	13U ATLS	$pp$ at 7 TeV
5279.58±0.15±0.28		3 AAIJ	12E LHCB	$pp$ at 7 TeV
5279.63±0.53±0.33		4 ACOSTA	06 CDF	$p\bar{p}$ at 1.96 TeV
5279.1 ±0.7 ±0.3	135	5 CSORNA	00 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
5281.3 ±2.2 ±1.4	51	ABE	96B CDF	$p\bar{p}$ at 1.8 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
5279.2 ±0.54±2.0	340	ALAM	94 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
5278.0 ±0.4 ±2.0		BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
5279.6 ±0.7 ±2.0	40	6 ALBRECHT	90J ARG	$e^+e^- \rightarrow \Upsilon(4S)$
5278.2 ±1.0 ±3.0	40	ALBRECHT	87C ARG	$e^+e^- \rightarrow \Upsilon(4S)$
5279.5 ±1.6 ±3.0	7	7 ALBRECHT	87D ARG	$e^+e^- \rightarrow \Upsilon(4S)$
5280.6 ±0.8 ±2.0		BEBEK	87 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses  $B^0 \rightarrow J/\psi p\bar{p}$  decays.

<sup>2</sup> Measured with  $B_d^0 \rightarrow J/\psi(\mu^+\mu^-) K_S^0(\pi^+\pi^-)$  decays.

<sup>3</sup> Uses  $B^0 \rightarrow J/\psi K^0$  fully reconstructed decays.

<sup>4</sup> Uses exclusively reconstructed final states containing a  $J/\psi \rightarrow \mu^+\mu^-$  decays.

<sup>5</sup> CSORNA 00 uses fully reconstructed 135  $B^0 \rightarrow J/\psi(^1)K_S^0$  events and invariant masses without beam constraint.

<sup>6</sup> ALBRECHT 90J assumes 10580 for  $\Upsilon(4S)$  mass. Supersedes ALBRECHT 87C and ALBRECHT 87D.

<sup>7</sup> Found using fully reconstructed decays with  $J/\psi$ . ALBRECHT 87D assume  $m_{\Upsilon(4S)} = 10577$  MeV.

### $m_{B^0} - m_{B^\pm}$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>0.31±0.05 OUR FIT</b>			
<b>0.33±0.05 OUR AVERAGE</b>			
0.57±0.49±0.10	<sup>1</sup> SIRUNYAN	18DF CMS	$pp$ at 8 TeV
0.20±0.17±0.11	<sup>1</sup> AAIJ	12E LHCb	$pp$ at 7 TeV
0.33±0.05±0.03	<sup>2</sup> AUBERT	08AF BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.53±0.67±0.14	<sup>1</sup> ACOSTA	06 CDF	$p\bar{p}$ at 1.96 TeV
0.41±0.25±0.19	ALAM	94 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
-0.4 ±0.6 ±0.5	BORTOLETTO <sup>92</sup>	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
-0.9 ±1.2 ±0.5	ALBRECHT	90J ARG	$e^+e^- \rightarrow \Upsilon(4S)$
2.0 ±1.1 ±0.3	<sup>3</sup> BEBEK	87 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Uses exclusively reconstructed final states containing a $J/\psi \rightarrow \mu^+\mu^-$ decay.			
<sup>2</sup> Uses the $B$ -momentum distributions in the $e^+e^-$ rest frame.			
<sup>3</sup> BEBEK 87 actually measure the difference between half of $E_{\text{cm}}$ and the $B^\pm$ or $B^0$ mass, so the $m_{B^0} - m_{B^\pm}$ is more accurate. Assume $m_{\Upsilon(4S)} = 10580$ MeV.			

### $m_{B_H^0} - m_{B_L^0}$

See the  $B^0-\bar{B}^0$  MIXING PARAMETERS section near the end of these  $B^0$  Listings.

### $B^0$ MEAN LIFE

See  $B^\pm/B^0/B_s^0/b$ -baryon ADMIXTURE section for data on  $B$ -hadron mean life averaged over species of bottom particles.

VALUE ( $10^{-12}$ s)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1.517±0.004 OUR EVALUATION</b>		(Produced by HFLAV)		
1.499±0.013±0.008	<sup>1</sup>	ABUDINEN	23D BELL	$e^+e^- \rightarrow \Upsilon(4S)$
1.515±0.005±0.006	<sup>2</sup>	SIRUNYAN	18BY CMS	$pp$ at 8 TeV
1.534±0.019±0.021	<sup>3</sup>	ABAZOV	15A D0	$p\bar{p}$ at 1.96 TeV
1.499±0.013±0.005	<sup>4</sup>	AAIJ	14E LHCb	$pp$ at 7 TeV
1.524±0.006±0.004	<sup>5</sup>	AAIJ	14E LHCb	$pp$ at 7 TeV
1.524±0.011±0.004	<sup>6</sup>	AAIJ	14R LHCb	$pp$ at 7 TeV
1.509±0.012±0.018	<sup>7</sup>	AAD	13U ATLS	$pp$ at 7 TeV
1.508±0.025±0.043	<sup>4</sup>	ABAZOV	12U D0	$p\bar{p}$ at 1.96 TeV
1.507±0.010±0.008	<sup>8</sup>	AALTONEN	11 CDF	$p\bar{p}$ at 1.96 TeV
1.414±0.018±0.034	<sup>9</sup>	ABAZOV	09E D0	$p\bar{p}$ at 1.96 TeV
1.504±0.013 <sup>+0.018</sup> <sub>-0.013</sub>	<sup>10</sup>	AUBERT	06G BABR	$e^+e^- \rightarrow \Upsilon(4S)$
1.534±0.008±0.010	<sup>11</sup>	ABE	05B BELL	$e^+e^- \rightarrow \Upsilon(4S)$
1.531±0.021±0.031	<sup>12</sup>	ABDALLAH	04E DLPH	$e^+e^- \rightarrow Z$
1.523 <sup>+0.024</sup> <sub>-0.023</sub> ±0.022	<sup>13</sup>	AUBERT	03C BABR	$e^+e^- \rightarrow \Upsilon(4S)$
1.533±0.034±0.038	<sup>14</sup>	AUBERT	03H BABR	$e^+e^- \rightarrow \Upsilon(4S)$
1.497±0.073±0.032	<sup>15</sup>	ACOSTA	02C CDF	$p\bar{p}$ at 1.8 TeV

$1.529 \pm 0.012 \pm 0.029$		16	AUBERT	02H	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$1.546 \pm 0.032 \pm 0.022$		17	AUBERT	01F	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$1.541 \pm 0.028 \pm 0.023$		16	ABBIENDI,G	00B	OPAL	$e^+e^- \rightarrow Z$
$1.518 \pm 0.053 \pm 0.034$		18	BARATE	00R	ALEP	$e^+e^- \rightarrow Z$
$1.523 \pm 0.057 \pm 0.053$		19	ABBIENDI	99J	OPAL	$e^+e^- \rightarrow Z$
$1.474 \pm 0.039 \begin{smallmatrix} +0.052 \\ -0.051 \end{smallmatrix}$		18	ABE	98Q	CDF	$p\bar{p}$ at 1.8 TeV
$1.52 \pm 0.06 \pm 0.04$		19	ACCIARRI	98S	L3	$e^+e^- \rightarrow Z$
$1.64 \pm 0.08 \pm 0.08$		19	ABE	97J	SLD	$e^+e^- \rightarrow Z$
$1.532 \pm 0.041 \pm 0.040$		20	ABREU	97F	DLPH	$e^+e^- \rightarrow Z$
$1.25 \begin{smallmatrix} +0.15 \\ -0.13 \end{smallmatrix} \pm 0.05$	121	15	BUSKULIC	96J	ALEP	$e^+e^- \rightarrow Z$
$1.49 \begin{smallmatrix} +0.17 \\ -0.15 \end{smallmatrix} \begin{smallmatrix} +0.08 \\ -0.06 \end{smallmatrix}$		21	BUSKULIC	96J	ALEP	$e^+e^- \rightarrow Z$
$1.61 \begin{smallmatrix} +0.14 \\ -0.13 \end{smallmatrix} \pm 0.08$		18,22	ABREU	95Q	DLPH	$e^+e^- \rightarrow Z$
$1.63 \pm 0.14 \pm 0.13$		23	ADAM	95	DLPH	$e^+e^- \rightarrow Z$
$1.53 \pm 0.12 \pm 0.08$		18,24	AKERS	95T	OPAL	$e^+e^- \rightarrow Z$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●						
$1.501 \begin{smallmatrix} +0.078 \\ -0.074 \end{smallmatrix} \pm 0.050$		4	ABAZOV	07S	D0	Repl. by ABAZOV 12U
$1.524 \pm 0.030 \pm 0.016$		4	ABULENCIA	07A	CDF	Repl. by AALTONEN 11
$1.473 \begin{smallmatrix} +0.052 \\ -0.050 \end{smallmatrix} \pm 0.023$		9	ABAZOV	05B	D0	Repl. by ABAZOV 05W
$1.40 \begin{smallmatrix} +0.11 \\ -0.10 \end{smallmatrix} \pm 0.03$		4	ABAZOV	05C	D0	Repl. by ABAZOV 07S
$1.530 \pm 0.043 \pm 0.023$		9	ABAZOV	05W	D0	Repl. by ABAZOV 09E
$1.54 \pm 0.05 \pm 0.02$		25	ACOSTA	05	CDF	Repl. by AALTONEN 11
$1.554 \pm 0.030 \pm 0.019$		17	ABE	02H	BELL	Repl. by ABE 05B
$1.58 \pm 0.09 \pm 0.02$		15	ABE	98B	CDF	Repl. by ACOSTA 02C
$1.54 \pm 0.08 \pm 0.06$		18	ABE	96C	CDF	Repl. by ABE 98Q
$1.55 \pm 0.06 \pm 0.03$		26	BUSKULIC	96J	ALEP	$e^+e^- \rightarrow Z$
$1.61 \pm 0.07 \pm 0.04$		18	BUSKULIC	96J	ALEP	Repl. by BARATE 00R
$1.62 \pm 0.12$		27	ADAM	95	DLPH	$e^+e^- \rightarrow Z$
$1.57 \pm 0.18 \pm 0.08$	121	15	ABE	94D	CDF	Repl. by ABE 98B
$1.17 \begin{smallmatrix} +0.29 \\ -0.23 \end{smallmatrix} \pm 0.16$	96	18	ABREU	93D	DLPH	Sup. by ABREU 95Q
$1.55 \pm 0.25 \pm 0.18$	76	23	ABREU	93G	DLPH	Sup. by ADAM 95
$1.51 \begin{smallmatrix} +0.24 \\ -0.23 \end{smallmatrix} \begin{smallmatrix} +0.12 \\ -0.14 \end{smallmatrix}$	78	18	ACTON	93C	OPAL	Sup. by AKERS 95T
$1.52 \begin{smallmatrix} +0.20 \\ -0.18 \end{smallmatrix} \begin{smallmatrix} +0.07 \\ -0.13 \end{smallmatrix}$	77	18	BUSKULIC	93D	ALEP	Sup. by BUSKULIC 96J
$1.20 \begin{smallmatrix} +0.52 \\ -0.36 \end{smallmatrix} \begin{smallmatrix} +0.16 \\ -0.14 \end{smallmatrix}$	15	28	WAGNER	90	MRK2	$E_{\text{cm}}^{ee} = 29 \text{ GeV}$
$0.82 \begin{smallmatrix} +0.57 \\ -0.37 \end{smallmatrix} \pm 0.27$		29	AVERILL	89	HRS	$E_{\text{cm}}^{ee} = 29 \text{ GeV}$

<sup>1</sup> Measured using  $B^0 \rightarrow D^{(*)-} \pi^+$  decays.

<sup>2</sup> Measured using  $B^0 \rightarrow J/\psi K^{*0}(892)$  and  $B^0 \rightarrow J/\psi K_S^0$  decays.

<sup>3</sup> Measured using  $B^0 \rightarrow D^- \mu^+ \nu X$  decays.

<sup>4</sup> Measured mean life using  $B^0 \rightarrow J/\psi K_S^0$  decays.

<sup>5</sup> Measured using  $B^0 \rightarrow J/\psi K^{*0}$  decays.

<sup>6</sup> Measured using  $B^0 \rightarrow K^+ \pi^-$  decays.

<sup>7</sup> Measured with  $B_d^0 \rightarrow J/\psi(\mu^+ \mu^-) K_S^0(\pi^+ \pi^-)$  decays.

- 8 Measured mean life using fully reconstructed decays ( $J/\psi K^{(*)}$ ).
- 9 Measured mean life using  $B^0 \rightarrow J/\psi K^{*0}$  decays.
- 10 Measured using a simultaneous fit of the  $B^0$  lifetime and  $\bar{B}^0 B^0$  oscillation frequency  $\Delta m_d$  in the partially reconstructed  $B^0 \rightarrow D^{*-} \ell \nu$  decays.
- 11 Measurement performed using a combined fit of  $CP$ -violation, mixing and lifetimes.
- 12 Measurement performed using an inclusive reconstruction and  $B$  flavor identification technique.
- 13 AUBERT 03C uses a sample of approximately 14,000 exclusively reconstructed  $B^0 \rightarrow D^{*}(2010)^- \ell \nu$  and simultaneously measures the lifetime and oscillation frequency.
- 14 Measurement performed with decays  $B^0 \rightarrow D^{*-} \pi^+$  and  $B^0 \rightarrow D^{*-} \rho^+$  using a partial reconstruction technique.
- 15 Measured mean life using fully reconstructed decays.
- 16 Data analyzed using partially reconstructed  $\bar{B}^0 \rightarrow D^{*+} \ell^- \bar{\nu}$  decays.
- 17 Events are selected in which one  $B$  meson is fully reconstructed while the second  $B$  meson is reconstructed inclusively.
- 18 Data analyzed using  $D/D^* \ell X$  event vertices.
- 19 Data analyzed using charge of secondary vertex.
- 20 Data analyzed using inclusive  $D/D^* \ell X$ .
- 21 Measured mean life using partially reconstructed  $D^{*-} \pi^+ X$  vertices.
- 22 ABREU 95Q assumes  $B(B^0 \rightarrow D^{*-} \ell^+ \nu_\ell) = 3.2 \pm 1.7\%$ .
- 23 Data analyzed using vertex-charge technique to tag  $B$  charge.
- 24 AKERS 95T assumes  $B(B^0 \rightarrow D_s^{(*)} D^0)^{(*)} = 5.0 \pm 0.9\%$  to find  $B^+ / B^0$  yield.
- 25 Measured using the time-dependent angular analysis of  $B_d^0 \rightarrow J/\psi K^{*0}$  decays.
- 26 Combined result of  $D/D^* \ell X$  analysis, fully reconstructed  $B$  analysis, and partially reconstructed  $D^{*-} \pi^+ X$  analysis.
- 27 Combined ABREU 95Q and ADAM 95 result.
- 28 WAGNER 90 tagged  $B^0$  mesons by their decays into  $D^{*-} e^+ \nu$  and  $D^{*-} \mu^+ \nu$  where the  $D^{*-}$  is tagged by its decay into  $\pi^- \bar{D}^0$ .
- 29 AVERILL 89 is an estimate of the  $B^0$  mean lifetime assuming that  $B^0 \rightarrow D^{*+} + X$  always.

**$\tau_{B^0} / \tau_{\bar{B}^0}$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>1.000 \pm 0.008 \pm 0.009</math></b>	1 AAIJ	14E LHCB	$pp$ at 7 TeV

<sup>1</sup> Measured using  $B^0 \rightarrow J/\psi K^{*0}$  decays.

**MEAN LIFE RATIO  $\tau_{B^+} / \tau_{B^0}$**

**$\tau_{B^+} / \tau_{B^0}$  (direct measurements)**

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>1.076 \pm 0.004</math></b>	<b>OUR EVALUATION</b>	(Produced by HFLAV)		
$1.074 \pm 0.005 \pm 0.003$	1	AAIJ	14E LHCB	$pp$ at 7 TeV
$1.088 \pm 0.009 \pm 0.004$	2	AALTONEN	11 CDF	$p\bar{p}$ at 1.96 TeV
$1.080 \pm 0.016 \pm 0.014$	3	ABAZOV	05D D0	$p\bar{p}$ at 1.96 TeV
$1.066 \pm 0.008 \pm 0.008$	4	ABE	05B BELL	$e^+ e^- \rightarrow \gamma(4S)$
$1.060 \pm 0.021 \pm 0.024$	5	ABDALLAH	04E DLPH	$e^+ e^- \rightarrow Z$
$1.093 \pm 0.066 \pm 0.028$	6	ACOSTA	02C CDF	$p\bar{p}$ at 1.8 TeV
$1.082 \pm 0.026 \pm 0.012$	7	AUBERT	01F BABR	$e^+ e^- \rightarrow \gamma(4S)$
$1.085 \pm 0.059 \pm 0.018$	3	BARATE	00R ALEP	$e^+ e^- \rightarrow Z$

$1.079 \pm 0.064 \pm 0.041$	<sup>8</sup>	ABBIENDI	99J	OPAL	$e^+e^- \rightarrow Z$
$1.110 \pm 0.056^{+0.033}_{-0.030}$	<sup>3</sup>	ABE	98Q	CDF	$\rho\bar{p}$ at 1.8 TeV
$1.09 \pm 0.07 \pm 0.03$	<sup>8</sup>	ACCIARRI	98S	L3	$e^+e^- \rightarrow Z$
$1.01 \pm 0.07 \pm 0.06$	<sup>8</sup>	ABE	97J	SLD	$e^+e^- \rightarrow Z$
$1.27^{+0.23}_{-0.19}^{+0.03}_{-0.02}$	<sup>6</sup>	BUSKULIC	96J	ALEP	$e^+e^- \rightarrow Z$
$1.00^{+0.17}_{-0.15} \pm 0.10$	<sup>3,9</sup>	ABREU	95Q	DLPH	$e^+e^- \rightarrow Z$
$1.06^{+0.13}_{-0.11} \pm 0.10$	<sup>10</sup>	ADAM	95	DLPH	$e^+e^- \rightarrow Z$
$0.99 \pm 0.14^{+0.05}_{-0.04}$	<sup>3,11</sup>	AKERS	95T	OPAL	$e^+e^- \rightarrow Z$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.091 \pm 0.023 \pm 0.014$	<sup>7</sup>	ABE	02H	BELL	Repl. by ABE 05B
$1.06 \pm 0.07 \pm 0.02$	<sup>6</sup>	ABE	98B	CDF	Repl. by ACOSTA 02C
$1.01 \pm 0.11 \pm 0.02$	<sup>3</sup>	ABE	96C	CDF	Repl. by ABE 98Q
$1.03 \pm 0.08 \pm 0.02$	<sup>12</sup>	BUSKULIC	96J	ALEP	$e^+e^- \rightarrow Z$
$0.98 \pm 0.08 \pm 0.03$	<sup>3</sup>	BUSKULIC	96J	ALEP	Repl. by BARATE 00R
$1.02 \pm 0.16 \pm 0.05$	269	<sup>6</sup> ABE	94D	CDF	Repl. by ABE 98B
$1.11^{+0.51}_{-0.39} \pm 0.11$	188	<sup>3</sup> ABREU	93D	DLPH	Sup. by ABREU 95Q
$1.01^{+0.29}_{-0.22} \pm 0.12$	253	<sup>10</sup> ABREU	93G	DLPH	Sup. by ADAM 95
$1.0^{+0.33}_{-0.25} \pm 0.08$	130	ACTON	93C	OPAL	Sup. by AKERS 95T
$0.96^{+0.19}_{-0.15}^{+0.18}_{-0.12}$	154	<sup>3</sup> BUSKULIC	93D	ALEP	Sup. by BUSKULIC 96J

<sup>1</sup> Measured using  $B \rightarrow J/\psi K^{(*)}$  decays.

<sup>2</sup> Measured mean life using fully reconstructed decays ( $J/\psi K^{(*)}$ ).

<sup>3</sup> Data analyzed using  $D/D^* \mu X$  vertices.

<sup>4</sup> Measurement performed using a combined fit of  $CP$ -violation, mixing and lifetimes.

<sup>5</sup> Measurement performed using an inclusive reconstruction and  $B$  flavor identification technique.

<sup>6</sup> Measured using fully reconstructed decays.

<sup>7</sup> Events are selected in which one  $B$  meson is fully reconstructed while the second  $B$  meson is reconstructed inclusively.

<sup>8</sup> Data analyzed using charge of secondary vertex.

<sup>9</sup> ABREU 95Q assumes  $B(B^0 \rightarrow D^{*-} \ell^+ \nu_\ell) = 3.2 \pm 1.7\%$ .

<sup>10</sup> Data analyzed using vertex-charge technique to tag  $B$  charge.

<sup>11</sup> AKERS 95T assumes  $B(B^0 \rightarrow D_s^{(*)} D^0) = 5.0 \pm 0.9\%$  to find  $B^+/B^0$  yield.

<sup>12</sup> Combined result of  $D/D^* \ell X$  analysis and fully reconstructed  $B$  analysis.

### $\tau_{B^+}/\tau_{B^0}$ (inferred from branching fractions)

These measurements are inferred from the branching fractions for semileptonic decay or other spectator-dominated decays by assuming that the rates for such decays are equal for  $B^0$  and  $B^+$ . We do not use measurements which assume equal production of  $B^0$  and  $B^+$  because of the large uncertainty in the production ratio.

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>1.07 \pm 0.04</math></b>					<b>OUR AVERAGE</b>
$1.07 \pm 0.04 \pm 0.03$			URQUIJO	07	BELL $e^+e^- \rightarrow \Upsilon(4S)$
$1.067 \pm 0.041 \pm 0.033$			AUBERT,B	06Y	BABR $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.95 $\begin{smallmatrix} +0.117 \\ -0.080 \end{smallmatrix} \pm 0.091$		<sup>1</sup> ARTUSO	97	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
1.15 $\pm 0.17 \pm 0.06$		<sup>2</sup> JESSOP	97	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.93 $\pm 0.18 \pm 0.12$		<sup>3</sup> ATHANAS	94	CLE2	Sup. by ARTUSO 97
0.91 $\pm 0.27 \pm 0.21$		<sup>4</sup> ALBRECHT	92C	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
1.0 $\pm 0.4$	29	<sup>4,5</sup> ALBRECHT	92G	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.89 $\pm 0.19 \pm 0.13$		<sup>4</sup> FULTON	91	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
1.00 $\pm 0.23 \pm 0.14$		<sup>4</sup> ALBRECHT	89L	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.49 to 2.3	90	<sup>6</sup> BEAN	87B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ARTUSO 97 uses partial reconstruction of  $B \rightarrow D^* \ell \nu_\ell$  and independent of  $B^0$  and  $B^+$  production fraction.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> ATHANAS 94 uses events tagged by fully reconstructed  $B^-$  decays and partially or fully reconstructed  $B^0$  decays.

<sup>4</sup> Assumes equal production of  $B^0$  and  $B^+$ .

<sup>5</sup> ALBRECHT 92G data analyzed using  $B \rightarrow D_s \bar{D}, D_s \bar{D}^*, D_s^* \bar{D}, D_s^* \bar{D}^*$  events.

<sup>6</sup> BEAN 87B assume the fraction of  $B^0 \bar{B}^0$  events at the  $\Upsilon(4S)$  is 0.41.

### $\Delta\Gamma_{B_d^0} / \Gamma_{B_d^0}$

$\Gamma_{B_d^0}$  and  $\Delta\Gamma_{B_d^0}$  are the decay rate average and difference between two  $B_d^0$  CP eigenstates (light – heavy). The  $\lambda_{CP}$  characterizes  $B^0$  and  $\bar{B}^0$  decays to states of charmonium plus  $K_L^0$ , see the review on “CP Violation” in the reviews section.

VALUE (units $10^{-2}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.1 ± 1.0</b>	<b>OUR EVALUATION</b>	(Produced by HFLAV)		
<b>0.1 ± 1.0</b>	<b>OUR AVERAGE</b>			
3.4 ± 2.3 ± 2.4		<sup>1</sup> SIRUNYAN	18BY CMS	$pp$ at 8 TeV
– 0.1 ± 1.1 ± 0.9		<sup>2</sup> AABOUD	16G ATLS	$pp$ at 7, 8 TeV
– 4.4 ± 2.5 ± 1.1		<sup>3</sup> AAIJ	14E LHCB	$pp$ at 7 TeV
1.7 ± 1.8 ± 1.1		<sup>4</sup> HIGUCHI	12 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.8 ± 3.7 ± 1.8		<sup>5</sup> AUBERT,B	04C BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0 ± 9		<sup>6</sup> ABDALLAH	03B DLPH	$e^+e^- \rightarrow Z$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.50 ± 1.38		ABAZOV	14	D0	$p\bar{p}$ at 1.96 TeV
< 80	95	<sup>7</sup> BEHRENS	00B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measured using  $B^0 \rightarrow J/\psi K^*(892)^0$  and  $B^0 \rightarrow J/\psi K_S^0$  decays, and assuming  $\beta = 21.9 \pm 0.7$  degrees.

<sup>2</sup> Measured from the ratio of decay time distributions of  $B^0 \rightarrow J/\psi K_S^0$  and  $B^0 \rightarrow J/\psi K^{*0}$  decays.

<sup>3</sup> Measured using the effective lifetimes of  $B^0 \rightarrow J/\psi K_S^0$  and  $B^0 \rightarrow J/\psi K^{*0}$  decays.

<sup>4</sup> Reports  $-\Delta\Gamma_d/\Gamma_d$  using  $B^0 \rightarrow J/\psi K_S^0, J/\psi K_L^0, D^- \pi^+, D^{*-} \pi^+, D^{*-} \rho^+,$  and  $D^{*-} \ell^+ \nu$  decays.

<sup>5</sup> Corresponds to 90% confidence range  $[-0.084, 0.068]$ .

- <sup>6</sup> Used the measured  $\tau_{B^0} = 1.55 \pm 0.03$  ps. Corresponds to an upper limit of  $< 0.18$  at 95% C.L.  
<sup>7</sup> BEHRENS 00B uses high-momentum lepton tags and partially reconstructed  $\bar{B}^0 \rightarrow D^{*+} \pi^-, \rho^-$  decays to determine the flavor of the  $B$  meson. Assumes  $\Delta_{md} = 0.478 \pm 0.018$  ps<sup>-1</sup> and  $\tau_{B^0} = 1.548 \pm 0.032$  ps.

## $B^0$ DECAY MODES

$\bar{B}^0$  modes are charge conjugates of the modes below. Reactions indicate the weak decay vertex and do not include mixing. Modes which do not identify the charge state of the  $B$  are listed in the  $B^\pm/B^0$  ADMIXTURE section.

The branching fractions listed below assume 50%  $B^0\bar{B}^0$  and 50%  $B^+B^-$  production at the  $\Upsilon(4S)$ . We have attempted to bring older measurements up to date by rescaling their assumed  $\Upsilon(4S)$  production ratio to 50:50 and their assumed  $D, D_s, D^*$ , and  $\psi$  branching ratios to current values whenever this would affect our averages and best limits significantly.

Indentation is used to indicate a subchannel of a previous reaction. All resonant subchannels have been corrected for resonance branching fractions to the final state so the sum of the subchannel branching fractions can exceed that of the final state.

For inclusive branching fractions, e.g.,  $B \rightarrow D^\pm X$ , the values usually are multiplicities, not branching fractions. They can be greater than one.

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Scale factor/ Confidence level
$\Gamma_1$ $\ell^+ \nu_\ell X$	[a] ( 10.33 ± 0.28 ) %	
$\Gamma_2$ $e^+ \nu_e X_c$	( 10.1 ± 0.4 ) %	
$\Gamma_3$ $\ell^+ \nu_\ell X_u$	[a] ( 1.51 ± 0.19 ) × 10 <sup>-3</sup>	
$\Gamma_4$ $D \ell^+ \nu_\ell X$	[a] ( 9.1 ± 0.8 ) %	
$\Gamma_5$ $D^- \ell^+ \nu_\ell$	[a] ( 2.12 ± 0.06 ) %	
$\Gamma_6$ $D^- \tau^+ \nu_\tau$	( 9.9 ± 2.1 ) × 10 <sup>-3</sup>	
$\Gamma_7$ $D^*(2010)^- \ell^+ \nu_\ell$	[a] ( 4.90 ± 0.12 ) %	
$\Gamma_8$ $D^*(2010)^- e^+ \nu_e$		
$\Gamma_9$ $D^*(2010)^- \mu^+ \nu_\mu$		
$\Gamma_{10}$ $D^*(2010)^- \tau^+ \nu_\tau$	( 1.45 ± 0.10 ) %	S=1.3
$\Gamma_{11}$ $\bar{D}^{(*)} n \pi \ell^+ \nu_\ell (n \geq 1)$	[a] ( 2.3 ± 0.5 ) %	
$\Gamma_{12}$ $\bar{D}^0 \pi^- \ell^+ \nu_\ell$	[a] ( 3.64 ± 0.20 ) × 10 <sup>-3</sup>	
$\Gamma_{13}$ $D_0^*(2300)^- \ell^+ \nu_\ell,$ $D_0^{*-} \rightarrow \bar{D}^0 \pi^-$	[a] < 4.4 × 10 <sup>-4</sup>	CL=90%
$\Gamma_{14}$ $D_2^*(2460)^- \ell^+ \nu_\ell,$ $D_2^{*-} \rightarrow \bar{D}^0 \pi^-$	[a] ( 1.41 ± 0.20 ) × 10 <sup>-3</sup>	S=1.7
$\Gamma_{15}$ $\bar{D}^{*0} \pi^- \ell^+ \nu_\ell$	[a] ( 5.44 ± 0.28 ) × 10 <sup>-3</sup>	

$\Gamma_{16}$	$D_1(2420)^- \ell^+ \nu_\ell, D_1^- \rightarrow \bar{D}^{*0} \pi^-$	[a]	$(2.85 \pm 0.25) \times 10^{-3}$	
$\Gamma_{17}$	$D_1(2420)^- \ell^+ \nu_\ell, D_1^- \rightarrow D^- \pi^+ \pi^-$	[a]	$(1.02 \pm 0.16) \times 10^{-3}$	
$\Gamma_{18}$	$D_1'(2430)^- \ell^+ \nu_\ell, D_1'^- \rightarrow \bar{D}^{*0} \pi^-$	[a]	$(2.5 \pm 0.6) \times 10^{-3}$	
$\Gamma_{19}$	$D_2^*(2460)^- \ell^+ \nu_\ell, D_2^{*-} \rightarrow \bar{D}^{*0} \pi^-$	[a]	$(6.6 \pm 1.1) \times 10^{-4}$	
$\Gamma_{20}$	$D^- \pi^+ \pi^- \ell^+ \nu_\ell$	[a]	$(1.45 \pm 0.22) \times 10^{-3}$	
$\Gamma_{21}$	$D^{*-} \pi^+ \pi^- \ell^+ \nu_\ell$	[a]	$(5.1 \pm 2.3) \times 10^{-4}$	
$\Gamma_{22}$	$\rho^- \ell^+ \nu_\ell$	[a]	$(2.94 \pm 0.21) \times 10^{-4}$	
$\Gamma_{23}$	$\pi^- \ell^+ \nu_\ell$	[a]	$(1.50 \pm 0.06) \times 10^{-4}$	
$\Gamma_{24}$	$\pi^- \mu^+ \nu_\mu$			
$\Gamma_{25}$	$\pi^- \tau^+ \nu_\tau$	<	$2.5 \times 10^{-4}$	CL=90%

### Inclusive modes

$\Gamma_{26}$	$K^\pm X$		$(78 \pm 8) \%$	
$\Gamma_{27}$	$D^0 X$		$(8.1 \pm 1.5) \%$	
$\Gamma_{28}$	$\bar{D}^0 X$		$(47.4 \pm 2.8) \%$	
$\Gamma_{29}$	$D^+ X$	<	$3.9 \%$	CL=90%
$\Gamma_{30}$	$D^- X$		$(36.9 \pm 3.3) \%$	
$\Gamma_{31}$	$D_s^+ X$		$(10.3 \pm 2.1) \%$	
$\Gamma_{32}$	$D_s^- X$	<	$2.6 \%$	CL=90%
$\Gamma_{33}$	$\Lambda_c^+ X$	<	$3.1 \%$	CL=90%
$\Gamma_{34}$	$\bar{\Lambda}_c^- X$		$(5.0 \pm 2.1) \%$	
$\Gamma_{35}$	$\bar{c} X$		$(95 \pm 5) \%$	
$\Gamma_{36}$	$c X$		$(24.6 \pm 3.1) \%$	
$\Gamma_{37}$	$\bar{c}/c X$		$(119 \pm 6) \%$	

### $D, D^*$ , or $D_s$ modes

$\Gamma_{38}$	$D^- \pi^+$		$(2.51 \pm 0.08) \times 10^{-3}$	
$\Gamma_{39}$	$D^- \rho^+$		$(7.6 \pm 1.2) \times 10^{-3}$	
$\Gamma_{40}$	$D^- K^0 \pi^+$		$(4.9 \pm 0.9) \times 10^{-4}$	
$\Gamma_{41}$	$D^- K^*(892)^+$		$(4.5 \pm 0.7) \times 10^{-4}$	
$\Gamma_{42}$	$D^- \omega \pi^+$		$(2.8 \pm 0.6) \times 10^{-3}$	
$\Gamma_{43}$	$D^- K^+$		$(2.05 \pm 0.08) \times 10^{-4}$	
$\Gamma_{44}$	$D^- K^+ \pi^+ \pi^-$		$(3.5 \pm 0.8) \times 10^{-4}$	
$\Gamma_{45}$	$D^- K^+ \bar{K}^0$	<	$3.1 \times 10^{-4}$	CL=90%
$\Gamma_{46}$	$D^- K^+ \bar{K}^*(892)^0$		$(8.8 \pm 1.9) \times 10^{-4}$	
$\Gamma_{47}$	$\bar{D}^0 \pi^+ \pi^-$		$(8.8 \pm 0.5) \times 10^{-4}$	
$\Gamma_{48}$	$D^*(2010)^- \pi^+$		$(2.66 \pm 0.07) \times 10^{-3}$	
$\Gamma_{49}$	$\bar{D}^0 K^+ K^-$		$(6.1 \pm 0.5) \times 10^{-5}$	
$\Gamma_{50}$	$D^- \pi^+ \pi^+ \pi^-$		$(6.0 \pm 0.6) \times 10^{-3}$	
$\Gamma_{51}$	$(D^- \pi^+ \pi^+ \pi^-)$ nonresonant		$(3.9 \pm 1.9) \times 10^{-3}$	



$\Gamma_{52}$	$D^- \pi^+ \rho^0$	$( 1.1 \pm 1.0 ) \times 10^{-3}$	
$\Gamma_{53}$	$D^- a_1(1260)^+$	$( 6.0 \pm 3.3 ) \times 10^{-3}$	
$\Gamma_{54}$	$D^*(2010)^- \pi^+ \pi^0$	$( 1.5 \pm 0.5 ) \%$	
$\Gamma_{55}$	$D^*(2010)^- \rho^+$	$( 6.8 \pm 0.9 ) \times 10^{-3}$	
$\Gamma_{56}$	$D^*(2010)^- K^+$	$( 2.16 \pm 0.08 ) \times 10^{-4}$	
$\Gamma_{57}$	$D^*(2010)^- K^0 \pi^+$	$( 3.0 \pm 0.8 ) \times 10^{-4}$	
$\Gamma_{58}$	$D^*(2010)^- K^*(892)^+$	$( 3.3 \pm 0.6 ) \times 10^{-4}$	
$\Gamma_{59}$	$D^*(2010)^- K^+ \bar{K}^0$	$< 4.7 \times 10^{-4}$	CL=90%
$\Gamma_{60}$	$D^*(2010)^- K^+ \bar{K}^*(892)^0$	$( 1.29 \pm 0.33 ) \times 10^{-3}$	
$\Gamma_{61}$	$D^*(2010)^- \pi^+ \pi^+ \pi^-$	$( 7.21 \pm 0.29 ) \times 10^{-3}$	
$\Gamma_{62}$	$( D^*(2010)^- \pi^+ \pi^+ \pi^- )$ non-resonant	$( 0.0 \pm 2.5 ) \times 10^{-3}$	
$\Gamma_{63}$	$D^*(2010)^- \pi^+ \rho^0$	$( 5.7 \pm 3.2 ) \times 10^{-3}$	
$\Gamma_{64}$	$D^*(2010)^- a_1(1260)^+$	$( 1.30 \pm 0.27 ) \%$	
$\Gamma_{65}$	$\bar{D}_1(2420)^0 \pi^- \pi^+, \bar{D}_1^0 \rightarrow D^{*-} \pi^+$	$( 1.47 \pm 0.35 ) \times 10^{-4}$	
$\Gamma_{66}$	$D^*(2010)^- K^+ \pi^- \pi^+$	$( 4.7 \pm 0.4 ) \times 10^{-4}$	
$\Gamma_{67}$	$D^*(2010)^- \pi^+ \pi^+ \pi^- \pi^0$	$( 1.76 \pm 0.27 ) \%$	
$\Gamma_{68}$	$D^{*-} 3\pi^+ 2\pi^-$	$( 4.7 \pm 0.9 ) \times 10^{-3}$	
$\Gamma_{69}$	$D^*(2010)^- \omega \pi^+$	$( 2.46 \pm 0.18 ) \times 10^{-3}$	S=1.2
$\Gamma_{70}$	$\bar{D}_1(2430)^0 \omega, \bar{D}_1^0 \rightarrow D^{*-} \pi^+$	$( 2.7 \pm_{-0.4}^{0.8} ) \times 10^{-4}$	
$\Gamma_{71}$	$D^{*-} \rho(1450)^+, \rho^+ \rightarrow \omega \pi^+$	$( 1.07 \pm_{-0.34}^{0.40} ) \times 10^{-3}$	
$\Gamma_{72}$	$\bar{D}_1(2420)^0 \omega, \bar{D}_1^0 \rightarrow D^{*-} \pi^+$	$( 7.0 \pm 2.2 ) \times 10^{-5}$	
$\Gamma_{73}$	$\bar{D}_2^*(2460)^0 \omega, \bar{D}_2^0 \rightarrow D^{*-} \pi^+$	$( 4.0 \pm 1.4 ) \times 10^{-5}$	
$\Gamma_{74}$	$D^{*-} b_1(1235)^+, b_1^+ \rightarrow \omega \pi^+$	$< 7 \times 10^{-5}$	CL=90%
$\Gamma_{75}$	$\bar{D}^{*-} \pi^+$	[b] $( 1.9 \pm 0.9 ) \times 10^{-3}$	
$\Gamma_{76}$	$D_1(2420)^- \pi^+, D_1^- \rightarrow D^- \pi^+ \pi^-$	$( 9.9 \pm_{-2.5}^{2.0} ) \times 10^{-5}$	
$\Gamma_{77}$	$D_1(2420)^- \pi^+, D_1^- \rightarrow D^{*-} \pi^+ \pi^-$	$< 3.3 \times 10^{-5}$	CL=90%
$\Gamma_{78}$	$\bar{D}_2^*(2460)^- \pi^+, D_2^{*-} \rightarrow D^0 \pi^-$	$( 2.38 \pm 0.16 ) \times 10^{-4}$	
$\Gamma_{79}$	$\bar{D}_0^*(2400)^- \pi^+, D_0^{*-} \rightarrow D^0 \pi^-$	$( 7.6 \pm 0.8 ) \times 10^{-5}$	
$\Gamma_{80}$	$D_2^*(2460)^- \pi^+, D_2^{*-} \rightarrow D^{*-} \pi^+ \pi^-$	$< 2.4 \times 10^{-5}$	CL=90%
$\Gamma_{81}$	$\bar{D}_2^*(2460)^- \rho^+$	$< 4.9 \times 10^{-3}$	CL=90%
$\Gamma_{82}$	$D^0 \bar{D}^0$	$( 1.4 \pm 0.7 ) \times 10^{-5}$	
$\Gamma_{83}$	$D^{*0} \bar{D}^0$	$< 2.9 \times 10^{-4}$	CL=90%
$\Gamma_{84}$	$D^- D^+$	$( 2.11 \pm 0.18 ) \times 10^{-4}$	
$\Gamma_{85}$	$D^\pm D^{*\mp} (CP\text{-averaged})$	$( 6.1 \pm 0.6 ) \times 10^{-4}$	
$\Gamma_{86}$	$D^- D_s^+$	$( 7.2 \pm 0.8 ) \times 10^{-3}$	
$\Gamma_{87}$	$\bar{D}^0 D_s^+ \pi^-$	$( 5.1 \pm 1.1 ) \%$	
$\Gamma_{88}$	$D^*(2010)^- D_s^+$	$( 8.0 \pm 1.1 ) \times 10^{-3}$	

$\Gamma_{89}$	$D_2^*(2460)^- D_s^+$	( 1.14 ± 0.26 ) %	
$\Gamma_{90}$	$D_1^*(2600)^- D_s^+$	( 7 ± 4 ) × 10 <sup>-4</sup>	
$\Gamma_{91}$	$D_3^*(2750)^- D_s^+$	( 1.6 ± 1.2 ) × 10 <sup>-4</sup>	
$\Gamma_{92}$	$D_1^*(2760)^- D_s^+$	( 1 ± 8 ) × 10 <sup>-4</sup>	
$\Gamma_{93}$	$D_J^*(3000)^- D_s^+$	( 2.3 ± 2.2 ) × 10 <sup>-4</sup>	
$\Gamma_{94}$	$T_{cs0}^*(2870)^0 \bar{D}^0$	( 1.3 ± 0.6 ) × 10 <sup>-3</sup>	
$\Gamma_{95}$	$D^- D_s^{*+}$	( 7.4 ± 1.6 ) × 10 <sup>-3</sup>	
$\Gamma_{96}$	$D^*(2010)^- D_s^{*+}$	( 1.77 ± 0.14 ) %	
$\Gamma_{97}$	$D_{s0}(2317)^- K^+, D_{s0}^- \rightarrow D_s^- \pi^0$	( 4.2 ± 1.4 ) × 10 <sup>-5</sup>	
$\Gamma_{98}$	$D_{s0}(2317)^- \pi^+, D_{s0}^- \rightarrow D_s^- \pi^0$	< 2.5 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{99}$	$D_{sJ}(2457)^- K^+, D_{sJ}^- \rightarrow D_s^- \pi^0$	< 9.4 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{100}$	$D_{sJ}(2457)^- \pi^+, D_{sJ}^- \rightarrow D_s^- \pi^0$	< 4.0 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{101}$	$D_s^- D_s^+$	< 3.6 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{102}$	$D_s^{*-} D_s^+$	< 1.3 × 10 <sup>-4</sup>	CL=90%
$\Gamma_{103}$	$D_s^{*-} D_s^{*+}$	< 2.4 × 10 <sup>-4</sup>	CL=90%
$\Gamma_{104}$	$D_{s0}^*(2317)^+ D^-, D_{s0}^{*+} \rightarrow D_s^+ \pi^0$	( 1.06 ± 0.16 ) × 10 <sup>-3</sup>	S=1.1
$\Gamma_{105}$	$D_{s0}(2317)^+ D^-, D_{s0}^+ \rightarrow D_s^{*+} \gamma$	< 9.5 × 10 <sup>-4</sup>	CL=90%
$\Gamma_{106}$	$D_{s0}(2317)^+ D^*(2010)^-, D_{s0}^+ \rightarrow D_s^+ \pi^0$	( 1.5 ± 0.6 ) × 10 <sup>-3</sup>	
$\Gamma_{107}$	$D_{sJ}(2457)^+ D^-$	( 3.5 ± 1.1 ) × 10 <sup>-3</sup>	
$\Gamma_{108}$	$D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^+ \gamma$	( 6.5 $\pm$ $\frac{1.7}{1.4}$ ) × 10 <sup>-4</sup>	
$\Gamma_{109}$	$D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^{*+} \gamma$	< 6.0 × 10 <sup>-4</sup>	CL=90%
$\Gamma_{110}$	$D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^+ \pi^+ \pi^-$	< 2.0 × 10 <sup>-4</sup>	CL=90%
$\Gamma_{111}$	$D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^+ \pi^0$	< 3.6 × 10 <sup>-4</sup>	CL=90%
$\Gamma_{112}$	$D^*(2010)^- D_{sJ}(2457)^+$	( 9.3 ± 2.2 ) × 10 <sup>-3</sup>	
$\Gamma_{113}$	$D_{sJ}(2457)^+ D^*(2010)^-, D_{sJ}^+ \rightarrow D_s^+ \gamma$	( 2.3 $\pm$ $\frac{0.9}{0.7}$ ) × 10 <sup>-3</sup>	
$\Gamma_{114}$	$D^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*0} K^+ + D^{*+} K^0$	( 2.8 ± 0.7 ) × 10 <sup>-4</sup>	
$\Gamma_{115}$	$D^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*0} K^+$	( 1.7 ± 0.6 ) × 10 <sup>-4</sup>	

$\Gamma_{116}$	$D^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*+} K^0$	$( 2.6 \pm 1.1 ) \times 10^{-4}$	
$\Gamma_{117}$	$D^*(2010)^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*0} K^+ + D^{*+} K^0$	$( 5.0 \pm 1.4 ) \times 10^{-4}$	
$\Gamma_{118}$	$D^*(2010)^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*0} K^+$	$( 3.3 \pm 1.1 ) \times 10^{-4}$	
$\Gamma_{119}$	$D^{*-} D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*+} K^0$	$( 5.0 \pm 1.7 ) \times 10^{-4}$	
$\Gamma_{120}$	$D^- D_{sJ}(2573)^+, D_{sJ}^+ \rightarrow D^0 K^+$	$( 3.4 \pm 1.8 ) \times 10^{-5}$	
$\Gamma_{121}$	$D^*(2010)^- D_{sJ}(2573)^+, D_{sJ}^+ \rightarrow D^0 K^+$	$< 2 \times 10^{-4}$	CL=90%
$\Gamma_{122}$	$D^- D_{sJ}(2700)^+, D_{sJ}^+ \rightarrow D^0 K^+$	$( 7.1 \pm 1.2 ) \times 10^{-4}$	
$\Gamma_{123}$	$D^+ \pi^-$	$( 7.3 \pm 1.2 ) \times 10^{-7}$	
$\Gamma_{124}$	$D_s^+ \pi^-$	$( 2.03 \pm 0.18 ) \times 10^{-5}$	
$\Gamma_{125}$	$D_s^{*+} \pi^-$	$( 2.1 \pm 0.4 ) \times 10^{-5}$	S=1.4
$\Gamma_{126}$	$D_s^+ \rho^-$	$< 2.4 \times 10^{-5}$	CL=90%
$\Gamma_{127}$	$D_s^{*+} \rho^-$	$( 4.1 \pm 1.3 ) \times 10^{-5}$	
$\Gamma_{128}$	$D_s^+ a_0^-$	$< 1.9 \times 10^{-5}$	CL=90%
$\Gamma_{129}$	$D_s^{*+} a_0^-$	$< 3.6 \times 10^{-5}$	CL=90%
$\Gamma_{130}$	$D_s^+ a_1(1260)^-$	$< 2.1 \times 10^{-3}$	CL=90%
$\Gamma_{131}$	$D_s^{*+} a_1(1260)^-$	$< 1.7 \times 10^{-3}$	CL=90%
$\Gamma_{132}$	$D_s^+ a_2^-$	$< 1.9 \times 10^{-4}$	CL=90%
$\Gamma_{133}$	$D_s^{*+} a_2^-$	$< 2.0 \times 10^{-4}$	CL=90%
$\Gamma_{134}$	$D_s^- K^+$	$( 2.7 \pm 0.5 ) \times 10^{-5}$	S=2.7
$\Gamma_{135}$	$D_s^{*-} K^+$	$( 2.19 \pm 0.30 ) \times 10^{-5}$	
$\Gamma_{136}$	$D_{s1}(2536)^{\mp} K^{\pm}, D_{s1}^- \rightarrow \bar{D}^*(2007)^0 K^-$	$( 5.1 \pm 0.6 ) \times 10^{-6}$	
$\Gamma_{137}$	$D_s^- K^*(892)^+$	$( 3.5 \pm 1.0 ) \times 10^{-5}$	
$\Gamma_{138}$	$D_s^{*-} K^*(892)^+$	$( 3.2 \pm 1.5 \pm 1.3 ) \times 10^{-5}$	
$\Gamma_{139}$	$D_s^- \pi^+ K^0$	$( 9.7 \pm 1.4 ) \times 10^{-5}$	
$\Gamma_{140}$	$D_s^{*-} \pi^+ K^0$	$< 1.10 \times 10^{-4}$	CL=90%
$\Gamma_{141}$	$D_s^- K^+ \pi^+ \pi^-$	$( 1.7 \pm 0.5 ) \times 10^{-4}$	
$\Gamma_{142}$	$D_s^- \pi^+ K^*(892)^0$	$< 3.0 \times 10^{-3}$	CL=90%
$\Gamma_{143}$	$D_s^{*-} \pi^+ K^*(892)^0$	$< 1.6 \times 10^{-3}$	CL=90%
$\Gamma_{144}$	$\bar{D}^0 K^0$	$( 5.5 \pm 0.4 ) \times 10^{-5}$	
$\Gamma_{145}$	$\bar{D}^0 K^+ \pi^-$	$( 8.8 \pm 1.7 ) \times 10^{-5}$	
$\Gamma_{146}$	$\bar{D}^0 K^*(892)^0$	$( 4.5 \pm 0.6 ) \times 10^{-5}$	
$\Gamma_{147}$	$\bar{D}^0 K^*(1410)^0$	$< 6.7 \times 10^{-5}$	CL=90%
$\Gamma_{148}$	$\bar{D}^0 K_0^*(1430)^0$	$( 7 \pm 7 ) \times 10^{-6}$	

$\Gamma_{149}$	$\bar{D}^0 K_2^*(1430)^0$	$( 2.1 \pm 0.9 ) \times 10^{-5}$	
$\Gamma_{150}$	$D_0^*(2300)^- K^+, D_0^{*-} \rightarrow \bar{D}^0 \pi^-$	$( 1.9 \pm 0.9 ) \times 10^{-5}$	
$\Gamma_{151}$	$D_2^*(2460)^- K^+, D_2^{*-} \rightarrow \bar{D}^0 \pi^-$	$( 2.03 \pm 0.35 ) \times 10^{-5}$	
$\Gamma_{152}$	$D_3^*(2760)^- K^+, D_3^{*-} \rightarrow \bar{D}^0 \pi^-$	$< 1.0 \times 10^{-6}$	CL=90%
$\Gamma_{153}$	$\bar{D}^0 K^+ \pi^-$ nonresonant	$< 3.7 \times 10^{-5}$	CL=90%
$\Gamma_{154}$	$[K^+ K^-]_D K^*(892)^0$	$( 4.2 \pm 0.7 ) \times 10^{-5}$	
$\Gamma_{155}$	$[\pi^+ \pi^-]_D K^*(892)^0$	$( 6.0 \pm 1.1 ) \times 10^{-5}$	
$\Gamma_{156}$	$[\pi^+ K^-]_D K^*(892)^0$		
$\Gamma_{157}$	$[K^+ \pi^-]_D K^*(892)^0$		
$\Gamma_{158}$	$[\pi^+ \pi^- \pi^+ \pi^-]_D K^{*0}$	$( 4.6 \pm 0.9 ) \times 10^{-5}$	
$\Gamma_{159}$	$[\pi^+ K^- \pi^+ \pi^-]_D K^{*0}$		
$\Gamma_{160}$	$[K^+ \pi^- \pi^+ \pi^-]_D K^{*0}$		
$\Gamma_{161}$	$\bar{D}^0 \pi^0$	$( 2.67 \pm 0.09 ) \times 10^{-4}$	
$\Gamma_{162}$	$\bar{D}^0 \rho^0$	$( 3.21 \pm 0.21 ) \times 10^{-4}$	
$\Gamma_{163}$	$\bar{D}^0 f_2$	$( 1.56 \pm 0.21 ) \times 10^{-4}$	
$\Gamma_{164}$	$\bar{D}^0 \eta$	$( 2.56 \pm 0.12 ) \times 10^{-4}$	
$\Gamma_{165}$	$\bar{D}^0 \eta'$	$( 1.38 \pm 0.16 ) \times 10^{-4}$	S=1.3
$\Gamma_{166}$	$\bar{D}^0 \omega$	$( 2.54 \pm 0.16 ) \times 10^{-4}$	
$\Gamma_{167}$	$\bar{D}^0 \phi$	$( 7.7 \pm 2.3 ) \times 10^{-7}$	
$\Gamma_{168}$	$D^0 K^+ \pi^-$	$( 5.3 \pm 3.2 ) \times 10^{-6}$	
$\Gamma_{169}$	$D^0 K^*(892)^0$	$( 3.0 \pm 0.6 ) \times 10^{-6}$	
$\Gamma_{170}$	$\bar{D}^{*0} \gamma$	$< 2.5 \times 10^{-5}$	CL=90%
$\Gamma_{171}$	$\bar{D}^*(2007)^0 \pi^0$	$( 2.2 \pm 0.6 ) \times 10^{-4}$	S=2.6
$\Gamma_{172}$	$\bar{D}^*(2007)^0 \rho^0$	$< 5.1 \times 10^{-4}$	CL=90%
$\Gamma_{173}$	$\bar{D}^*(2007)^0 \eta$	$( 2.3 \pm 0.6 ) \times 10^{-4}$	S=2.8
$\Gamma_{174}$	$\bar{D}^*(2007)^0 \eta'$	$( 1.40 \pm 0.22 ) \times 10^{-4}$	
$\Gamma_{175}$	$\bar{D}^*(2007)^0 \pi^+ \pi^-$	$( 6.2 \pm 2.2 ) \times 10^{-4}$	
$\Gamma_{176}$	$\bar{D}^*(2007)^0 K^+ \pi^-$	$( 5.2 \pm 1.9 ) \times 10^{-5}$	
$\Gamma_{177}$	$\bar{D}^*(2007)^0 K^0$	$( 3.6 \pm 1.2 ) \times 10^{-5}$	
$\Gamma_{178}$	$\bar{D}^*(2007)^0 K^*(892)^0$	$< 6.9 \times 10^{-5}$	CL=90%
$\Gamma_{179}$	$\bar{D}^*(2007)^0 \phi$	$( 2.2 \pm 0.6 ) \times 10^{-6}$	
$\Gamma_{180}$	$D^*(2007)^0 K^*(892)^0$	$< 4.0 \times 10^{-5}$	CL=90%
$\Gamma_{181}$	$D^*(2007)^0 \pi^+ \pi^+ \pi^- \pi^-$	$( 2.7 \pm 0.5 ) \times 10^{-3}$	
$\Gamma_{182}$	$D^*(2010)^+ D^*(2010)^-$	$( 8.0 \pm 0.6 ) \times 10^{-4}$	
$\Gamma_{183}$	$\bar{D}^*(2007)^0 \omega$	$( 3.6 \pm 1.1 ) \times 10^{-4}$	S=3.1
$\Gamma_{184}$	$D^*(2010)^+ D^-$	$( 6.1 \pm 1.5 ) \times 10^{-4}$	S=1.6
$\Gamma_{185}$	$D^*(2007)^0 \bar{D}^*(2007)^0$	$< 9 \times 10^{-5}$	CL=90%
$\Gamma_{186}$	$D^- D^0 K^+$	$( 1.07 \pm 0.11 ) \times 10^{-3}$	
$\Gamma_{187}$	$D^- D^*(2007)^0 K^+$	$( 3.5 \pm 0.4 ) \times 10^{-3}$	
$\Gamma_{188}$	$D^*(2010)^- D^0 K^+$	$( 2.47 \pm 0.21 ) \times 10^{-3}$	
$\Gamma_{189}$	$D^*(2010)^- D^*(2007)^0 K^+$	$( 1.06 \pm 0.09 ) \%$	

$\Gamma_{190}$	$D^- D^+ K^0$	$( 7.5 \pm 1.7 ) \times 10^{-4}$	
$\Gamma_{191}$	$D^*(2010)^- D^+ K^0 +$ $D^- D^*(2010)^+ K^0$	$( 6.4 \pm 0.5 ) \times 10^{-3}$	
$\Gamma_{192}$	$D^*(2010)^- D^*(2010)^+ K^0$	$( 8.1 \pm 0.7 ) \times 10^{-3}$	
$\Gamma_{193}$	$D^{*-} D_{s1}(2536)^+, D_{s1}^+ \rightarrow$ $D^{*+} K^0$	$( 8.0 \pm 2.4 ) \times 10^{-4}$	
$\Gamma_{194}$	$\bar{D}^0 D^0 K^0$	$( 2.7 \pm 1.1 ) \times 10^{-4}$	
$\Gamma_{195}$	$D^0 \bar{D}^0 K^+ \pi^-$	$( 3.5 \pm 0.5 ) \times 10^{-4}$	
$\Gamma_{196}$	$\bar{D}^0 D^*(2007)^0 K^0 +$ $\bar{D}^*(2007)^0 D^0 K^0$	$( 1.1 \pm 0.5 ) \times 10^{-3}$	
$\Gamma_{197}$	$\bar{D}^*(2007)^0 D^*(2007)^0 K^0$	$( 2.4 \pm 0.9 ) \times 10^{-3}$	
$\Gamma_{198}$	$(\bar{D} + \bar{D}^*)(D + D^*)K$	$( 3.68 \pm 0.26 ) \%$	

### Charmonium modes

$\Gamma_{199}$	$\eta_c K^0$	$( 9.0 \pm 1.1 ) \times 10^{-4}$	
$\Gamma_{200}$	$\eta_c(1S) K^+ \pi^-$	$( 6.5 \pm 0.7 ) \times 10^{-4}$	
$\Gamma_{201}$	$\eta_c(1S) K^+ \pi^-$ (NR)	$( 6.7 \pm 1.4 ) \times 10^{-5}$	
$\Gamma_{202}$	$T_{c\bar{c}}(4100)^- K^+, T_{c\bar{c}}^- \rightarrow$ $\eta_c \pi^-$	$( 2.2 \pm 1.1 ) \times 10^{-5}$	
$\Gamma_{203}$	$\eta_c(1S) K^*(1410)^0$	$( 2.1 \pm 1.6 ) \times 10^{-4}$	
$\Gamma_{204}$	$\eta_c(1S) K_0^*(1430)^0$	$( 1.8 \pm 0.4 ) \times 10^{-4}$	
$\Gamma_{205}$	$\eta_c(1S) K_2^*(1430)^0$	$( 5.4 \begin{smallmatrix} + \\ - \end{smallmatrix} \begin{smallmatrix} 2.4 \\ 2.9 \end{smallmatrix} ) \times 10^{-5}$	
$\Gamma_{206}$	$\eta_c(1S) K^*(1680)^0$	$( 4 \pm 4 ) \times 10^{-5}$	
$\Gamma_{207}$	$\eta_c(1S) K_0^*(1950)^0$	$( 4.8 \begin{smallmatrix} + \\ - \end{smallmatrix} \begin{smallmatrix} 3.2 \\ 4.0 \end{smallmatrix} ) \times 10^{-5}$	
$\Gamma_{208}$	$\eta_c K^*(892)^0$	$( 5.3 \begin{smallmatrix} + \\ - \end{smallmatrix} \begin{smallmatrix} 0.8 \\ 0.9 \end{smallmatrix} ) \times 10^{-4}$	S=1.7
$\Gamma_{209}$	$\eta_c(2S) K_S^0, \eta_c \rightarrow p\bar{p}\pi^+\pi^-$	$( 4.2 \begin{smallmatrix} + \\ - \end{smallmatrix} \begin{smallmatrix} 1.4 \\ 1.2 \end{smallmatrix} ) \times 10^{-7}$	
$\Gamma_{210}$	$\eta_c(2S) K^*0$	$< 3.9 \times 10^{-4}$	CL=90%
$\Gamma_{211}$	$h_c(1P) K_S^0$	$< 1.4 \times 10^{-5}$	
$\Gamma_{212}$	$h_c(1P) K^*0$	$< 4 \times 10^{-4}$	CL=90%
$\Gamma_{213}$	$J/\psi(1S) K^0$	$( 8.91 \pm 0.21 ) \times 10^{-4}$	
$\Gamma_{214}$	$J/\psi(1S) K^+ \pi^-$	$( 1.15 \pm 0.05 ) \times 10^{-3}$	
$\Gamma_{215}$	$J/\psi(1S) K^*(892)^0$	$( 1.27 \pm 0.05 ) \times 10^{-3}$	
$\Gamma_{216}$	$J/\psi(1S) \eta K_S^0$	$( 5.4 \pm 0.9 ) \times 10^{-5}$	
$\Gamma_{217}$	$J/\psi(1S) \eta' K_S^0$	$< 2.5 \times 10^{-5}$	CL=90%
$\Gamma_{218}$	$J/\psi(1S) \phi K^0$	$( 4.9 \pm 1.0 ) \times 10^{-5}$	S=1.3
$\Gamma_{219}$	$J/\psi(1S) \omega K^0$	$( 2.3 \pm 0.4 ) \times 10^{-4}$	
$\Gamma_{220}$	$\chi_{c0}(3915), \chi_{c0} \rightarrow J/\psi \omega$	$( 2.1 \pm 0.9 ) \times 10^{-5}$	
$\Gamma_{221}$	$J/\psi(1S) K(1270)^0$	$( 1.3 \pm 0.5 ) \times 10^{-3}$	
$\Gamma_{222}$	$J/\psi(1S) \pi^0$	$( 1.66 \pm 0.10 ) \times 10^{-5}$	
$\Gamma_{223}$	$J/\psi(1S) \eta$	$( 1.08 \pm 0.23 ) \times 10^{-5}$	S=1.5
$\Gamma_{224}$	$J/\psi(1S) \pi^+ \pi^-$	$( 3.99 \pm 0.15 ) \times 10^{-5}$	
$\Gamma_{225}$	$J/\psi(1S) \pi^+ \pi^-$ nonresonant	$< 1.2 \times 10^{-5}$	CL=90%

$\Gamma_{226}$	$J/\psi(1S) f_0(500), f_0 \rightarrow \pi\pi$	$( 8.8 \pm_{-1.6}^{+1.2} ) \times 10^{-6}$	
$\Gamma_{227}$	$J/\psi(1S) f_2$	$( 3.3 \pm_{-0.6}^{+0.5} ) \times 10^{-6}$	S=1.5
$\Gamma_{228}$	$J/\psi(1S) \rho^0$	$( 2.55 \pm_{-0.16}^{+0.18} ) \times 10^{-5}$	
$\Gamma_{229}$	$J/\psi(1S) f_0(980), f_0 \rightarrow \pi^+ \pi^-$	$< 1.1 \times 10^{-6}$	CL=90%
$\Gamma_{230}$	$J/\psi(1S) \rho(1450)^0, \rho^0 \rightarrow \pi\pi$	$( 2.9 \pm_{-0.7}^{+1.6} ) \times 10^{-6}$	
$\Gamma_{231}$	$J/\psi \rho(1700)^0, \rho^0 \rightarrow \pi^+ \pi^-$	$( 2.0 \pm 1.3 ) \times 10^{-6}$	
$\Gamma_{232}$	$J/\psi(1S) \omega$	$( 1.8 \pm_{-0.5}^{+0.7} ) \times 10^{-5}$	
$\Gamma_{233}$	$J/\psi(1S) K^+ K^-$	$( 2.53 \pm 0.35 ) \times 10^{-6}$	
$\Gamma_{234}$	$J/\psi(1S) a_0(980), a_0 \rightarrow K^+ K^-$	$( 4.7 \pm 3.4 ) \times 10^{-7}$	
$\Gamma_{235}$	$J/\psi(1S) \phi$	$< 1.1 \times 10^{-7}$	CL=90%
$\Gamma_{236}$	$J/\psi(1S) \eta'(958)$	$( 7.6 \pm 2.4 ) \times 10^{-6}$	
$\Gamma_{237}$	$J/\psi(1S) K^0 \pi^+ \pi^-$	$( 4.5 \pm 0.4 ) \times 10^{-4}$	
$\Gamma_{238}$	$J/\psi(1S) K^0 K^- \pi^+ + \text{c.c.}$	$< 2.1 \times 10^{-5}$	CL=90%
$\Gamma_{239}$	$J/\psi(1S) K^0 K^+ K^-$	$( 2.5 \pm 0.7 ) \times 10^{-5}$	S=1.8
$\Gamma_{240}$	$J/\psi(1S) K^0 K^\pm \pi^\mp$		
$\Gamma_{241}$	$J/\psi(1S) K^0 \rho^0$	$( 5.4 \pm 3.0 ) \times 10^{-4}$	
$\Gamma_{242}$	$J/\psi(1S) K^*(892)^+ \pi^-$	$( 8 \pm 4 ) \times 10^{-4}$	
$\Gamma_{243}$	$J/\psi(1S) \pi^+ \pi^- \pi^+ \pi^-$	$( 1.44 \pm 0.12 ) \times 10^{-5}$	
$\Gamma_{244}$	$J/\psi(1S) f_1(1285)$	$( 8.4 \pm 2.1 ) \times 10^{-6}$	
$\Gamma_{245}$	$J/\psi(1S) K^*(892)^0 \pi^+ \pi^-$	$( 6.6 \pm 2.2 ) \times 10^{-4}$	
$\Gamma_{246}$	$\eta_{c2}(1D) K_S^0, \eta_{c2} \rightarrow h_c \gamma$	$< 3.5 \times 10^{-5}$	CL=90%
$\Gamma_{247}$	$\eta_{c2}(1D) \pi^- K^+, \eta_{c2} \rightarrow h_c \gamma$	$< 1.0 \times 10^{-4}$	CL=90%
$\Gamma_{248}$	$\chi_{c1}(3872)^- K^+$	$< 5 \times 10^{-4}$	CL=90%
$\Gamma_{249}$	$\chi_{c1}(3872)^- K^+, \chi_{c1}(3872)^- \rightarrow J/\psi(1S) \pi^- \pi^0$	$[c] < 4.2 \times 10^{-6}$	CL=90%
$\Gamma_{250}$	$\chi_{c1}(3872) K^0$	$( 1.4 \pm 0.4 ) \times 10^{-4}$	S=1.1
$\Gamma_{251}$	$\chi_{c1}(3872) K^*(892)^0$	$( 1.1 \pm 0.5 ) \times 10^{-4}$	
$\Gamma_{252}$	$\chi_{c1}(3872) K^+ \pi^-$	$( 2.2 \pm 0.7 ) \times 10^{-4}$	
$\Gamma_{253}$	$\chi_{c1}(3872) \gamma$	$< 1.4 \times 10^{-5}$	CL=90%
$\Gamma_{254}$	$T_{c\bar{c}1}(4430)^\pm K^\mp, T_{c\bar{c}1}^\pm \rightarrow \psi(2S) \pi^\pm$	$( 6.0 \pm_{-2.4}^{+3.0} ) \times 10^{-5}$	
$\Gamma_{255}$	$T_{c\bar{c}1}(4430)^\pm K^\mp, T_{c\bar{c}1}^\pm \rightarrow J/\psi \pi^\pm$	$( 5.4 \pm_{-1.2}^{+4.0} ) \times 10^{-6}$	
$\Gamma_{256}$	$T_{c\bar{c}1}(3900)^\pm K^\mp, T_{c\bar{c}1}^\pm \rightarrow J/\psi \pi^\pm$	$< 9 \times 10^{-7}$	
$\Gamma_{257}$	$T_{c\bar{c}1}(4200)^\pm K^\mp, T_{c\bar{c}1}^\pm \rightarrow J/\psi \pi^\pm$	$( 2.2 \pm_{-0.8}^{+1.3} ) \times 10^{-5}$	

$\Gamma_{258}$	$J/\psi(1S)p\bar{p}$	$(4.5 \pm 0.6) \times 10^{-7}$	
$\Gamma_{259}$	$J/\psi(1S)\gamma$	$< 1.5 \times 10^{-6}$	CL=90%
$\Gamma_{260}$	$J/\psi\mu^+\mu^-$ , $J/\psi \rightarrow \mu^+\mu^-$	$< 1.0 \times 10^{-9}$	CL=95%
$\Gamma_{261}$	$J/\psi(1S)\bar{D}^0$	$< 1.3 \times 10^{-5}$	CL=90%
$\Gamma_{262}$	$\psi(2S)\pi^0$	$(1.17 \pm 0.19) \times 10^{-5}$	
$\Gamma_{263}$	$\psi(2S)K^0$	$(5.8 \pm 0.5) \times 10^{-4}$	
$\Gamma_{264}$	$\psi(2S)K^0\pi^+\pi^-$	$(2.81 \pm 0.30) \times 10^{-4}$	
$\Gamma_{265}$	$\psi(3770)K^0$ , $\psi \rightarrow \bar{D}^0 D^0$	$< 1.23 \times 10^{-4}$	CL=90%
$\Gamma_{266}$	$\psi(3770)K^0$ , $\psi \rightarrow D^- D^+$	$< 1.88 \times 10^{-4}$	CL=90%
$\Gamma_{267}$	$\psi(2S)\pi^+\pi^-$	$(2.24 \pm 0.35) \times 10^{-5}$	
$\Gamma_{268}$	$\psi(2S)K^+\pi^-$	$(5.8 \pm 0.4) \times 10^{-4}$	
$\Gamma_{269}$	$\psi(2S)K^*(892)^0$	$(5.9 \pm 0.4) \times 10^{-4}$	
$\Gamma_{270}$	$\chi_{c0}K^0$	$(1.9 \pm 0.4) \times 10^{-4}$	
$\Gamma_{271}$	$\chi_{c0}K^*(892)^0$	$(1.7 \pm 0.4) \times 10^{-4}$	
$\Gamma_{272}$	$\chi_{c1}\pi^0$	$(1.12 \pm 0.28) \times 10^{-5}$	
$\Gamma_{273}$	$\chi_{c1}K^0$	$(3.95 \pm 0.27) \times 10^{-4}$	
$\Gamma_{274}$	$\chi_{c1}\pi^-K^+$	$(4.97 \pm 0.30) \times 10^{-4}$	
$\Gamma_{275}$	$\chi_{c1}K^*(892)^0$	$(2.38 \pm 0.19) \times 10^{-4}$	S=1.2
$\Gamma_{276}$	$T_{c\bar{c}}(4050)^-K^+$ , $T_{c\bar{c}}^- \rightarrow \chi_{c1}\pi^-$	$(3.0 \begin{smallmatrix} + \\ - \end{smallmatrix} \begin{smallmatrix} 4.0 \\ 1.8 \end{smallmatrix}) \times 10^{-5}$	
$\Gamma_{277}$	$T_{c\bar{c}}(4250)^-K^+$ , $T_{c\bar{c}}^- \rightarrow \chi_{c1}\pi^-$	$(4.0 \begin{smallmatrix} +20.0 \\ -1.0 \end{smallmatrix}) \times 10^{-5}$	
$\Gamma_{278}$	$\chi_{c1}\pi^+\pi^-K^0$	$(3.2 \pm 0.5) \times 10^{-4}$	
$\Gamma_{279}$	$\chi_{c1}\pi^-\pi^0K^+$	$(3.5 \pm 0.6) \times 10^{-4}$	
$\Gamma_{280}$	$\chi_{c2}K^0$	$< 1.5 \times 10^{-5}$	CL=90%
$\Gamma_{281}$	$\chi_{c2}K^*(892)^0$	$(4.9 \pm 1.2) \times 10^{-5}$	S=1.1
$\Gamma_{282}$	$\chi_{c2}\pi^-K^+$	$(7.2 \pm 1.0) \times 10^{-5}$	
$\Gamma_{283}$	$\chi_{c2}\pi^+\pi^-K^0$	$< 1.70 \times 10^{-4}$	CL=90%
$\Gamma_{284}$	$\chi_{c2}\pi^-\pi^0K^+$	$< 7.4 \times 10^{-5}$	CL=90%
$\Gamma_{285}$	$\psi(4660)K^0$ , $\psi \rightarrow \Lambda_c^+ \Lambda_c^-$	$< 2.3 \times 10^{-4}$	CL=90%
$\Gamma_{286}$	$\psi(4230)^0K^0$ , $\psi^0 \rightarrow J/\psi\pi^+\pi^-$	$< 1.7 \times 10^{-5}$	CL=90%

### K or K\* modes

$\Gamma_{287}$	$K^+\pi^-$	$(2.00 \pm 0.04) \times 10^{-5}$	
$\Gamma_{288}$	$K^0\pi^0$	$(1.01 \pm 0.04) \times 10^{-5}$	
$\Gamma_{289}$	$\eta'K^0$	$(6.6 \pm 0.4) \times 10^{-5}$	S=1.4
$\Gamma_{290}$	$\eta'K^*(892)^0$	$(2.8 \pm 0.6) \times 10^{-6}$	
$\Gamma_{291}$	$\eta'K_0^*(1430)^0$	$(6.3 \pm 1.6) \times 10^{-6}$	
$\Gamma_{292}$	$\eta'K_2^*(1430)^0$	$(1.37 \pm 0.32) \times 10^{-5}$	
$\Gamma_{293}$	$\eta K^0$	$(1.23 \begin{smallmatrix} + \\ - \end{smallmatrix} \begin{smallmatrix} 0.27 \\ 0.24 \end{smallmatrix}) \times 10^{-6}$	
$\Gamma_{294}$	$\eta K^*(892)^0$	$(1.59 \pm 0.10) \times 10^{-5}$	
$\Gamma_{295}$	$\eta K_0^*(1430)^0$	$(1.10 \pm 0.22) \times 10^{-5}$	

$\Gamma_{296}$	$\eta K_2^*(1430)^0$	$( 9.6 \pm 2.1 ) \times 10^{-6}$	
$\Gamma_{297}$	$\omega K_0^0$	$( 4.8 \pm 0.4 ) \times 10^{-6}$	
$\Gamma_{298}$	$a_0(980)^0 K^0, a_0^0 \rightarrow \eta \pi^0$	$< 7.8 \times 10^{-6}$	CL=90%
$\Gamma_{299}$	$b_1^0 K^0, b_1^0 \rightarrow \omega \pi^0$	$< 7.8 \times 10^{-6}$	CL=90%
$\Gamma_{300}$	$a_0(980)^\pm K^\mp, a_0^\pm \rightarrow \eta \pi^\pm$	$< 1.9 \times 10^{-6}$	CL=90%
$\Gamma_{301}$	$b_1^- K^+, b_1^- \rightarrow \omega \pi^-$	$( 7.4 \pm 1.4 ) \times 10^{-6}$	
$\Gamma_{302}$	$b_1^0 K^{*0}, b_1^0 \rightarrow \omega \pi^0$	$< 8.0 \times 10^{-6}$	CL=90%
$\Gamma_{303}$	$b_1^- K^{*+}, b_1^- \rightarrow \omega \pi^-$	$< 5.0 \times 10^{-6}$	CL=90%
$\Gamma_{304}$	$a_0(1450)^\pm K^\mp, a_0^\pm \rightarrow \eta \pi^\pm$	$< 3.1 \times 10^{-6}$	CL=90%
$\Gamma_{305}$	$K_S^0 X^0$ (Familon)	$< 5.3 \times 10^{-5}$	CL=90%
$\Gamma_{306}$	$\omega K^*(892)^0$	$( 2.0 \pm 0.5 ) \times 10^{-6}$	
$\Gamma_{307}$	$\omega (K\pi)_0^{*0}$	$( 1.84 \pm 0.25 ) \times 10^{-5}$	
$\Gamma_{308}$	$\omega K_0^*(1430)^0$	$( 1.60 \pm 0.34 ) \times 10^{-5}$	
$\Gamma_{309}$	$\omega K_2^*(1430)^0$	$( 1.01 \pm 0.23 ) \times 10^{-5}$	
$\Gamma_{310}$	$\omega K^+ \pi^-$ nonresonant	$( 5.1 \pm 1.0 ) \times 10^{-6}$	
$\Gamma_{311}$	$K^+ \pi^- \pi^0$	$( 3.78 \pm 0.32 ) \times 10^{-5}$	
$\Gamma_{312}$	$K^+ \rho^-$	$( 7.0 \pm 0.9 ) \times 10^{-6}$	
$\Gamma_{313}$	$K^+ \rho(1450)^-$	$( 2.4 \pm 1.2 ) \times 10^{-6}$	
$\Gamma_{314}$	$K^+ \rho(1700)^-$	$( 6 \pm 7 ) \times 10^{-7}$	
$\Gamma_{315}$	$(K^+ \pi^- \pi^0)$ nonresonant	$( 2.8 \pm 0.6 ) \times 10^{-6}$	
$\Gamma_{316}$	$(K\pi)_0^{*+} \pi^-, (K\pi)_0^{*+} \rightarrow$	$( 3.4 \pm 0.5 ) \times 10^{-5}$	
$\Gamma_{317}$	$K^+ \pi^0$ $(K\pi)_0^{*0} \pi^0, (K\pi)_0^{*0} \rightarrow$	$( 8.6 \pm 1.7 ) \times 10^{-6}$	
$\Gamma_{318}$	$K_2^*(1430)^0 \pi^0$	$< 4.0 \times 10^{-6}$	CL=90%
$\Gamma_{319}$	$K^*(1680)^0 \pi^0$	$< 7.5 \times 10^{-6}$	CL=90%
$\Gamma_{320}$	$K_x^{*0} \pi^0$	[d] $( 6.1 \pm 1.6 ) \times 10^{-6}$	
$\Gamma_{321}$	$K^0 \pi^+ \pi^-$	$( 4.97 \pm 0.18 ) \times 10^{-5}$	
$\Gamma_{322}$	$K^0 \pi^+ \pi^-$ nonresonant	$( 1.39 \pm_{-0.18}^{+0.26} ) \times 10^{-5}$	S=1.6
$\Gamma_{323}$	$K^0 \rho^0$	$( 3.4 \pm 1.1 ) \times 10^{-6}$	S=2.3
$\Gamma_{324}$	$K^*(892)^+ \pi^-$	$( 7.5 \pm 0.4 ) \times 10^{-6}$	
$\Gamma_{325}$	$K_0^*(1430)^+ \pi^-$	$( 3.3 \pm 0.7 ) \times 10^{-5}$	S=2.0
$\Gamma_{326}$	$K_x^{*+} \pi^-$	[d] $( 5.1 \pm 1.6 ) \times 10^{-6}$	
$\Gamma_{327}$	$K^*(1410)^+ \pi^-, K^{*+} \rightarrow$	$< 3.8 \times 10^{-6}$	CL=90%
$\Gamma_{328}$	$K^0 \pi^+$ $(K\pi)_0^{*+} \pi^-, (K\pi)_0^{*+} \rightarrow$	$( 1.62 \pm 0.13 ) \times 10^{-5}$	
$\Gamma_{329}$	$K^0 \pi^+$ $f_0(980) K^0, f_0 \rightarrow \pi^+ \pi^-$	$( 8.1 \pm 0.8 ) \times 10^{-6}$	S=1.3
$\Gamma_{330}$	$K^0 f_0(500)$	$( 1.6 \pm_{-1.6}^{+2.5} ) \times 10^{-7}$	
$\Gamma_{331}$	$K^0 f_0(1500)$	$( 1.3 \pm 0.8 ) \times 10^{-6}$	
$\Gamma_{332}$	$f_2(1270) K^0$	$( 2.7 \pm_{-1.2}^{+1.3} ) \times 10^{-6}$	



Γ <sub>333</sub>	$f_x(1300)K^0, f_x \rightarrow \pi^+\pi^-$	( 1.8 ± 0.7 ) × 10 <sup>-6</sup>	
Γ <sub>334</sub>	$K^*(892)^0\pi^0$	( 3.3 ± 0.6 ) × 10 <sup>-6</sup>	
Γ <sub>335</sub>	$K_2^*(1430)^+\pi^-$	( 3.65 ± 0.34 ) × 10 <sup>-6</sup>	
Γ <sub>336</sub>	$K^*(1680)^+\pi^-$	( 1.41 ± 0.10 ) × 10 <sup>-5</sup>	
Γ <sub>337</sub>	$K^+\pi^-\pi^+\pi^-$	[e] < 2.3 × 10 <sup>-4</sup>	CL=90%
Γ <sub>338</sub>	$\rho^0 K^+\pi^-$	( 2.8 ± 0.7 ) × 10 <sup>-6</sup>	
Γ <sub>339</sub>	$f_0(980)K^+\pi^-, f_0 \rightarrow \pi\pi$	( 1.4 <sup>+0.5</sup> / <sub>-0.6</sub> ) × 10 <sup>-6</sup>	
Γ <sub>340</sub>	$K^+\pi^-\pi^+\pi^-$ nonresonant	< 2.1 × 10 <sup>-6</sup>	CL=90%
Γ <sub>341</sub>	$K^*(892)^0\pi^+\pi^-$	( 5.5 ± 0.5 ) × 10 <sup>-5</sup>	
Γ <sub>342</sub>	$K^*(892)^0\rho^0$	( 3.9 ± 1.3 ) × 10 <sup>-6</sup>	S=1.9
Γ <sub>343</sub>	$K^*(892)^0 f_0(980), f_0 \rightarrow \pi\pi$	( 3.9 <sup>+2.1</sup> / <sub>-1.8</sub> ) × 10 <sup>-6</sup>	S=3.9
Γ <sub>344</sub>	$K_1(1270)^+\pi^-$	< 3.0 × 10 <sup>-5</sup>	CL=90%
Γ <sub>345</sub>	$K_1(1400)^+\pi^-$	< 2.7 × 10 <sup>-5</sup>	CL=90%
Γ <sub>346</sub>	$a_1(1260)^-K^+$	[e] ( 1.6 ± 0.4 ) × 10 <sup>-5</sup>	
Γ <sub>347</sub>	$K^*(892)^+\rho^-$	( 1.03 ± 0.26 ) × 10 <sup>-5</sup>	
Γ <sub>348</sub>	$K_0^*(1430)^+\rho^-$	( 2.8 ± 1.2 ) × 10 <sup>-5</sup>	
Γ <sub>349</sub>	$K_1(1400)^0\rho^0$	< 3.0 × 10 <sup>-3</sup>	CL=90%
Γ <sub>350</sub>	$K_0^*(1430)^0\rho^0$	( 2.7 ± 0.6 ) × 10 <sup>-5</sup>	
Γ <sub>351</sub>	$K_0^*(1430)^0 f_0(980), f_0 \rightarrow \pi\pi$	( 2.7 ± 0.9 ) × 10 <sup>-6</sup>	
Γ <sub>352</sub>	$K_2^*(1430)^0 f_0(980), f_0 \rightarrow \pi\pi$	( 8.6 ± 2.0 ) × 10 <sup>-6</sup>	
Γ <sub>353</sub>	$K^+K^-$	( 7.8 ± 1.5 ) × 10 <sup>-8</sup>	
Γ <sub>354</sub>	$K^0\bar{K}^0$	( 1.21 ± 0.16 ) × 10 <sup>-6</sup>	
Γ <sub>355</sub>	$K^0K^-\pi^+$	( 6.7 ± 0.5 ) × 10 <sup>-6</sup>	
Γ <sub>356</sub>	$K^*(892)^\pm K^\mp$	< 4 × 10 <sup>-7</sup>	CL=90%
Γ <sub>357</sub>	$\bar{K}^{*0}K^0 + K^{*0}\bar{K}^0$	< 9.6 × 10 <sup>-7</sup>	CL=90%
Γ <sub>358</sub>	$K^+K^-\pi^0$	( 2.2 ± 0.6 ) × 10 <sup>-6</sup>	
Γ <sub>359</sub>	$K_S^0 K_S^0 \pi^0$	< 9 × 10 <sup>-7</sup>	CL=90%
Γ <sub>360</sub>	$K_S^0 K_S^0 \eta$	< 1.0 × 10 <sup>-6</sup>	CL=90%
Γ <sub>361</sub>	$K_S^0 K_S^0 \eta'$	< 2.0 × 10 <sup>-6</sup>	CL=90%
Γ <sub>362</sub>	$K^0 K^+ K^-$	( 2.68 ± 0.11 ) × 10 <sup>-5</sup>	
Γ <sub>363</sub>	$K^0\phi$	( 7.3 ± 0.7 ) × 10 <sup>-6</sup>	
Γ <sub>364</sub>	$f_0(980)K^0, f_0 \rightarrow K^+K^-$	( 7.0 <sup>+3.5</sup> / <sub>-3.0</sub> ) × 10 <sup>-6</sup>	
Γ <sub>365</sub>	$f_0(1500)K^0$	( 1.3 <sup>+0.7</sup> / <sub>-0.5</sub> ) × 10 <sup>-5</sup>	
Γ <sub>366</sub>	$f_2'(1525)^0 K^0$	( 3 <sup>+5</sup> / <sub>-4</sub> ) × 10 <sup>-7</sup>	
Γ <sub>367</sub>	$f_0(1710)K^0, f_0 \rightarrow K^+K^-$	( 4.4 ± 0.9 ) × 10 <sup>-6</sup>	
Γ <sub>368</sub>	$K^0 K^+ K^-$ nonresonant	( 3.3 ± 1.0 ) × 10 <sup>-5</sup>	
Γ <sub>369</sub>	$K_S^0 K_S^0 K_S^0$	( 6.0 ± 0.5 ) × 10 <sup>-6</sup>	S=1.1
Γ <sub>370</sub>	$f_0(980)K^0, f_0 \rightarrow K_S^0 K_S^0$	( 2.7 ± 1.8 ) × 10 <sup>-6</sup>	
Γ <sub>371</sub>	$f_0(1710)K^0, f_0 \rightarrow K_S^0 K_S^0$	( 5.0 <sup>+5.0</sup> / <sub>-2.6</sub> ) × 10 <sup>-7</sup>	
Γ <sub>372</sub>	$f_2(2010)K^0, f_2 \rightarrow K_S^0 K_S^0$	( 5 ± 6 ) × 10 <sup>-7</sup>	

$\Gamma_{373}$	$K_S^0 K_S^0 K_S^0$ nonresonant	( 1.33 ± 0.31 ) × 10 <sup>-5</sup>	
$\Gamma_{374}$	$K_S^0 K_S^0 K_L^0$	< 1.6 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{375}$	$K^*(892)^0 K^+ K^-$	( 2.75 ± 0.26 ) × 10 <sup>-5</sup>	
$\Gamma_{376}$	$K^*(892)^0 \phi$	( 1.00 ± 0.05 ) × 10 <sup>-5</sup>	
$\Gamma_{377}$	$K^+ K^- \pi^+ \pi^-$ nonresonant	< 7.17 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{378}$	$K^*(892)^0 K^- \pi^+$	( 4.5 ± 1.3 ) × 10 <sup>-6</sup>	
$\Gamma_{379}$	$K^*(892)^0 \bar{K}^*(892)^0$	( 8.3 ± 2.4 ) × 10 <sup>-7</sup>	S=1.5
$\Gamma_{380}$	$K^+ K^+ \pi^- \pi^-$ nonresonant	< 6.0 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{381}$	$K^*(892)^0 K^+ \pi^-$	< 2.2 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{382}$	$K^*(892)^0 K^*(892)^0$	< 2 × 10 <sup>-7</sup>	CL=90%
$\Gamma_{383}$	$K^*(892)^+ K^*(892)^-$	< 2.0 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{384}$	$K_1(1400)^0 \phi$	< 5.0 × 10 <sup>-3</sup>	CL=90%
$\Gamma_{385}$	$\phi(K\pi)_0^{*0}$	( 4.3 ± 0.4 ) × 10 <sup>-6</sup>	
$\Gamma_{386}$	$\phi(K\pi)_0^{*0} (1.60 < m_{K\pi} < 2.15)$ [f]	< 1.7 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{387}$	$K_0^*(1430)^0 K^- \pi^+$	< 3.18 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{388}$	$K_0^*(1430)^0 \bar{K}^*(892)^0$	< 3.3 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{389}$	$K_0^*(1430)^0 \bar{K}_0^*(1430)^0$	< 8.4 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{390}$	$K_0^*(1430)^0 \phi$	( 3.9 ± 0.8 ) × 10 <sup>-6</sup>	
$\Gamma_{391}$	$K_0^*(1430)^0 K^*(892)^0$	< 1.7 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{392}$	$K_0^*(1430)^0 K_0^*(1430)^0$	< 4.7 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{393}$	$K^*(1680)^0 \phi$	< 3.5 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{394}$	$K^*(1780)^0 \phi$	< 2.7 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{395}$	$K^*(2045)^0 \phi$	< 1.53 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{396}$	$K_2^*(1430)^0 \rho^0$	< 1.1 × 10 <sup>-3</sup>	CL=90%
$\Gamma_{397}$	$K_2^*(1430)^0 \phi$	( 6.8 ± 0.9 ) × 10 <sup>-6</sup>	S=1.2
$\Gamma_{398}$	$K_0^0 \phi \phi$	( 3.7 ± 0.7 ) × 10 <sup>-6</sup>	S=1.3
$\Gamma_{399}$	$\eta' \eta' K^0$	< 3.1 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{400}$	$\eta K^0 \gamma$	( 7.6 ± 1.8 ) × 10 <sup>-6</sup>	
$\Gamma_{401}$	$\eta' K^0 \gamma$	< 6.4 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{402}$	$K^0 \phi \gamma$	( 2.7 ± 0.7 ) × 10 <sup>-6</sup>	
$\Gamma_{403}$	$K^+ \pi^- \gamma$	( 4.6 ± 1.4 ) × 10 <sup>-6</sup>	
$\Gamma_{404}$	$K^*(892)^0 \gamma$	( 4.18 ± 0.25 ) × 10 <sup>-5</sup>	S=2.1
$\Gamma_{405}$	$K^*(1410) \gamma$	< 1.3 × 10 <sup>-4</sup>	CL=90%
$\Gamma_{406}$	$K^+ \pi^- \gamma$ nonresonant	< 2.6 × 10 <sup>-6</sup>	CL=90%
$\Gamma_{407}$	$K^*(892)^0 X(214), X \rightarrow \mu^+ \mu^-$ [g]	< 2.26 × 10 <sup>-8</sup>	CL=90%
$\Gamma_{408}$	$K^0 \pi^+ \pi^- \gamma$	( 1.99 ± 0.18 ) × 10 <sup>-5</sup>	
$\Gamma_{409}$	$K^+ \pi^- \pi^0 \gamma$	( 4.1 ± 0.4 ) × 10 <sup>-5</sup>	
$\Gamma_{410}$	$K_1(1270)^0 \gamma$	< 5.8 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{411}$	$K_1(1400)^0 \gamma$	< 1.2 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{412}$	$K_2^*(1430)^0 \gamma$	( 1.24 ± 0.24 ) × 10 <sup>-5</sup>	
$\Gamma_{413}$	$K^*(1680)^0 \gamma$	< 2.0 × 10 <sup>-3</sup>	CL=90%
$\Gamma_{414}$	$K_3^*(1780)^0 \gamma$	< 8.3 × 10 <sup>-5</sup>	CL=90%
$\Gamma_{415}$	$K_4^*(2045)^0 \gamma$	< 4.3 × 10 <sup>-3</sup>	CL=90%

### Light unflavored meson modes

$\Gamma_{416}$	$\rho^0 \gamma$	$( 8.6 \pm 1.5 ) \times 10^{-7}$	
$\Gamma_{417}$	$\rho^0 X(214), X \rightarrow \mu^+ \mu^-$	$[g] < 1.73$	$\times 10^{-8}$ CL=90%
$\Gamma_{418}$	$\omega \gamma$	$( 4.4 \pm_{-1.6}^{1.8} ) \times 10^{-7}$	
$\Gamma_{419}$	$\phi \gamma$	$< 1.0$	$\times 10^{-7}$ CL=90%
$\Gamma_{420}$	$f_2(1270) \gamma, f_2 \rightarrow (KS)^0 (KS)^0$	$< 3.1$	$\times 10^{-7}$
$\Gamma_{421}$	$f'_2(1525) \gamma, f'_2 \rightarrow (KS)^0 (KS)^0$	$< 2.1$	$\times 10^{-7}$
$\Gamma_{422}$	$\pi^+ \pi^-$	$( 5.37 \pm 0.20 ) \times 10^{-6}$	S=1.3
$\Gamma_{423}$	$\pi^0 \pi^0$	$( 1.55 \pm 0.17 ) \times 10^{-6}$	S=1.1
$\Gamma_{424}$	$\eta \pi^0$	$( 4.1 \pm 1.7 ) \times 10^{-7}$	
$\Gamma_{425}$	$\eta \eta$	$< 1.0$	$\times 10^{-6}$ CL=90%
$\Gamma_{426}$	$\eta' \pi^0$	$( 1.2 \pm 0.6 ) \times 10^{-6}$	S=1.7
$\Gamma_{427}$	$\eta' \eta'$	$< 1.7$	$\times 10^{-6}$ CL=90%
$\Gamma_{428}$	$\eta' \eta$	$< 1.2$	$\times 10^{-6}$ CL=90%
$\Gamma_{429}$	$\eta' \rho^0$	$< 1.3$	$\times 10^{-6}$ CL=90%
$\Gamma_{430}$	$\eta' f_0(980), f_0 \rightarrow \pi^+ \pi^-$	$< 9$	$\times 10^{-7}$ CL=90%
$\Gamma_{431}$	$\eta \rho^0$	$< 1.5$	$\times 10^{-6}$ CL=90%
$\Gamma_{432}$	$\eta f_0(980), f_0 \rightarrow \pi^+ \pi^-$	$< 4$	$\times 10^{-7}$ CL=90%
$\Gamma_{433}$	$\omega \eta$	$( 9.4 \pm_{-3.1}^{4.0} ) \times 10^{-7}$	
$\Gamma_{434}$	$\omega \eta'$	$( 1.0 \pm_{-0.4}^{0.5} ) \times 10^{-6}$	
$\Gamma_{435}$	$\omega \rho^0$	$< 1.6$	$\times 10^{-6}$ CL=90%
$\Gamma_{436}$	$\omega f_0(980), f_0 \rightarrow \pi^+ \pi^-$	$< 1.5$	$\times 10^{-6}$ CL=90%
$\Gamma_{437}$	$\omega \omega$	$( 1.2 \pm 0.4 ) \times 10^{-6}$	
$\Gamma_{438}$	$\phi \pi^0$	$< 1.5$	$\times 10^{-7}$ CL=90%
$\Gamma_{439}$	$\phi \eta$	$< 5$	$\times 10^{-7}$ CL=90%
$\Gamma_{440}$	$\phi \eta'$	$< 5$	$\times 10^{-7}$ CL=90%
$\Gamma_{441}$	$\phi \pi^+ \pi^-$	$( 1.8 \pm 0.5 ) \times 10^{-7}$	
$\Gamma_{442}$	$\phi \rho^0$	$< 3.3$	$\times 10^{-7}$ CL=90%
$\Gamma_{443}$	$\phi f_0(980), f_0 \rightarrow \pi^+ \pi^-$	$< 3.8$	$\times 10^{-7}$ CL=90%
$\Gamma_{444}$	$\phi \omega$	$< 7$	$\times 10^{-7}$ CL=90%
$\Gamma_{445}$	$\phi \phi$	$< 2.7$	$\times 10^{-8}$ CL=90%
$\Gamma_{446}$	$a_0(980)^\pm \pi^\mp, a_0^\pm \rightarrow \eta \pi^\pm$	$< 3.1$	$\times 10^{-6}$ CL=90%
$\Gamma_{447}$	$a_0(1450)^\pm \pi^\mp, a_0^\pm \rightarrow \eta \pi^\pm$	$< 2.3$	$\times 10^{-6}$ CL=90%
$\Gamma_{448}$	$\pi^+ \pi^- \pi^0$	$< 7.2$	$\times 10^{-4}$ CL=90%
$\Gamma_{449}$	$\rho^0 \pi^0$	$( 2.0 \pm 0.5 ) \times 10^{-6}$	
$\Gamma_{450}$	$\rho^\mp \pi^\pm$	$[h] ( 2.30 \pm 0.23 ) \times 10^{-5}$	
$\Gamma_{451}$	$\pi^+ \pi^- \pi^+ \pi^-$	$< 1.12$	$\times 10^{-5}$ CL=90%
$\Gamma_{452}$	$\rho^0 \pi^+ \pi^-$	$< 8.8$	$\times 10^{-6}$ CL=90%
$\Gamma_{453}$	$\rho^0 \rho^0$	$( 9.6 \pm 1.5 ) \times 10^{-7}$	
$\Gamma_{454}$	$f_0(980) \pi^+ \pi^-, f_0 \rightarrow \pi^+ \pi^-$	$< 3.0$	$\times 10^{-6}$ CL=90%

$\Gamma_{455}$	$\rho^0 f_0(980), f_0 \rightarrow \pi^+ \pi^-$	$( 7.8 \pm 2.5 ) \times 10^{-7}$	
$\Gamma_{456}$	$f_0(980) f_0(980), f_0 \rightarrow \pi^+ \pi^-,$ $f_0 \rightarrow \pi^+ \pi^-$	$< 1.9 \times 10^{-7}$	CL=90%
$\Gamma_{457}$	$f_0(980) f_0(980), f_0 \rightarrow \pi^+ \pi^-,$ $f_0 \rightarrow K^+ K^-$	$< 2.3 \times 10^{-7}$	CL=90%
$\Gamma_{458}$	$a_1(1260)^\mp \pi^\pm$	$[h] ( 2.6 \pm 0.5 ) \times 10^{-5}$	S=1.9
$\Gamma_{459}$	$a_2(1320)^\mp \pi^\pm$	$[h] < 6.3 \times 10^{-6}$	CL=90%
$\Gamma_{460}$	$\pi^+ \pi^- \pi^0 \pi^0$	$< 3.1 \times 10^{-3}$	CL=90%
$\Gamma_{461}$	$\rho^+ \rho^-$	$( 2.77 \pm 0.19 ) \times 10^{-5}$	
$\Gamma_{462}$	$a_1(1260)^0 \pi^0$	$< 1.1 \times 10^{-3}$	CL=90%
$\Gamma_{463}$	$\omega \pi^0$	$< 5 \times 10^{-7}$	CL=90%
$\Gamma_{464}$	$\pi^+ \pi^+ \pi^- \pi^- \pi^0$	$< 9.0 \times 10^{-3}$	CL=90%
$\Gamma_{465}$	$a_1(1260)^+ \rho^-$	$< 6.1 \times 10^{-5}$	CL=90%
$\Gamma_{466}$	$a_1(1260)^0 \rho^0$	$< 2.4 \times 10^{-3}$	CL=90%
$\Gamma_{467}$	$b_1^\mp \pi^\pm, b_1^\mp \rightarrow \omega \pi^\mp$	$( 1.09 \pm 0.15 ) \times 10^{-5}$	
$\Gamma_{468}$	$b_1^0 \pi^0, b_1^0 \rightarrow \omega \pi^0$	$< 1.9 \times 10^{-6}$	CL=90%
$\Gamma_{469}$	$b_1^- \rho^+, b_1^- \rightarrow \omega \pi^-$	$< 1.4 \times 10^{-6}$	CL=90%
$\Gamma_{470}$	$b_1^0 \rho^0, b_1^0 \rightarrow \omega \pi^0$	$< 3.4 \times 10^{-6}$	CL=90%
$\Gamma_{471}$	$\pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^-$	$< 3.0 \times 10^{-3}$	CL=90%
$\Gamma_{472}$	$a_1(1260)^+ a_1(1260)^-, a_1^+ \rightarrow$ $2\pi^+ \pi^-, a_1^- \rightarrow 2\pi^- \pi^+$	$( 1.18 \pm 0.31 ) \times 10^{-5}$	
$\Gamma_{473}$	$\pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^0$	$< 1.1 \%$	CL=90%

### Baryon modes

$\Gamma_{474}$	$p \bar{p}$	$( 1.27 \pm 0.14 ) \times 10^{-8}$	
$\Gamma_{475}$	$p \bar{p} \pi^+ \pi^-$	$( 2.87 \pm 0.19 ) \times 10^{-6}$	
$\Gamma_{476}$	$p \bar{p} K^+ \pi^-$	$( 6.3 \pm 0.5 ) \times 10^{-6}$	
$\Gamma_{477}$	$p \bar{p} K^0$	$( 2.66 \pm 0.32 ) \times 10^{-6}$	
$\Gamma_{478}$	$\Theta(1540)^+ \bar{p}, \Theta^+ \rightarrow p K_S^0$	$[i] < 5 \times 10^{-8}$	CL=90%
$\Gamma_{479}$	$f_J(2220) K^0, f_J \rightarrow p \bar{p}$	$< 4.5 \times 10^{-7}$	CL=90%
$\Gamma_{480}$	$p \bar{p} K^*(892)^0$	$( 1.24_{-0.25}^{+0.28} ) \times 10^{-6}$	
$\Gamma_{481}$	$f_J(2220) K_0^*, f_J \rightarrow p \bar{p}$	$< 1.5 \times 10^{-7}$	CL=90%
$\Gamma_{482}$	$p \bar{p} K^+ K^-$	$( 1.21 \pm 0.32 ) \times 10^{-7}$	
$\Gamma_{483}$	$p \bar{p} \pi^0$	$( 5.0 \pm 1.9 ) \times 10^{-7}$	
$\Gamma_{484}$	$p \bar{p} p \bar{p}$	$( 2.2 \pm 0.4 ) \times 10^{-8}$	
$\Gamma_{485}$	$p \bar{\Lambda} \pi^-$	$( 3.16 \pm 0.24 ) \times 10^{-6}$	
$\Gamma_{486}$	$p \bar{\Lambda} \pi^- \gamma$	$< 6.5 \times 10^{-7}$	CL=90%
$\Gamma_{487}$	$p \bar{\Sigma}^-(1385)^-$	$< 2.6 \times 10^{-7}$	CL=90%
$\Gamma_{488}$	$\Delta(1232)^+ \bar{p} + \Delta(1232)^- p$	$< 1.6 \times 10^{-6}$	
$\Gamma_{489}$	$\Delta^0 \bar{\Lambda}$	$< 9.3 \times 10^{-7}$	CL=90%
$\Gamma_{490}$	$p \bar{\Lambda} K^-$	$< 8.2 \times 10^{-7}$	CL=90%
$\Gamma_{491}$	$p \bar{\Lambda} D^-$	$( 2.5 \pm 0.4 ) \times 10^{-5}$	
$\Gamma_{492}$	$p \bar{\Lambda} D^{*-}$	$( 3.4 \pm 0.8 ) \times 10^{-5}$	

$\Gamma_{493}$	$p\bar{\Sigma}^0\pi^-$	$(1.2 \pm 0.4) \times 10^{-6}$	
$\Gamma_{494}$	$\bar{\Lambda}\Lambda$	$< 3.2 \times 10^{-7}$	CL=90%
$\Gamma_{495}$	$\bar{\Lambda}\Lambda K^0$	$(4.8 \pm_{-0.9}^{+1.0}) \times 10^{-6}$	
$\Gamma_{496}$	$\bar{\Lambda}\Lambda K^{*0}$	$(2.5 \pm_{-0.8}^{+0.9}) \times 10^{-6}$	
$\Gamma_{497}$	$\bar{\Lambda}\Lambda D^0$	$(1.00 \pm_{-0.26}^{+0.30}) \times 10^{-5}$	
$\Gamma_{498}$	$D^0\Sigma^0\bar{\Lambda} + \text{c.c.}$	$< 3.1 \times 10^{-5}$	CL=90%
$\Gamma_{499}$	$\Delta^0\bar{\Delta}^0$	$< 1.5 \times 10^{-3}$	CL=90%
$\Gamma_{500}$	$\Delta^{++}\bar{\Delta}^{--}$	$< 1.1 \times 10^{-4}$	CL=90%
$\Gamma_{501}$	$\bar{D}^0 p\bar{p}$	$(1.04 \pm 0.07) \times 10^{-4}$	
$\Gamma_{502}$	$D_s^- \bar{\Lambda} p$	$(2.8 \pm 0.9) \times 10^{-5}$	
$\Gamma_{503}$	$\bar{D}^*(2007)^0 p\bar{p}$	$(9.9 \pm 1.1) \times 10^{-5}$	
$\Gamma_{504}$	$D^*(2010)^- p\bar{n}$	$(1.4 \pm 0.4) \times 10^{-3}$	
$\Gamma_{505}$	$D^- p\bar{p}\pi^+$	$(3.32 \pm 0.31) \times 10^{-4}$	
$\Gamma_{506}$	$D^*(2010)^- p\bar{p}\pi^+$	$(4.7 \pm 0.5) \times 10^{-4}$	S=1.2
$\Gamma_{507}$	$\bar{D}^0 p\bar{p}\pi^+\pi^-$	$(3.0 \pm 0.5) \times 10^{-4}$	
$\Gamma_{508}$	$\bar{D}^{*0} p\bar{p}\pi^+\pi^-$	$(1.9 \pm 0.5) \times 10^{-4}$	
$\Gamma_{509}$	$\Theta_c \bar{p}\pi^+, \Theta_c \rightarrow D^- p$	$< 9 \times 10^{-6}$	CL=90%
$\Gamma_{510}$	$\Theta_c \bar{p}\pi^+, \Theta_c \rightarrow D^{*-} p$	$< 1.4 \times 10^{-5}$	CL=90%
$\Gamma_{511}$	$\bar{\Sigma}_c^{--} \Delta^{++}$	$< 8 \times 10^{-4}$	CL=90%
$\Gamma_{512}$	$\bar{\Lambda}_c^- p\pi^+\pi^-$	$(1.02 \pm 0.14) \times 10^{-3}$	S=1.3
$\Gamma_{513}$	$\bar{\Lambda}_c^- p$	$(1.55 \pm 0.17) \times 10^{-5}$	
$\Gamma_{514}$	$\bar{\Lambda}_c^- p\pi^0$	$(1.55 \pm 0.18) \times 10^{-4}$	
$\Gamma_{515}$	$\bar{\Sigma}_c(2455)^- p$	$< 2.4 \times 10^{-5}$	
$\Gamma_{516}$	$\bar{\Lambda}_c^- p\pi^+\pi^-\pi^0$	$< 5.07 \times 10^{-3}$	CL=90%
$\Gamma_{517}$	$\bar{\Lambda}_c^- p\pi^+\pi^-\pi^+\pi^-$	$< 2.74 \times 10^{-3}$	CL=90%
$\Gamma_{518}$	$\bar{\Lambda}_c^- p\pi^+\pi^-$ (nonresonant)	$(5.5 \pm 1.0) \times 10^{-4}$	S=1.3
$\Gamma_{519}$	$\bar{\Sigma}_c(2520)^{--} p\pi^+$	$(1.02 \pm 0.18) \times 10^{-4}$	
$\Gamma_{520}$	$\bar{\Sigma}_c(2520)^0 p\pi^-$	$< 3.1 \times 10^{-5}$	CL=90%
$\Gamma_{521}$	$\bar{\Sigma}_c(2455)^0 p\pi^-$	$(1.08 \pm 0.09) \times 10^{-4}$	
$\Gamma_{522}$	$\bar{\Sigma}_c(2455)^0 N^0, N^0 \rightarrow p\pi^-$	$(6.4 \pm 1.7) \times 10^{-5}$	
$\Gamma_{523}$	$\bar{\Sigma}_c(2455)^{--} p\pi^+$	$(1.89 \pm 0.15) \times 10^{-4}$	
$\Gamma_{524}$	$\Lambda_c^- pK^+\pi^-$	$(3.5 \pm 0.7) \times 10^{-5}$	
$\Gamma_{525}$	$\bar{\Sigma}_c(2455)^{--} pK^+, \bar{\Sigma}_c^{--} \rightarrow \bar{\Lambda}_c^- \pi^-$	$(8.9 \pm 2.6) \times 10^{-6}$	
$\Gamma_{526}$	$\Lambda_c^- pK^*(892)^0$	$< 2.42 \times 10^{-5}$	CL=90%
$\Gamma_{527}$	$\Lambda_c^- pK^+K^-$	$(2.0 \pm 0.4) \times 10^{-5}$	
$\Gamma_{528}$	$\Lambda_c^- p\phi$	$< 1.0 \times 10^{-5}$	CL=90%
$\Gamma_{529}$	$\Lambda_c^- p\bar{p}p$	$< 2.8 \times 10^{-6}$	
$\Gamma_{530}$	$\bar{\Lambda}_c^- \Lambda K^+$	$(4.8 \pm 1.1) \times 10^{-5}$	

Γ <sub>531</sub>	$\bar{\Lambda}_c^- \Lambda_c^+$		<	1.6	$\times 10^{-5}$	CL=95%
Γ <sub>532</sub>	$\bar{\Lambda}_c(2593)^- / \bar{\Lambda}_c(2625)^- p$		<	1.1	$\times 10^{-4}$	CL=90%
Γ <sub>533</sub>	$\bar{\Xi}_c^- \Lambda_c^+$		(	$1.2 \pm 0.8$	$) \times 10^{-3}$	
Γ <sub>534</sub>	$\bar{\Xi}_c^- \Lambda_c^+, \bar{\Xi}_c^- \rightarrow \bar{\Xi}^+ \pi^- \pi^-$		(	$2.4 \pm 1.1$	$) \times 10^{-5}$	S=1.8
Γ <sub>535</sub>	$\bar{\Xi}_c^- \Lambda_c^+, \bar{\Xi}_c^- \rightarrow \bar{p} K^+ \pi^-$		(	$5.3 \pm 1.7$	$) \times 10^{-6}$	
Γ <sub>536</sub>	$\Lambda_c^+ \Lambda_c^- K^0$		(	$4.0 \pm 0.9$	$) \times 10^{-4}$	
Γ <sub>537</sub>	$\bar{\Lambda}_c(2910)^- p, \bar{\Lambda}_c^- \rightarrow$ $\bar{\Sigma}_c(2455)^- \pi^+$		(	$1.2 \pm 0.4$	$) \times 10^{-5}$	
Γ <sub>538</sub>	$\bar{\Lambda}_c(2910)^- p, \bar{\Lambda}_c^- \rightarrow$ $\bar{\Sigma}_c(2455)^0 \pi^-$		(	$10 \pm 4$	$) \times 10^{-6}$	
Γ <sub>539</sub>	$\bar{\Xi}_c(2930)^- \Lambda_c^+, \bar{\Xi}_c^- \rightarrow \Lambda_c^- K^0$		(	$2.4 \pm 0.6$	$) \times 10^{-4}$	
Γ <sub>540</sub>	$\Lambda \psi_{DS}$		[j] <	$0.13-5.2$	$\times 10^{-5}$	

**Lepton Family number (LF) or Lepton number (L) or Baryon number (B) violating modes, or/and  $\Delta B = 1$  weak neutral current (B1) modes**

Γ <sub>541</sub>	$\gamma \gamma$	B1	<	3.2	$\times 10^{-7}$	CL=90%
Γ <sub>542</sub>	$e^+ e^-$	B1	<	2.5	$\times 10^{-9}$	CL=90%
Γ <sub>543</sub>	$e^+ e^- \gamma$	B1	<	1.2	$\times 10^{-7}$	CL=90%
Γ <sub>544</sub>	$\mu^+ \mu^-$	B1	<	1.5	$\times 10^{-10}$	CL=90%
Γ <sub>545</sub>	$\mu^+ \mu^- \gamma$	B1				
Γ <sub>546</sub>	$\mu^+ \mu^- \mu^+ \mu^-$	B1	<	1.8	$\times 10^{-10}$	CL=95%
Γ <sub>547</sub>	$SP, S \rightarrow \mu^+ \mu^-,$ $P \rightarrow \mu^+ \mu^-$	B1	[k] <	6.0	$\times 10^{-10}$	CL=95%
Γ <sub>548</sub>	$aa, a \rightarrow \mu^+ \mu^-$	B1	<	2.3	$\times 10^{-10}$	CL=95%
Γ <sub>549</sub>	$\tau^+ \tau^-$	B1	<	2.1	$\times 10^{-3}$	CL=95%
Γ <sub>550</sub>	$\pi^0 \ell^+ \ell^-$	B1	[a] <	5.3	$\times 10^{-8}$	CL=90%
Γ <sub>551</sub>	$\pi^0 e^+ e^-$	B1	<	8.4	$\times 10^{-8}$	CL=90%
Γ <sub>552</sub>	$\pi^0 \mu^+ \mu^-$	B1	<	6.9	$\times 10^{-8}$	CL=90%
Γ <sub>553</sub>	$\eta \ell^+ \ell^-$	B1	[a] <	6.4	$\times 10^{-8}$	CL=90%
Γ <sub>554</sub>	$\eta e^+ e^-$	B1	<	1.08	$\times 10^{-7}$	CL=90%
Γ <sub>555</sub>	$\eta \mu^+ \mu^-$	B1	<	1.12	$\times 10^{-7}$	CL=90%
Γ <sub>556</sub>	$\pi^0 \nu \bar{\nu}$	B1	<	9	$\times 10^{-6}$	CL=90%
Γ <sub>557</sub>	$K^0 \ell^+ \ell^-$	B1	[a] (	$3.3 \pm 0.6$	$) \times 10^{-7}$	
Γ <sub>558</sub>	$K^0 e^+ e^-$	B1	(	$2.5 \pm 1.1$	$) \times 10^{-7}$	S=1.3
Γ <sub>559</sub>	$K^0 \mu^+ \mu^-$	B1	(	$3.39 \pm 0.35$	$) \times 10^{-7}$	S=1.1
Γ <sub>560</sub>	$K^0 \nu \bar{\nu}$	B1	<	2.6	$\times 10^{-5}$	CL=90%
Γ <sub>561</sub>	$\rho^0 \nu \bar{\nu}$	B1	<	4.0	$\times 10^{-5}$	CL=90%
Γ <sub>562</sub>	$K^*(892)^0 \ell^+ \ell^-$	B1	[a] (	$9.9 \pm 1.2$	$) \times 10^{-7}$	
Γ <sub>563</sub>	$K^*(892)^0 e^+ e^-$	B1	(	$1.03 \pm 0.19$	$) \times 10^{-6}$	
Γ <sub>564</sub>	$K^*(892)^0 \mu^+ \mu^-$	B1	(	$9.4 \pm 0.5$	$) \times 10^{-7}$	
Γ <sub>565</sub>	$K^*(892)^0 \chi, \chi \rightarrow$ $\mu^+ \mu^-$	B1				

$\Gamma_{566}$	$K^*(892)^0 \tau^+ \tau^-$	$B1$	$< 3.1$	$\times 10^{-3}$	CL=90%
$\Gamma_{567}$	$\pi^+ \pi^- \mu^+ \mu^-$	$B1$	$( 2.1 \pm 0.5 )$	$\times 10^{-8}$	
$\Gamma_{568}$	$K^*(892)^0 \nu \bar{\nu}$	$B1$	$< 1.8$	$\times 10^{-5}$	CL=90%
$\Gamma_{569}$	invisible	$B1$	$< 2.4$	$\times 10^{-5}$	CL=90%
$\Gamma_{570}$	$\nu \bar{\nu} \gamma$	$B1$	$< 1.6$	$\times 10^{-5}$	CL=90%
$\Gamma_{571}$	$\phi \mu^+ \mu^-$	$B1$	$< 3.2$	$\times 10^{-9}$	CL=90%
$\Gamma_{572}$	$\phi \nu \bar{\nu}$	$B1$	$< 1.27$	$\times 10^{-4}$	CL=90%
$\Gamma_{573}$	$e^\pm \mu^\mp$	$LF$	$[h] < 1.0$	$\times 10^{-9}$	CL=90%
$\Gamma_{574}$	$\pi^0 e^\pm \mu^\mp$	$LF$	$< 1.4$	$\times 10^{-7}$	CL=90%
$\Gamma_{575}$	$K^0 e^\pm \mu^\mp$	$LF$	$< 3.8$	$\times 10^{-8}$	CL=90%
$\Gamma_{576}$	$K^*(892)^0 e^+ \mu^-$	$LF$	$< 6.8$	$\times 10^{-9}$	CL=90%
$\Gamma_{577}$	$K^*(892)^0 e^- \mu^+$	$LF$	$< 5.7$	$\times 10^{-9}$	CL=90%
$\Gamma_{578}$	$K^*(892)^0 e^\pm \mu^\mp$	$LF$	$< 1.01$	$\times 10^{-8}$	CL=90%
$\Gamma_{579}$	$K^*(892)^0 \tau^+ \mu^-$	$LF$	$< 1.0$	$\times 10^{-5}$	CL=90%
$\Gamma_{580}$	$K^*(892)^0 \tau^- \mu^+$	$LF$	$< 8.2$	$\times 10^{-6}$	CL=90%
$\Gamma_{581}$	$e^\pm \tau^\mp$	$LF$	$[h] < 1.6$	$\times 10^{-5}$	CL=90%
$\Gamma_{582}$	$\mu^\pm \tau^\mp$	$LF$	$[h] < 1.4$	$\times 10^{-5}$	CL=95%
$\Gamma_{583}$	$\rho \mu^-$	$L,B$	$< 2.6$	$\times 10^{-9}$	CL=90%
$\Gamma_{584}$	$\Lambda_c^+ \mu^-$	$L,B$	$< 1.4$	$\times 10^{-6}$	CL=90%
$\Gamma_{585}$	$\Lambda_c^+ e^-$	$L,B$	$< 4$	$\times 10^{-6}$	CL=90%

- [a] An  $\ell$  indicates an  $e$  or a  $\mu$  mode, not a sum over these modes.
- [b]  $\bar{D}^{**}$  represents an excited state with mass  $2.2 < M < 2.8 \text{ GeV}/c^2$ .
- [c]  $\chi_{c1}(3872)^+$  is a hypothetical charged partner of the  $\chi_{c1}(3872)$ .
- [d] Stands for the possible candidates of  $K^*(1410)$ ,  $K_0^*(1430)$  and  $K_2^*(1430)$ .
- [e]  $B^0$  and  $B_s^0$  contributions not separated. Limit is on weighted average of the two decay rates.
- [f] This decay refers to the coherent sum of resonant and nonresonant  $J^P = 0^+ K \pi$  components with  $1.60 < m_{K \pi} < 2.15 \text{ GeV}/c^2$ .
- [g]  $X(214)$  is a hypothetical particle of mass  $214 \text{ MeV}/c^2$  reported by the HyperCP experiment, Physical Review Letters **94** 021801 (2005)
- [h] The value is for the sum of the charge states or particle/antiparticle states indicated.
- [i]  $\Theta(1540)^+$  denotes a possible narrow pentaquark state.
- [j]  $\psi_{DS}$  is a GeV-scale dark sector antibaryon (mass range  $1\text{--}4 \text{ GeV}/c^2$ ).
- [k] Here  $S$  and  $P$  are the hypothetical scalar and pseudoscalar particles with masses of  $2.5 \text{ GeV}/c^2$  and  $214.3 \text{ MeV}/c^2$ , respectively.

### FIT INFORMATION

An overall fit to 36 branching ratios uses 95 measurements to determine 22 parameters. The overall fit has a  $\chi^2 = 72.1$  for 73 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients  $\langle \delta x_i \delta x_j \rangle / (\delta x_i \delta x_j)$ , in percent, from the fit to the branching fractions,  $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$ .

x10	26										
x38	0	0									
x50	0	0	28								
x76	0	0	4	13							
x124	0	0	19	6	1						
x134	0	0	7	2	0	1					
x213	0	0	0	0	0	0	0				
x215	0	0	0	0	0	0	0	0			
x263	0	0	0	0	0	0	0	0	0		
x269	0	0	0	0	0	0	0	0	0	0	19
x275	0	0	0	0	0	0	0	0	0	29	0
x281	0	0	0	0	0	0	0	0	0	6	0
x287	0	0	0	0	0	0	0	0	0	0	0
x321	0	0	0	0	0	0	0	0	0	0	0
x355	0	0	0	0	0	0	0	0	0	0	0
x362	0	0	0	0	0	0	0	0	0	0	0
x376	0	0	0	0	0	0	0	0	0	0	0
x422	0	0	0	0	0	0	0	0	0	0	0
x453	0	0	0	0	0	0	0	0	0	0	0
x559	0	0	0	0	0	0	0	0	0	0	0
x564	0	0	0	0	0	0	0	0	0	15	0
	x7	x10	x38	x50	x76	x124	x134	x213	x215	x263	



x275	0									
x281	0	22								
x287	0	0	0							
x321	0	0	0	0						
x355	0	0	0	0	16					
x362	0	0	0	0	27	4				
x376	0	0	0	0	0	0	0			
x422	0	0	0	24	0	0	0	0		
x453	0	0	0	0	0	0	0	20	0	
x559	0	0	0	0	0	0	0	0	0	0
x564	0	4	1	0	0	0	0	0	0	0
	x269	x275	x281	x287	x321	x355	x362	x376	x422	x453
x564	0									
	x559									

### B<sup>0</sup> BRANCHING RATIOS

For branching ratios in which the charge of the decaying  $B$  is not determined, see the  $B^\pm$  section.

$\Gamma(\ell^+ \nu_e X) / \Gamma_{\text{total}}$

$\Gamma_1 / \Gamma$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>10.33 ± 0.28 OUR EVALUATION</b>	(Produced by HFLAV)		
<b>10.14 ± 0.30 OUR AVERAGE</b>	Error includes scale factor of 1.1.		
10.46 ± 0.30 ± 0.23	<sup>1</sup> URQUIJO	07	BELL $e^+ e^- \rightarrow \gamma(4S)$
9.64 ± 0.27 ± 0.33	<sup>2</sup> AUBERT,B	06Y	BABR $e^+ e^- \rightarrow \gamma(4S)$
10.78 ± 0.60 ± 0.69	<sup>3</sup> ARTUSO	97	CLE2 $e^+ e^- \rightarrow \gamma(4S)$
9.3 ± 1.1 ± 1.5	ALBRECHT	94	ARG $e^+ e^- \rightarrow \gamma(4S)$
9.9 ± 3.0 ± 0.9	HENDERSON	92	CLEO $e^+ e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
10.32 ± 0.36 ± 0.35	<sup>4</sup> OKABE	05	BELL Repl. by URQUIJO 07
10.9 ± 0.7 ± 1.1	ATHANAS	94	CLE2 Sup. by ARTUSO 97

<sup>1</sup> URQUIJO 07 report a measurement of  $(9.80 \pm 0.29 \pm 0.21)\%$  for the partial branching fraction of  $B \rightarrow e \nu_e X_C$  decay with electron energy above 0.6 GeV. We converted the result to  $B \rightarrow e \nu_e X$  branching fraction.

<sup>2</sup> The measurements are obtained for charged and neutral  $B$  mesons partial rates of semileptonic decay to electrons with momentum above 0.6 GeV/c in the  $B$  rest frame. The best precision on the ratio is achieved for a momentum threshold of 1.0 GeV:  $B(B^+ \rightarrow e^+ \nu_e X) / B(B^0 \rightarrow e^+ \nu_e X) = 1.074 \pm 0.041 \pm 0.026$ .

<sup>3</sup> ARTUSO 97 uses partial reconstruction of  $B \rightarrow D^* \ell \nu_\ell$  and inclusive semileptonic branching ratio from BARISH 96B ( $0.1049 \pm 0.0017 \pm 0.0043$ ).

<sup>4</sup> The measurements are obtained for charged and neutral  $B$  mesons partial rates of semileptonic decay to electrons with momentum above 0.6 GeV/c in the  $B$  rest frame, and their ratio of  $B(B^+ \rightarrow e^+ \nu_e X) / B(B^0 \rightarrow e^+ \nu_e X) = 1.08 \pm 0.05 \pm 0.02$ .

$\Gamma(e^+ \nu_e X_c)/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>10.08±0.30±0.22</b>	<sup>1</sup> URQUIJO 07	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measure the independent  $B^+$  and  $B^0$  partial branching fractions with electron threshold energies of 0.4 GeV.

$\Gamma(\ell^+ \nu_\ell X_u)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$

Requires  $E_\ell^* > 1$  GeV, where  $E_\ell^*$  is lepton energy in  $B$  rest frame.

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.51±0.10±0.16</b>	<sup>1</sup> CAO 21A	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> The correlation of 50% with  $B(B^+ \rightarrow \ell^+ \nu_\ell X_u)$ (lepton energy in  $B$  rest frame  $E_\ell^* > 1$  GeV) was reported.

$\Gamma(D^- \ell^+ \nu_\ell)/\Gamma_{\text{total}}$   $\Gamma_5/\Gamma$

$\ell$  denotes  $e$  or  $\mu$ , not the sum.

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<b>2.12±0.06 OUR EVALUATION</b>	(Produced by HFLAV)		
<b>2.25±0.08 OUR AVERAGE</b>			

2.31±0.03±0.11	<sup>1</sup> GLATTAUER 16	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
2.21±0.11±0.11	<sup>2</sup> AUBERT 10	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
2.09±0.13±0.18	<sup>3</sup> BARTELT 99	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
2.35±0.20±0.44	<sup>4</sup> BUSKULIC 97	ALEP	$e^+ e^- \rightarrow Z$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2.21±0.11±0.12	<sup>2</sup> AUBERT 08Q	BABR	Repl. by AUBERT 10
2.13±0.12±0.39	ABE 02E	BELL	Repl. by GLATTAUER 16
1.87±0.15±0.32	<sup>5</sup> ATHANAS 97	CLE2	Repl. by BARTELT 99
1.8 ±0.6 ±0.3	<sup>6</sup> FULTON 91	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
2.0 ±0.7 ±0.6	<sup>7</sup> ALBRECHT 89J	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side while the other, on the signal side, is partially reconstructed from  $B \rightarrow D \ell \nu$ .

<sup>2</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> BUSKULIC 97 assumes fraction ( $B^+$ ) = fraction ( $B^0$ ) =  $(37.8 \pm 2.2)\%$  and PDG 96 values for  $B$  lifetime and branching ratio of  $D^*$  and  $D$  decays.

<sup>5</sup> ATHANAS 97 uses missing energy and missing momentum to reconstruct neutrino.

<sup>6</sup> FULTON 91 assumes assuming equal production of  $B^0$  and  $B^+$  at the  $\Upsilon(4S)$  and uses Mark III  $D$  and  $D^*$  branching ratios.

<sup>7</sup> ALBRECHT 89J reports  $0.018 \pm 0.006 \pm 0.005$ . We rescale using the method described in STONE 94 but with the updated PDG 94  $B(D^0 \rightarrow K^- \pi^+)$ .

$\Gamma(D^- \ell^+ \nu_\ell)/\Gamma(\ell^+ \nu_\ell X)$   $\Gamma_5/\Gamma_1$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.230±0.011±0.011</b>	<sup>1</sup> AUBERT 10	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses a fully reconstructed  $B$  meson on the recoil side.

$\Gamma(D^- \ell^+ \nu_\ell)/\Gamma(D \ell^+ \nu_\ell X)$   $\Gamma_5/\Gamma_4$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.215±0.016±0.013</b>	<sup>1</sup> AUBERT 07AN	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses a fully reconstructed  $B$  meson on the recoil side.

$\Gamma(D^- \tau^+ \nu_\tau) / \Gamma_{\text{total}}$   $\Gamma_6 / \Gamma$

VALUE (units  $10^{-2}$ )      DOCUMENT ID      TECN      COMMENT

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.04 \pm 0.35 \pm 0.18$       <sup>1</sup> AUBERT      08N      BABR      Repl. by AUBERT 09S

<sup>1</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

$\Gamma(D^- \tau^+ \nu_\tau) / \Gamma(D^- \ell^+ \nu_\ell)$   $\Gamma_6 / \Gamma_5$

VALUE      DOCUMENT ID      TECN      COMMENT

**$0.469 \pm 0.084 \pm 0.053$**       <sup>1,2</sup> LEES      12D      BABR       $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.489 \pm 0.165 \pm 0.069$       <sup>1</sup> AUBERT      09S      BABR      Repl. by LEES 12D

<sup>1</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

<sup>2</sup> Uses  $\tau^+ \rightarrow e^+ \nu_e \bar{\nu}_\tau$  and  $\tau^+ \rightarrow \mu^+ \nu_\mu \bar{\nu}_\tau$  and  $e^+$  or  $\mu^+$  as  $\ell^+$ .

$\Gamma(D^{*(2010)-} \ell^+ \nu_\ell) / \Gamma_{\text{total}}$   $\Gamma_7 / \Gamma$

VALUE (%)      EVTS      DOCUMENT ID      TECN      COMMENT

**$4.90 \pm 0.12$  OUR EVALUATION**      (Produced by HFLAV) This value assumes isospin symmetry.

**$5.11 \pm 0.14$  OUR FIT**      Error includes scale factor of 1.4.

**$5.11 \pm 0.15$  OUR AVERAGE**      Error includes scale factor of 1.4. See the ideogram below.

$4.922 \pm 0.023 \pm 0.220$       <sup>1</sup> ADACHI      23J      BELL       $e^+ e^- \rightarrow \gamma(4S)$

$5.02 \pm 0.02 \pm 0.16$       <sup>2</sup> WAHEED      21      BELL       $e^+ e^- \rightarrow \gamma(4S)$

$5.49 \pm 0.16 \pm 0.25$       <sup>3</sup> AUBERT      08Q      BABR       $e^+ e^- \rightarrow \gamma(4S)$

$4.69 \pm 0.04 \pm 0.34$       <sup>4</sup> AUBERT      08R      BABR       $e^+ e^- \rightarrow \gamma(4S)$

$5.90 \pm 0.22 \pm 0.50$       <sup>5</sup> ABDALLAH      04D      DLPH       $e^+ e^- \rightarrow Z^0$

$6.09 \pm 0.19 \pm 0.40$       <sup>6</sup> ADAM      03      CLE2       $e^+ e^- \rightarrow \gamma(4S)$

$4.70 \pm 0.13 \pm 0.36$   
 $-0.31$       <sup>7</sup> ABREU      01H      DLPH       $e^+ e^- \rightarrow Z$

$5.26 \pm 0.20 \pm 0.46$       <sup>8</sup> ABBIENDI      00Q      OPAL       $e^+ e^- \rightarrow Z$

$5.53 \pm 0.26 \pm 0.52$       <sup>9</sup> BUSKULIC      97      ALEP       $e^+ e^- \rightarrow Z$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$4.917 \pm 0.032 \pm 0.216$       <sup>10</sup> ADACHI      23J      BELL       $e^+ e^- \rightarrow \gamma(4S)$

$4.926 \pm 0.032 \pm 0.231$       <sup>11</sup> ADACHI      23J      BELL       $e^+ e^- \rightarrow \gamma(4S)$

$4.90 \pm 0.02 \pm 0.16$       <sup>2</sup> WAHEED      19      BELL      Repl. by WAHEED 21

$4.58 \pm 0.03 \pm 0.26$       <sup>2</sup> DUNGEL      10      BELL      Repl. by WAHEED 19

$4.90 \pm 0.07 \pm 0.36$   
 $-0.35$       <sup>5</sup> AUBERT      05E      BABR      Repl. by AUBERT 08R

$5.39 \pm 0.11 \pm 0.34$       <sup>12</sup> ABDALLAH      04D      DLPH       $e^+ e^- \rightarrow Z^0$

$4.59 \pm 0.23 \pm 0.40$       <sup>13</sup> ABE      02F      BELL      Repl. by DUNGEL 10

$6.09 \pm 0.19 \pm 0.40$       <sup>14</sup> BRIERE      02      CLE2       $e^+ e^- \rightarrow \gamma(4S)$

$5.08 \pm 0.21 \pm 0.66$       <sup>15</sup> ACKERSTAFF      97G      OPAL      Repl. by ABBIENDI 00Q

$5.52 \pm 0.17 \pm 0.68$       <sup>16</sup> ABREU      96P      DLPH      Repl. by ABREU 01H

$4.49 \pm 0.32 \pm 0.39$       376      <sup>17</sup> BARISH      95      CLE2      Repl. by ADAM 03

$5.18 \pm 0.30 \pm 0.62$       410      <sup>18</sup> BUSKULIC      95N      ALEP      Sup. by BUSKULIC 97

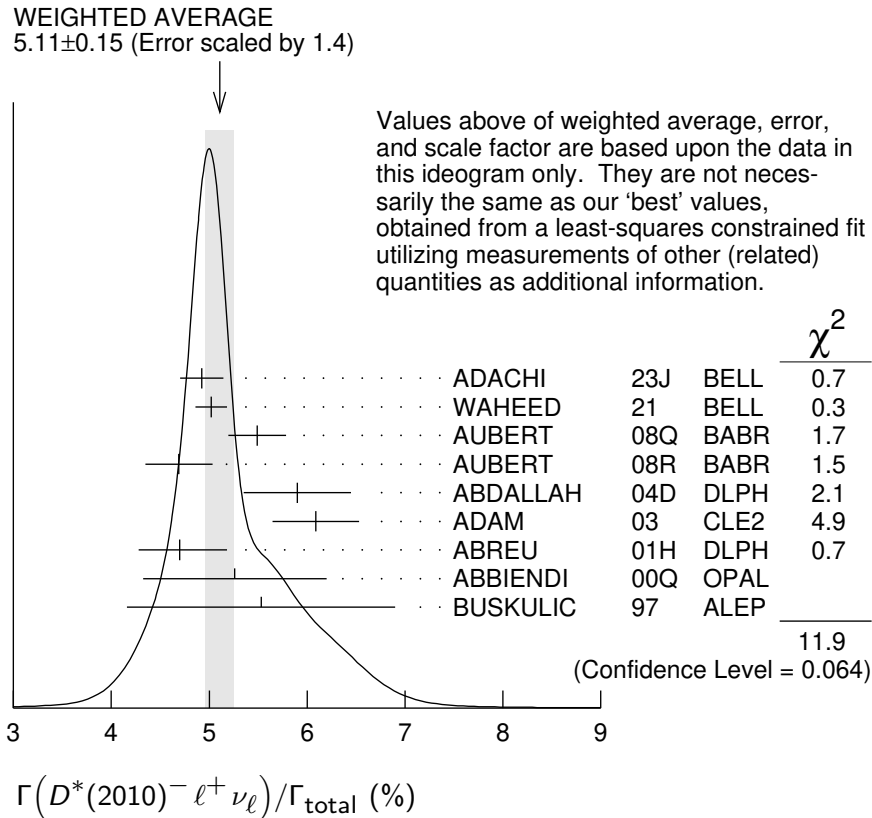
$4.5 \pm 0.3 \pm 0.4$       <sup>19</sup> ALBRECHT      94      ARG       $e^+ e^- \rightarrow \gamma(4S)$

$4.7 \pm 0.5 \pm 0.5$       235      <sup>20</sup> ALBRECHT      93      ARG       $e^+ e^- \rightarrow \gamma(4S)$

seen		398	21 SANGHERA	93	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
7.0	$\pm 1.8$	$\pm 1.4$	22 ANTREASYAN	90B	CBAL	$e^+e^- \rightarrow \Upsilon(4S)$
			23 ALBRECHT	89C	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
6.0	$\pm 1.0$	$\pm 1.4$	24 ALBRECHT	89J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
4.0	$\pm 0.4$	$\pm 0.6$	25 BORTOLETTO	89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
7.0	$\pm 1.2$	$\pm 1.9$	47 26 ALBRECHT	87J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> Uses fully reconstructed  $D^{*-}\ell^+\nu$  events with  $\ell = e$  or  $\mu$ .
- <sup>2</sup> WAHEED 21 uses fully reconstructed  $D^{*-}\ell^+\nu$  events ( $\ell = e$  or  $\mu$ ).
- <sup>3</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.
- <sup>4</sup> Measured using fully reconstructed  $D^*$  sample and a simultaneous fit to the Caprini-Lellouch-Neubert form factor parameters:  $\rho^2 = 1.191 \pm 0.048 \pm 0.028$ ,  $R_1(1) = 1.429 \pm 0.061 \pm 0.044$ , and  $R_2(1) = 0.827 \pm 0.038 \pm 0.022$ .
- <sup>5</sup> Measured using fully reconstructed  $D^*$  sample.
- <sup>6</sup> Uses the combined fit of both  $B^0 \rightarrow D^*(2010)^-\ell\nu$  and  $B^+ \rightarrow \bar{D}^*(2007)^0\ell\nu$  samples.
- <sup>7</sup> ABREU 01H measured using about 5000 partial reconstructed  $D^*$  sample.
- <sup>8</sup> ABBIENDI 00Q assumes the fraction  $B(b \rightarrow B^0) = (39.7^{+1.8}_{-2.2})\%$ . This result is an average of two methods using exclusive and partial  $D^*$  reconstruction.
- <sup>9</sup> BUSKULIC 97 assumes fraction ( $B^+$ ) = fraction ( $B^0$ ) =  $(37.8 \pm 2.2)\%$  and PDG 96 values for  $B$  lifetime and  $D^*$  and  $D$  branching fractions.
- <sup>10</sup> Uses fully reconstructed  $D^{*-}e^+\nu$  events.
- <sup>11</sup> Uses fully reconstructed  $D^{*-}\mu^+\nu$  events.
- <sup>12</sup> Combines with previous partial reconstructed  $D^*$  measurement.
- <sup>13</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .
- <sup>14</sup> The results are based on the same analysis and data sample reported in ADAM 03.
- <sup>15</sup> ACKERSTAFF 97G assumes fraction ( $B^+$ ) = fraction ( $B^0$ ) =  $(37.8 \pm 2.2)\%$  and PDG 96 values for  $B$  lifetime and branching ratio of  $D^*$  and  $D$  decays.
- <sup>16</sup> ABREU 96P result is the average of two methods using exclusive and partial  $D^*$  reconstruction.
- <sup>17</sup> BARISH 95 use  $B(D^0 \rightarrow K^-\pi^+) = (3.91 \pm 0.08 \pm 0.17)\%$  and  $B(D^{*+} \rightarrow D^0\pi^+) = (68.1 \pm 1.0 \pm 1.3)\%$ .
- <sup>18</sup> BUSKULIC 95N assumes fraction ( $B^+$ ) = fraction ( $B^0$ ) =  $38.2 \pm 1.3 \pm 2.2\%$  and  $\tau_{B^0} = 1.58 \pm 0.06$  ps.  $\Gamma(D^{*-}\ell^+\nu_\ell)/\text{total} = [5.18 - 0.13(\text{fraction}(B^0) - 38.2) - 1.5(\tau_{B^0} - 1.58)]\%$ .
- <sup>19</sup> ALBRECHT 94 assumes  $B(D^{*+} \rightarrow D^0\pi^+) = 68.1 \pm 1.0 \pm 1.3\%$ . Uses partial reconstruction of  $D^{*+}$  and is independent of  $D^0$  branching ratios.
- <sup>20</sup> ALBRECHT 93 reports  $0.052 \pm 0.005 \pm 0.006$ . We rescale using the method described in STONE 94 but with the updated PDG 94  $B(D^0 \rightarrow K^-\pi^+)$ . We have taken their average  $e$  and  $\mu$  value. They also obtain  $\alpha = 2*\Gamma^0/(\Gamma^- + \Gamma^+) - 1 = 1.1 \pm 0.4 \pm 0.2$ ,  $A_{AF} = 3/4*(\Gamma^- - \Gamma^+)/\Gamma = 0.2 \pm 0.08 \pm 0.06$  and a value of  $|V_{cb}| = 0.036-0.045$  depending on model assumptions.
- <sup>21</sup> Combining  $\bar{D}^{*0}\ell^+\nu_\ell$  and  $\bar{D}^{*-}\ell^+\nu_\ell$  SANGHERA 93 test  $V-A$  structure and fit the decay angular distributions to obtain  $A_{FB} = 3/4*(\Gamma^- - \Gamma^+)/\Gamma = 0.14 \pm 0.06 \pm 0.03$ . Assuming a value of  $V_{cb}$ , they measure  $V$ ,  $A_1$ , and  $A_2$ , the three form factors for the  $D^*\ell\nu_\ell$  decay, where results are slightly dependent on model assumptions.
- <sup>22</sup> ANTREASYAN 90B is average over  $B$  and  $\bar{D}^*(2010)$  charge states.
- <sup>23</sup> The measurement of ALBRECHT 89C suggests a  $D^*$  polarization  $\gamma_L/\gamma_T$  of  $0.85 \pm 0.45$ . or  $\alpha = 0.7 \pm 0.9$ .
- <sup>24</sup> ALBRECHT 89J is ALBRECHT 87J value rescaled using  $B(D^*(2010)^- \rightarrow D^0\pi^-) = 0.57 \pm 0.04 \pm 0.04$ . Superseded by ALBRECHT 93.

- <sup>25</sup> We have taken average of the the BORTOLETTO 89B values for electrons and muons,  $0.046 \pm 0.005 \pm 0.007$ . We rescale using the method described in STONE 94 but with the updated PDG 94  $B(D^0 \rightarrow K^- \pi^+)$ . The measurement suggests a  $D^*$  polarization parameter value  $\alpha = 0.65 \pm 0.66 \pm 0.25$ .
- <sup>26</sup> ALBRECHT 87J assume  $\mu$ - $e$  universality, the  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 0.45$ , the  $B(D^0 \rightarrow K^- \pi^+) = (0.042 \pm 0.004 \pm 0.004)$ , and the  $B(D^*(2010)^- \rightarrow D^0 \pi^-) = 0.49 \pm 0.08$ . Superseded by ALBRECHT 89J.



**$\Gamma(D^*(2010)^- \ell^+ \nu_\ell) / \Gamma(D \ell^+ \nu_\ell X)$   $\Gamma_7/\Gamma_4$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.537±0.031±0.036</b>	<sup>1</sup> AUBERT	07AN BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses a fully reconstructed  $B$  meson on the recoil side.

**$\Gamma(D^*(2010)^- e^+ \nu_e) / \Gamma(D^*(2010)^- \mu^+ \nu_\mu)$   $\Gamma_8/\Gamma_9$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.001±0.019 OUR AVERAGE</b>			
0.998±0.009±0.020	ADACHI	23J BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
1.011±0.035±0.024	PRIM	23 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(D^*(2010)^-\tau^+\nu_\tau)/\Gamma_{\text{total}}$   $\Gamma_{10}/\Gamma$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
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**1.45±0.10 OUR FIT** Error includes scale factor of 1.3.

**1.48±0.18 OUR AVERAGE** Error includes scale factor of 1.1.

1.42±0.094±0.140	<sup>1</sup> AAIJ	18D	LHCB $pp$ at 7, 8 TeV
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2.02 <sup>+0.40</sup> <sub>-0.37</sub> ±0.37	<sup>2</sup> MATYJA	07	BELL $e^+e^- \rightarrow \gamma(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.11±0.51 ±0.06	<sup>3</sup> AUBERT	08N	BABR Repl. by AUBERT 09S
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<sup>1</sup> Normalizes to  $B(B^0 \rightarrow D^*(2010)^-\pi^+\pi^-\pi^+) = (7.214 \pm 0.28) \times 10^{-3}$ .

<sup>2</sup> Observed in the recoil of the accompanying  $B$  meson.

<sup>3</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

$\Gamma(D^*(2010)^-\tau^+\nu_\tau)/\Gamma(D^*(2010)^-\ell^+\nu_\ell)$   $\Gamma_{10}/\Gamma_7$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.284±0.019 OUR FIT** Error includes scale factor of 1.3.

**0.283±0.025 OUR AVERAGE** Error includes scale factor of 1.5. See the ideogram below.

0.257±0.012±0.018	<sup>1,2</sup> AAIJ	23W	LHCB $pp$ at 7, 8, 13 TeV
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0.302±0.030±0.011	<sup>3</sup> SATO	16B	BELL $e^+e^- \rightarrow \gamma(4S)$
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0.355±0.039±0.021	<sup>4,5</sup> LEES	12D	BABR $e^+e^- \rightarrow \gamma(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.247±0.015±0.019	<sup>1</sup> AAIJ	23W	LHCB $pp$ at 13 TeV
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0.291±0.019±0.029	<sup>1</sup> AAIJ	18D	LHCB Repl. by AAIJ 23W
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0.336±0.027±0.030	<sup>6</sup> AAIJ	15Q	LHCB Repl. by AAIJ 23AR
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0.207±0.095±0.008	<sup>4</sup> AUBERT	09S	BABR Repl. by LEES 12D
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<sup>1</sup> Uses  $\tau^+ \rightarrow \pi^+\pi^-\pi^+\bar{\nu}_\tau$  and  $\tau^+ \rightarrow \pi^+\pi^-\pi^+\pi^0\bar{\nu}_\tau$ , and  $\mu^+$  as  $\ell^+$ .

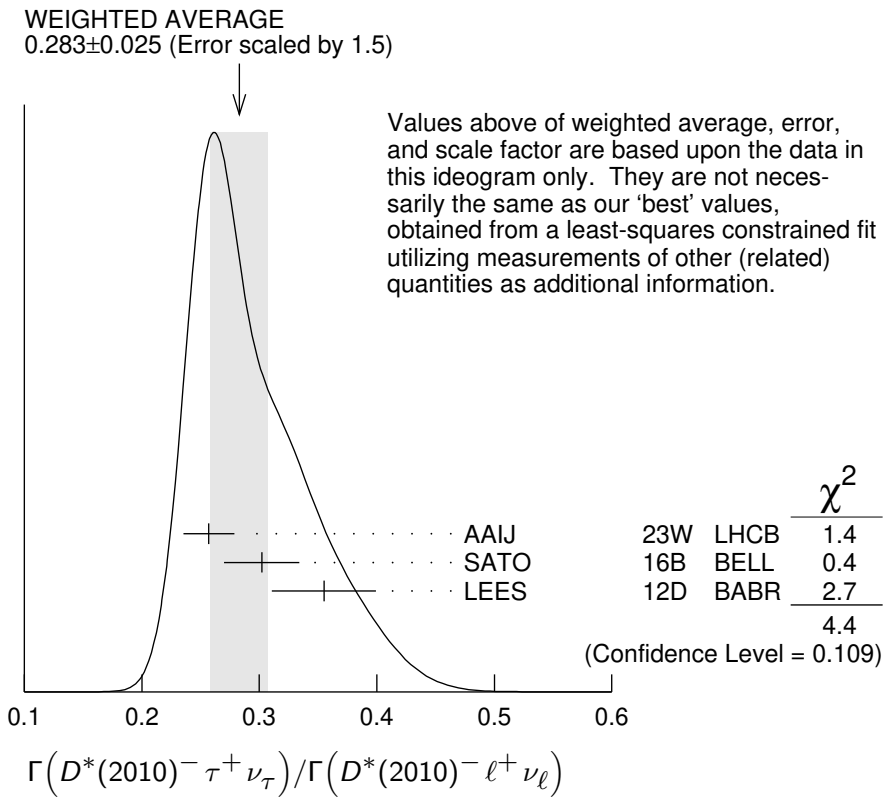
<sup>2</sup> Combination with measurement from AAIJ 18D.

<sup>3</sup> Uses semileptonic  $B$  decay events for tagging and  $\tau^+ \rightarrow \ell^+\nu_\ell\bar{\nu}_\tau$  mode.

<sup>4</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

<sup>5</sup> Uses  $\tau^+ \rightarrow e^+\nu_e\bar{\nu}_\tau$  and  $\tau^+ \rightarrow \mu^+\nu_\mu\bar{\nu}_\tau$  and  $e^+$  or  $\mu^+$  as  $\ell^+$ .

<sup>6</sup> Uses  $\tau^+ \rightarrow \mu^+\nu_\mu\bar{\nu}_\tau$  and  $\mu^+$  as  $\ell^+$ .



**$\Gamma(D^*(2010)^- \tau^+ \nu_\tau) / \Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^-)$   $\Gamma_{10}/\Gamma_{61}$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.77±0.08±0.10</b>	1,2 AAIJ	23W LHCb	$pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.70±0.10 <sup>+0.11</sup> <sub>-0.10</sub>	1 AAIJ	23W LHCb	$pp$ at 13 TeV
1.97±0.13±0.18	1 AAIJ	18D LHCb	Repl. by AAIJ 23W

<sup>1</sup> Uses  $\tau^+ \rightarrow \pi^+ \pi^- \pi^+ \bar{\nu}_\tau$  and  $\tau^+ \rightarrow \pi^+ \pi^- \pi^+ \pi^0 \bar{\nu}_\tau$  modes.

<sup>2</sup> Combination with result from AAIJ 18D.

**$\Gamma(\bar{D}^* n \pi \ell^+ \nu_\ell (n \geq 1)) / \Gamma(D \ell^+ \nu_\ell X)$   $\Gamma_{11}/\Gamma_4$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.248±0.032±0.030</b>	1 AUBERT	07AN BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses a fully reconstructed  $B$  meson on the recoil side.

**$\Gamma(\bar{D}^0 \pi^- \ell^+ \nu_\ell) / \Gamma_{\text{total}}$   $\Gamma_{12}/\Gamma$**

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>3.64±0.20 OUR AVERAGE</b>			
3.60±0.18±0.11	MEIER	23 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
4.3 ±0.8 ±0.3	<sup>1</sup> AUBERT	08Q BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
4.05±0.36±0.41	VOSSSEN	18 BELL	Repl. by MEIER 23
4.2 ±0.8 ±0.1	<sup>1,2</sup> LIVENTSEV	08 BELL	Repl. by VOSSSEN 18
3.3 ±0.9 ±0.1	<sup>3</sup> LIVENTSEV	05 BELL	Repl. by LIVENTSEV 08

<sup>1</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

<sup>2</sup> LIVENTSEV 08 reports  $(4.2 \pm 0.7 \pm 0.6) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{D}^0 \pi^- \ell^+ \nu_\ell) / \Gamma_{\text{total}}] / [B(B^0 \rightarrow D^- \ell^+ \nu_\ell)]$  assuming  $B(B^0 \rightarrow D^- \ell^+ \nu_\ell) = (2.12 \pm 0.20) \times 10^{-2}$ , which we rescale to our best value  $B(B^0 \rightarrow D^- \ell^+ \nu_\ell) = (2.12 \pm 0.06) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> LIVENTSEV 05 reports  $[\Gamma(B^0 \rightarrow \bar{D}^0 \pi^- \ell^+ \nu_\ell) / \Gamma_{\text{total}}] / [B(B^+ \rightarrow \bar{D}^0 \ell^+ \nu_\ell)] = 0.15 \pm 0.03 \pm 0.03$  which we multiply by our best value  $B(B^+ \rightarrow \bar{D}^0 \ell^+ \nu_\ell) = (2.21 \pm 0.06) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_0^{*}(2300)^- \ell^+ \nu_\ell, D_0^{*-} \rightarrow \bar{D}^0 \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{13} / \Gamma$

<u>VALUE (units <math>10^{-4}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt; 4.4</b>	90	MEIER	23	BELL $e^+ e^- \rightarrow \gamma(4S)$
44 $\pm 8 \pm 6$		<sup>1</sup> AUBERT	08BL BABR	$e^+ e^- \rightarrow \gamma(4S)$
20 $\pm 7 \pm 5$		<sup>1</sup> LIVENTSEV	08 BELL	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<sup>1</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

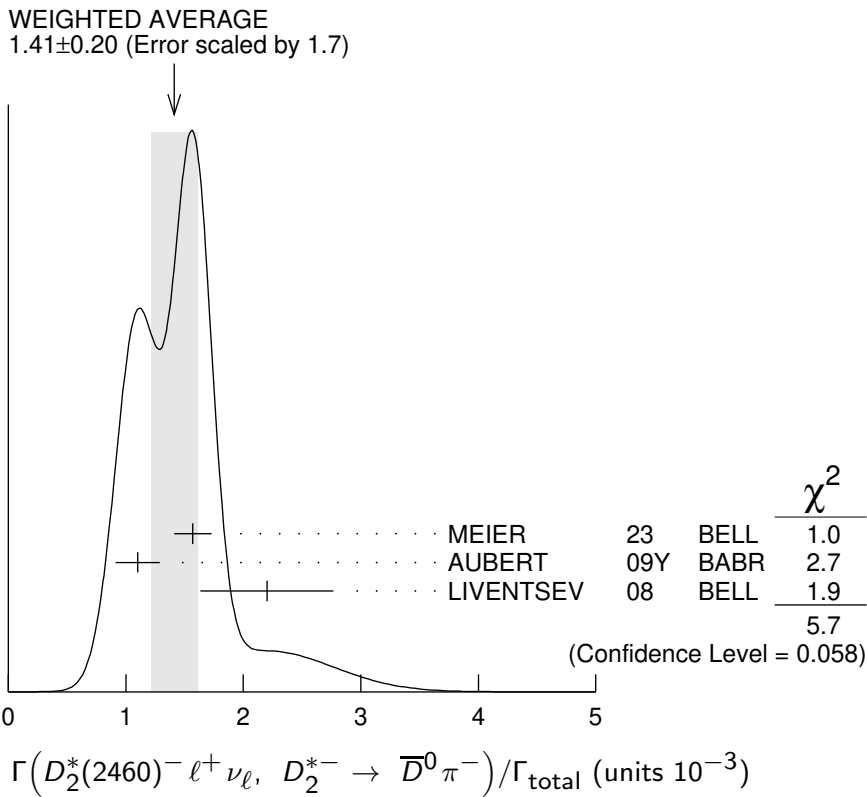
$\Gamma(D_2^{*}(2460)^- \ell^+ \nu_\ell, D_2^{*-} \rightarrow \bar{D}^0 \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{14} / \Gamma$

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.41 <math>\pm 0.20</math> OUR AVERAGE</b>	Error includes scale factor of 1.7. See the ideogram below.		
1.57 $\pm 0.15 \pm 0.05$	MEIER	23	BELL $e^+ e^- \rightarrow \gamma(4S)$
1.10 $\pm 0.17 \pm 0.08$	<sup>1</sup> AUBERT	09Y	BABR $e^+ e^- \rightarrow \gamma(4S)$
2.2 $\pm 0.4 \pm 0.4$	<sup>2</sup> LIVENTSEV	08	BELL $e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses a simultaneous fit of all  $B$  semileptonic decays without full reconstruction of events. AUBERT 09Y reports  $B(B^0 \rightarrow \bar{D}_2^{*}(2460)^- \ell^+ \nu_\ell) \cdot B(\bar{D}_2^{*}(2460)^- \rightarrow \bar{D}^{(*)0} \pi^-) = (1.77 \pm 0.26 \pm 0.11) \times 10^{-3}$  and the authors have provided us the individual measurement.

<sup>2</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.





$\Gamma(\bar{D}^{*0} \pi^- \ell^+ \nu_\ell) / \Gamma_{\text{total}}$   $\Gamma_{15} / \Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>5.44±0.28 OUR AVERAGE</b>			
5.51±0.24±0.17	MEIER	23	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
4.8 ±0.8 ±0.4	<sup>1</sup> AUBERT	08Q	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
6.46±0.53±0.52	VOSSSEN	18	BELL Repl. by MEIER 23
5.6 ±2.2 ±0.2	<sup>1,2</sup> LIVENTSEV	08	BELL Repl. by VOSSSEN 18
5.5 ±1.2 ±0.2	<sup>3,4</sup> LIVENTSEV	05	BELL Repl. by LIVENTSEV 08

<sup>1</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

<sup>2</sup> LIVENTSEV 08 reports  $(5.6 \pm 2.1 \pm 0.8) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{D}^{*0} \pi^- \ell^+ \nu_\ell) / \Gamma_{\text{total}}] / [B(B^0 \rightarrow D^- \ell^+ \nu_\ell)]$  assuming  $B(B^0 \rightarrow D^- \ell^+ \nu_\ell) = (2.12 \pm 0.20) \times 10^{-2}$ , which we rescale to our best value  $B(B^0 \rightarrow D^- \ell^+ \nu_\ell) = (2.12 \pm 0.06) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> Excludes  $D^{*+}$  contribution to  $D\pi$  modes.

<sup>4</sup> LIVENTSEV 05 reports  $[\Gamma(B^0 \rightarrow \bar{D}^{*0} \pi^- \ell^+ \nu_\ell) / \Gamma_{\text{total}}] / [B(B^+ \rightarrow \bar{D}^*(2007)^0 \ell^+ \nu_\ell)] = 0.10 \pm 0.02 \pm 0.01$  which we multiply by our best value  $B(B^+ \rightarrow \bar{D}^*(2007)^0 \ell^+ \nu_\ell) = (5.53 \pm 0.22) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_1(2420)^- \ell^+ \nu_\ell, D_1^- \rightarrow \bar{D}^{*0} \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{16} / \Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>2.85 ± 0.25 OUR AVERAGE</b>			
3.06 ± 0.50 ± 0.28	MEIER	23	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
2.78 ± 0.24 ± 0.25	<sup>1</sup> AUBERT	09Y	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
2.7 ± 0.4 ± 0.3	<sup>2</sup> AUBERT	08BL	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
5.4 ± 1.9 ± 0.9	<sup>2</sup> LIVENTSEV	08	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses a simultaneous measurement of all  $B$  semileptonic decays without full reconstruction of events.

<sup>2</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

$\Gamma(D_1(2420)^- \ell^+ \nu_\ell, D_1^- \rightarrow D^- \pi^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{17} / \Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.02 ± 0.13 ± 0.09</b>	MEIER	23	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(D_1'(2430)^- \ell^+ \nu_\ell, D_1'^- \rightarrow \bar{D}^{*0} \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{18} / \Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.5 ± 0.6 OUR AVERAGE</b>				
2.06 ± 0.68 ± 0.25		MEIER	23	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
3.1 ± 0.7 ± 0.5		<sup>1</sup> AUBERT	08BL	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<5.0                      90                      <sup>1</sup> LIVENTSEV    08    BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

$\Gamma(D_2^*(2460)^- \ell^+ \nu_\ell, D_2^{*-} \rightarrow \bar{D}^{*0} \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{19} / \Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>6.6 ± 1.1 OUR AVERAGE</b>				
5.1 ± 4.0 ± 1.0		MEIER	23	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
6.7 ± 1.2 ± 0.5		<sup>1</sup> AUBERT	09Y	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
7 ± 2 ± 2		<sup>2</sup> AUBERT	08BL	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<30                      90                      <sup>2</sup> LIVENTSEV    08    BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses a simultaneous fit of all  $B$  semileptonic decays without full reconstruction of events.

AUBERT 09Y reports  $B(B^0 \rightarrow \bar{D}_2^*(2460)^- \ell^+ \nu_\ell) \cdot B(\bar{D}_2^*(2460)^- \rightarrow \bar{D}^{(*)0} \pi^-) = (1.77 \pm 0.26 \pm 0.11) \times 10^{-3}$  and the authors have provided us the individual measurement.

<sup>2</sup> Uses a fully reconstructed  $B$  meson as a tag on the recoil side.

$\Gamma(D^- \pi^+ \pi^- \ell^+ \nu_\ell) / \Gamma_{\text{total}}$   $\Gamma_{20} / \Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.45 ± 0.18 ± 0.13</b>	MEIER	23	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(D^- \pi^+ \pi^- \ell^+ \nu_\ell) / \Gamma(D^- \ell^+ \nu_\ell)$   $\Gamma_{20} / \Gamma_5$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>5.8 ± 1.8 ± 1.2</b>	<sup>1</sup> LEES	16	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measurement used electrons and muons as leptons.

$\Gamma(D^{*-}\pi^+\pi^-\ell^+\nu_\ell)/\Gamma_{\text{total}}$				$\Gamma_{21}/\Gamma$
VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT	
<b><math>5.1 \pm 2.1 \pm 0.9</math></b>	MEIER	23	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(D^{*-}\pi^+\pi^-\ell^+\nu_\ell)/\Gamma(D^{*(2010)^-\ell^+\nu_\ell}$				$\Gamma_{21}/\Gamma_7$
VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT	
<b><math>2.8 \pm 0.8 \pm 0.6</math></b>	<sup>1</sup> LEES	16	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measurement used electrons and muons as leptons.

$\Gamma(\rho^-\ell^+\nu_\ell)/\Gamma_{\text{total}}$				$\Gamma_{22}/\Gamma$
$\ell = e \text{ or } \mu, \text{ not sum over } e \text{ and } \mu \text{ modes.}$				

“OUR EVALUATION” includes both  $B^0$  and  $B^+$  decays. The average assumes equality of the semileptonic decay width for these isospin conjugate states.

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>2.94 \pm 0.11 \pm 0.18</math></b>		<b>OUR EVALUATION</b> (Produced by HFLAV)		
<b><math>2.45 \pm 0.32</math></b>		<b>OUR AVERAGE</b> Error includes scale factor of 1.6. See the ideogram below.		

$3.22 \pm 0.27 \pm 0.24$	<sup>1</sup> SIBIDANOV	13	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$1.75 \pm 0.15 \pm 0.27$	<sup>2</sup> DEL-AMO-SA..11C	BABR	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$2.93 \pm 0.37 \pm 0.37$	<sup>3</sup> ADAM	07	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$2.17 \pm 0.54 \pm 0.32$	<sup>4</sup> HOKUUE	07	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$2.57 \pm 0.29^{+0.53}_{-0.62}$	<sup>5</sup> BEHRENS	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$2.14 \pm 0.21 \pm 0.56$	<sup>2</sup> AUBERT,B	050	BABR	Repl. by DEL-AMO-SANCHEZ 11c
$2.17 \pm 0.34^{+0.62}_{-0.68}$	<sup>6</sup> ATHAR	03	CLE2	Repl. by ADAM 07
$3.29 \pm 0.42 \pm 0.72$	<sup>7</sup> AUBERT	03E	BABR	Repl. by AUBERT,B 050
$2.69 \pm 0.41^{+0.61}_{-0.64}$	<sup>8</sup> BEHRENS	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$2.5 \pm 0.4^{+0.7}_{-0.9}$	<sup>9</sup> ALEXANDER	96T	CLE2	Repl. by BEHRENS 00
<4.1	90	<sup>10</sup> BEAN	93B	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> The signal events are tagged by a second  $B$  meson reconstructed in the fully hadronic decays.

<sup>2</sup>  $B^+$  and  $B^0$  decays combined assuming isospin symmetry. Systematic errors include both experimental and form-factor uncertainties.

<sup>3</sup> The  $B^0$  and  $B^+$  results are combined assuming the isospin,  $B$  lifetimes, and relative charged/neutral  $B$  production at the  $\Upsilon(4S)$ .

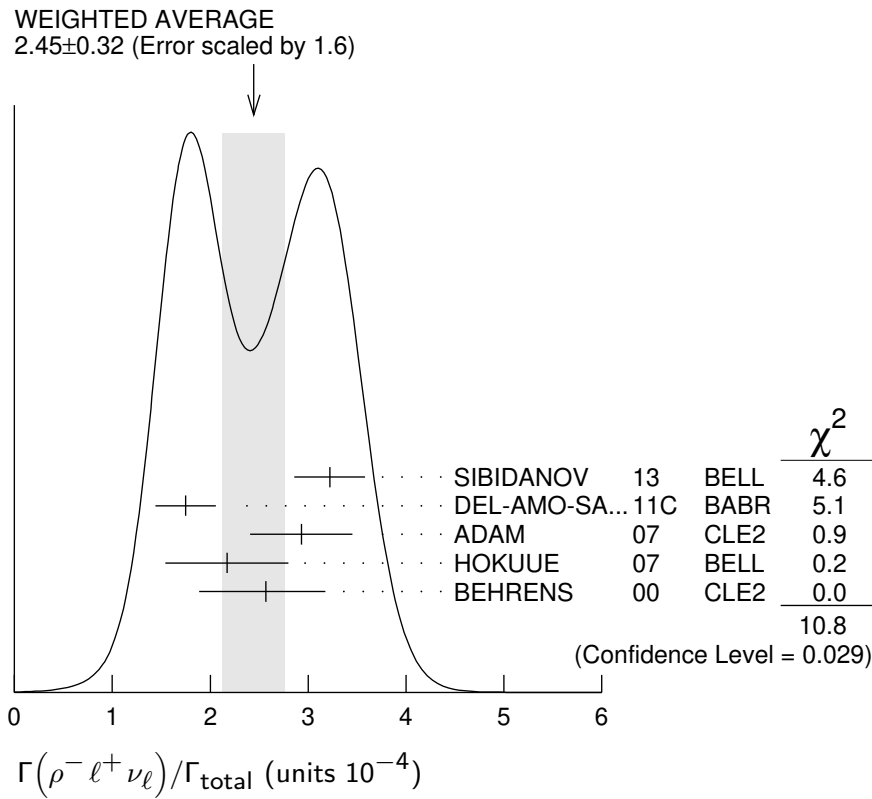
<sup>4</sup> The signal events are tagged by a second  $B$  meson reconstructed in the semileptonic mode  $B \rightarrow D^{(*)}\ell\nu_\ell$ .

<sup>5</sup> Averaging with ALEXANDER 96T results including experimental and theoretical correlations considered, BEHRENS 00 reports systematic errors  $^{+0.33}_{-0.46} \pm 0.41$ , where the second error is theoretical model dependence. We combine these in quadrature.

<sup>6</sup> ATHAR 03 reports systematic errors  $^{+0.47}_{-0.50} \pm 0.41 \pm 0.01$ , which are experimental systematic, systematic due to residual form-factor uncertainties in the signal, and systematic due to residual form-factor uncertainties in the cross-feed modes, respectively. We combine these in quadrature.

<sup>7</sup> Uses isospin constraints and extrapolation to all electron energies according to five different form-factor calculations. The second error combines the systematic and theoretical uncertainties in quadrature.

- <sup>8</sup> BEHRENS 00 reports  $\frac{+0.35}{-0.40} \pm 0.50$ , where the second error is the theoretical model dependence. We combine these in quadrature.  $B^+$  and  $B^0$  decays combined using isospin symmetry:  $\Gamma(B^0 \rightarrow \rho^- \ell^+ \nu) = 2\Gamma(B^+ \rightarrow \rho^0 \ell^+ \nu) \approx 2\Gamma(B^+ \rightarrow \omega \ell^+ \nu)$ . No evidence for  $\omega \ell \nu$  is reported.
- <sup>9</sup> ALEXANDER 96T reports  $\frac{+0.5}{-0.7} \pm 0.5$  where the second error is the theoretical model dependence. We combine these in quadrature.  $B^+$  and  $B^0$  decays combined using isospin symmetry:  $\Gamma(B^0 \rightarrow \rho^- \ell^+ \nu) = 2\Gamma(B^+ \rightarrow \rho^0 \ell^+ \nu) \approx 2\Gamma(B^+ \rightarrow \omega \ell^+ \nu)$ . No evidence for  $\omega \ell \nu$  is reported.
- <sup>10</sup> BEAN 93B limit set using ISGW Model. Using isospin and the quark model to combine  $\Gamma(\rho^0 \ell^+ \nu_\ell)$  and  $\Gamma(\omega \ell^+ \nu_\ell)$  with this result, they obtain a limit  $<(1.6-2.7) \times 10^{-4}$  at 90% CL for  $B^+ \rightarrow (\omega \text{ or } \rho^0) \ell^+ \nu_\ell$ . The range corresponds to the ISGW, WSB, and KS models. An upper limit on  $|V_{ub}/V_{cb}| < 0.08-0.13$  at 90% CL is derived as well.



$\Gamma(\pi^- \ell^+ \nu_\ell) / \Gamma_{\text{total}}$				$\Gamma_{23} / \Gamma$
VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT	
<b>1.50±0.06 OUR EVALUATION</b>	(Produced by HFLAV)			
<b>1.46±0.04 OUR AVERAGE</b>				
1.49±0.09±0.07	<sup>1</sup> SIBIDANOV	13	BELL	$e^+ e^- \rightarrow \gamma(4S)$
1.47±0.05±0.06	<sup>2,3</sup> LEES	12AA	BABR	$e^+ e^- \rightarrow \gamma(4S)$
1.41±0.05±0.07	<sup>4</sup> DEL-AMO-SA...	11C	BABR	$e^+ e^- \rightarrow \gamma(4S)$
1.49±0.04±0.07	<sup>2</sup> HA	11	BELL	$e^+ e^- \rightarrow \gamma(4S)$
1.54±0.17±0.09	<sup>4</sup> AUBERT	08AV	BABR	$e^+ e^- \rightarrow \gamma(4S)$
1.37±0.15±0.11	<sup>5,6</sup> ADAM	07	CLE2	$e^+ e^- \rightarrow \gamma(4S)$
1.38±0.19±0.14	<sup>7</sup> HOKUUE	07	BELL	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.53±0.18±0.12	1,8	CAO	23	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
1.42±0.05±0.08	2	DEL-AMO-SA..11F	BABR	Repl. by LEES 12AA	
1.46±0.07±0.08	9	AUBERT	07J	BABR	Repl. by DEL-AMO-SANCHEZ 11F
1.33±0.17±0.11	10	AUBERT,B	06K	BABR	Repl. by AUBERT 08AV
1.38±0.10±0.18	11	AUBERT,B	05O	BABR	Repl. by DEL-AMO-SANCHEZ 11C
1.33±0.18±0.13	12	ATHAR	03	CLE2	Repl. by ADAM 07
1.8 ±0.4 ±0.4	13	ALEXANDER	96T	CLE2	Repl. by ATHAR 03

<sup>1</sup> The signal events are tagged by a second  $B$  meson reconstructed in the fully hadronic decays.

<sup>2</sup> Uses loose neutrino reconstruction technique. Assumes  $B(\Upsilon(4S) \rightarrow B^+ B^-) = (51.6 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = (48.4 \pm 0.6)\%$ .

<sup>3</sup> Reports also a branching fraction value  $B(B^0 \rightarrow \pi^- \ell^+ \nu) = (1.45 \pm 0.04 \pm 0.06) \times 10^{-4}$  from the decays of  $B^+$  and  $B^0$  that are combined using the isospin symmetry relation.

<sup>4</sup> Using the isospin symmetry relation,  $B^+$  and  $B^0$  branching fractions are combined.

<sup>5</sup> The  $B^0$  and  $B^+$  results are combined assuming the isospin,  $B$  lifetimes, and relative charged/neutral  $B$  production at the  $\Upsilon(4S)$ .

<sup>6</sup> Also report the rate for  $q^2 > 16 \text{ GeV}^2$  of  $(0.41 \pm 0.08 \pm 0.04) \times 10^{-4}$  from which they obtain  $|V_{ub}| = 3.6 \pm 0.4 \pm 0.2^{+0.6}_{-0.4}$  (last error is from theory).

<sup>7</sup> The signal events are tagged by a second  $B$  meson reconstructed in the semileptonic mode  $B \rightarrow D^{(*)} \ell \nu \ell$ .

<sup>8</sup> This analysis provides the inclusive and exclusive measurement of  $|V_{ub}|$ .

<sup>9</sup> The analysis uses events in which the signal  $B$  decays are reconstructed with an innovative loose neutrino reconstruction technique.

<sup>10</sup> The signals are tagged by a second  $B$  meson reconstructed in a semileptonic or hadronic decay. The  $B^0$  and  $B^+$  results are combined assuming the isospin symmetry.

<sup>11</sup>  $B^+$  and  $B^0$  decays combined assuming isospin symmetry. Systematic errors include both experimental and form-factor uncertainties.

<sup>12</sup> ATHAR 03 reports systematic errors  $0.11 \pm 0.01 \pm 0.07$ , which are experimental systematic, systematic due to residual form-factor uncertainties in the signal, and systematic due to residual form-factor uncertainties in the cross-feed modes, respectively. We combine these in quadrature.

<sup>13</sup> ALEXANDER 96T gives systematic errors  $\pm 0.3 \pm 0.2$  where the second error reflects the estimated model dependence. We combine these in quadrature. Assumes isospin symmetry:  $\Gamma(B^0 \rightarrow \pi^- \ell^+ \nu) = 2 \times \Gamma(B^+ \rightarrow \pi^0 \ell^+ \nu)$ .

### $\Gamma(\pi^- \mu^+ \nu_\mu) / \Gamma_{\text{total}}$

$\Gamma_{24} / \Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

seen <sup>1</sup> ALBRECHT 91C ARG

<sup>1</sup> In ALBRECHT 91C, one event is fully reconstructed providing evidence for the  $b \rightarrow u$  transition.

### $\Gamma(\pi^- \tau^+ \nu_\tau) / \Gamma_{\text{total}}$

$\Gamma_{25} / \Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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$< 2.5 \times 10^{-4}$  90 <sup>1</sup> HAMER 16 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^\pm X)/\Gamma_{\text{total}}$				$\Gamma_{26}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.78±0.08</b>	<sup>1</sup> ALBRECHT	96D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Average multiplicity.				

$\Gamma(D^0 X)/\Gamma_{\text{total}}$				$\Gamma_{27}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.081±0.014±0.005</b>	<sup>1</sup> AUBERT	07N	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.063±0.019±0.005	<sup>1</sup> AUBERT,BE	04B	BABR	Repl. by AUBERT 07N
<sup>1</sup> Events are selected by completely reconstructing one $B$ and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.				

$\Gamma(\bar{D}^0 X)/\Gamma_{\text{total}}$				$\Gamma_{28}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.474±0.020<sup>+0.020</sup><sub>-0.019</sub></b>	<sup>1</sup> AUBERT	07N	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.511±0.031±0.028	<sup>1</sup> AUBERT,BE	04B	BABR	Repl. by AUBERT 07N
<sup>1</sup> Events are selected by completely reconstructing one $B$ and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.				

$\Gamma(D^0 X)/[\Gamma(D^0 X) + \Gamma(\bar{D}^0 X)]$				$\Gamma_{27}/(\Gamma_{27}+\Gamma_{28})$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.146±0.022±0.006</b>	AUBERT	07N	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.110±0.031±0.008	AUBERT,BE	04B	BABR	Repl. by AUBERT 07N

$\Gamma(D^+ X)/\Gamma_{\text{total}}$				$\Gamma_{29}/\Gamma$
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;0.039</b>	90	<sup>1</sup> AUBERT	07N	BABR $e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.051	90	<sup>1</sup> AUBERT,BE	04B	BABR Repl. by AUBERT 07N
<sup>1</sup> Events are selected by completely reconstructing one $B$ and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.				

$\Gamma(D^- X)/\Gamma_{\text{total}}$				$\Gamma_{30}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.369±0.016<sup>+0.030</sup><sub>-0.027</sub></b>	<sup>1</sup> AUBERT	07N	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.397±0.030 <sup>+0.040</sup> <sub>-0.038</sub>	<sup>1</sup> AUBERT,BE	04B	BABR	Repl. by AUBERT 07N
<sup>1</sup> Events are selected by completely reconstructing one $B$ and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.				

$\Gamma(D^+ X)/[\Gamma(D^+ X) + \Gamma(D^- X)]$   $\Gamma_{29}/(\Gamma_{29}+\Gamma_{30})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.058±0.028±0.006</b>	AUBERT	07N	BABR $e^+e^- \rightarrow \gamma(4S)$
••• We do not use the following data for averages, fits, limits, etc. •••			
0.055±0.040±0.006	AUBERT,BE	04B	BABR Repl. by AUBERT 07N

$\Gamma(D_s^+ X)/\Gamma_{total}$   $\Gamma_{31}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.103±0.012<sup>+0.017</sup><sub>-0.014</sub></b>	<sup>1</sup> AUBERT	07N	BABR $e^+e^- \rightarrow \gamma(4S)$
••• We do not use the following data for averages, fits, limits, etc. •••			
0.109±0.021 <sup>+0.039</sup> <sub>-0.024</sub>	<sup>1</sup> AUBERT,BE	04B	BABR Repl. by AUBERT 07N

<sup>1</sup> Events are selected by completely reconstructing one  $B$  and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(D_s^- X)/\Gamma_{total}$   $\Gamma_{32}/\Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;0.026</b>	90	<sup>1</sup> AUBERT	07N	BABR $e^+e^- \rightarrow \gamma(4S)$
••• We do not use the following data for averages, fits, limits, etc. •••				
<0.087	90	<sup>1</sup> AUBERT,BE	04B	BABR Repl. by AUBERT 07N

<sup>1</sup> Events are selected by completely reconstructing one  $B$  and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(D_s^+ X)/[\Gamma(D_s^+ X) + \Gamma(D_s^- X)]$   $\Gamma_{31}/(\Gamma_{31}+\Gamma_{32})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.879±0.066±0.005</b>	AUBERT	07N	BABR $e^+e^- \rightarrow \gamma(4S)$
••• We do not use the following data for averages, fits, limits, etc. •••			
0.733±0.092±0.010	AUBERT,BE	04B	BABR Repl. by AUBERT 07N

$\Gamma(\Lambda_c^+ X)/\Gamma_{total}$   $\Gamma_{33}/\Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;0.031</b>	90	<sup>1</sup> AUBERT	07N	BABR $e^+e^- \rightarrow \gamma(4S)$
••• We do not use the following data for averages, fits, limits, etc. •••				
<0.038	90	<sup>1</sup> AUBERT,BE	04B	BABR Repl. by AUBERT 07N

<sup>1</sup> Events are selected by completely reconstructing one  $B$  and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(\bar{\Lambda}_c^- X)/\Gamma_{total}$   $\Gamma_{34}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.05 ±0.010<sup>+0.019</sup><sub>-0.011</sub></b>	<sup>1</sup> AUBERT	07N	BABR $e^+e^- \rightarrow \gamma(4S)$
••• We do not use the following data for averages, fits, limits, etc. •••			
0.049±0.017 <sup>+0.018</sup> <sub>-0.011</sub>	<sup>1</sup> AUBERT,BE	04B	BABR Repl. by AUBERT 07N

<sup>1</sup> Events are selected by completely reconstructing one  $B$  and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(\Lambda_c^+ X)/[\Gamma(\Lambda_c^+ X) + \Gamma(\bar{\Lambda}_c^- X)]$   $\Gamma_{33}/(\Gamma_{33}+\Gamma_{34})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>0.243<sup>+0.119</sup><sub>-0.121</sub> ± 0.003</b>	AUBERT	07N	BABR $e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.286 ± 0.142 ± 0.007	AUBERT, BE	04B	BABR Repl. by AUBERT 07N
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$\Gamma(\bar{c} X)/\Gamma_{total}$   $\Gamma_{35}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>0.947 ± 0.030<sup>+0.045</sup><sub>-0.040</sub></b>	<sup>1</sup> AUBERT	07N	BABR $e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.039 ± 0.051 <sup>+0.063</sup> <sub>-0.058</sub>	<sup>1</sup> AUBERT, BE	04B	BABR Repl. by AUBERT 07N
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<sup>1</sup> Events are selected by completely reconstructing one  $B$  and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(c X)/\Gamma_{total}$   $\Gamma_{36}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>0.246 ± 0.024<sup>+0.021</sup><sub>-0.017</sub></b>	<sup>1</sup> AUBERT	07N	BABR $e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.237 ± 0.036 <sup>+0.041</sup> <sub>-0.027</sub>	<sup>1</sup> AUBERT, BE	04B	BABR Repl. by AUBERT 07N
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<sup>1</sup> Events are selected by completely reconstructing one  $B$  and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(\bar{c}/c X)/\Gamma_{total}$   $\Gamma_{37}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>1.193 ± 0.030<sup>+0.053</sup><sub>-0.049</sub></b>	<sup>1</sup> AUBERT	07N	BABR $e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.276 ± 0.062 <sup>+0.088</sup> <sub>-0.074</sub>	<sup>1</sup> AUBERT, BE	04B	BABR Repl. by AUBERT 07N
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<sup>1</sup> Events are selected by completely reconstructing one  $B$  and searching for a reconstructed charmed particle in the rest of the event. The last error includes systematic and charm branching ratio uncertainties.

$\Gamma(D^- \pi^+)/\Gamma_{total}$   $\Gamma_{38}/\Gamma$

<u>VALUE (units 10<sup>-3</sup>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**2.51 ± 0.08 OUR FIT**

**2.56 ± 0.08 OUR AVERAGE**

2.48 ± 0.01 ± 0.10	WAHEED	22	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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2.55 ± 0.05 ± 0.16	<sup>1</sup> AUBERT	07H	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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3.03 ± 0.23 ± 0.23	<sup>2</sup> AUBERT, BE	06J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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2.68 ± 0.12 ± 0.24	<sup>1,3</sup> AHMED	02B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
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2.7 ± 0.6 ± 0.5	<sup>4</sup> BORTOLETTO92	CLEO	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
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4.8 ± 1.1 ± 1.1	22	<sup>5</sup> ALBRECHT	90J	ARG $e^+e^- \rightarrow \Upsilon(4S)$
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5.1 <sup>+2.8</sup> <sub>-2.5</sub> <sup>+1.3</sup> <sub>-1.2</sub>	4	<sup>6</sup> BEBEK	87	CLEO $e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

2.73±0.19±0.05		<sup>1,7</sup> AUBERT,B	040	BABR	Repl. by AUBERT 07H
2.83±0.42±0.05	81	<sup>8</sup> ALAM	94	CLE2	Repl. by AHMED 02B
3.1 ±1.3 ±1.0	7	<sup>5</sup> ALBRECHT	88K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses a missing-mass method. Does not depend on  $D$  branching fractions or  $B^+/B^0$  production rates.

<sup>3</sup> AHMED 02B reports an additional uncertainty on the branching ratios to account for 4.5% uncertainty on relative production of  $B^0$  and  $B^+$ , which is not included here.

<sup>4</sup> BORTOLETTO 92 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .

<sup>5</sup> ALBRECHT 88K assumes  $B^0\bar{B}^0:B^+B^-$  production ratio is 45:55. Superseded by ALBRECHT 90J which assumes 50:50.

<sup>6</sup> BEBEK 87 value has been updated in BERKELMAN 91 to use same assumptions as noted for BORTOLETTO 92.

<sup>7</sup> AUBERT,B 040 reports  $[\Gamma(B^0 \rightarrow D^- \pi^+)/\Gamma_{\text{total}}] \times [B(D^+ \rightarrow K_S^0 \pi^+)] = (42.7 \pm 2.1 \pm 2.2) \times 10^{-6}$  which we divide by our best value  $B(D^+ \rightarrow K_S^0 \pi^+) = (1.562 \pm 0.031) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>8</sup> ALAM 94 reports  $[\Gamma(B^0 \rightarrow D^- \pi^+)/\Gamma_{\text{total}}] \times [B(D^+ \rightarrow K^- 2\pi^+)] = (0.265 \pm 0.032 \pm 0.023) \times 10^{-3}$  which we divide by our best value  $B(D^+ \rightarrow K^- 2\pi^+) = (9.38 \pm 0.16) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

### $\Gamma(D^- \ell^+ \nu_\ell)/\Gamma(D^- \pi^+)$

$\Gamma_5/\Gamma_{38}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>9.9±1.0±0.9</b>	AALTONEN	09E	CDF $p\bar{p}$ at 1.96 TeV

### $\Gamma(D^- \rho^+)/\Gamma_{\text{total}}$

$\Gamma_{39}/\Gamma$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.0076±0.0012 OUR AVERAGE</b>				

0.0075±0.0013±0.0001	79	<sup>1</sup> ALAM	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.009 ±0.005 ±0.003	9	<sup>2</sup> ALBRECHT	90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.022 ±0.012 ±0.009	6	<sup>2</sup> ALBRECHT	88K	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> ALAM 94 reports  $[\Gamma(B^0 \rightarrow D^- \rho^+)/\Gamma_{\text{total}}] \times [B(D^+ \rightarrow K^- 2\pi^+)] = 0.000704 \pm 0.000096 \pm 0.000070$  which we divide by our best value  $B(D^+ \rightarrow K^- 2\pi^+) = (9.38 \pm 0.16) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 88K assumes  $B^0\bar{B}^0:B^+B^-$  production ratio is 45:55. Superseded by ALBRECHT 90J which assumes 50:50.

### $\Gamma(D^- K^0 \pi^+)/\Gamma_{\text{total}}$

$\Gamma_{40}/\Gamma$

<u>VALUE (units <math>10^{-4}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>4.9±0.7±0.5</b>	<sup>1</sup> AUBERT,BE	05B	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- K^*(892)^+)/\Gamma_{\text{total}}$   $\Gamma_{41}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>4.5±0.7 OUR AVERAGE</b>			
4.6±0.6±0.5	<sup>1</sup> AUBERT, BE 05B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
3.7±1.5±1.0	<sup>1</sup> MAHAPATRA 02	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- \omega \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{42}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.0028±0.0005±0.0004</b>	<sup>1</sup> ALEXANDER 01B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ . The signal is consistent with all observed  $\omega \pi^+$  having proceeded through the  $\rho'^+$  resonance at mass  $1349 \pm 25^{+10}_{-5}$  MeV and width  $547 \pm 86^{+46}_{-45}$  MeV.

$\Gamma(D^- K^+)/\Gamma(D^- \pi^+)$   $\Gamma_{43}/\Gamma_{38}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>8.19±0.20 OUR AVERAGE</b>			
8.19±0.20±0.23	WAHEED 22	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
8.22±0.11±0.25	AAIJ 13P	LHCB	$pp$ at 7 TeV
6.8 ±1.5 ±0.7	ABE 01I	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(D^- K^+ \pi^+ \pi^-)/\Gamma(D^- \pi^+ \pi^+ \pi^-)$   $\Gamma_{44}/\Gamma_{50}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>5.9±1.1±0.5</b>	AAIJ 12T	LHCB	$pp$ at 7 TeV

$\Gamma(D^- K^+ \bar{K}^0)/\Gamma_{\text{total}}$   $\Gamma_{45}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;3.1</b>	90	<sup>1</sup> DRUTSKOY 02	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- K^+ \bar{K}^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{46}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>8.8±1.1±1.5</b>	<sup>1</sup> DRUTSKOY 02	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{D}^0 \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{47}/\Gamma$

VALUE (units $10^{-4}$ )	CL% EVTS	DOCUMENT ID	TECN	COMMENT
<b>8.8 ±0.5 OUR AVERAGE</b>				
8.95 ±0.15 ±0.52		<sup>1</sup> AAIJ 15Y	LHCB	$pp$ at 7, 8 TeV
8.4 ±0.4 ±0.8		<sup>2</sup> KUZMIN 07	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
8.0 ±0.6 ±1.5		<sup>2,3</sup> SATPATHY 03	BELL	Repl. by KUZMIN 07
< 16	90	<sup>2</sup> ALAM 94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
< 70	90	<sup>4</sup> BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<340	90	<sup>5</sup> BEBEK 87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
700 ± 500	5	<sup>6</sup> BEHRENDTS 83	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> The second uncertainty combines in quadrature all systematic uncertainties quoted in the paper. AAIJ 15Y reports  $B(B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-) = (8.46 \pm 0.14 \pm 0.49) \times 10^{-4}$  in the kinematic region  $m(\bar{D}^0 \pi^\pm) > 2.1$  GeV which we corrected to the full phase-space dividing by 0.945 from Belle.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> No assumption about the intermediate mechanism is made in the analysis.

<sup>4</sup> BORTOLETTO 92 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ . The product branching fraction into  $D_0^*(2340) \pi$  followed by  $D_0^*(2340) \rightarrow D^0 \pi$  is  $< 0.0001$  at 90% CL and into  $D_2^*(2460)$  followed by  $D_2^*(2460) \rightarrow D^0 \pi$  is  $< 0.0004$  at 90% CL.

<sup>5</sup> BEBEK 87 assume the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.  $B(D^0 \rightarrow K^- \pi^+) = (4.2 \pm 0.4 \pm 0.4)\%$  and  $B(D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-) = (9.1 \pm 0.8 \pm 0.8)\%$  were used.

<sup>6</sup> Corrected by us using assumptions:  $B(D^0 \rightarrow K^- \pi^+) = (0.042 \pm 0.006)$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 50\%$ . The product branching ratio is  $B(B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-)B(\bar{D}^0 \rightarrow K^+ \pi^-) = (0.39 \pm 0.26) \times 10^{-2}$ .

### $\Gamma(D^*(2010)^- \pi^+) / \Gamma_{\text{total}}$

$\Gamma_{48} / \Gamma$

VALUE (units $10^{-3}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b>2.66 ± 0.07 OUR AVERAGE</b>				
2.62 ± 0.02 ± 0.09		<sup>1</sup> KROHN 23	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
2.79 ± 0.08 ± 0.17		<sup>2</sup> AUBERT 07H	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
2.48 ± 0.34 ± 0.08		<sup>3,4</sup> AUBERT,BE 06J	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
2.81 ± 0.24 ± 0.05		<sup>5</sup> BRANDENB... 98	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
2.6 ± 0.3 ± 0.4	82	<sup>6</sup> ALAM 94	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
3.37 ± 0.96 ± 0.02		<sup>7</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
2.36 ± 0.88 ± 0.02	12	<sup>8</sup> ALBRECHT 90J	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
2.36 <sup>+1.50</sup> <sub>-1.10</sub> ± 0.02	5	<sup>9</sup> BEBEK 87	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

10 ± 4 ± 1	8	<sup>10</sup> AKERS 94J	OPAL	$e^+ e^- \rightarrow Z$
2.7 ± 1.4 ± 1.0	5	<sup>11</sup> ALBRECHT 87C	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
3.5 ± 2 ± 2		<sup>12</sup> ALBRECHT 86F	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
17 ± 5 ± 5	41	<sup>13</sup> GILES 84	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> KROHN 23 reports  $(2.623 \pm 0.016 \pm 0.086) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+) / \Gamma_{\text{total}}] / [B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0)]$  assuming  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 0.486 \pm 0.006$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> AUBERT,BE 06J reports  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+) / \Gamma_{\text{total}}] / [B(B^0 \rightarrow D^- \pi^+)] = 0.99 \pm 0.11 \pm 0.08$  which we multiply by our best value  $B(B^0 \rightarrow D^- \pi^+) = (2.51 \pm 0.08) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> Uses a missing-mass method. Does not depend on  $D$  branching fractions or  $B^+ / B^0$  production rates.

<sup>5</sup> BRANDENBURG 98 assume equal production of  $B^+$  and  $B^0$  at  $\Upsilon(4S)$  and use the  $D^*$  reconstruction technique. The first error is their experiment's error and the second error is the systematic error from the PDG 96 value of  $B(D^* \rightarrow D \pi)$ .

<sup>6</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2010)^+ \rightarrow D^0 \pi^+)$  and absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0) / B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-) / B(D^0 \rightarrow K^- \pi^+)$ .

- <sup>7</sup> BORTOLETTO 92 reports  $(4.0 \pm 1.0 \pm 0.7) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+) / \Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .
- <sup>8</sup> ALBRECHT 90J reports  $(2.8 \pm 0.9 \pm 0.6) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+) / \Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .
- <sup>9</sup> BEBEK 87 reports  $(2.8^{+1.5+1.0}_{-1.2-0.6}) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+) / \Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Updated in BERKELMAN 91 to use same assumptions as noted for BORTOLETTO 92 and ALBRECHT 90J.
- <sup>10</sup> Assumes  $B(Z \rightarrow b\bar{b}) = 0.217$  and 38%  $B_d$  production fraction.
- <sup>11</sup> ALBRECHT 87C use PDG 86 branching ratios for  $D$  and  $D^*(2010)$  and assume  $B(\Upsilon(4S) \rightarrow B^+ B^-) = 55\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 45\%$ . Superseded by ALBRECHT 90J.
- <sup>12</sup> ALBRECHT 86F uses pseudomass that is independent of  $D^0$  and  $D^+$  branching ratios.
- <sup>13</sup> Assumes  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.60^{+0.08}_{-0.15}$ . Assumes  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 0.40 \pm 0.02$  Does not depend on  $D$  branching ratios.

$\Gamma(D^*(2010)^- \ell^+ \nu_\ell) / \Gamma(D^*(2010)^- \pi^+)$				$\Gamma_7 / \Gamma_{48}$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>16.5 ± 2.3 ± 1.1</b>	AALTONEN	09E	CDF	$p\bar{p}$ at 1.96 TeV

$\Gamma(\bar{D}^0 K^+ K^-) / \Gamma(\bar{D}^0 \pi^+ \pi^-)$				$\Gamma_{49} / \Gamma_{47}$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>0.069 ± 0.004 ± 0.003</b>	AAIJ	18AZ	LHCB	$pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.056 ± 0.011 ± 0.007	AAIJ	12AM	LHCB	$pp$ at 7 TeV, Repl. by AAIJ 18AZ
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$\Gamma(D^- \pi^+ \pi^+ \pi^-) / \Gamma_{\text{total}}$				$\Gamma_{50} / \Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>0.0060 ± 0.0006 OUR FIT</b>				
<b>0.0080 ± 0.0021 ± 0.0014</b>	<sup>1</sup> BORTOLETTO92	CLEO		$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> BORTOLETTO 92 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .

$\Gamma(D^- \pi^+ \pi^+ \pi^-) / \Gamma(D^- \pi^+)$				$\Gamma_{50} / \Gamma_{38}$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>2.39 ± 0.23 OUR FIT</b>				
<b>2.38 ± 0.11 ± 0.21</b>	AAIJ	11E	LHCB	$pp$ at 7 TeV

$\Gamma((D^- \pi^+ \pi^+ \pi^-) \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{51}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.0039 ± 0.0014 ± 0.0013</b>	<sup>1</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> BORTOLETTO 92 assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ and uses Mark III branching fractions for the $D$ .			

$\Gamma(D^- \pi^+ \rho^0)/\Gamma_{\text{total}}$   $\Gamma_{52}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.0011 ± 0.0009 ± 0.0004</b>	<sup>1</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> BORTOLETTO 92 assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ and uses Mark III branching fractions for the $D$ .			

$\Gamma(D^- a_1(1260)^+)/\Gamma_{\text{total}}$   $\Gamma_{53}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.0060 ± 0.0022 ± 0.0024</b>	<sup>1</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> BORTOLETTO 92 assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ and uses Mark III branching fractions for the $D$ .			

$\Gamma(D^*(2010)^- \pi^+ \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{54}/\Gamma$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.0152 ± 0.0052 ± 0.0001</b>	51	<sup>1</sup> ALBRECHT 90J	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.015 ± 0.008 ± 0.008	8	<sup>2</sup> ALBRECHT 87C	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> ALBRECHT 90J reports  $0.018 \pm 0.004 \pm 0.005$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+ \pi^0)/\Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .

<sup>2</sup> ALBRECHT 87C use PDG 86 branching ratios for  $D$  and  $D^*(2010)$  and assume  $B(\Upsilon(4S) \rightarrow B^+ B^-) = 55\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 45\%$ . Superseded by ALBRECHT 90J.

$\Gamma(D^*(2010)^- \rho^+)/\Gamma_{\text{total}}$   $\Gamma_{55}/\Gamma$

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**6.8 ± 0.9 OUR AVERAGE**

6.8 ± 0.3 ± 0.9		<sup>1,2</sup> CSORNA 03	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
16.0 ± 11.3 ± 0.1		<sup>3</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
5.89 ± 3.52 ± 0.04	19	<sup>4</sup> ALBRECHT 90J	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

		<sup>2,5</sup> MATVIENKO 15	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
7.4 ± 1.0 ± 1.4	76	<sup>6,7</sup> ALAM 94	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
81 ± 29 <sup>+59</sup> / <sub>-24</sub>	19	<sup>8</sup> CHEN 85	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> The second error combines the systematic and theoretical uncertainties in quadrature. CSORNA 03 includes data used in ALAM 94. A full angular fit to three complex helicity amplitudes is performed.
- <sup>2</sup> Assumes equal production of  $B^0$  and  $B^+$  at the  $\Upsilon(4S)$  resonance.
- <sup>3</sup> BORTOLETTO 92 reports  $0.019 \pm 0.008 \pm 0.011$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \rho^+) / \Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .
- <sup>4</sup> ALBRECHT 90J reports  $0.007 \pm 0.003 \pm 0.003$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \rho^+) / \Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .
- <sup>5</sup> MATVIENKO 15 reports  $B(B^0 \rightarrow D^*(2010)^- \rho^+, \rho^+ \rightarrow \omega \pi^+) = (1.48 \pm 0.27^{+0.15+0.21}_{-0.09-0.56}) \times 10^{-3}$ . The last uncertainty is a model one.
- <sup>6</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2010)^+ \rightarrow D^0 \pi^+)$  and absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0) / B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-) / B(D^0 \rightarrow K^- \pi^+)$ .
- <sup>7</sup> This decay is nearly completely longitudinally polarized,  $\Gamma_L / \Gamma = (93 \pm 5 \pm 5)\%$ , as expected from the factorization hypothesis (ROSNER 90). The nonresonant  $\pi^+ \pi^0$  contribution under the  $\rho^+$  is less than 9% at 90% CL.
- <sup>8</sup> Uses  $B(D^* \rightarrow D^0 \pi^+) = 0.6 \pm 0.15$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 0.4$ . Does not depend on  $D$  branching ratios.

**$\Gamma(D^*(2010)^- K^+) / \Gamma_{\text{total}}$   $\Gamma_{56} / \Gamma$**

VALUE (units  $10^{-4}$ )                      DOCUMENT ID    TECN    COMMENT

**2.16 ± 0.08 OUR AVERAGE**

2.22 ± 0.06 ± 0.08	<sup>1</sup> KROHN	23	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
2.06 ± 0.12 ± 0.06	<sup>2</sup> AUBERT	06A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

2.0 ± 0.4 ± 0.1	<sup>3</sup> ABE	01I	BELL	Repl. by KROHN 23
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- <sup>1</sup> KROHN 23 reports  $(2.221 \pm 0.063 \pm 0.077) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- K^+) / \Gamma_{\text{total}}] / [B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0)]$  assuming  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 0.486 \pm 0.006$ .
- <sup>2</sup> AUBERT 06A reports  $[\Gamma(B^0 \rightarrow D^*(2010)^- K^+) / \Gamma_{\text{total}}] / [B(B^0 \rightarrow D^*(2010)^- \pi^+)] = 0.0776 \pm 0.0034 \pm 0.0029$  which we multiply by our best value  $B(B^0 \rightarrow D^*(2010)^- \pi^+) = (2.66 \pm 0.07) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>3</sup> ABE 01I reports  $[\Gamma(B^0 \rightarrow D^*(2010)^- K^+) / \Gamma_{\text{total}}] / [B(B^0 \rightarrow D^*(2010)^- \pi^+)] = 0.074 \pm 0.015 \pm 0.006$  which we multiply by our best value  $B(B^0 \rightarrow D^*(2010)^- \pi^+) = (2.66 \pm 0.07) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^*(2010)^- K^+)/\Gamma(D^*(2010)^- \pi^+)$   $\Gamma_{56}/\Gamma_{48}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>8.22±0.29 OUR AVERAGE</b>	Error includes scale factor of 1.3.		
8.41±0.24±0.13	KROHN	23 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
7.76±0.34±0.26	AAIJ	13AO LHCB	$pp$ at 7 TeV

$\Gamma(D^*(2010)^- K^0 \pi^+)/\Gamma_{total}$   $\Gamma_{57}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>3.0±0.7±0.3</b>	<sup>1</sup> AUBERT,BE	05B BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .			

$\Gamma(D^*(2010)^- K^*(892)^+)/\Gamma_{total}$   $\Gamma_{58}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>3.3±0.6 OUR AVERAGE</b>			
3.2±0.6±0.3	<sup>1</sup> AUBERT,BE	05B BABR	$e^+e^- \rightarrow \Upsilon(4S)$
3.8±1.3±0.8	<sup>2</sup> MAHAPATRA	02 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .			
<sup>2</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ and an unpolarized final state.			

$\Gamma(D^*(2010)^- K^+ \bar{K}^0)/\Gamma_{total}$   $\Gamma_{59}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;4.7</b>	90	<sup>1</sup> DRUTSKOY	02 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .				

$\Gamma(D^*(2010)^- K^+ \bar{K}^*(892)^0)/\Gamma_{total}$   $\Gamma_{60}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>12.9±2.2±2.5</b>	<sup>1</sup> DRUTSKOY	02 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .			

$\Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^-)/\Gamma_{total}$   $\Gamma_{61}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>7.21±0.29 OUR AVERAGE</b>				
7.26±0.11±0.31		<sup>1</sup> LEES	16H BABR	$e^+e^- \rightarrow \Upsilon(4S)$
6.81±0.23±0.72		<sup>2</sup> MAJUMDER	04 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
6.3 ±1.0 ±1.1		<sup>3,4</sup> ALAM	94 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
13.4 ±3.6 ±0.1		<sup>5</sup> BORTOLETTO	092 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
10.1 ±4.1 ±0.1		<sup>6</sup> ALBRECHT	90J ARG	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

33 ±9 ±16		<sup>7</sup> ALBRECHT	87C ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<42	90	<sup>8</sup> BEBEK	87 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 0.486 \pm 0.006$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2010)^+ \rightarrow D^0 \pi^+)$  and absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0)/B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$ .

- <sup>4</sup>The three pion mass is required to be between 1.0 and 1.6 GeV consistent with an  $a_1$  meson. (If this channel is dominated by  $a_1^+$ , the branching ratio for  $\bar{D}^{*-} a_1^+$  is twice that for  $\bar{D}^{*-} \pi^+ \pi^+ \pi^-$ .)
- <sup>5</sup>BORTOLETTO 92 reports  $0.0159 \pm 0.0028 \pm 0.0037$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+ \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .
- <sup>6</sup>ALBRECHT 90J reports  $0.012 \pm 0.003 \pm 0.004$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+ \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .
- <sup>7</sup>ALBRECHT 87C use PDG 86 branching ratios for  $D$  and  $D^*(2010)$  and assume  $B(\Upsilon(4S) \rightarrow B^+ B^-) = 55\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 45\%$ . Superseded by ALBRECHT 90J.
- <sup>8</sup>BEBEK 87 value has been updated in BERKELMAN 91 to use same assumptions as noted for BORTOLETTO 92.

**$\Gamma((D^*(2010)^- \pi^+ \pi^+ \pi^-) \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{62}/\Gamma$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.0000±0.0019±0.0016</b>	<sup>1</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>BORTOLETTO 92 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$  and  $D^*(2010)$ .

**$\Gamma(D^*(2010)^- \pi^+ \rho^0)/\Gamma_{\text{total}}$   $\Gamma_{63}/\Gamma$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.00573±0.00317±0.00004</b>	<sup>1</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>BORTOLETTO 92 reports  $0.0068 \pm 0.0032 \pm 0.0021$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+ \rho^0)/\Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .

**$\Gamma(D^*(2010)^- a_1(1260)^+)/\Gamma_{\text{total}}$   $\Gamma_{64}/\Gamma$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.0130±0.0027 OUR AVERAGE</b>			
0.0126±0.0020±0.0022	<sup>1,2</sup> ALAM 94	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0152±0.0070±0.0001	<sup>3</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>ALAM 94 value is twice their  $\Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^-)/\Gamma_{\text{total}}$  value based on their observation that the three pions are dominantly in the  $a_1(1260)$  mass range 1.0 to 1.6 GeV.

<sup>2</sup>ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2010)^+ \rightarrow D^0 \pi^+)$  and absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0)/B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$ .



<sup>3</sup> BORTOLETTO 92 reports  $0.018 \pm 0.006 \pm 0.006$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- a_1(1260)^+)/\Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .

$\Gamma(\overline{D}_1(2420)^0 \pi^- \pi^+, \overline{D}_1^0 \rightarrow D^{*-} \pi^+)/\Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^-)$	$\Gamma_{65}/\Gamma_{61}$		
VALUE	DOCUMENT ID	TECN	COMMENT
$(2.04 \pm 0.42 \pm 0.22) \times 10^{-2}$	AAIJ	13AO LHCB	$pp$ at 7 TeV

$\Gamma(D^*(2010)^- K^+ \pi^- \pi^+)/\Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^-)$	$\Gamma_{66}/\Gamma_{61}$		
VALUE	DOCUMENT ID	TECN	COMMENT
$(6.47 \pm 0.37 \pm 0.35) \times 10^{-2}$	AAIJ	13AO LHCB	$pp$ at 7 TeV

$\Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$	$\Gamma_{67}/\Gamma$			
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.0176 ± 0.0027 OUR AVERAGE</b>				
0.0172 ± 0.0014 ± 0.0024		<sup>1</sup> ALEXANDER 01B	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0345 ± 0.0181 ± 0.0003	28	<sup>2</sup> ALBRECHT 90J	ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ . The signal is consistent with all observed  $\omega \pi^+$  having proceeded through the  $\rho'^+$  resonance at mass  $1349 \pm 25_{-5}^{+10}$  MeV and width  $547 \pm 86_{-45}^{+46}$  MeV.

<sup>2</sup> ALBRECHT 90J reports  $0.041 \pm 0.015 \pm 0.016$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- \pi^+ \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}] \times [B(D^*(2010)^+ \rightarrow D^0 \pi^+)]$  assuming  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 0.57 \pm 0.06$ , which we rescale to our best value  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = (67.7 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .

$\Gamma(D^{*-} 3\pi^+ 2\pi^-)/\Gamma_{\text{total}}$	$\Gamma_{68}/\Gamma$		
VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>4.72 ± 0.59 ± 0.71</b>	<sup>1</sup> MAJUMDER 04	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^*(2010)^- \omega \pi^+)/\Gamma_{\text{total}}$	$\Gamma_{69}/\Gamma$		
VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>2.46 ± 0.18 OUR AVERAGE</b>	Error includes scale factor of 1.2.		
2.31 ± 0.11 ± 0.14	<sup>1</sup> MATVIENKO 15	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
2.88 ± 0.21 ± 0.31	<sup>1</sup> AUBERT 06L	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
2.9 ± 0.3 ± 0.4	<sup>1,2</sup> ALEXANDER 01B	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> The signal is consistent with all observed  $\omega \pi^+$  having proceeded through the  $\rho'^+$  resonance at mass  $1349 \pm 25_{-5}^{+10}$  MeV and width  $547 \pm 86_{-45}^{+46}$  MeV.

$\Gamma(\bar{D}_1(2430)^0 \omega, \bar{D}_1^0 \rightarrow D^{*-} \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{70}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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**$2.7^{+0.8}_{-0.4}$  OUR AVERAGE**

$2.5 \pm 0.4^{+0.8}_{-0.2}$	1,2	MATVIENKO 15	BELL	$e^+ e^- \rightarrow \gamma(4S)$
$4.1 \pm 1.2 \pm 1.1$	3	AUBERT 06L	BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$ .

<sup>2</sup> The measurement is obtained by amplitude analysis of  $B^0 \rightarrow D^{*-} \omega \pi^+$ . The second uncertainty combines in quadrature experimental systematic and model uncertainties.

<sup>3</sup> Obtained by fitting the events with  $\cos \theta_{D^*} < 0.5$  and scaling up the result by a factor of 4/3. No interference effects between  $B^0 \rightarrow D_1' \omega$  and  $D^* \omega \pi$  are assumed.

$\Gamma(D^{*-} \rho(1450)^+, \rho^+ \rightarrow \omega \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{71}/\Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
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<b><math>1.07^{+0.15+0.40}_{-0.31-0.13}</math></b>	1,2	MATVIENKO 15	BELL	$e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Obtained by amplitude analysis of  $\bar{B}^0 \rightarrow D^{*-} \omega \pi^+$ . The second uncertainty combines in quadrature experimental systematic and model uncertainties.

<sup>2</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\gamma(4S)$ .

$\Gamma(\bar{D}_1(2420)^0 \omega, \bar{D}_1^0 \rightarrow D^{*-} \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{72}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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<b><math>0.7 \pm 0.2 \pm 0.1</math></b>	1,2	MATVIENKO 15	BELL	$e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Obtained by amplitude analysis of  $\bar{B}^0 \rightarrow D^{*-} \omega \pi^+$ . The second uncertainty combines in quadrature experimental systematic and model uncertainties.

<sup>2</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\gamma(4S)$ .

$\Gamma(\bar{D}_2^*(2460)^0 \omega, \bar{D}_2^0 \rightarrow D^{*-} \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{73}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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<b><math>0.4 \pm 0.1 \pm 0.1</math></b>	1,2	MATVIENKO 15	BELL	$e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Obtained by amplitude analysis of  $\bar{B}^0 \rightarrow D^{*-} \omega \pi^+$ . The second uncertainty combines in quadrature experimental systematic and model uncertainties.

<sup>2</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\gamma(4S)$ .

$\Gamma(D^{*-} b_1(1235)^+, b_1^+ \rightarrow \omega \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{74}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$< 0.7 \times 10^{-4}$	90	1 MATVIENKO 15	BELL	$e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\gamma(4S)$ .

$\Gamma(\bar{D}^{*-} \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{75}/\Gamma$

$D^{*-}$  represents an excited state with mass  $2.2 < M < 2.8 \text{ GeV}/c^2$ .

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
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<b><math>1.9 \pm 0.9 \pm 0.1</math></b>	1,2	AUBERT, BE 06J	BABR	$e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> AUBERT, BE 06J reports  $[\Gamma(B^0 \rightarrow \bar{D}^{*-} \pi^+)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow D^- \pi^+)] = 0.77 \pm 0.22 \pm 0.29$  which we multiply by our best value  $B(B^0 \rightarrow D^- \pi^+) = (2.51 \pm 0.08) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Uses a missing-mass method. Does not depend on  $D$  branching fractions or  $B^+/B^0$  production rates.

$$\Gamma(D_1(2420)^- \pi^+, D_1^- \rightarrow D^- \pi^+ \pi^-) / \Gamma_{\text{total}} \quad \Gamma_{76} / \Gamma$$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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**0.99<sup>+0.20</sup><sub>-0.25</sub> OUR FIT**

<b>0.89<math>\pm</math>0.15<sup>+0.17</sup><sub>-0.32</sub></b>	<sup>1</sup> ABE	05A	BELL $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$$\Gamma(D_1(2420)^- \pi^+, D_1^- \rightarrow D^- \pi^+ \pi^-) / \Gamma(D^- \pi^+ \pi^+ \pi^-) \quad \Gamma_{76} / \Gamma_{50}$$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
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**1.7 $\pm$ 0.4 OUR FIT**

<b>2.1<math>\pm</math>0.5<sup>+0.3</sup><sub>-0.5</sub></b>	AAIJ	11E	LHCB $pp$ at 7 TeV
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$$\Gamma(D_1(2420)^- \pi^+, D_1^- \rightarrow D^{*-} \pi^+ \pi^-) / \Gamma_{\text{total}} \quad \Gamma_{77} / \Gamma$$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.33</b>	90	<sup>1</sup> ABE	05A	BELL $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$$\Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^-) / \Gamma(D^*(2010)^- \pi^+) \quad \Gamma_{61} / \Gamma_{48}$$

VALUE	DOCUMENT ID	TECN	COMMENT
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<b>2.64<math>\pm</math>0.04<math>\pm</math>0.13</b>	AAIJ	13A0	LHCB $pp$ at 7 TeV
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$$\Gamma(\overline{D}_2^*(2460)^- \pi^+, D_2^{*-} \rightarrow D^0 \pi^-) / \Gamma_{\text{total}} \quad \Gamma_{78} / \Gamma$$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**2.38 $\pm$ 0.16 OUR AVERAGE**

2.44 $\pm$ 0.07 $\pm$ 0.16	<sup>1</sup> AAIJ	15Y	LHCB $pp$ at 7, 8 TeV
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2.15 $\pm$ 0.17 $\pm$ 0.31	<sup>2,3</sup> KUZMIN	07	BELL $e^+ e^- \rightarrow \gamma(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<14.7	90	<sup>2</sup> ALAM	94	CLE2 $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Result obtained using the isobar formalism. The second uncertainty combines in quadrature all systematic uncertainties quoted in the paper.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>3</sup> Our second uncertainty combines systematics and model errors quoted in the paper.

$$\Gamma(\overline{D}_0^*(2400)^- \pi^+, D_0^{*-} \rightarrow D^0 \pi^-) / \Gamma_{\text{total}} \quad \Gamma_{79} / \Gamma$$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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**0.76 $\pm$ 0.08 OUR AVERAGE**

0.77 $\pm$ 0.05 $\pm$ 0.06	<sup>1</sup> AAIJ	15Y	LHCB $pp$ at 7, 8 TeV
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0.60 $\pm$ 0.13 $\pm$ 0.27	<sup>2,3</sup> KUZMIN	07	BELL $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Result obtained using the isobar formalism. The second uncertainty combines in quadrature all systematic uncertainties quoted in the paper.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>3</sup> Our second uncertainty combines systematics and model errors quoted in the paper.

$$\Gamma(D_2^*(2460)^- \pi^+, D_2^{*-} \rightarrow D^{*-} \pi^+ \pi^-) / \Gamma_{\text{total}} \quad \Gamma_{80} / \Gamma$$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.24</b>	90	<sup>1</sup> ABE	05A	BELL $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(\overline{D}_2^*(2460)^- \rho^+)/\Gamma_{\text{total}}$   $\Gamma_{81}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0049	90	<sup>1</sup> ALAM	94 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALAM 94 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II absolute  $B(D^0 \rightarrow K^- \pi^+)$  and  $B(D_2^*(2460)^+ \rightarrow D^0 \pi^+) = 30\%$ .

$\Gamma(D^0 \overline{D}^0)/\Gamma_{\text{total}}$   $\Gamma_{82}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.14 ± 0.06 ± 0.03</b>		<sup>1</sup> AAIJ	13AP LHCB	$pp$ at 7 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.43	90	<sup>2</sup> ADACHI	08 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
<0.6	90	<sup>2</sup> AUBERT,B	06A BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses  $B(B^0 \rightarrow D^- D^+) = (2.11 \pm 0.31) \times 10^{-4}$  and  $B(B^+ \rightarrow \overline{D}^0 D_s^+) = (10.1 \pm 1.7) \times 10^{-3}$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^{*0} \overline{D}^0)/\Gamma_{\text{total}}$   $\Gamma_{83}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<2.9	90	<sup>1</sup> AUBERT,B	06A BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- D^+)/\Gamma_{\text{total}}$   $\Gamma_{84}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.11 ± 0.18 OUR AVERAGE</b>				
2.12 ± 0.16 ± 0.18		<sup>1</sup> ROHRKEN	12 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
1.97 ± 0.20 ± 0.20		<sup>1</sup> FRATINA	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
2.8 ± 0.4 ± 0.5		<sup>1</sup> AUBERT,B	06A BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.91 ± 0.51 ± 0.30		<sup>1</sup> MAJUMDER	05 BELL	Repl. by FRATINA 07
< 9.4	90	<sup>1</sup> LIPELES	00 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<59	90	BARATE	98Q ALEP	$e^+e^- \rightarrow Z$
<12	90	ASNER	97 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^\pm D^{*\mp} (CP\text{-averaged}))/\Gamma_{\text{total}}$   $\Gamma_{85}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>6.14 ± 0.29 ± 0.50</b>	<sup>1</sup> ROHRKEN	12 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- D_s^+)/\Gamma_{\text{total}}$				$\Gamma_{86}/\Gamma$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.0072±0.0008 OUR AVERAGE</b>				
0.0073±0.0004±0.0007		<sup>1</sup> ZUPANC	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0066±0.0014±0.0006		<sup>2</sup> AUBERT	06N BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0068±0.0024±0.0006		<sup>3</sup> GIBAUT	96 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.010 ±0.009 ±0.001		<sup>4</sup> ALBRECHT	92G ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0053±0.0030±0.0005		<sup>5</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.012 ±0.007	3	<sup>6</sup> BORTOLETTO90	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ZUPANC 07 reports  $(7.5 \pm 0.2 \pm 1.1) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^- D_s^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = (4.4 \pm 0.6) \times 10^{-2}$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> AUBERT 06N reports  $(0.64 \pm 0.13 \pm 0.10) \times 10^{-2}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^- D_s^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.0462 \pm 0.0062$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> GIBAUT 96 reports  $0.0087 \pm 0.0024 \pm 0.0020$  from a measurement of  $[\Gamma(B^0 \rightarrow D^- D_s^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.035$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> ALBRECHT 92G reports  $0.017 \pm 0.013 \pm 0.006$  from a measurement of  $[\Gamma(B^0 \rightarrow D^- D_s^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990  $D^+$  branching ratios, e.g.,  $B(D^+ \rightarrow K^- 2\pi^+) = 7.7 \pm 1.0\%$ .

<sup>5</sup> BORTOLETTO 92 reports  $0.0080 \pm 0.0045 \pm 0.0030$  from a measurement of  $[\Gamma(B^0 \rightarrow D^- D_s^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.030 \pm 0.011$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .

<sup>6</sup> BORTOLETTO 90 assume  $B(D_s \rightarrow \phi\pi^+) = 2\%$ . Superseded by BORTOLETTO 92.

$\Gamma(D^{*(2010)-} D_s^+)/\Gamma_{\text{total}}$				$\Gamma_{88}/\Gamma$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.0080±0.0011 OUR AVERAGE</b>				
0.0073±0.0013±0.0007		<sup>1</sup> AUBERT	06N BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0083±0.0015±0.0007		<sup>2</sup> AUBERT	03I BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
0.0088±0.0017±0.0008		<sup>3</sup> AHMED	00B CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
0.008 ±0.006 ±0.001		<sup>4</sup> ALBRECHT	92G ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
0.011 ±0.006 ±0.001		<sup>5</sup> BORTOLETTO92	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				

0.0072 ± 0.0022 ± 0.0006      <sup>6</sup> GIBAUT      96    CLE2    Repl. by AHMED 00B  
 0.024 ± 0.014                    3      <sup>7</sup> BORTOLETTO90    CLEO    e<sup>+</sup>e<sup>-</sup> →  $\Upsilon(4S)$

<sup>1</sup> AUBERT 06N reports  $(0.71 \pm 0.13 \pm 0.09) \times 10^{-2}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^+) / \Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.0462 \pm 0.0062$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> AUBERT 03I reports  $0.0103 \pm 0.0014 \pm 0.0013$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^+) / \Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.036$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> AHMED 00B reports  $0.0110 \pm 0.0018 \pm 0.0011$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^+) / \Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.036$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> ALBRECHT 92G reports  $0.014 \pm 0.010 \pm 0.003$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^+) / \Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990  $D^+$  and  $D^*(2010)^+$  branching ratios, e.g.,  $B(D^0 \rightarrow K^- \pi^+) = 3.71 \pm 0.25\%$ ,  $B(D^+ \rightarrow K^- 2\pi^+) = 7.1 \pm 1.0\%$ , and  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 55 \pm 4\%$ .

<sup>5</sup> BORTOLETTO 92 reports  $0.016 \pm 0.009 \pm 0.006$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^+) / \Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.030 \pm 0.011$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$  and  $D^*(2010)$ .

<sup>6</sup> GIBAUT 96 reports  $0.0093 \pm 0.0023 \pm 0.0016$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^+) / \Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.035$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>7</sup> BORTOLETTO 90 assume  $B(D_s \rightarrow \phi \pi^+) = 2\%$ . Superseded by BORTOLETTO 92.

$\Gamma(D^*(2010)^- D_s^+) / \Gamma(\bar{D}^0 D_s^+ \pi^-)$   $\Gamma_{88} / \Gamma_{87}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>15.8 ± 1.3 ± 2.4</b>	<sup>1</sup> AAIJ	23B	LHCB $pp$ at 7, 8, 13 TeV

<sup>1</sup> Uses simultaneous fits of  $\bar{B}^0 \rightarrow \bar{D}^0 D_s^+ \pi^-$  and  $B^+ \rightarrow D^- D_s^+ \pi^+$  amplitudes assuming isospin symmetry.

$\Gamma(D_2^*(2460)^- D_s^+)/\Gamma(\bar{D}^0 D_s^+ \pi^-)$   $\Gamma_{89}/\Gamma_{87}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>22.38±0.88±0.60</b>	<sup>1</sup> AAIJ	23B	LHCB $pp$ at 7, 8, 13 TeV

<sup>1</sup> Uses simultaneous fits of  $\bar{B}^0 \rightarrow \bar{D}^0 D_s^+ \pi^-$  and  $B^+ \rightarrow D^- D_s^+ \pi^+$  amplitudes assuming isospin symmetry.

$\Gamma(D_1^*(2600)^- D_s^+)/\Gamma(\bar{D}^0 D_s^+ \pi^-)$   $\Gamma_{90}/\Gamma_{87}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.35±0.40±0.59</b>	<sup>1</sup> AAIJ	23B	LHCB $pp$ at 7, 8, 13 TeV

<sup>1</sup> Uses simultaneous fits of  $\bar{B}^0 \rightarrow \bar{D}^0 D_s^+ \pi^-$  and  $B^+ \rightarrow D^- D_s^+ \pi^+$  amplitudes assuming isospin symmetry.

$\Gamma(D_3^*(2750)^- D_s^+)/\Gamma(\bar{D}^0 D_s^+ \pi^-)$   $\Gamma_{91}/\Gamma_{87}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.31±0.14±0.17</b>	<sup>1</sup> AAIJ	23B	LHCB $pp$ at 7, 8, 13 TeV

<sup>1</sup> Uses simultaneous fits of  $\bar{B}^0 \rightarrow \bar{D}^0 D_s^+ \pi^-$  and  $B^+ \rightarrow D^- D_s^+ \pi^+$  amplitudes assuming isospin symmetry.

$\Gamma(D_1^*(2760)^- D_s^+)/\Gamma(\bar{D}^0 D_s^+ \pi^-)$   $\Gamma_{92}/\Gamma_{87}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.28±0.25±1.48</b>	<sup>1</sup> AAIJ	23B	LHCB $pp$ at 7, 8, 13 TeV

<sup>1</sup> Uses simultaneous fits of  $\bar{B}^0 \rightarrow \bar{D}^0 D_s^+ \pi^-$  and  $B^+ \rightarrow D^- D_s^+ \pi^+$  amplitudes assuming isospin symmetry.

$\Gamma(D_J^*(3000)^- D_s^+)/\Gamma(\bar{D}^0 D_s^+ \pi^-)$   $\Gamma_{93}/\Gamma_{87}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.45±0.16±0.38</b>	<sup>1</sup> AAIJ	23B	LHCB $pp$ at 7, 8, 13 TeV

<sup>1</sup> Uses simultaneous fits of  $\bar{B}^0 \rightarrow \bar{D}^0 D_s^+ \pi^-$  and  $B^+ \rightarrow D^- D_s^+ \pi^+$  amplitudes assuming isospin symmetry.

$\Gamma(T_{cs0}^*(2870)^0 \bar{D}^0)/\Gamma(\bar{D}^0 D_s^+ \pi^-)$   $\Gamma_{94}/\Gamma_{87}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>2.48±0.67±0.77</b>	<sup>1</sup> AAIJ	23B	LHCB $pp$ at 7, 8, 13 TeV

<sup>1</sup> Uses simultaneous fits of  $\bar{B}^0 \rightarrow \bar{D}^0 D_s^+ \pi^-$  and  $B^+ \rightarrow D^- D_s^+ \pi^+$  amplitudes assuming isospin symmetry.

$\Gamma(D^- D_s^{*+})/\Gamma_{\text{total}}$   $\Gamma_{95}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.0074±0.0016 OUR AVERAGE</b>			
0.0071±0.0016±0.0006	<sup>1</sup> AUBERT	06N	BABR $e^+ e^- \rightarrow \gamma(4S)$
0.0078±0.0032±0.0007	<sup>2</sup> GIBAUT	96	CLE2 $e^+ e^- \rightarrow \gamma(4S)$
0.016 ±0.012 ±0.001	<sup>3</sup> ALBRECHT	92G	ARG $e^+ e^- \rightarrow \gamma(4S)$

- <sup>1</sup> AUBERT 06N reports  $(0.69 \pm 0.16 \pm 0.09) \times 10^{-2}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^- D_s^{*+})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.0462 \pm 0.0062$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>2</sup> GIBAUT 96 reports  $0.0100 \pm 0.0035 \pm 0.0022$  from a measurement of  $[\Gamma(B^0 \rightarrow D^- D_s^{*+})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.035$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>3</sup> ALBRECHT 92G reports  $0.027 \pm 0.017 \pm 0.009$  from a measurement of  $[\Gamma(B^0 \rightarrow D^- D_s^{*+})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990  $D^+$  branching ratios, e.g.,  $B(D^+ \rightarrow K^- 2\pi^+) = 7.7 \pm 1.0\%$ .

$\Gamma(D^*(2010)^- D_s^{*+})/\Gamma_{\text{total}}$   $\Gamma_{96}/\Gamma$

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*VALUE* *DOCUMENT ID* *TECN* *COMMENT*

**0.0177 ± 0.0014 OUR AVERAGE**

0.0173 ± 0.0018 ± 0.0015	<sup>1</sup> AUBERT	06N	BABR	$e^+e^- \rightarrow \gamma(4S)$
0.0188 ± 0.0009 ± 0.0017	<sup>2</sup> AUBERT	05V	BABR	$e^+e^- \rightarrow \gamma(4S)$
0.0158 ± 0.0027 ± 0.0014	<sup>3</sup> AUBERT	03I	BABR	$e^+e^- \rightarrow \gamma(4S)$
0.015 ± 0.004 ± 0.001	<sup>4</sup> AHMED	00B	CLE2	$e^+e^- \rightarrow \gamma(4S)$
0.016 ± 0.009 ± 0.001	<sup>5</sup> ALBRECHT	92G	ARG	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.016 ± 0.005 ± 0.001	<sup>6</sup> GIBAUT	96	CLE2	Repl. by AHMED 00B
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- <sup>1</sup> AUBERT 06N reports  $(1.68 \pm 0.21 \pm 0.19) \times 10^{-2}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^{*+})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.0462 \pm 0.0062$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>2</sup> A partial reconstruction technique is used and the result is independent of the particle decay rate of  $D_s^+$  meson. It also provides a model-independent determination of  $B(D_s^+ \rightarrow \phi\pi^+) = (4.81 \pm 0.52 \pm 0.38)\%$ .
- <sup>3</sup> AUBERT 03I reports  $0.0197 \pm 0.0015 \pm 0.0030$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^{*+})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>4</sup> AHMED 00B reports  $0.0182 \pm 0.0037 \pm 0.0025$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^{*+})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>5</sup> ALBRECHT 92G reports  $0.026 \pm 0.014 \pm 0.006$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^{*+})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$ ,



which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes PDG 1990  $D^+$  and  $D^*(2010)^+$  branching ratios, e.g.,  $B(D^0 \rightarrow K^- \pi^+) = 3.71 \pm 0.25\%$ ,  $B(D^+ \rightarrow K^- 2\pi^+) = 7.1 \pm 1.0\%$ , and  $B(D^*(2010)^+ \rightarrow D^0 \pi^+) = 55 \pm 4\%$ .

<sup>6</sup> GIBAUT 96 reports  $0.0203 \pm 0.0050 \pm 0.0036$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^{*+})/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.035$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D^*(2010)^- D_s^{*+})/\Gamma(D^*(2010)^- D_s^+)$   $\Gamma_{96}/\Gamma_{88}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>2.19±0.08±0.01</b>	<sup>1</sup> AAIJ	21S	LHCB $pp$ at 13 TeV

<sup>1</sup>AAIJ 21S reports  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^{*+})/\Gamma(B^0 \rightarrow D^*(2010)^- D_s^+)] \times [B(D_s^{*+} \rightarrow D_s^+ \gamma)] = 2.045 \pm 0.022 \pm 0.071$  which we divide by our best value  $B(D_s^{*+} \rightarrow D_s^+ \gamma) = (93.6 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$[\Gamma(D^*(2010)^- D_s^+) + \Gamma(D^*(2010)^- D_s^{*+})]/\Gamma_{\text{total}}$   $(\Gamma_{88} + \Gamma_{96})/\Gamma$

VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b>2.5 ± 0.4 OUR AVERAGE</b>				

2.40±0.35±0.22		<sup>1</sup> AUBERT	03I	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
3.3 ± 0.9 ± 0.3	22	<sup>2</sup> BORTOLETTO90	CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>AUBERT 03I reports  $(3.00 \pm 0.19 \pm 0.39) \times 10^{-2}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^+) + \Gamma(B^0 \rightarrow D^*(2010)^- D_s^{*+})]/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.036$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup>BORTOLETTO 90 reports  $(7.5 \pm 2.0) \times 10^{-2}$  from a measurement of  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_s^+) + \Gamma(B^0 \rightarrow D^*(2010)^- D_s^{*+})]/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.02$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{s0}(2317)^- K^+, D_{s0}^- \rightarrow D_s^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{97}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b>4.2<sup>+1.4</sup><sub>-1.3</sub>±0.4</b>	<sup>1</sup> DRUTSKOY	05	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>DRUTSKOY 05 reports  $(5.3^{+1.5}_{-1.3} \pm 1.6) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_{s0}(2317)^- K^+, D_{s0}^- \rightarrow D_s^- \pi^0)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.036 \pm 0.009$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{s0}(2317)^- \pi^+, D_{s0}^- \rightarrow D_s^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{98}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<2.5	90	<sup>1</sup> DRUTSKOY 05	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_{sJ}(2457)^- K^+, D_{sJ}^- \rightarrow D_s^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{99}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<0.94	90	<sup>1</sup> DRUTSKOY 05	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_{sJ}(2457)^- \pi^+, D_{sJ}^- \rightarrow D_s^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{100}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<0.40	90	<sup>1</sup> DRUTSKOY 05	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_s^- D_s^+)/\Gamma_{\text{total}}$   $\Gamma_{101}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< $3.6 \times 10^{-5}$	90	<sup>1</sup> ZUPANC 07	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<10 $\times 10^{-5}$	90	<sup>1</sup> AUBERT,BE 05F	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_s^{*-} D_s^+)/\Gamma_{\text{total}}$   $\Gamma_{102}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< $1.3 \times 10^{-4}$	90	<sup>1</sup> AUBERT,BE 05F	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_s^{*-} D_s^{*+})/\Gamma_{\text{total}}$   $\Gamma_{103}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< $2.4 \times 10^{-4}$	90	<sup>1</sup> AUBERT,BE 05F	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_{s0}^*(2317)^+ D^-, D_{s0}^{*+} \rightarrow D_s^+ \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{104}/\Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.06 ± 0.16 OUR AVERAGE</b>	Error includes scale factor of 1.1.		

$1.00^{+0.16}_{-0.15} \pm 0.03$	<sup>1,2</sup> CHOI 15A	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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$1.4^{+0.5}_{-0.4} \pm 0.1$	<sup>2,3</sup> AUBERT,B 04S	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.69^{+0.29}_{-0.24} \pm 0.06$	<sup>2,4</sup> KROKOVNY 03B	BELL	Repl. by CHOI 15A
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<sup>1</sup> CHOI 15A reports  $(10.2^{+1.3}_{-1.2} \pm 1.0 \pm 0.4) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_{s0}^*(2317)^+ D^-, D_{s0}^{*+} \rightarrow D_s^+ \pi^0)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow K^+ K^- \pi^+)] \times [B(D_s^+ \rightarrow K^- 2\pi^+)]$  assuming  $B(D_s^+ \rightarrow K^+ K^- \pi^+) = (5.39 \pm 0.21) \times 10^{-2}$ ,  $B(D_s^+ \rightarrow K^- 2\pi^+) = (9.13 \pm 0.19) \times 10^{-2}$ , which we rescale to our best values  $B(D_s^+ \rightarrow K^+ K^- \pi^+) = (5.37 \pm 0.10) \times 10^{-2}$ ,  $B(D_s^+ \rightarrow K^- 2\pi^+) = (9.38 \pm 0.16) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best values.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> AUBERT,B 04s reports  $(1.8 \pm 0.4^{+0.7}_{-0.5}) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_{s0}^*(2317)^+ D^-, D_{s0}^{*+} \rightarrow D_s^+ \pi^0)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.036 \pm 0.009$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> KROKOVNY 03B reports  $(0.86^{+0.33}_{-0.26} \pm 0.26) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_{s0}^*(2317)^+ D^-, D_{s0}^{*+} \rightarrow D_s^+ \pi^0)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.036 \pm 0.009$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(D_{s0}(2317)^+ D^-, D_{s0}^{*+} \rightarrow D_s^{*+} \gamma)/\Gamma_{\text{total}}$   $\Gamma_{105}/\Gamma$**

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;0.95</b>	90	<sup>1</sup> KROKOVNY 03B	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(D_{s0}(2317)^+ D^*(2010)^-, D_{s0}^{*+} \rightarrow D_s^+ \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{106}/\Gamma$**

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>1.5 \pm 0.4^{+0.5}_{-0.4}</math></b>	<sup>1</sup> AUBERT,B 04s	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(D_{sJ}(2457)^+ D^-)/\Gamma_{\text{total}}$   $\Gamma_{107}/\Gamma$**

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>3.5 \pm 1.1</math> OUR AVERAGE</b>			
$2.6 \pm 1.5 \pm 0.7$	<sup>1</sup> AUBERT 06N	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$4.8^{+2.2}_{-1.6} \pm 1.1$	<sup>2,3</sup> AUBERT,B 04s	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$3.9^{+1.5}_{-1.3} \pm 0.9$	<sup>2,4</sup> KROKOVNY 03B	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses a missing-mass method in the events that one of the  $B$  mesons is fully reconstructed.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> AUBERT,B 04s reports  $[\Gamma(B^0 \rightarrow D_{sJ}(2457)^+ D^-)/\Gamma_{\text{total}}] \times [B(D_{s1}(2460)^+ \rightarrow D_s^{*+} \pi^0)] = (2.3^{+1.0}_{-0.7} \pm 0.3) \times 10^{-3}$  which we divide by our best value  $B(D_{s1}(2460)^+ \rightarrow D_s^{*+} \pi^0) = (48 \pm 11) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> KROKOVNY 03B reports  $[\Gamma(B^0 \rightarrow D_{sJ}(2457)^+ D^-)/\Gamma_{\text{total}}] \times [B(D_{s1}(2460)^+ \rightarrow D_s^{*+} \pi^0)] = (1.9^{+0.7}_{-0.6} \pm 0.2) \times 10^{-3}$  which we divide by our best value  $B(D_{s1}(2460)^+ \rightarrow D_s^{*+} \pi^0)$ .

$D_s^{*+} \pi^0 = (48 \pm 11) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^+ \gamma) / \Gamma_{\text{total}}$   $\Gamma_{108}/\Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
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**$0.65^{+0.17}_{-0.14}$  OUR AVERAGE**

$0.64^{+0.24}_{-0.16} \pm 0.06$	1,2	AUBERT,B	04s	BABR	$e^+ e^- \rightarrow \gamma(4S)$
$0.66^{+0.21}_{-0.19} \pm 0.06$	1,3	KROKOVNY	03B	BELL	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> AUBERT,B 04s reports  $(0.8 \pm 0.2^{+0.3}_{-0.2}) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^+ \gamma) / \Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.036 \pm 0.009$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> KROKOVNY 03B reports  $(0.82^{+0.22}_{-0.19} \pm 0.25) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^+ \gamma) / \Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.036 \pm 0.009$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^{*+} \gamma) / \Gamma_{\text{total}}$   $\Gamma_{109}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.60</b>	90	1	KROKOVNY	03B	BELL $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^+ \pi^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{110}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.20</b>	90	1	KROKOVNY	03B	BELL $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(D_{sJ}(2457)^+ D^-, D_{sJ}^+ \rightarrow D_s^+ \pi^0) / \Gamma_{\text{total}}$   $\Gamma_{111}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.36</b>	90	1	KROKOVNY	03B	BELL $e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(D^*(2010)^- D_{sJ}(2457)^+) / \Gamma_{\text{total}}$   $\Gamma_{112}/\Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
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**$9.3 \pm 2.2$  OUR AVERAGE**

$8.8 \pm 2.0 \pm 1.4$	1	AUBERT	06N	BABR	$e^+ e^- \rightarrow \gamma(4S)$
11 $\begin{matrix} +5 \\ -4 \end{matrix} \pm 3$	2,3	AUBERT,B	04s	BABR	$e^+ e^- \rightarrow \gamma(4S)$

- <sup>1</sup> Uses a missing-mass method in the events that one of the  $B$  mesons is fully reconstructed.  
<sup>2</sup> AUBERT,B 04S reports  $[\Gamma(B^0 \rightarrow D^*(2010)^- D_{sJ}(2457)^+)/\Gamma_{\text{total}}] \times [B(D_{s1}(2460)^+ \rightarrow D_s^{*+} \pi^0)] = (5.5 \pm 1.2_{-1.6}^{+2.2}) \times 10^{-3}$  which we divide by our best value  $B(D_{s1}(2460)^+ \rightarrow D_s^{*+} \pi^0) = (48 \pm 11) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.  
<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_{sJ}(2457)^+ D^*(2010), D_{sJ}^+ \rightarrow D_s^+ \gamma)/\Gamma_{\text{total}} \quad \Gamma_{113}/\Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.3 \pm 0.3_{-0.6}^{+0.9}</math></b>	<sup>1</sup> AUBERT,B 04S	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$[\Gamma(D^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*0} K^+) + \Gamma(D^{*+} K^0)]/\Gamma_{\text{total}} \quad \Gamma_{114}/\Gamma = (\Gamma_{115} + \Gamma_{116})/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.75 \pm 0.62 \pm 0.36</math></b>	<sup>1,2</sup> AUSHEV 11	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> Uses  $\Gamma(D^*(2007)^0 \rightarrow D^0 \pi^0) / \Gamma(D^*(2007)^0 \rightarrow D^0 \gamma) = 1.74 \pm 0.13$  and  $\Gamma(D_{s1}(2536)^+ \rightarrow D^*(2007)^0 K^+) / \Gamma(D_{s1}(2536)^+ \rightarrow D^*(2010)^+ K^0) = 1.36 \pm 0.2$ .  
<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*0} K^+)/\Gamma_{\text{total}} \quad \Gamma_{115}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>1.71 \pm 0.48 \pm 0.32</math></b>		<sup>1</sup> AUBERT 08B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<5                      90                      AUBERT 03X                      BABR                      Repl. by AUBERT 08B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*+} K^0)/\Gamma_{\text{total}} \quad \Gamma_{116}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.61 \pm 1.03 \pm 0.31</math></b>	<sup>1</sup> AUBERT 08B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$[\Gamma(D^*(2010)^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*0} K^+) + \Gamma(D^{*+} K^0)]/\Gamma_{\text{total}} \quad \Gamma_{117}/\Gamma = (\Gamma_{118} + \Gamma_{119})/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>5.01 \pm 1.21 \pm 0.70</math></b>	<sup>1,2</sup> AUSHEV 11	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> Uses  $\Gamma(D^*(2007)^0 \rightarrow D^0 \pi^0) / \Gamma(D^*(2007)^0 \rightarrow D^0 \gamma) = 1.74 \pm 0.13$  and  $\Gamma(D_{s1}(2536)^+ \rightarrow D^*(2007)^0 K^+) / \Gamma(D_{s1}(2536)^+ \rightarrow D^*(2010)^+ K^0) = 1.36 \pm 0.2$ .  
<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^*(2010)^- D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*0} K^+)/\Gamma_{\text{total}} \quad \Gamma_{118}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>3.32 \pm 0.88 \pm 0.66</math></b>		<sup>1</sup> AUBERT 08B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<7                      90                      AUBERT 03X                      BABR                      Repl. by AUBERT 08B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^{*-} D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*+} K^0)/\Gamma_{\text{total}}$   $\Gamma_{119}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>5.00±1.51±0.67</b>		<sup>1</sup> AUBERT	08B	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- D_{sJ}(2573)^+, D_{sJ}^+ \rightarrow D^0 K^+)/\Gamma_{\text{total}}$   $\Gamma_{120}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>3.4±1.7±0.5</b>		<sup>1</sup> LEES	15C	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<10	90	AUBERT	03X	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^*(2010)^- D_{sJ}(2573)^+, D_{sJ}^+ \rightarrow D^0 K^+)/\Gamma_{\text{total}}$   $\Gamma_{121}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<2	90	AUBERT	03X	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(D^- D_{sJ}(2700)^+, D_{sJ}^+ \rightarrow D^0 K^+)/\Gamma_{\text{total}}$   $\Gamma_{122}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>7.14±0.96±0.69</b>		<sup>1</sup> LEES	15C	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{123}/\Gamma$

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>7.3±1.2±0.2</b>		<sup>1,2</sup> DAS	10	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> DAS 10 reports  $[\Gamma(B^0 \rightarrow D^+ \pi^-)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow D^- \pi^+)] = (2.92 \pm 0.38 \pm 0.31) \times 10^{-4}$  which we multiply by our best value  $B(B^0 \rightarrow D^- \pi^+) = (2.51 \pm 0.08) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Derived using  $\tan(\theta_C) f_D/f_{D_s} \sqrt{B(B^0 \rightarrow D_s^+ \pi^-)/B(B^0 \rightarrow D^- \pi^+)}$  by assuming the flavor SU(3) symmetry, where  $\theta_C$  is the Cabibbo angle,  $f_D$  ( $f_{D_s}$ ) is the  $D$  ( $D_s$ ) meson decay constant.

$\Gamma(D_s^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{124}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>20.3±1.8 OUR FIT</b>				
<b>21.6±2.6 OUR AVERAGE</b>				
19.9±2.6±1.8		<sup>1</sup> DAS	10	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
25 ±4 ±2		<sup>1</sup> AUBERT	08AJ	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
14.0±3.5±1.3		<sup>2</sup> AUBERT	07K	BABR Repl. by AUBERT 08AJ
25 ±9 ±2		<sup>3</sup> AUBERT	03D	BABR Repl. by AUBERT 07K
19 $\frac{+9}{-7}$ ±2		<sup>4</sup> KROKOVNY	02	BELL Repl. by DAS 10
< 220	90	<sup>5</sup> ALEXANDER	93B	CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$
<1300	90	<sup>6</sup> BORTOLETTO	90	CLEO $e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .
- <sup>2</sup> AUBERT 07K reports  $[\Gamma(B^0 \rightarrow D_s^+ \pi^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)] = (0.63 \pm 0.15 \pm 0.05) \times 10^{-6}$  which we divide by our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>3</sup> AUBERT 03D reports  $[\Gamma(B^0 \rightarrow D_s^+ \pi^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)] = (1.13 \pm 0.33 \pm 0.21) \times 10^{-6}$  which we divide by our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>4</sup> KROKOVNY 02 reports  $[\Gamma(B^0 \rightarrow D_s^+ \pi^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)] = (0.86^{+0.37}_{-0.30} \pm 0.11) \times 10^{-6}$  which we divide by our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>5</sup> ALEXANDER 93B reports  $< 270 \times 10^{-6}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^+ \pi^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.037$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .
- <sup>6</sup> BORTOLETTO 90 assume  $B(D_s \rightarrow \phi \pi^+) = 2\%$ .

$[\Gamma(D_s^+ \pi^-) + \Gamma(D_s^- K^+)]/\Gamma_{\text{total}} \quad (\Gamma_{124} + \Gamma_{134})/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 1.0 \times 10^{-3}</math></b>	90	<sup>1</sup> ALBRECHT	93E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> ALBRECHT 93E reports  $< 1.7 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^+ \pi^-) + \Gamma(B^0 \rightarrow D_s^- K^+)]/\Gamma_{\text{total}} \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

$\Gamma(D_s^+ \pi^-)/\Gamma(D^- \pi^+) \quad \Gamma_{124}/\Gamma_{38}$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>8.1 \pm 0.7</math> OUR FIT</b>			
<b><math>7.7 \pm 0.7 \pm 0.6</math></b>	AAIJ	21W LHCB	$pp$ at 7, 8, 13 TeV

$\Gamma(D_s^{*+} \pi^-)/\Gamma_{\text{total}} \quad \Gamma_{125}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>2.1 \pm 0.4</math> OUR AVERAGE</b>		Error includes scale factor of 1.4.		
$1.75 \pm 0.34 \pm 0.20$		<sup>1</sup> JOSHI	10 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$2.6^{+0.5}_{-0.4} \pm 0.2$		<sup>1</sup> AUBERT	08AJ BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$2.9 \pm 0.7 \pm 0.3$		<sup>2</sup> AUBERT	07K BABR	Repl. by AUBERT 08AJ
$< 4.1$	90	AUBERT	03D BABR	Repl. by AUBERT 07K
$< 40$	90	<sup>3</sup> ALEXANDER	93B CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .
- <sup>2</sup> AUBERT 07K reports  $[\Gamma(B^0 \rightarrow D_s^{*+} \pi^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)] = (1.32 \pm 0.27 \pm 0.15) \times 10^{-6}$  which we divide by our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> ALEXANDER 93B reports  $< 44 \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*+} \pi^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.037$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

**$[\Gamma(D_s^{*+} \pi^-) + \Gamma(D_s^{*-} K^+)]/\Gamma_{\text{total}}$   $(\Gamma_{125} + \Gamma_{135})/\Gamma$**

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 7 \times 10^{-4}$	90	<sup>1</sup> ALBRECHT 93E ARG		$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 93E reports  $< 1.2 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*+} \pi^-) + \Gamma(B^0 \rightarrow D_s^{*-} K^+)]/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

**$\Gamma(D_s^+ \rho^-)/\Gamma_{\text{total}}$   $\Gamma_{126}/\Gamma$**

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$< 2.4$	90	<sup>1</sup> AUBERT 08AJ BABR		$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 130$	90	<sup>2</sup> ALBRECHT 93E ARG		$e^+ e^- \rightarrow \Upsilon(4S)$
$< 50$	90	<sup>3</sup> ALEXANDER 93B CLE2		$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 93E reports  $< 2.2 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^+ \rho^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

<sup>3</sup> ALEXANDER 93B reports  $< 6.6 \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^+ \rho^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.037$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

**$\Gamma(D_s^{*+} \rho^-)/\Gamma_{\text{total}}$   $\Gamma_{127}/\Gamma$**

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$4.1^{+1.3}_{-1.2} \pm 0.4$		<sup>1</sup> AUBERT 08AJ BABR		$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 150$	90	<sup>2</sup> ALBRECHT 93E ARG		$e^+ e^- \rightarrow \Upsilon(4S)$
$< 60$	90	<sup>3</sup> ALEXANDER 93B CLE2		$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 93E reports  $< 2.5 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*+} \rho^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

<sup>3</sup> ALEXANDER 93B reports  $< 7.4 \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*+} \rho^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.037$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .



$\Gamma(D_s^+ a_0^-)/\Gamma_{\text{total}}$   $\Gamma_{128}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;1.9</b>	90	<sup>1</sup> AUBERT	06X BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_s^{*+} a_0^-)/\Gamma_{\text{total}}$   $\Gamma_{129}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;3.6</b>	90	<sup>1</sup> AUBERT	06X BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_s^+ a_1(1260)^-)/\Gamma_{\text{total}}$   $\Gamma_{130}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;2.1 <math>\times 10^{-3}</math></b>	90	<sup>1</sup> ALBRECHT	93E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 93E reports  $< 3.5 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^+ a_1(1260)^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = 4.5 \times 10^{-2}$ .

$\Gamma(D_s^{*+} a_1(1260)^-)/\Gamma_{\text{total}}$   $\Gamma_{131}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;1.7 <math>\times 10^{-3}</math></b>	90	<sup>1</sup> ALBRECHT	93E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 93E reports  $< 2.9 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*+} a_1(1260)^-)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = 4.5 \times 10^{-2}$ .

$\Gamma(D_s^+ a_2^-)/\Gamma_{\text{total}}$   $\Gamma_{132}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;19</b>	90	<sup>1</sup> AUBERT	06X BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_s^{*+} a_2^-)/\Gamma_{\text{total}}$   $\Gamma_{133}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;20</b>	90	<sup>1</sup> AUBERT	06X BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_s^- K^+)/\Gamma_{\text{total}}$   $\Gamma_{134}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>27 <math>\pm</math> 5 OUR FIT</b>				Error includes scale factor of 2.7.
<b>22 <math>\pm</math> 5 OUR AVERAGE</b>				Error includes scale factor of 1.8.
19.1 $\pm$ 2.4 $\pm$ 1.7		<sup>1</sup> DAS	10 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
29 $\pm$ 4 $\pm$ 2		<sup>1</sup> AUBERT	08AJ BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

27 ± 5 ± 2		<sup>2</sup> AUBERT	07K	BABR	Repl. by AUBERT 08AJ
26 ± 10 ± 2		<sup>3</sup> AUBERT	03D	BABR	Repl. by AUBERT 07K
36 $\begin{smallmatrix} +11 \\ -10 \end{smallmatrix}$ ± 3		<sup>4</sup> KROKOVNY	02	BELL	Repl. by DAS 10
< 190	90	<sup>5</sup> ALEXANDER	93B	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
< 1300	90	<sup>6</sup> BORTOLETTO	90	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> AUBERT 07K reports  $[\Gamma(B^0 \rightarrow D_s^- K^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)] = (1.21 \pm 0.17 \pm 0.11) \times 10^{-6}$  which we divide by our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> AUBERT 03D reports  $[\Gamma(B^0 \rightarrow D_s^- K^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)] = (1.16 \pm 0.36 \pm 0.24) \times 10^{-6}$  which we divide by our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> KROKOVNY 02 reports  $[\Gamma(B^0 \rightarrow D_s^- K^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)] = (1.61^{+0.45}_{-0.38} \pm 0.21) \times 10^{-6}$  which we divide by our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>5</sup> ALEXANDER 93B reports  $< 230 \times 10^{-6}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^- K^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = 4.5 \times 10^{-2}$ .

<sup>6</sup> BORTOLETTO 90 assume  $B(D_s \rightarrow \phi\pi^+) = 2\%$ .

### $\Gamma(D_s^- K^+)/\Gamma(D^- \pi^+)$

$\Gamma_{134}/\Gamma_{38}$

<u>VALUE (units <math>10^{-2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.09 ± 0.19 OUR FIT</b>	Error includes scale factor of 2.7.		
<b>1.29 ± 0.05 ± 0.08</b>	AAIJ	15AC	LHCB $pp$ at 7, 8 TeV

### $\Gamma(D_s^{*-} K^+)/\Gamma_{\text{total}}$

$\Gamma_{135}/\Gamma$

<u>VALUE (units <math>10^{-5}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2.19 ± 0.30 OUR AVERAGE</b>				

2.02 ± 0.33 ± 0.22

<sup>1</sup> JOSHI 10 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

2.4 ± 0.4 ± 0.2

<sup>1</sup> AUBERT 08AJ BABR  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

2.2 ± 0.6 ± 0.2

<sup>2</sup> AUBERT 07K BABR Repl. by AUBERT 08AJ

< 2.5

90

AUBERT 03D BABR Repl. by AUBERT 07K

< 14

90

<sup>3</sup> ALEXANDER 93B CLE2  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> AUBERT 07K reports  $[\Gamma(B^0 \rightarrow D_s^{*-} K^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)] = (0.97 \pm 0.24 \pm 0.12) \times 10^{-6}$  which we divide by our best value  $B(D_s^+ \rightarrow \phi\pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> ALEXANDER 93B reports  $< 17 \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*-} K^+)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi\pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi\pi^+) = 0.037$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi\pi^+) = 4.5 \times 10^{-2}$ .

$$\Gamma(D_{s1}(2536)^{\mp} K^{\pm}, D_{s1}^{-} \rightarrow \bar{D}^{*}(2007)^0 K^{-}) / \Gamma(\bar{D}^0 K^{+} K^{-}) \quad \Gamma_{136}/\Gamma_{49}$$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>8.4 \pm 0.3 \pm 0.6</math></b>	AAIJ	23AY LHCB	$pp$ at 7, 8, 13 TeV

$$\Gamma(D_s^{-} K^{*}(892)^{+}) / \Gamma_{\text{total}} \quad \Gamma_{137}/\Gamma$$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>3.5^{+1.0}_{-0.9} \pm 0.4</math></b>		<sup>1</sup> AUBERT	08AJ BABR	$e^{+}e^{-} \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<280	90	<sup>2</sup> ALBRECHT	93E ARG	$e^{+}e^{-} \rightarrow \Upsilon(4S)$
< 80	90	<sup>3</sup> ALEXANDER	93B CLE2	$e^{+}e^{-} \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^{+}$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 93E reports  $< 4.6 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{-} K^{*}(892)^{+}) / \Gamma_{\text{total}}] \times [B(D_s^{+} \rightarrow \phi\pi^{+})]$  assuming  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 0.027$ , which we rescale to our best value  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 4.5 \times 10^{-2}$ .

<sup>3</sup> ALEXANDER 93B reports  $< 9.7 \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{-} K^{*}(892)^{+}) / \Gamma_{\text{total}}] \times [B(D_s^{+} \rightarrow \phi\pi^{+})]$  assuming  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 0.037$ , which we rescale to our best value  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 4.5 \times 10^{-2}$ .

$$\Gamma(D_s^{*-} K^{*}(892)^{+}) / \Gamma_{\text{total}} \quad \Gamma_{138}/\Gamma$$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>3.2^{+1.4}_{-1.2} \pm 0.4</math></b>		<sup>1</sup> AUBERT	08AJ BABR	$e^{+}e^{-} \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<350	90	<sup>2</sup> ALBRECHT	93E ARG	$e^{+}e^{-} \rightarrow \Upsilon(4S)$
< 90	90	<sup>3</sup> ALEXANDER	93B CLE2	$e^{+}e^{-} \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^{+}$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 93E reports  $< 5.8 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*-} K^{*}(892)^{+}) / \Gamma_{\text{total}}] \times [B(D_s^{+} \rightarrow \phi\pi^{+})]$  assuming  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 0.027$ , which we rescale to our best value  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 4.5 \times 10^{-2}$ .

<sup>3</sup> ALEXANDER 93B reports  $< 11.0 \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*-} K^{*}(892)^{+}) / \Gamma_{\text{total}}] \times [B(D_s^{+} \rightarrow \phi\pi^{+})]$  assuming  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 0.037$ , which we rescale to our best value  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 4.5 \times 10^{-2}$ .

$$\Gamma(D_s^{-} \pi^{+} K^0) / \Gamma_{\text{total}} \quad \Gamma_{139}/\Gamma$$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>0.97 \pm 0.14</math> OUR AVERAGE</b>				

0.94  $\pm$  0.12  $\pm$  0.10 <sup>1</sup> WIEHCZYN...15 BELL  $e^{+}e^{-} \rightarrow \Upsilon(4S)$

1.10  $\pm$  0.26  $\pm$  0.20 <sup>1</sup> AUBERT 08G BABR  $e^{+}e^{-} \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<40	90	<sup>2</sup> ALBRECHT	93E ARG	$e^{+}e^{-} \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^{+}$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 93E reports  $< 7.3 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{-} \pi^{+} K^0) / \Gamma_{\text{total}}] \times [B(D_s^{+} \rightarrow \phi\pi^{+})]$  assuming  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 0.027$ , which we rescale to our best value  $B(D_s^{+} \rightarrow \phi\pi^{+}) = 4.5 \times 10^{-2}$ .

$\Gamma(D_s^{*-} \pi^+ K^0)/\Gamma_{\text{total}}$   $\Gamma_{140}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt; 1.10</b>	90	<sup>1</sup> AUBERT	08G BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<25	90	<sup>2</sup> ALBRECHT	93E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 93E reports  $< 4.2 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*-} \pi^+ K^0)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

$\Gamma(D_s^- K^+ \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{141}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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<b>1.71±0.31±0.34</b>	<sup>1</sup> AAIJ	12AX LHCB	$pp$ at 7 TeV
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<sup>1</sup> AAIJ 12AX reports  $[\Gamma(B^0 \rightarrow D_s^- K^+ \pi^+ \pi^-)/\Gamma_{\text{total}}] / [B(B_s^0 \rightarrow D_s^- K^+ \pi^+ \pi^-)] = 0.54 \pm 0.07 \pm 0.07$  which we multiply by our best value  $B(B_s^0 \rightarrow D_s^- K^+ \pi^+ \pi^-) = (3.2 \pm 0.6) \times 10^{-4}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(D_s^- \pi^+ K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{142}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;3.0 × 10<sup>-3</sup></b>	90	<sup>1</sup> ALBRECHT	93E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> ALBRECHT 93E reports  $< 5.0 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^- \pi^+ K^*(892)^0)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

$\Gamma(D_s^{*-} \pi^+ K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{143}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;1.6 × 10<sup>-3</sup></b>	90	<sup>1</sup> ALBRECHT	93E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> ALBRECHT 93E reports  $< 2.7 \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^{*-} \pi^+ K^*(892)^0)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = 0.027$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = 4.5 \times 10^{-2}$ .

$\Gamma(\bar{D}^0 K^0)/\Gamma_{\text{total}}$   $\Gamma_{144}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
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**5.5±0.4 OUR AVERAGE**

5.6±0.5±0.2	KUMAR	23 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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5.3±0.7±0.3	<sup>1</sup> AUBERT,B	06L BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

5.0 <sup>+1.3</sup> <sub>-1.2</sub> ±0.6	<sup>1</sup> KROKOVNY	03 BELL	Repl. by KUMAR 23
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\overline{D}^0 K^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{145}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>88 \pm 15 \pm 9</math></b>	<sup>1</sup> AUBERT	06A BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\overline{D}^0 K^+ \pi^-)/\Gamma(\overline{D}^0 \pi^+ \pi^-)$   $\Gamma_{145}/\Gamma_{47}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.106 \pm 0.007 \pm 0.008</math></b>	AAIJ	13AQ LHCB	$pp$ at 7 TeV

$\Gamma(\overline{D}^0 K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{146}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>4.5 \pm 0.6</math> OUR AVERAGE</b>			
$5.4 \pm 0.3 \pm 1.1$	<sup>1,2</sup> AAIJ	15X LHCB	$pp$ at 7, 8 TeV
$4.0 \pm 0.7 \pm 0.3$	<sup>3</sup> AUBERT,B	06L BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$4.8^{+1.1}_{-1.0} \pm 0.5$	<sup>3</sup> KROKOVNY	03 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$5.7 \pm 0.9 \pm 0.6$	<sup>3</sup> AUBERT	06A BABR	Repl. by AUBERT,B 06L
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<sup>1</sup> AAIJ 15X reports  $(5.13 \pm 0.20 \pm 0.15 \pm 0.24 \pm 0.60) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \overline{D}^0 K^*(892)^0)/\Gamma_{\text{total}}] \times [B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-)]$  assuming  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (9.2 \pm 0.6 \pm 0.7 \pm 0.6) \times 10^{-5}$ , which we rescale to our best value  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (8.8 \pm 1.7) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Measured via amplitude analysis of  $B^0 \rightarrow \overline{D}^0 K^+ \pi^-$ , which excludes contribution from decay via  $D^*(2010)^-$  resonance.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\overline{D}^0 K^*(1410)^0)/\Gamma_{\text{total}}$   $\Gamma_{147}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 6.7 \times 10^{-5}</math></b>	90	<sup>1</sup> AAIJ	15X LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Measured via amplitude analysis of  $B^0 \rightarrow \overline{D}^0 K^+ \pi^-$ , which excludes contribution from decay via  $D^*(2010)^-$  resonance.

$\Gamma(\overline{D}^0 K_0^*(1430)^0)/\Gamma_{\text{total}}$   $\Gamma_{148}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>0.7 \pm 0.7 \pm 0.1</math></b>	<sup>1,2</sup> AAIJ	15X LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> AAIJ 15X reports  $(0.71 \pm 0.27 \pm 0.33 \pm 0.47 \pm 0.08) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \overline{D}^0 K_0^*(1430)^0)/\Gamma_{\text{total}}] \times [B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-)]$  assuming  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (9.2 \pm 0.6 \pm 0.7 \pm 0.6) \times 10^{-5}$ , which we rescale to our best value  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (8.8 \pm 1.7) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Measured via amplitude analysis of  $B^0 \rightarrow \overline{D}^0 K^+ \pi^-$ , which excludes contribution from decay via  $D^*(2010)^-$  resonance.

$\Gamma(\overline{D}^0 K_2^*(1430)^0)/\Gamma_{\text{total}}$   $\Gamma_{149}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.1 \pm 0.8 \pm 0.4</math></b>	1,2 AAIJ	15X LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> AAIJ 15X reports  $(2.04 \pm 0.45 \pm 0.30 \pm 0.54 \pm 0.25) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \overline{D}^0 K_2^*(1430)^0)/\Gamma_{\text{total}}] \times [B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-)]$  assuming  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (9.2 \pm 0.6 \pm 0.7 \pm 0.6) \times 10^{-5}$ , which we rescale to our best value  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (8.8 \pm 1.7) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Measured via amplitude analysis of  $B^0 \rightarrow \overline{D}^0 K^+ \pi^-$ , which excludes contribution from decay via  $D^*(2010)^-$  resonance.

$\Gamma(D_0^*(2300)^- K^+, D_0^{*-} \rightarrow \overline{D}^0 \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{150}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>1.9 \pm 0.8 \pm 0.4</math></b>	1,2 AAIJ	15X LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> AAIJ 15X reports  $(1.77 \pm 0.26 \pm 0.19 \pm 0.67 \pm 0.20) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_0^*(2300)^- K^+, D_0^{*-} \rightarrow \overline{D}^0 \pi^-)/\Gamma_{\text{total}}] \times [B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-)]$  assuming  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (9.2 \pm 0.6 \pm 0.7 \pm 0.6) \times 10^{-5}$ , which we rescale to our best value  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (8.8 \pm 1.7) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Measured via amplitude analysis of  $B^0 \rightarrow \overline{D}^0 K^+ \pi^-$ , which excludes contribution from decay via  $D^*(2010)^-$  resonance.

$\Gamma(D_2^*(2460)^- K^+, D_2^{*-} \rightarrow \overline{D}^0 \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{151}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>20.3 \pm 3.5</math> OUR AVERAGE</b>			
$22 \pm 2 \pm 4$	1,2 AAIJ	15X LHCB	$pp$ at 7, 8 TeV
$18.3 \pm 4.0 \pm 3.1$	<sup>3</sup> AUBERT	06A BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> AAIJ 15X reports  $(2.12 \pm 0.10 \pm 0.11 \pm 0.11 \pm 0.25) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_2^*(2460)^- K^+, D_2^{*-} \rightarrow \overline{D}^0 \pi^-)/\Gamma_{\text{total}}] \times [B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-)]$  assuming  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (9.2 \pm 0.6 \pm 0.7 \pm 0.6) \times 10^{-5}$ , which we rescale to our best value  $B(B^0 \rightarrow \overline{D}^0 K^+ \pi^-) = (8.8 \pm 1.7) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Measured via amplitude analysis of  $B^0 \rightarrow \overline{D}^0 K^+ \pi^-$ , which excludes contribution from decay via  $D^*(2010)^-$  resonance.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_3^*(2760)^- K^+, D_3^{*-} \rightarrow \overline{D}^0 \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{152}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 0.10 \times 10^{-5}</math></b>	90	1 AAIJ	15X LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Measured via amplitude analysis of  $B^0 \rightarrow \overline{D}^0 K^+ \pi^-$ , which excludes contribution from decay via  $D^*(2010)^-$  resonance.

$\Gamma(\overline{D}^0 K^+ \pi^- \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{153}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 37</math></b>	90	1 AUBERT	06A BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma([K^+ K^-]_D K^*(892)^0)/\Gamma(\overline{D}^0 K^*(892)^0)$   $\Gamma_{154}/\Gamma_{146}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.92±0.10±0.02</b>	AAIJ	19N	LHCB <i>pp</i> at 7, 8, 13 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1.05 <sup>+0.17</sup> <sub>-0.15</sub> ± 0.04	AAIJ	14BN	LHCB Repl. by AAIJ 16S
1.36 <sup>+0.37</sup> <sub>-0.32</sub> ± 0.07	AAIJ	13L	LHCB Repl. by AAIJ 14BN

$\Gamma([\pi^+ \pi^-]_D K^*(892)^0)/\Gamma(\overline{D}^0 K^*(892)^0)$   $\Gamma_{155}/\Gamma_{146}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.32±0.19±0.03</b>	AAIJ	19N	LHCB <i>pp</i> at 7, 8, 13 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1.21 <sup>+0.28</sup> <sub>-0.25</sub> ± 0.05	AAIJ	14BN	LHCB Repl. by AAIJ 16S

$\Gamma([\pi^+ K^-]_D K^*(892)^0)/\Gamma([K^+ \pi^-]_D K^*(892)^0)$   $\Gamma_{156}/\Gamma_{157}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.080±0.015±0.002</b>	AAIJ	19N	LHCB <i>pp</i> at 7, 8, 13 TeV

$\Gamma([\pi^+ \pi^- \pi^+ \pi^-]_D K^{*0})/\Gamma(\overline{D}^0 K^{*0})$   $\Gamma_{158}/\Gamma_{146}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.01±0.16±0.04</b>	AAIJ	19N	LHCB <i>pp</i> at 7, 8, 13 TeV

$\Gamma([\pi^+ K^- \pi^+ \pi^-]_D K^{*0})/\Gamma([K^+ \pi^- \pi^+ \pi^-]_D K^{*0})$   $\Gamma_{159}/\Gamma_{160}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.073±0.018±0.002</b>	AAIJ	19N	LHCB <i>pp</i> at 7, 8, 13 TeV

$\Gamma(\overline{D}^0 \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{161}/\Gamma$

VALUE (units 10 <sup>-4</sup> )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.67±0.09 OUR AVERAGE</b>				
2.70±0.06±0.10		BLOOMFIELD 22	BELL	<i>e<sup>+</sup>e<sup>-</sup></i> → $\Upsilon(4S)$
2.69±0.09±0.13		<sup>1</sup> LEES	11M	BABR <i>e<sup>+</sup>e<sup>-</sup></i> → $\Upsilon(4S)$
2.25±0.14±0.35		<sup>1</sup> BLYTH	06	BELL <i>e<sup>+</sup>e<sup>-</sup></i> → $\Upsilon(4S)$
2.74 <sup>+0.36</sup> <sub>-0.32</sub> ± 0.55		<sup>1</sup> COAN	02	CLE2 <i>e<sup>+</sup>e<sup>-</sup></i> → $\Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
2.9 ± 0.2 ± 0.3		<sup>1</sup> AUBERT	04B	BABR Repl. by LEES 11M
3.1 ± 0.4 ± 0.5		<sup>1</sup> ABE	02J	BELL Repl. by BLYTH 06
<1.2	90	<sup>2</sup> NEMAT1	98	CLE2 Repl. by COAN 02
<4.8	90	<sup>3</sup> ALAM	94	CLE2 Repl. by NEMAT1 98

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> NEMAT1 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>3</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0)/B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$ .

$\Gamma(\overline{D}^0 \rho^0)/\Gamma_{\text{total}}$   $\Gamma_{162}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**3.21 ± 0.21 OUR AVERAGE**

3.21 ± 0.10 ± 0.21		1 AAIJ	15Y	LHCB $pp$ at 7, 8 TeV
3.19 ± 0.20 ± 0.45		2,3 KUZMIN	07	BELL $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

2.9 ± 1.0 ± 0.4		2 SATPATHY	03	BELL Repl. by KUZMIN 07
< 3.9	90	4 NEMATI	98	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
< 5.5	90	5 ALAM	94	CLE2 Repl. by NEMATI 98
< 6.0	90	6 BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
< 27.0	90	7 ALBRECHT	88K	ARG $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measured using isobar formalism in the decay chain  $B^0 \rightarrow \overline{D}^0 \rho(770)$ ,  $\rho \rightarrow \pi^+ \pi^-$  assuming  $B(\rho(770) \rightarrow \pi^+ \pi^-) = 1$ . The second uncertainty combines in quadrature all systematic uncertainties quoted in the paper.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Our second uncertainty combines systematics and model errors quoted in the paper.

<sup>4</sup> NEMATI 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>5</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0)/B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$ .

<sup>6</sup> BORTOLETTO 92 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses Mark III branching fractions for the  $D$ .

<sup>7</sup> ALBRECHT 88K reports  $< 0.003$  assuming  $B^0 \overline{B}^0 : B^+ B^-$  production ratio is 45:55. We rescale to 50%.

$\Gamma(\overline{D}^0 f_2)/\Gamma_{\text{total}}$   $\Gamma_{163}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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**1.56 ± 0.21 OUR AVERAGE**

1.68 ± 0.11 ± 0.21	1 AAIJ	15Y	LHCB $pp$ at 7, 8 TeV
1.20 ± 0.18 ± 0.38	2,3 KUZMIN	07	BELL $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Result obtained using the isobar formalism. The second uncertainty combines in quadrature all systematic uncertainties quoted in the paper. Measured in the decay chain  $B^0 \rightarrow \overline{D}^0 f_2(1270)$ ,  $f_2 \rightarrow \pi^+ \pi^-$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Our second uncertainty combines systematics and model errors quoted in the paper.

$\Gamma(\overline{D}^0 \eta)/\Gamma_{\text{total}}$   $\Gamma_{164}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**2.56 ± 0.12 OUR AVERAGE**

2.66 ± 0.12 ± 0.21		KUMAR	23	BELL $e^+e^- \rightarrow \Upsilon(4S)$
2.53 ± 0.09 ± 0.11		1 LEES	11M	BABR $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.77 ± 0.16 ± 0.21		1 BLYTH	06	BELL Repl. by KUMAR 23
2.5 ± 0.2 ± 0.3		1 AUBERT	04B	BABR Repl. by LEES 11M
1.4 <sup>+0.5</sup> / <sub>-0.4</sub> ± 0.3		1 ABE	02J	BELL Repl. by BLYTH 06
< 1.3	90	2 NEMATI	98	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
< 6.8	90	3 ALAM	94	CLE2 Repl. by NEMATI 98



<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> NEMAT1 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>3</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0)/B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$ .

$\Gamma(\overline{D^0} \eta')/\Gamma_{\text{total}}$   $\Gamma_{165}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**1.38 ± 0.16 OUR AVERAGE** Error includes scale factor of 1.3.

1.48 ± 0.13 ± 0.07		<sup>1</sup> LEES	11M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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1.14 ± 0.20 <sup>+0.10</sup> / <sub>-0.13</sub>		<sup>1</sup> SCHUMANN	05 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.7 ± 0.4 ± 0.2		<sup>1</sup> AUBERT	04B BABR	Repl. by LEES 11M
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<9.4	90	<sup>2</sup> NEMAT1	98 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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<8.6	90	<sup>3</sup> ALAM	94 CLE2	Repl. by NEMAT1 98
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> NEMAT1 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>3</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0)/B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$ .

$\Gamma(\overline{D^0} \eta')/\Gamma(\overline{D^0} \eta)$   $\Gamma_{165}/\Gamma_{164}$

VALUE	DOCUMENT ID	TECN	COMMENT
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<b>0.54 ± 0.07 ± 0.01</b>	LEES	11M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.7 ± 0.2 ± 0.1	AUBERT	04B BABR	Repl. by LEES 11M
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$\Gamma(\overline{D^0} \omega)/\Gamma_{\text{total}}$   $\Gamma_{166}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**2.54 ± 0.16 OUR AVERAGE**

2.75 ± 0.72 ± 0.35		<sup>1</sup> AAIJ	15Y LHCB	$pp$ at 7, 8 TeV
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2.57 ± 0.11 ± 0.14		<sup>2</sup> LEES	11M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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2.37 ± 0.23 ± 0.28		<sup>2</sup> BLYTH	06 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

3.0 ± 0.3 ± 0.4		<sup>2</sup> AUBERT	04B BABR	Repl. by LEES 11M
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1.8 ± 0.5 <sup>+0.4</sup> / <sub>-0.3</sub>		<sup>2</sup> ABE	02J BELL	Repl. by BLYTH 06
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<5.1	90	<sup>3</sup> NEMAT1	98 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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<6.3	90	<sup>4</sup> ALAM	94 CLE2	Repl. by NEMAT1 98
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<sup>1</sup> Result obtained using the isobar model. The second uncertainty combines in quadrature all systematic uncertainties quoted in the paper.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> NEMAT1 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>4</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0)/B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$ .

$\Gamma(\overline{D}^0 \phi) / \Gamma_{\text{total}}$   $\Gamma_{167} / \Gamma$

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**$7.7 \pm 2.1 \pm 1.0$**  <sup>1</sup> AAIJ 23AZ LHCB *pp* at 7, 8, 13 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 23 95 AAIJ 18AY LHCB Repl. by AAIJ 23AZ

< 116 90 <sup>2</sup> AUBERT 07AO BABR  $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup>The last uncertainty includes the uncertainties of the branching fractions  $B(B^0 \rightarrow \overline{D}^0 K^+ K^-)$  and  $B(\phi \rightarrow K^+ K^-)$ .

<sup>2</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(D^0 K^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{168} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

< 19 90 <sup>1</sup> AUBERT 06A BABR Repl. by AUBERT 09AE

<sup>1</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(D^0 K^+ \pi^-) / \Gamma(\overline{D}^0 K^+ \pi^-)$   $\Gamma_{168} / \Gamma_{145}$

VALUE	DOCUMENT ID	TECN	COMMENT
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**$0.060 \pm 0.034$  OUR AVERAGE**

$0.045^{+0.056+0.028}_{-0.050-0.018}$  1,2 NEGISHI 12 BELL  $e^+e^- \rightarrow \gamma(4S)$

$0.068 \pm 0.042$  <sup>3</sup> AUBERT 09AE BABR  $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup>Assumes equal production of  $B^0$  and  $B^+$  at  $\gamma(4S)$ .

<sup>2</sup>Uses  $D^0 \rightarrow K^- \pi^+$  mode. Restricts  $K^+ \pi^-$  mass within  $\pm 50$  MeV of the nominal  $K^{*0}$  mass. Corresponds to the upper limit, < 0.16 at 95% CL.

<sup>3</sup>Reports a signal at the level of 2.5 standard deviations after combining results from  $D^0 \rightarrow K^+ \pi^-$ ,  $K^+ \pi^- \pi^0$ , and  $K^+ \pi^- \pi^+ \pi^-$ .

$\Gamma(D^0 K^*(892)^0) / \Gamma_{\text{total}}$   $\Gamma_{169} / \Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

< 1.1 90 <sup>1</sup> AUBERT,B 06L BABR  $e^+e^- \rightarrow \gamma(4S)$

< 1.8 90 <sup>1</sup> KROKOVNY 03 BELL  $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(D^0 K^*(892)^0) / \Gamma(\overline{D}^0 K^*(892)^0)$   $\Gamma_{169} / \Gamma_{146}$

"OUR EVALUATION" is derived from  $r_{B^0}(B^0 \rightarrow DK^{*0})$  data block listed in "CP violation parameters" section.

VALUE (units $10^{-2}$ )	DOCUMENT ID
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**$6.6^{+1.1}_{-1.2}$  OUR EVALUATION** (Produced by HFLAV)

$\Gamma(\overline{D}^{*0} \gamma) / \Gamma_{\text{total}}$   $\Gamma_{170} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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**<  $2.5 \times 10^{-5}$**  90 <sup>1</sup> AUBERT,B 05Q BABR  $e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<  $5.0 \times 10^{-5}$  90 <sup>1</sup> ARTUSO 00 CLE2  $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(\bar{D}^*(2007)^0 \pi^0) / \Gamma_{\text{total}}$

$\Gamma_{171} / \Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.2 ± 0.6</b>	<b>OUR AVERAGE</b>	Error includes scale factor of 2.6. See the ideogram below.		

3.05 ± 0.14 ± 0.28		1 LEES	11M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
1.39 ± 0.18 ± 0.26		1 BLYTH	06 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
2.20 <sup>+0.59</sup> <sub>-0.52</sub> ± 0.79		1 COAN	02 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

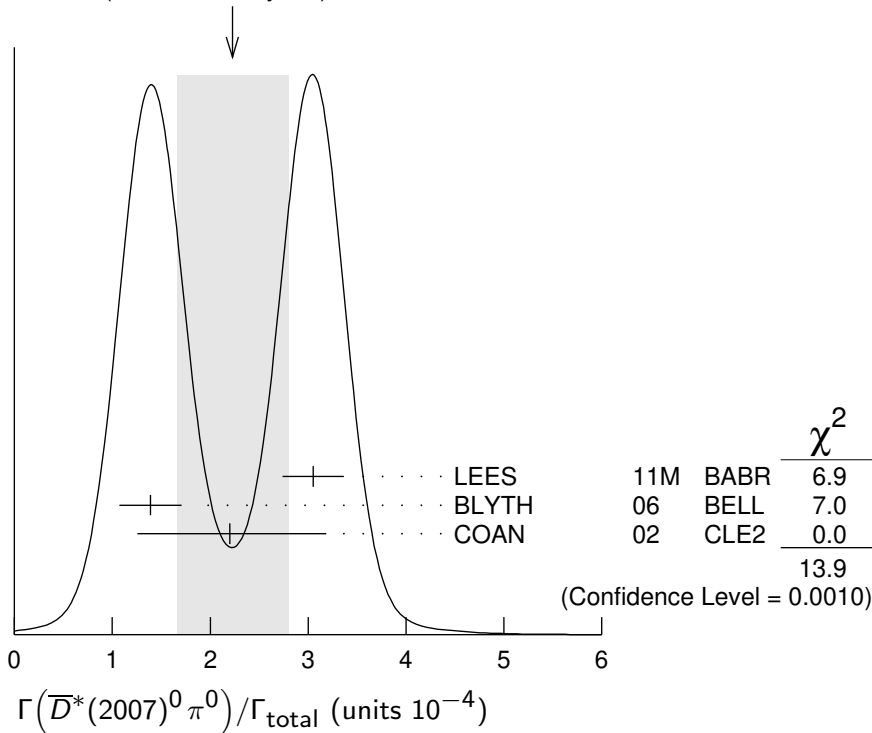
2.9 ± 0.4 ± 0.5		1 AUBERT	04B BABR	Repl. by LEES 11M
2.7 <sup>+0.8</sup> <sub>-0.7</sub> ± 0.5		1 ABE	02J BELL	Repl. by BLYTH 06
<4.4	90	2 NEMAT1	98 CLE2	Repl. by COAN 02
<9.7	90	3 ALAM	94 CLE2	Repl. by NEMAT1 98

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> NEMAT1 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>3</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2007)^0 \rightarrow D^0 \pi^0)$  and absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0) / B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-) / B(D^0 \rightarrow K^- \pi^+)$ .

WEIGHTED AVERAGE  
2.2±0.6 (Error scaled by 2.6)



$\Gamma(\bar{D}^0 \pi^0) / \Gamma(\bar{D}^*(2007)^0 \pi^0)$

$\Gamma_{161} / \Gamma_{171}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.90 ± 0.08</b>	<b>OUR AVERAGE</b>		

0.88 ± 0.05 ± 0.06	LEES	11M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
1.62 ± 0.23 ± 0.35	BLYTH	06 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.0 ± 0.1 ± 0.2	AUBERT	04B BABR	Repl. by LEES 11M
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$\Gamma(\overline{D}^*(2007)^0 \rho^0) / \Gamma_{\text{total}}$   $\Gamma_{172} / \Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;5.1 x 10<sup>-4</sup></b>	90	<sup>1</sup> SATPATHY 03	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<0.00056	90	<sup>2</sup> NEMAT1 98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<0.00117	90	<sup>3</sup> ALAM 94	CLE2	Repl. by NEMAT1 98

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> NEMAT1 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>3</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2007)^0 \rightarrow D^0 \pi^0)$  and absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0) / B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-) / B(D^0 \rightarrow K^- \pi^+)$ .

$\Gamma(\overline{D}^*(2007)^0 \eta) / \Gamma_{\text{total}}$   $\Gamma_{173} / \Gamma$

<u>VALUE (units 10<sup>-4</sup>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2.3 ± 0.6 OUR AVERAGE</b>		Error includes scale factor of 2.8.		
2.69 ± 0.14 ± 0.23		<sup>1</sup> LEES 11M	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
1.40 ± 0.28 ± 0.26		<sup>1</sup> BLYTH 06	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●

2.6 ± 0.4 ± 0.4		<sup>1</sup> AUBERT 04B	BABR	Repl. by LEES 11M
<4.6	90	<sup>1</sup> ABE 02J	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
<2.6	90	<sup>2</sup> NEMAT1 98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<6.9	90	<sup>3</sup> ALAM 94	CLE2	Repl. by NEMAT1 98

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> NEMAT1 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>3</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2007)^0 \rightarrow D^0 \pi^0)$  and absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0) / B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-) / B(D^0 \rightarrow K^- \pi^+)$ .

$\Gamma(\overline{D}^0 \eta) / \Gamma(\overline{D}^*(2007)^0 \eta)$   $\Gamma_{164} / \Gamma_{173}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.99 ± 0.10 OUR AVERAGE</b>			
0.97 ± 0.07 ± 0.07	LEES 11M	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
1.27 ± 0.29 ± 0.25	BLYTH 06	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.9 ± 0.2 ± 0.1	AUBERT 04B	BABR	Repl. by LEES 11M

$\Gamma(\overline{D}^*(2007)^0 \eta') / \Gamma(\overline{D}^*(2007)^0 \eta)$   $\Gamma_{174} / \Gamma_{173}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.61 ± 0.14 ± 0.02</b>	LEES 11M	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.5 ± 0.3 ± 0.1	AUBERT 04B	BABR	Repl. by LEES 11M

$\Gamma(\bar{D}^*(2007)^0 \eta')/\Gamma_{\text{total}}$   $\Gamma_{174}/\Gamma$

<u>VALUE (units <math>10^{-4}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**1.40 ± 0.22 OUR AVERAGE**

1.48 ± 0.22 ± 0.13      <sup>1</sup> LEES      11M BABR       $e^+ e^- \rightarrow \Upsilon(4S)$

1.21 ± 0.34 ± 0.22      <sup>1</sup> SCHUMANN      05 BELL       $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.3 ± 0.7 ± 0.2      <sup>1,2</sup> AUBERT      04B BABR      Repl. by LEES 11M

<14      90      BRANDENB...      98 CLE2       $e^+ e^- \rightarrow \Upsilon(4S)$

<19      90      <sup>3</sup> NEMATI      98 CLE2       $e^+ e^- \rightarrow \Upsilon(4S)$

<27      90      <sup>4</sup> ALAM      94 CLE2      Repl. by NEMATI 98

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Reports an upper limit  $< 2.6 \times 10^{-4}$  at 90% CL.

<sup>3</sup> NEMATI 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>4</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^*(2007)^0 \rightarrow D^0 \pi^0)$  and absolute  $B(D^0 \rightarrow K^- \pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^- \pi^+ \pi^0)/B(D^0 \rightarrow K^- \pi^+)$  and  $B(D^0 \rightarrow K^- 2\pi^+ \pi^-)/B(D^0 \rightarrow K^- \pi^+)$ .

$\Gamma(\bar{D}^0 \eta')/\Gamma(\bar{D}^*(2007)^0 \eta')$   $\Gamma_{165}/\Gamma_{174}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**0.96 ± 0.18 ± 0.06**      LEES      11M BABR       $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.3 ± 0.8 ± 0.2      AUBERT      04B BABR      Repl. by LEES 11M

$\Gamma(\bar{D}^*(2007)^0 \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{175}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**(6.2 ± 1.2 ± 1.8) × 10<sup>-4</sup>**      <sup>1,2</sup> SATPATHY      03 BELL       $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> No assumption about the intermediate mechanism is made in the analysis.

$\Gamma(\bar{D}^*(2007)^0 K^+ \pi^-)/\Gamma(\bar{D}^*(2007)^0 \pi^+ \pi^-)$   $\Gamma_{176}/\Gamma_{175}$

<u>VALUE (units <math>10^{-2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**8.36 ± 0.43 ± 0.61**      AAIJ      22N LHCB       $pp$  at 13 TeV

$\Gamma(\bar{D}^*(2007)^0 K^0)/\Gamma_{\text{total}}$   $\Gamma_{177}/\Gamma$

<u>VALUE (units <math>10^{-5}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**3.6 ± 1.2 ± 0.3**      <sup>1</sup> AUBERT,B      06L BABR       $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<6.6      90      <sup>1</sup> KROKOVNY      03 BELL       $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{D}^*(2007)^0 K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{178}/\Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**<6.9 × 10<sup>-5</sup>**      90      <sup>1</sup> KROKOVNY      03 BELL       $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{D}^*(2007)^0 \phi) / \Gamma_{\text{total}}$   $\Gamma_{179} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>2.2 \pm 0.5 \pm 0.3</math></b>		<sup>1</sup> AAIJ	23AZ LHCB	$pp$ at 7, 8, 13 TeV

<sup>1</sup>The last uncertainty includes the uncertainties of the branching fraction  $B(B^0 \rightarrow \bar{D}^0 K^+ K^-)$  and  $B(\phi \rightarrow K^+ K^-)$ .

$\Gamma(D^*(2007)^0 K^*(892)^0) / \Gamma_{\text{total}}$   $\Gamma_{180} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 4.0 \times 10^{-5}</math></b>	90	<sup>1</sup> KROKOVNY	03 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^*(2007)^0 \pi^+ \pi^+ \pi^- \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{181} / \Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>2.7 \pm 0.5</math> OUR AVERAGE</b>				
$2.60 \pm 0.47 \pm 0.37$		<sup>1</sup> MAJUMDER	04 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$3.0 \pm 0.7 \pm 0.6$		<sup>1</sup> EDWARDS	02 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^*(2007)^0 \pi^+ \pi^+ \pi^- \pi^-) / \Gamma(D^*(2010)^- \pi^+ \pi^+ \pi^- \pi^0)$   $\Gamma_{181} / \Gamma_{67}$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>0.17 \pm 0.04 \pm 0.02</math></b>		<sup>1</sup> EDWARDS	02 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^*(2010)^+ D^*(2010)^-) / \Gamma_{\text{total}}$   $\Gamma_{182} / \Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>8.0 \pm 0.6</math> OUR AVERAGE</b>				
$7.82 \pm 0.38 \pm 0.63$		<sup>1</sup> KRONENBIT...12	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$8.1 \pm 0.6 \pm 1.0$		<sup>1</sup> AUBERT,B	06A BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$9.9 \begin{smallmatrix} +4.2 \\ -3.3 \end{smallmatrix} \pm 1.2$		<sup>1</sup> LIPELES	00 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$8.1 \pm 0.8 \pm 1.1$		<sup>1</sup> MIYAKE	05 BELL	Repl. by KRONENBIT-TER 12
$8.3 \pm 1.6 \pm 1.2$		<sup>1,2</sup> AUBERT	02M BABR	Repl. by AUBERT,B 06B
$6.2 \begin{smallmatrix} +4.0 \\ -2.9 \end{smallmatrix} \pm 1.0$		<sup>3</sup> ARTUSO	99 CLE2	Repl. by LIPELES 00
$< 61$	90	<sup>4</sup> BARATE	98Q ALEP	$e^+ e^- \rightarrow Z$
$< 22$	90	<sup>5</sup> ASNER	97 CLE2	Repl. by ARTUSO 99

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> AUBERT 02M also assumes the measured  $CP$ -odd fraction of the final states is  $0.22 \pm 0.18 \pm 0.03$ .

<sup>3</sup> ARTUSO 99 uses  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = (48 \pm 4)\%$ .

<sup>4</sup> BARATE 98Q (ALEPH) observes 2 events with an expected background of  $0.10 \pm 0.03$  which corresponds to a branching ratio of  $(2.3 \begin{smallmatrix} +1.9 \\ -1.2 \end{smallmatrix} \pm 0.4) \times 10^{-3}$ .

<sup>5</sup> ASNER 97 at CLEO observes 1 event with an expected background of  $0.022 \pm 0.011$ . This corresponds to a branching ratio of  $(5.3 \begin{smallmatrix} +7.1 \\ -3.7 \end{smallmatrix} \pm 1.0) \times 10^{-4}$ .

$\Gamma(\bar{D}^*(2007)^0\omega)/\Gamma_{\text{total}}$   $\Gamma_{183}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**3.6 ± 1.1 OUR AVERAGE** Error includes scale factor of 3.1.

4.55 ± 0.24 ± 0.39		<sup>1</sup> LEES	11M BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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2.29 ± 0.39 ± 0.40		<sup>1</sup> BLYTH	06 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

4.2 ± 0.7 ± 0.9	90	<sup>1</sup> AUBERT	04B BABR	Repl. by LEES 11M
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< 7.9	90	<sup>1</sup> ABE	02J BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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< 7.4	90	<sup>2</sup> NEMAT1	98 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
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< 21	90	<sup>3</sup> ALAM	94 CLE2	Repl. by NEMAT1 98
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> NEMAT1 98 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the PDG 96 values for  $D^0$ ,  $D^{*0}$ ,  $\eta$ ,  $\eta'$ , and  $\omega$  branching fractions.

<sup>3</sup> ALAM 94 assume equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and use the CLEO II  $B(D^{*0}(2007)^0 \rightarrow D^0\pi^0)$  and absolute  $B(D^0 \rightarrow K^-\pi^+)$  and the PDG 1992  $B(D^0 \rightarrow K^-\pi^+\pi^0)/B(D^0 \rightarrow K^-\pi^+)$  and  $B(D^0 \rightarrow K^-\pi^+\pi^-)/B(D^0 \rightarrow K^-\pi^+)$ .

$\Gamma(\bar{D}^0\omega)/\Gamma(\bar{D}^*(2007)^0\omega)$   $\Gamma_{166}/\Gamma_{183}$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.58 ± 0.06 OUR AVERAGE**

0.56 ± 0.04 ± 0.04	LEES	11M BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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1.04 ± 0.20 ± 0.17	BLYTH	06 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.7 ± 0.1 ± 0.1	AUBERT	04B BABR	Repl. by LEES 11M
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$\Gamma(D^*(2010)^+D^-)/\Gamma_{\text{total}}$   $\Gamma_{184}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**6.1 ± 1.5 OUR AVERAGE** Error includes scale factor of 1.6.

5.7 ± 0.7 ± 0.7		<sup>1</sup> AUBERT,B	06A BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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11.7 ± 2.6 <sup>+2.2</sup> <sub>-2.5</sub>		<sup>1,2</sup> ABE	02Q BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

8.8 ± 1.0 ± 1.3		<sup>1</sup> AUBERT	03J BABR	Repl. by AUBERT,B 06B
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14.8 ± 3.8 <sup>+2.8</sup> <sub>-3.1</sub>		<sup>1,3</sup> ABE	02Q BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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< 6.3	90	<sup>1</sup> LIPELES	00 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
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< 56	90	BARATE	98Q ALEP	$e^+e^- \rightarrow Z$
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< 18	90	ASNER	97 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> The measurement is performed using fully reconstructed  $D^*$  and  $D^+$  decays.

<sup>3</sup> The measurement is performed using a partial reconstruction technique for the  $D^*$  and fully reconstructed  $D^+$  decays as a cross check.

$\Gamma(D^*(2007)^0\bar{D}^*(2007)^0)/\Gamma_{\text{total}}$   $\Gamma_{185}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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< <b>0.9</b>	90	<sup>1</sup> AUBERT,B	06A BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

< 270	90	BARATE	98Q ALEP	$e^+e^- \rightarrow Z$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- D^0 K^+)/\Gamma_{\text{total}}$   $\Gamma_{186}/\Gamma$

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.07±0.07±0.09</b>	<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.7 ±0.3 ±0.3	<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- D^{*(2007)^0} K^+)/\Gamma_{\text{total}}$   $\Gamma_{187}/\Gamma$

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>3.46±0.18±0.37</b>	<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
4.6 ±0.7 ±0.7	<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^{*(2010)^-} D^0 K^+)/\Gamma_{\text{total}}$   $\Gamma_{188}/\Gamma$

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2.47±0.10±0.18</b>	<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
3.1 <sup>+0.4</sup> <sub>-0.3</sub> ±0.4	<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^{*(2010)^-} D^0 K^+)/\Gamma(D^- D^0 K^+)$   $\Gamma_{188}/\Gamma_{186}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.754±0.028±0.038</b>	<sup>1</sup> AAIJ	20AN LHCB	$pp$ at 7, 8, 13 TeV

<sup>1</sup> Uses  $D^+ \rightarrow K^- \pi^+ \pi^+$ ,  $D^0 \rightarrow K^- \pi^+$  and  $D^0 \rightarrow K^- \pi^+ \pi^+ \pi^-$  decays.

$\Gamma(D^{*(2010)^-} D^{*(2007)^0} K^+)/\Gamma_{\text{total}}$   $\Gamma_{189}/\Gamma$

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>10.6±0.33±0.86</b>	<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
11.8±1.0 ±1.7	<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- D^+ K^0)/\Gamma_{\text{total}}$   $\Gamma_{190}/\Gamma$

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.75±0.12±0.12</b>		<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.7	90	<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .



$[\Gamma(D^{*}(2010)^- D^+ K^0) + \Gamma(D^- D^{*}(2010)^+ K^0)]/\Gamma_{\text{total}}$   $\Gamma_{191}/\Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>6.41 ± 0.36 ± 0.39</b>	<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
6.5 ± 1.2 ± 1.0	<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^{*}(2010)^- D^{*}(2010)^+ K^0)/\Gamma_{\text{total}}$   $\Gamma_{192}/\Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>8.1 ± 0.7 OUR AVERAGE</b>			
8.26 ± 0.43 ± 0.67	<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
6.8 ± 0.8 ± 1.4	<sup>1,2</sup> DALSENO	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
8.8 ± 0.8 ± 1.4	<sup>1,2</sup> AUBERT,B	06Q BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
8.8 $^{+1.5}_{-1.4}$ ± 1.3	<sup>1</sup> AUBERT	03X BABR	Repl. by AUBERT,B 06Q

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> The result is rescaled by a factor of 2 to convert from  $K_S^0$  to  $K^0$ .

$\Gamma(D^{*-} D_{s1}(2536)^+, D_{s1}^+ \rightarrow D^{*+} K^0)/\Gamma_{\text{total}}$   $\Gamma_{193}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>8.0 ± 2.4 OUR AVERAGE</b>			
7.6 $^{+4.8+1.6}_{-4.2-1.4}$	<sup>1,2</sup> DALSENO	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
8.2 ± 2.6 ± 1.2	<sup>1,2</sup> AUBERT,B	06Q BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> The result is rescaled by a factor of 2 to convert from  $K_S^0$  to  $K^0$ .

$\Gamma(\overline{D}^0 D^0 K^0)/\Gamma_{\text{total}}$   $\Gamma_{194}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.27 ± 0.10 ± 0.05</b>		<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
<1.4	90	<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^0 \overline{D}^0 K^+ \pi^-)/\Gamma(D^{*}(2010)^- D^0 K^+)$   $\Gamma_{195}/\Gamma_{188}$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<b>14.2 ± 1.1 ± 1.0</b>	<sup>1</sup> AAIJ	20AG LHCB	$pp$ at 7, 8, and 13 TeV

<sup>1</sup> AAIJ 20AG excluded contributions from  $B^0 \rightarrow D^{*-} D^0 K^+$  transitions with  $D^{*-} \rightarrow \overline{D}^0 \pi^-$ .

$[\Gamma(\bar{D}^0 D^{*0}(2007)^0 K^0) + \Gamma(\bar{D}^{*0}(2007)^0 D^0 K^0)]/\Gamma_{\text{total}}$   $\Gamma_{196}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>1.08 ± 0.32 ± 0.36</b>		<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<3.7	90	<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{D}^{*0}(2007)^0 D^{*0}(2007)^0 K^0)/\Gamma_{\text{total}}$   $\Gamma_{197}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.40 ± 0.55 ± 0.67</b>		<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<6.6	90	<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma((\bar{D} + \bar{D}^*)(D + D^*)K)/\Gamma_{\text{total}}$   $\Gamma_{198}/\Gamma$

VALUE (units $10^{-2}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>3.68 ± 0.10 ± 0.24</b>		<sup>1</sup> DEL-AMO-SA..11B	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
4.3 ± 0.3 ± 0.6		<sup>1</sup> AUBERT	03X BABR	Repl. by DEL-AMO-SANCHEZ 11B

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta_c K^0)/\Gamma_{\text{total}}$   $\Gamma_{199}/\Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.90 ± 0.11 OUR AVERAGE</b>			
1.04 <sup>+0.18</sup> <sub>-0.15</sub> ± 0.13	<sup>1</sup> CHILIKIN	19 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
0.62 <sup>+0.21</sup> <sub>-0.20</sub> ± 0.05	<sup>2,3</sup> AUBERT	07AV BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
0.91 ± 0.16 ± 0.05	<sup>2,4</sup> AUBERT,B	04B BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
1.23 ± 0.23 <sup>+0.40</sup> <sub>-0.41</sub>	<sup>2</sup> FANG	03 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
1.09 <sup>+0.55</sup> <sub>-0.42</sub> ± 0.33	<sup>5</sup> EDWARDS	01 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> CHILIKIN 19 reports  $[\Gamma(B^0 \rightarrow \eta_c K^0)/\Gamma_{\text{total}}] \times [B(\eta_c(1S) \rightarrow p\bar{p}\pi^+\pi^-)] = (38.0^{+6.4+1.3}_{-2.9-4.7}) \times 10^{-7}$  which we divide by our best value  $B(\eta_c(1S) \rightarrow p\bar{p}\pi^+\pi^-) = (3.7 \pm 0.5) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> AUBERT 07AV reports  $[\Gamma(B^0 \rightarrow \eta_c K^0)/\Gamma_{\text{total}}] \times [B(\eta_c(1S) \rightarrow p\bar{p})] = (0.83^{+0.28}_{-0.26} \pm 0.05) \times 10^{-6}$  which we divide by our best value  $B(\eta_c(1S) \rightarrow p\bar{p}) = (1.33 \pm 0.11) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> AUBERT,B 04B reports  $[\Gamma(B^0 \rightarrow \eta_c K^0)/\Gamma_{\text{total}}] \times [B(\eta_c(1S) \rightarrow K\bar{K}\pi)] = (0.0648 \pm 0.0085 \pm 0.0071) \times 10^{-3}$  which we divide by our best value  $B(\eta_c(1S) \rightarrow K\bar{K}\pi) = (7.1 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>5</sup> EDWARDS 01 assumes equal production of  $B^0$  and  $B^+$  at the  $\Upsilon(4S)$ . The correlated uncertainties (28.3)% from  $B(J/\psi(1S) \rightarrow \gamma\eta_c)$  in those modes have been accounted for.

$\Gamma(\eta_c K^0)/\Gamma(J/\psi(1S) K^0)$   $\Gamma_{199}/\Gamma_{213}$

VALUE	DOCUMENT ID	TECN	COMMENT
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<b>1.39 ± 0.20 ± 0.45</b>	<sup>1</sup> AUBERT,B	04B	BABR $e^+e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Uses BABAR measurement of  $B(B^0 \rightarrow J/\psi K^0) = (8.5 \pm 0.5 \pm 0.6) \times 10^{-4}$ .

$\Gamma(\eta_c(1S) K^+ \pi^-)/\Gamma(J/\psi(1S) K^+ \pi^-)$   $\Gamma_{200}/\Gamma_{214}$

VALUE	DOCUMENT ID	TECN	COMMENT
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<b>0.57 ± 0.03 ± 0.05</b>	<sup>1</sup> AAIJ	18AN	LHCB $pp$ at 7, 8, 13 TeV
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<sup>1</sup> AAIJ 18AN reports  $[\Gamma(B^0 \rightarrow \eta_c(1S) K^+ \pi^-)/\Gamma(B^0 \rightarrow J/\psi(1S) K^+ \pi^-)] \times [B(\eta_c(1S) \rightarrow p\bar{p}) / B(J/\psi(1S) \rightarrow p\bar{p})] = 0.357 \pm 0.015 \pm 0.008$  which we multiply or divide by our best values  $B(\eta_c(1S) \rightarrow p\bar{p}) = (1.33 \pm 0.11) \times 10^{-3}$ ,  $B(J/\psi(1S) \rightarrow p\bar{p}) = (2.120 \pm 0.029) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(\eta_c(1S) K^*(1410)^0)/\Gamma(\eta_c(1S) K^+ \pi^-)$   $\Gamma_{203}/\Gamma_{200}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
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<b>32 ± 24 ± 6</b>	<sup>1</sup> AAIJ	18AN	LHCB $pp$ at 7, 8, 13 TeV
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<sup>1</sup> AAIJ 18AN reports  $[\Gamma(B^0 \rightarrow \eta_c(1S) K^*(1410)^0)/\Gamma(B^0 \rightarrow \eta_c(1S) K^+ \pi^-)] \times [B(K^*(1410) \rightarrow K\pi)] = 0.021 \pm 0.011 \pm 0.011$  which we divide by our best value  $B(K^*(1410) \rightarrow K\pi) = (6.6 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\eta_c(1S) K^+ \pi^- (NR))/\Gamma(\eta_c(1S) K^+ \pi^-)$   $\Gamma_{201}/\Gamma_{200}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
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<b>10.3 ± 1.4<sup>+1.0</sup><sub>-1.2</sub></b>	AAIJ	18AN	LHCB $pp$ at 7, 8, 13 TeV
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$\Gamma(\eta_c(1S) K_0^*(1430)^0)/\Gamma(\eta_c(1S) K^+ \pi^-)$   $\Gamma_{204}/\Gamma_{200}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
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<b>27 ± 5 ± 3</b>	<sup>1</sup> AAIJ	18AN	LHCB $pp$ at 7, 8, 13 TeV
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<sup>1</sup> AAIJ 18AN reports  $[\Gamma(B^0 \rightarrow \eta_c(1S) K_0^*(1430)^0)/\Gamma(B^0 \rightarrow \eta_c(1S) K^+ \pi^-)] \times [B(K_0^*(1430) \rightarrow K\pi)] = 0.253 \pm 0.035^{+0.035}_{-0.028}$  which we divide by our best value  $B(K_0^*(1430) \rightarrow K\pi) = (93 \pm 10) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\eta_c(1S) K_2^*(1430)^0)/\Gamma(\eta_c(1S) K^+ \pi^-)$   $\Gamma_{205}/\Gamma_{200}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
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<b>8.2<sup>+3.6</sup><sub>-4.4</sub> ± 0.2</b>	<sup>1</sup> AAIJ	18AN	LHCB $pp$ at 7, 8, 13 TeV
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<sup>1</sup> AAIJ 18AN reports  $[\Gamma(B^0 \rightarrow \eta_c(1S) K_2^*(1430)^0)/\Gamma(B^0 \rightarrow \eta_c(1S) K^+ \pi^-)] \times [B(K_2^*(1430) \rightarrow K\pi)] = 0.041 \pm 0.015^{+0.010}_{-0.016}$  which we divide by our best value  $B(K_2^*(1430) \rightarrow K\pi) = (49.9 \pm 1.2) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\eta_c(1S)K^*(1680)^0)/\Gamma(\eta_c(1S)K^+\pi^-)$   $\Gamma_{206}/\Gamma_{200}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
$5.7^{+6.5}_{-6.8} \pm 0.4$	<sup>1</sup> AAIJ	18AN LHCB	$pp$ at 7, 8, 13 TeV

<sup>1</sup> AAIJ 18AN reports  $[\Gamma(B^0 \rightarrow \eta_c(1S)K^*(1680)^0)/\Gamma(B^0 \rightarrow \eta_c(1S)K^+\pi^-)] \times [B(K^*(1680) \rightarrow K\pi)] = 0.022 \pm 0.020^{+0.015}_{-0.017}$  which we divide by our best value  $B(K^*(1680) \rightarrow K\pi) = (38.7 \pm 2.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\eta_c(1S)K_0^*(1950)^0)/\Gamma(\eta_c(1S)K^+\pi^-)$   $\Gamma_{207}/\Gamma_{200}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
$7^{+4}_{-6} \pm 2$	<sup>1</sup> AAIJ	18AN LHCB	$pp$ at 7, 8, 13 TeV

<sup>1</sup> AAIJ 18AN reports  $[\Gamma(B^0 \rightarrow \eta_c(1S)K_0^*(1950)^0)/\Gamma(B^0 \rightarrow \eta_c(1S)K^+\pi^-)] \times [B(K_0^*(1950) \rightarrow K^-\pi^+)] = 0.038 \pm 0.018^{+0.014}_{-0.025}$  which we divide by our best value  $B(K_0^*(1950) \rightarrow K^-\pi^+) = (52 \pm 14) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(T_{c\bar{c}}(4100)^-K^+, T_{c\bar{c}}^- \rightarrow \eta_c\pi^-)/\Gamma(\eta_c(1S)K^+\pi^-)$   $\Gamma_{202}/\Gamma_{200}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
$3.3 \pm 1.1^{+1.2}_{-1.1}$	AAIJ	18AN LHCB	$pp$ at 7, 8, 13 TeV

$\Gamma(\eta_c K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{208}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>5.3 <math>^{+0.8}_{-0.9}</math> OUR AVERAGE</b>	Error includes scale factor of 1.7. See the ideogram below.		

$4.42 \pm 0.24^{+0.54}_{-0.66}$	<sup>1</sup> AAIJ	18AN LHCB	$pp$ at 7, 8, 13 TeV
$6.8 \pm 0.9 \pm 0.4$	<sup>2,3</sup> AUBERT	08AB BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$7.7^{+2.4}_{-2.2} \pm 0.7$	<sup>4,5</sup> AUBERT	07AV BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$16.2 \pm 3.2^{+5.5}_{-6.0}$	<sup>5</sup> FANG	03 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

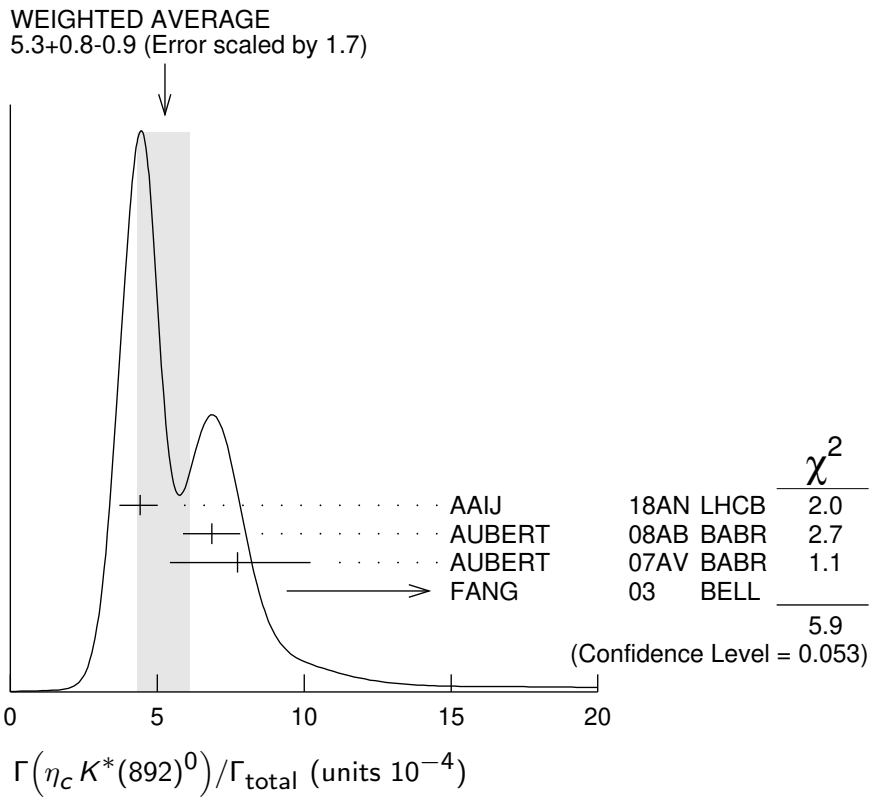
<sup>1</sup> AAIJ 18AN reports  $B(B^0 \rightarrow \eta_c K^*(892)^0)$ ,  $K^*(892)^0 \rightarrow K^+\pi^- = (2.95 \pm 0.16^{+0.36}_{-0.44}) \times 10^{-4}$  using the fitted fraction of  $0.514 \pm 0.019^{+0.017}_{-0.048}$  from Dalitz decay of  $B(B^0 \rightarrow \eta_c K^+\pi^-) = (5.73 \pm 0.24 \pm 0.67) \times 10^{-4}$  and corrected for  $B(K^*(892)^0 \rightarrow K^+\pi^-) = 2/3$ .

<sup>2</sup> AUBERT 08AB reports  $[\Gamma(B^0 \rightarrow \eta_c K^*(892)^0)/\Gamma_{\text{total}}] / [B(B^+ \rightarrow \eta_c K^+)] = 0.62 \pm 0.06 \pm 0.05$  which we multiply by our best value  $B(B^+ \rightarrow \eta_c K^+) = (1.10 \pm 0.07) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> Uses the production ratio of  $(B^+ B^-)/(B^0 \bar{B}^0) = 1.026 \pm 0.032$  at  $\Upsilon(4S)$ .

<sup>4</sup> AUBERT 07AV reports  $[\Gamma(B^0 \rightarrow \eta_c K^*(892)^0)/\Gamma_{\text{total}}] \times [B(\eta_c(1S) \rightarrow p\bar{p})] = (1.03^{+0.27}_{-0.24} \pm 0.17) \times 10^{-6}$  which we divide by our best value  $B(\eta_c(1S) \rightarrow p\bar{p}) = (1.33 \pm 0.11) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>5</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .



$\Gamma(\eta_c(2S) K_S^0, \eta_c \rightarrow p\bar{p}\pi^+\pi^-) / \Gamma_{\text{total}}$	$\Gamma_{209} / \Gamma$
VALUE (units $10^{-7}$ )	DOCUMENT ID TECN COMMENT
$4.2^{+1.4+0.3}_{-1.2-0.3}$	CHILIKIN 19 BELL $e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(\eta_c(2S) K^{*0}) / \Gamma_{\text{total}}$	$\Gamma_{210} / \Gamma$
VALUE (units $10^{-4}$ ) CL%	DOCUMENT ID TECN COMMENT
$<3.9$ 90	<sup>1</sup> AUBERT 08AB BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses the production ratio of  $(B^+ B^-) / (B^0 \bar{B}^0) = 1.026 \pm 0.032$  at  $\Upsilon(4S)$ .

$\Gamma(h_c(1P) K_S^0) / \Gamma_{\text{total}}$	$\Gamma_{211} / \Gamma$
VALUE	DOCUMENT ID TECN COMMENT
$<1.4 \times 10^{-5}$	CHILIKIN 19 BELL $e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(B^0 \rightarrow h_c(1P) K^{*0}) / \Gamma_{\text{total}} \times \Gamma(h_c(1P) \rightarrow \gamma \eta_c(1S)) / \Gamma_{\text{total}}$	$\Gamma_{212} / \Gamma \times \Gamma_{25}^{h_c(1P)} / \Gamma_{h_c(1P)}$
VALUE (units $10^{-4}$ ) CL%	DOCUMENT ID TECN COMMENT
$<2.2$ 90	<sup>1</sup> AUBERT 08AB BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses the production ratio of  $(B^+ B^-) / (B^0 \bar{B}^0) = 1.026 \pm 0.032$  at  $\Upsilon(4S)$ .

$\Gamma(\eta_c K^*(892)^0) / \Gamma(\eta_c K^0)$	$\Gamma_{208} / \Gamma_{199}$
VALUE	DOCUMENT ID TECN COMMENT
$1.33 \pm 0.36^{+0.24}_{-0.33}$	FANG 03 BELL $e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(J/\psi(1S)K^0)/\Gamma_{\text{total}}$   $\Gamma_{213}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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**8.91 ± 0.21 OUR FIT**

**8.91 ± 0.21 OUR AVERAGE**

9.02 ± 0.10 ± 0.26			<sup>1</sup> CHOUDHURY 21	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
8.1 ± 0.9 ± 0.6			<sup>2</sup> CHILIKIN 19	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
8.8 $^{+1.4}_{-1.3}$ ± 0.1			<sup>3,4</sup> AUBERT 07AV	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
8.69 ± 0.22 ± 0.30			<sup>4</sup> AUBERT 05J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
9.5 ± 0.8 ± 0.6			<sup>4</sup> AVERY 00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
11.5 ± 2.3 ± 1.7			<sup>5</sup> ABE 96H	CDF	$p\bar{p}$ at 1.8 TeV
6.93 ± 4.07 ± 0.04			<sup>6</sup> BORTOLETTO 92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
9.24 ± 7.21 ± 0.05		2	<sup>7</sup> ALBRECHT 90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

7.9 ± 0.4 ± 0.9			<sup>4</sup> ABE 03B	BELL	Repl. by CHOUDHURY 21
8.3 ± 0.4 ± 0.5			<sup>4</sup> AUBERT 02	BABR	Repl. by AUBERT 05J
8.5 $^{+1.4}_{-1.2}$ ± 0.6			<sup>4</sup> JESSOP 97	CLE2	Repl. by AVERY 00
7.5 ± 2.4 ± 0.8		10	<sup>6</sup> ALAM 94	CLE2	Sup. by JESSOP 97
<50	90		ALAM 86	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> CHOUDHURY 21 uses the relative production fraction of charged ( $f^{+-}$ ) to neutral ( $f^{00}$ )  $B$  mesons at  $\Upsilon(4S)$  value of  $f^{+-}/f^{00} = 1.058 \pm 0.024$ .

<sup>2</sup> CHILIKIN 19 reports  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow p\bar{p}\pi^+\pi^-)] = (48.6^{+4.6+2.4}_{-4.4-2.6}) \times 10^{-7}$  which we divide by our best value  $B(J/\psi(1S) \rightarrow p\bar{p}\pi^+\pi^-) = (6.0 \pm 0.5) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> AUBERT 07AV reports  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow p\bar{p})] = (1.87^{+0.28}_{-0.26} \pm 0.07) \times 10^{-6}$  which we divide by our best value  $B(J/\psi(1S) \rightarrow p\bar{p}) = (2.120 \pm 0.029) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>5</sup> ABE 96H assumes that  $B(B^+ \rightarrow J/\psi K^+) = (1.02 \pm 0.14) \times 10^{-3}$ .

<sup>6</sup> BORTOLETTO 92 reports  $(6 \pm 3 \pm 2) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow e^+e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+e^-) = 0.069 \pm 0.009$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>7</sup> ALBRECHT 90J reports  $(8 \pm 6 \pm 2) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow e^+e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+e^-) = 0.069 \pm 0.009$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(J/\psi(1S)K^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{214}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**1.15 ± 0.05 OUR AVERAGE**

1.15 ± 0.01 ± 0.05		CHILIKIN	14	BELL $\bar{B}^0 \rightarrow J/\psi K^- \pi^+$
1.16 ± 0.56 ± 0.01		<sup>1</sup> BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.079 ± 0.011		<sup>2</sup> AUBERT	09AA	BABR $e^+e^- \rightarrow \Upsilon(4S)$
<1.3	90	<sup>3</sup> ALBRECHT	87D	ARG $e^+e^- \rightarrow \Upsilon(4S)$
<6.3	90	GILES	84	CLEO $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>BORTOLETTO 92 reports  $(1.0 \pm 0.4 \pm 0.3) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^+\pi^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow e^+e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+e^-) = 0.069 \pm 0.009$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup>Does not report systematic uncertainties.

<sup>3</sup>ALBRECHT 87D assume  $B^+B^-/B^0\bar{B}^0$  ratio is 55/45.  $K\pi$  system is specifically selected as nonresonant.

$\Gamma(J/\psi(1S)K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{215}/\Gamma$

VALUE (units $10^{-3}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
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**1.27 ± 0.05 OUR FIT**

**1.28 ± 0.05 OUR AVERAGE**

1.19 ± 0.01 ± 0.08		CHILIKIN	14	BELL $\bar{B}^0 \rightarrow J/\psi K^- \pi^+$
1.33 $^{+0.22}_{-0.21}$ ± 0.02		<sup>1,2</sup> AUBERT	07AV	BABR $e^+e^- \rightarrow \Upsilon(4S)$
1.309 ± 0.026 ± 0.077		<sup>2</sup> AUBERT	05J	BABR $e^+e^- \rightarrow \Upsilon(4S)$
1.29 ± 0.05 ± 0.13		<sup>2</sup> ABE	02N	BELL $e^+e^- \rightarrow \Upsilon(4S)$
1.74 ± 0.20 ± 0.18		<sup>3</sup> ABE	98O	CDF $p\bar{p}$ 1.8 TeV
1.32 ± 0.17 ± 0.17		<sup>4</sup> JESSOP	97	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
1.27 ± 0.65 ± 0.01		<sup>5</sup> BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
1.27 ± 0.60 ± 0.01	6	<sup>6</sup> ALBRECHT	90J	ARG $e^+e^- \rightarrow \Upsilon(4S)$
4.04 ± 1.81 ± 0.02	5	<sup>7</sup> BEBEK	87	CLEO $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.24 ± 0.05 ± 0.09		<sup>2</sup> AUBERT	02	BABR Repl. by AUBERT 05J
1.36 ± 0.27 ± 0.22		<sup>8</sup> ABE	96H	CDF Sup. by ABE 98O
1.69 ± 0.31 ± 0.18	29	<sup>9</sup> ALAM	94	CLE2 Sup. by JESSOP 97
		<sup>10</sup> ALBRECHT	94G	ARG $e^+e^- \rightarrow \Upsilon(4S)$
4.0 ± 0.30		<sup>11</sup> ALBAJAR	91E	UA1 $E_{\text{cm}}^{p\bar{p}} = 630$ GeV
3.3 ± 0.18	5	<sup>12</sup> ALBRECHT	87D	ARG $e^+e^- \rightarrow \Upsilon(4S)$
4.1 ± 0.18	5	<sup>13</sup> ALAM	86	CLEO Repl. by BEBEK 87

<sup>1</sup>AUBERT 07AV reports  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^*(892)^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow p\bar{p})] = (2.82^{+0.30+0.36}_{-0.28-0.35}) \times 10^{-6}$  which we divide by our best value  $B(J/\psi(1S) \rightarrow p\bar{p}) = (2.120 \pm 0.029) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup>ABE 98O reports  $[B(B^0 \rightarrow J/\psi(1S)K^*(892)^0)]/[B(B^+ \rightarrow J/\psi(1S)K^+)] = 1.76 \pm 0.14 \pm 0.15$ . We multiply by our best value  $B(B^+ \rightarrow J/\psi(1S)K^+) = (9.9 \pm 1.0) \times 10^{-4}$ .

Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>5</sup> BORTOLETTO 92 reports  $(1.1 \pm 0.5 \pm 0.3) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^*(892)^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow e^+e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+e^-) = 0.069 \pm 0.009$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>6</sup> ALBRECHT 90J reports  $(1.1 \pm 0.5 \pm 0.2) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^*(892)^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow e^+e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+e^-) = 0.069 \pm 0.009$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>7</sup> BEBEK 87 reports  $(3.5 \pm 1.6 \pm 0.3) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^*(892)^0)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow e^+e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+e^-) = 0.069 \pm 0.009$ , which we rescale to our best value  $B(J/\psi(1S) \rightarrow e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Updated in BORTOLETTO 92 to use the same assumptions.

<sup>8</sup> ABE 96H assumes that  $B(B^+ \rightarrow J/\psi K^+) = (1.02 \pm 0.14) \times 10^{-3}$ .

<sup>9</sup> The neutral and charged  $B$  events together are predominantly longitudinally polarized,  $\Gamma_L/\Gamma = 0.080 \pm 0.08 \pm 0.05$ . This can be compared with a prediction using HQET, 0.73 (KRAMER 92). This polarization indicates that the  $B \rightarrow \psi K^*$  decay is dominated by the  $CP = -1$   $CP$  eigenstate. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>10</sup> ALBRECHT 94G measures the polarization in the vector-vector decay to be predominantly longitudinal,  $\Gamma_T/\Gamma = 0.03 \pm 0.16 \pm 0.15$  making the neutral decay a  $CP$  eigenstate when the  $K^*0$  decays through  $K_S^0 \pi^0$ .

<sup>11</sup> ALBAJAR 91E assumes  $B_d^0$  production fraction of 36%.

<sup>12</sup> ALBRECHT 87D assume  $B^+ B^- / B^0 \bar{B}^0$  ratio is 55/45. Superseded by ALBRECHT 90J.

<sup>13</sup> ALAM 86 assumes  $B^\pm / B^0$  ratio is 60/40. The observation of the decay  $B^+ \rightarrow J/\psi K^*(892)^+$  (HAAS 85) has been retracted in this paper.

### $\Gamma(J/\psi(1S)K^*(892)^0)/\Gamma(J/\psi(1S)K^0)$ $\Gamma_{215}/\Gamma_{213}$

VALUE	DOCUMENT ID	TECN	COMMENT
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**1.50 ± 0.09 OUR AVERAGE**

1.51 ± 0.05 ± 0.08	AUBERT	05J	BABR $e^+e^- \rightarrow \Upsilon(4S)$
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1.39 ± 0.36 ± 0.10	ABE	96Q	CDF $p\bar{p}$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.49 ± 0.10 ± 0.08	<sup>1</sup> AUBERT	02	BABR Repl. by AUBERT 05J
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

### $\Gamma(J/\psi(1S)\eta K_S^0)/\Gamma_{\text{total}}$ $\Gamma_{216}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
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**5.4 ± 0.9 OUR AVERAGE**

5.22 ± 0.78 ± 0.49	<sup>1</sup> IWASHITA	14	BELL $e^+e^- \rightarrow \Upsilon(4S)$
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8.4 ± 2.6 ± 2.7	<sup>1</sup> AUBERT	04Y	BABR $e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .



$\Gamma(J/\psi(1S)\eta'K_S^0)/\Gamma_{\text{total}}$   $\Gamma_{217}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;2.5</b>	90	<sup>1</sup> XIE	07	BELL $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(J/\psi(1S)\omega K^0)/\Gamma_{\text{total}}$   $\Gamma_{219}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>2.3±0.3±0.3</b>	<sup>1</sup> DEL-AMO-SA..10B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

3.1±0.6±0.3	<sup>1</sup> AUBERT	08W	BABR Repl. by DEL-AMO-SANCHEZ 10B
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c0}(3915), \chi_{c0} \rightarrow J/\psi\omega)/\Gamma_{\text{total}}$   $\Gamma_{220}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b>2.1±0.9±0.3</b>	<sup>1</sup> DEL-AMO-SA..10B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.3 <sup>+1.3</sup> <sub>-1.1</sub> ±0.2	<sup>1,2</sup> AUBERT	08W	BABR Repl. by DEL-AMO-SANCHEZ 10B
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Corresponds to upper limit of  $3.9 \times 10^{-5}$  at 90% CL.

$\Gamma(J/\psi(1S)\phi K^0)/\Gamma_{\text{total}}$   $\Gamma_{218}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b>4.9 ±1.0 OUR AVERAGE</b>	Error	includes scale factor of 1.3.	
4.43±0.76±0.19	LEES	15	BABR $e^+e^- \rightarrow \Upsilon(4S)$
10.2 ±3.8 ±1.0	<sup>1</sup> AUBERT	030	BABR $e^+e^- \rightarrow \Upsilon(4S)$
8.8 <sup>+3.5</sup> <sub>-3.0</sub> ±1.3	<sup>2</sup> ANASTASSOV 00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ANASTASSOV 00 finds 10 events on a background of  $0.5 \pm 0.2$ . Assumes equal production of  $B^0$  and  $B^+$  at the  $\Upsilon(4S)$ , a uniform Dalitz plot distribution, isotropic  $J/\psi(1S)$  and  $\phi$  decays, and  $B(B^+ \rightarrow J/\psi(1S)\phi K^+) = B(B^0 \rightarrow J/\psi(1S)\phi K^0)$ .

$\Gamma(J/\psi(1S)K(1270^0))/\Gamma_{\text{total}}$   $\Gamma_{221}/\Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.30±0.34±0.32</b>	<sup>1</sup> ABE	01L	BELL $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and uses the PDG value of  $B(B^+ \rightarrow J/\psi(1S)K^+) = (1.00 \pm 0.10) \times 10^{-3}$ .

$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{222}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>1.66±0.10 OUR AVERAGE</b>				
1.62±0.11±0.06		<sup>1</sup> PAL	18	BELL $e^+e^- \rightarrow \Upsilon(4S)$
1.69±0.14±0.07		<sup>1</sup> AUBERT	08AU	BABR $e^+e^- \rightarrow \Upsilon(4S)$
2.5 <sup>+1.1</sup> <sub>-0.9</sub> ±0.2		<sup>1</sup> AVERY	00	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.94 \pm 0.22 \pm 0.17$		<sup>1</sup> AUBERT,B	06B	BABR	Repl. by AUBERT 08AU
$2.3 \pm 0.5 \pm 0.2$		<sup>1</sup> ABE	03B	BELL	Repl. by PAL 18
$2.0 \pm 0.6 \pm 0.2$		<sup>1</sup> AUBERT	02	BABR	Repl. by AUBERT,B 06B
< 32	90	<sup>2</sup> ACCIARRI	97C	L3	
< 5.8	90	BISHAI	96	CLE2	Sup. by AVERY 00
< 690	90	<sup>1</sup> ALEXANDER	95	CLE2	Sup. by BISHAI 96

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ACCIARRI 97C assumes  $B^0$  production fraction  $(39.5 \pm 4.0)\%$  and  $B_s$   $(12.0 \pm 3.0)\%$ .

### $\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$ $\Gamma_{223}/\Gamma$

<u>VALUE (units <math>10^{-6}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>10.8 \pm 2.3</math> OUR AVERAGE</b>		Error includes scale factor of 1.5.		
$7.3 \pm 2.5 \pm 1.3$		<sup>1</sup> AAIJ	15D	LHCB $pp$ at 7, 8 TeV
$12.3^{+1.8}_{-1.7} \pm 0.7$		<sup>2,3</sup> CHANG	12	BELL $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$9.5 \pm 1.7 \pm 0.8$		<sup>3</sup> CHANG	07A	BELL	Repl. by CHANG 12
< 27	90	<sup>3</sup> AUBERT	03O	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 1200	90	<sup>4</sup> ACCIARRI	97C	L3	

<sup>1</sup> AAIJ 15D reports  $[\Gamma(B^0 \rightarrow J/\psi(1S)\eta)/\Gamma_{\text{total}}] / [B(B_s^0 \rightarrow J/\psi(1S)\eta)] = (1.85 \pm 0.61 \pm 0.14) \times 10^{-2}$  which we multiply by our best value  $B(B_s^0 \rightarrow J/\psi(1S)\eta) = (4.0 \pm 0.7) \times 10^{-4}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Reconstructs  $\eta$  in  $\gamma\gamma$  and  $\pi^+\pi^-\pi^0$  decays.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> ACCIARRI 97C assumes  $B^0$  production fraction  $(39.5 \pm 4.0\%)$  and  $B_s$   $(12.0 \pm 3.0\%)$ .

### $\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ $\Gamma_{224}/\Gamma$

<u>VALUE (units <math>10^{-5}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>3.99 \pm 0.15</math> OUR AVERAGE</b>			
$3.98 \pm 0.14 \pm 0.07$	<sup>1,2</sup> AAIJ	13M	LHCB $pp$ at 7 TeV
$4.6 \pm 0.7 \pm 0.6$	<sup>3</sup> AUBERT	03B	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> AAIJ 13M reports  $(3.97 \pm 0.09 \pm 0.11 \pm 0.16) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-)/\Gamma_{\text{total}}] / [B(B^+ \rightarrow J/\psi(1S)K^+)]$  assuming  $B(B^+ \rightarrow J/\psi(1S)K^+) = (1.018 \pm 0.042) \times 10^{-3}$ , which we rescale to our best value  $B(B^+ \rightarrow J/\psi(1S)K^+) = (1.020 \pm 0.019) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> AAIJ 13M does not report correlations between various measurements of the  $J/\psi\pi\pi$  final state.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

### $\Gamma(J/\psi(1S)\pi^+\pi^- \text{ nonresonant})/\Gamma_{\text{total}}$ $\Gamma_{225}/\Gamma$

<u>VALUE (units <math>10^{-5}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt; 1.2</b>	90	<sup>1</sup> AUBERT	07AC	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(J/\psi(1S)f_0(500), f_0 \rightarrow \pi\pi)/\Gamma_{\text{total}}$   $\Gamma_{226}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
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$8.8 \pm 0.5^{+1.1}_{-1.5}$	<sup>1</sup> AAIJ	14X LHCB	$pp$ at 7, 8 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$6.4^{+2.5}_{-1.1} \pm 0.2$	<sup>2,3</sup> AAIJ	13M LHCB	Repl. by AAIJ 14X
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<sup>1</sup> AAIJ 14X uses Dalitz plot analysis of  $B^0 \rightarrow J/\psi\pi^+\pi^-$ .

<sup>2</sup> AAIJ 13M reports  $(6.4 \pm 0.8^{+2.4}_{-0.8}) \times 10^{-6}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)f_0(500), f_0 \rightarrow \pi\pi)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-)]$  assuming  $B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-) = (3.97 \pm 0.09 \pm 0.11 \pm 0.16) \times 10^{-5}$ , which we rescale to our best value  $B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-) = (3.99 \pm 0.15) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> AAIJ 13M does not report correlations between various measurements of the  $J/\psi\pi\pi$  final state. Measured in Dalitz plot like analysis of  $B^0 \rightarrow J/\psi\pi^+\pi^-$ .

$\Gamma(J/\psi(1S)f_2)/\Gamma_{\text{total}}$   $\Gamma_{227}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**$0.33^{+0.05}_{-0.06}$  OUR AVERAGE** Error includes scale factor of 1.5.

$0.30 \pm 0.03^{+0.02}_{-0.03}$	<sup>1</sup> AAIJ	14X LHCB	$pp$ at 7, 8 TeV
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$0.42 \pm 0.06 \pm 0.02$	<sup>2,3</sup> AAIJ	13M LHCB	$pp$ at 7 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 0.5$	90	<sup>4,5</sup> AUBERT	07AC BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> AAIJ 14X uses Dalitz plot analysis of  $B^0 \rightarrow J/\psi\pi^+\pi^-$ .

<sup>2</sup> AAIJ 13M reports  $[\Gamma(B^0 \rightarrow J/\psi(1S)f_2)/\Gamma_{\text{total}}] \times [B(f_2(1270) \rightarrow \pi\pi)] = (3.5 \pm 0.4 \pm 0.4) \times 10^{-6}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)f_2)/\Gamma_{\text{total}}] \times [B(f_2(1270) \rightarrow \pi\pi)] / [B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-)]$  assuming  $B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-) = (3.97 \pm 0.09 \pm 0.11 \pm 0.16) \times 10^{-5}$ , which we rescale to our best values  $B(f_2(1270) \rightarrow \pi\pi) = (84.3^{+2.8}_{-1.0}) \times 10^{-2}$ ,  $B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-) = (3.99 \pm 0.15) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best values.

<sup>3</sup> AAIJ 13M does not report correlations between various measurements of the  $J/\psi\pi\pi$  final state. Measured in Dalitz plot like analysis of  $B^0 \rightarrow J/\psi\pi^+\pi^-$ .

<sup>4</sup> AUBERT 07AC reports  $[\Gamma(B^0 \rightarrow J/\psi(1S)f_2)/\Gamma_{\text{total}}] \times [B(f_2(1270) \rightarrow \pi\pi)] < 0.46 \times 10^{-5}$  which we divide by our best value  $B(f_2(1270) \rightarrow \pi\pi) = 84.3 \times 10^{-2}$ .

<sup>5</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(J/\psi(1S)\rho^0)/\Gamma_{\text{total}}$   $\Gamma_{228}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**$2.55^{+0.18}_{-0.16}$  OUR AVERAGE**

$2.50 \pm 0.10^{+0.18}_{-0.15}$	<sup>1</sup> AAIJ	14X LHCB	$pp$ at 7, 8 TeV
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$2.7 \pm 0.3 \pm 0.2$	<sup>2</sup> AUBERT	07AC BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

- $2.51^{+0.22}_{-0.23} \pm 0.10$       <sup>3,4</sup> AAIJ      13M LHCb    Repl. by AAIJ 14X  
 $1.6 \pm 0.6 \pm 0.4$       <sup>2</sup> AUBERT      03B BABR    Repl. by AUBERT 07AC  
 $<25$       90      BISHAI      96 CLE2     $e^+e^- \rightarrow \Upsilon(4S)$   
<sup>1</sup> AAIJ 14X uses Dalitz plot analysis of  $B^0 \rightarrow J/\psi \pi^+ \pi^-$ . We assume  $B(\rho(770)^0 \rightarrow \pi^+ \pi^-) = 100\%$ .  
<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .  
<sup>3</sup> AAIJ      13M      reports       $(2.49^{+0.20+0.16}_{-0.13-0.23}) \times 10^{-5}$   
 from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)\rho^0)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-)]$   
 assuming  $B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-) = (3.97 \pm 0.09 \pm 0.11 \pm 0.16) \times 10^{-5}$ , which we  
 rescale to our best value  $B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-) = (3.99 \pm 0.15) \times 10^{-5}$ . Our first  
 error is their experiment's error and our second error is the systematic error from using  
 our best value.  
<sup>4</sup> AAIJ 13M does not report correlations between various measurements of the  $J/\psi \pi \pi$  final  
 state. Measured in Dalitz plot like analysis of  $B^0 \rightarrow J/\psi \pi^+ \pi^-$ . Assumes  $B(\rho(770)^0 \rightarrow \pi \pi) = 100\%$ .

$\Gamma(J/\psi(1S) f_0(980), f_0 \rightarrow \pi^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{229}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.1 \times 10^{-6}$	90	<sup>1</sup> AAIJ	13M LHCb	$pp$ at 7 TeV

<sup>1</sup> AAIJ 13M does not provide correlations between various measurements of the  $J/\psi \pi^+ \pi^-$  final state. The measurements were obtained from a Dalitz plot like analysis of  $B^0 \rightarrow J/\psi \pi^+ \pi^-$ . Also reports  $\Gamma(J/\psi(1S) f_0(980), f_0 \rightarrow \pi^+ \pi^-) / \Gamma_{\text{total}} = (6.1^{+3.1+1.7}_{-2.0-1.4}) \times 10^{-6}$ .

$\Gamma(J/\psi(1S) \rho(1450)^0, \rho^0 \rightarrow \pi \pi) / \Gamma_{\text{total}}$   $\Gamma_{230}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.9^{+1.6}_{-0.7}</math> OUR AVERAGE</b>			

$4.6 \pm 1.1 \pm 1.9$	<sup>1</sup> AAIJ	14X LHCb	$pp$ at 7, 8 TeV
$2.1^{+2.4}_{-0.7} \pm 0.1$	<sup>2,3</sup> AAIJ	13M LHCb	$pp$ at 7 TeV

<sup>1</sup> AAIJ 14X uses Dalitz plot analysis of  $B^0 \rightarrow J/\psi \pi^+ \pi^-$ .  
<sup>2</sup> AAIJ 13M reports  $(2.1^{+1.0+2.2}_{-0.6-0.4}) \times 10^{-6}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)\rho(1450)^0, \rho^0 \rightarrow \pi \pi) / \Gamma_{\text{total}}] / [B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-)]$  assuming  $B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-) = (3.97 \pm 0.09 \pm 0.11 \pm 0.16) \times 10^{-5}$ , which we rescale to our best value  $B(B^0 \rightarrow J/\psi(1S)\pi^+\pi^-) = (3.99 \pm 0.15) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.  
<sup>3</sup> AAIJ 13M does not report correlations between various measurements of the  $J/\psi \pi \pi$  final state. Measured in Dalitz plot like analysis of  $B^0 \rightarrow J/\psi \pi^+ \pi^-$ .

$\Gamma(J/\psi \rho(1700)^0, \rho^0 \rightarrow \pi^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{231}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.0 \pm 0.5 \pm 1.2</math></b>	<sup>1</sup> AAIJ	14X LHCb	$pp$ at 7, 8 TeV

<sup>1</sup> AAIJ 14X uses Dalitz plot analysis of  $B^0 \rightarrow J/\psi \pi^+ \pi^-$ .

$\Gamma(J/\psi(1S)\omega)/\Gamma_{\text{total}}$   $\Gamma_{232}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$1.8^{+0.7}_{-0.5} \pm 0.1$		<sup>1</sup> AAIJ	14X	LHCB $pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

<27                      90                      BISHAI                      96                      CLE2                       $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> AAIJ 14X reports  $[\Gamma(B^0 \rightarrow J/\psi(1S)\omega)/\Gamma_{\text{total}}] \times [B(\omega(782) \rightarrow \pi^+\pi^-)] = (2.7^{+0.8+0.7}_{-0.6-0.5}) \times 10^{-7}$  which we divide by our best value  $B(\omega(782) \rightarrow \pi^+\pi^-) = (1.53 \pm 0.12) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(J/\psi(1S)\omega)/\Gamma(J/\psi(1S)\rho^0)$   $\Gamma_{232}/\Gamma_{228}$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.61^{+0.39}_{-0.21} \pm 0.05$	<sup>1,2</sup> AAIJ	13M	LHCB $pp$ at 7 TeV

<sup>1</sup> AAIJ 13M reports  $0.61^{+0.24+0.31}_{-0.14-0.16}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)\omega)/\Gamma(B^0 \rightarrow J/\psi(1S)\rho^0)] \times [B(\omega(782) \rightarrow \pi^+\pi^-)]$  assuming  $B(\omega(782) \rightarrow \pi^+\pi^-) = (1.53^{+0.11}_{-0.13}) \times 10^{-2}$ , which we rescale to our best value  $B(\omega(782) \rightarrow \pi^+\pi^-) = (1.53 \pm 0.12) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> AAIJ 13M does not report correlations between various measurements of the  $J/\psi\pi\pi$  final state. Measured in Dalitz plot like analysis of  $B^0 \rightarrow J/\psi\pi^+\pi^-$ . Assumes  $B(\rho(770)^0 \rightarrow \pi\pi) = 100\%$ .

$\Gamma(J/\psi(1S)\omega)/\Gamma(J/\psi(1S)\rho^0)$   $\Gamma_{232}/\Gamma_{228}$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.89 \pm 0.19^{+0.07}_{-0.13}$	AAIJ	13A	LHCB $pp$ at 7 TeV

$\Gamma(J/\psi(1S)K^+K^-)/\Gamma_{\text{total}}$   $\Gamma_{233}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$2.53 \pm 0.35 \pm 0.05$	<sup>1</sup> AAIJ	13BT	LHCB $pp$ at 7 TeV

<sup>1</sup> AAIJ 13BT reports  $(2.53 \pm 0.31 \pm 0.19) \times 10^{-6}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)K^+K^-)/\Gamma_{\text{total}}] / [B(B^+ \rightarrow J/\psi(1S)K^+)]$  assuming  $B(B^+ \rightarrow J/\psi(1S)K^+) = (1.018 \pm 0.042) \times 10^{-3}$ , which we rescale to our best value  $B(B^+ \rightarrow J/\psi(1S)K^+) = (1.020 \pm 0.019) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(J/\psi(1S)a_0(980), a_0 \rightarrow K^+K^-)/\Gamma_{\text{total}}$   $\Gamma_{234}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$0.470 \pm 0.331 \pm 0.072$	<sup>1</sup> AAIJ	13BT	LHCB $pp$ at 7 TeV

<sup>1</sup> AAIJ 13BT uses  $B(\bar{B}^0 \rightarrow J/\psi K^+K^-) = (2.53 \pm 0.31 \pm 0.19) \times 10^{-6}$  to derive this result. It also reports the equivalent upper limit of  $< 9.0 \times 10^{-7}$  at 90% CL.

$\Gamma(J/\psi(1S)\phi)/\Gamma_{\text{total}}$   $\Gamma_{235}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.1 × 10<sup>-7</sup></b>	90	AAIJ	21K	LHCB $pp$ at 7, 8, 13 TeV
<10.1 × 10 <sup>-7</sup>	90	LEES	15	BABR $e^+e^- \rightarrow \Upsilon(4S)$
< 1.9 × 10 <sup>-7</sup>	90	<sup>1</sup> AAIJ	13BT	LHCB $pp$ at 7 TeV
< 9.4 × 10 <sup>-7</sup>	90	<sup>2</sup> LIU	08I	BELL $e^+e^- \rightarrow \Upsilon(4S)$
< 9.2 × 10 <sup>-6</sup>	90	<sup>2</sup> AUBERT	03O	BABR $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •  
<sup>1</sup>AAIJ 13BT uses  $B(B^0 \rightarrow J/\psi(1S)K^+K^-) = (2.53 \pm 0.31 \pm 0.19) \times 10^{-6}$  and  $B(\phi \rightarrow K^+K^-) = (48.9 \pm 0.5)\%$  to obtain this result.  
<sup>2</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(J/\psi(1S)\eta'(958))/\Gamma_{\text{total}}$   $\Gamma_{236}/\Gamma$

VALUE (units 10 <sup>-6</sup> )	CL%	DOCUMENT ID	TECN	COMMENT
<b>7.6 ± 2.2 ± 1.0</b>		<sup>1</sup> AAIJ	15D	LHCB $pp$ at 7, 8 TeV
< 7.4	90	<sup>2,3</sup> CHANG	12	BELL $e^+e^- \rightarrow \Upsilon(4S)$
< 63	90	<sup>3</sup> AUBERT	03O	BABR $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •  
<sup>1</sup>AAIJ 15D reports  $[\Gamma(B^0 \rightarrow J/\psi(1S)\eta'(958))/\Gamma_{\text{total}}] / [B(B_S^0 \rightarrow J/\psi(1S)\eta')] = (2.28 \pm 0.65 \pm 0.16) \times 10^{-2}$  which we multiply by our best value  $B(B_S^0 \rightarrow J/\psi(1S)\eta') = (3.3 \pm 0.4) \times 10^{-4}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.  
<sup>2</sup>Reconstructs  $\eta'(985)$  in  $(\eta\pi^+\pi^-)$  and  $\rho(770)$  decays.  
<sup>3</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\eta'(958))$   $\Gamma_{223}/\Gamma_{236}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.111 ± 0.475 ± 0.062</b>	<sup>1</sup> AAIJ	15D	LHCB $pp$ at 7, 8 TeV

<sup>1</sup>Uses  $J/\psi \rightarrow \mu^+\mu^-$ ,  $\eta' \rightarrow \rho^0\gamma$ , and  $\eta' \rightarrow \eta\pi^+\pi^-$  decays.

$\Gamma(J/\psi(1S)K^0\pi^+\pi^-)/\Gamma(J/\psi(1S)K^0)$   $\Gamma_{237}/\Gamma_{213}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.50 ± 0.04 OUR AVERAGE</b>			
0.493 ± 0.034 ± 0.027	AAIJ	14L	LHCB $pp$ at 7 TeV
1.24 ± 0.40 ± 0.15	AFFOLDER	02B	CDF $p\bar{p}$ 1.8 TeV

$\Gamma(J/\psi(1S)K^0K^+K^-)/\Gamma_{\text{total}}$   $\Gamma_{239}/\Gamma$

VALUE (units 10 <sup>-6</sup> )	DOCUMENT ID	TECN	COMMENT
<b>25 ± 7 OUR AVERAGE</b>			Error includes scale factor of 1.8.
34.9 ± 6.7 ± 1.5	LEES	15	BABR $e^+e^- \rightarrow \Upsilon(4S)$
20.2 ± 4.3 ± 1.9	<sup>1</sup> AAIJ	14L	LHCB $pp$ at 7 TeV

<sup>1</sup>Measured with  $B(B^0 \rightarrow J/\psi K_S^0 K^+K^-) / B(B^0 \rightarrow J/\psi K_S^0)$  using PDG 12 for the involved branching fractions.

$\Gamma(J/\psi(1S)K^0K^-\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_{238}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<21 \times 10^{-6}$	90	<sup>1</sup> AAIJ	14L LHCB	$pp$ at 7 TeV

<sup>1</sup> Measured with  $B(B^0 \rightarrow J/\psi K_S^0 K^\pm \pi^\mp) / B(B^0 \rightarrow J/\psi K_S^0 \pi^+ \pi^-)$  using PDG 12 values for the involved branching fractions.

$\Gamma(J/\psi(1S)K^0\rho^0)/\Gamma_{\text{total}}$   $\Gamma_{241}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
$5.4 \pm 2.9 \pm 0.9$	<sup>1</sup> AFFOLDER	02B CDF	$p\bar{p}$ 1.8 TeV

<sup>1</sup> Uses  $B^0 \rightarrow J/\psi(1S)K_S^0$  decay as a reference and  $B(B^0 \rightarrow J/\psi(1S)K^0) = 8.3 \times 10^{-4}$ .

$\Gamma(J/\psi(1S)K^*(892)^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{242}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
$7.7 \pm 4.1 \pm 1.3$	<sup>1</sup> AFFOLDER	02B CDF	$p\bar{p}$ 1.8 TeV

<sup>1</sup> Uses  $B^0 \rightarrow J/\psi(1S)K_S^0$  decay as a reference and  $B(B^0 \rightarrow J/\psi(1S)K^0) = 8.3 \times 10^{-4}$ .

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$   $\Gamma_{243}/\Gamma_{224}$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.361 \pm 0.017 \pm 0.021$	<sup>1</sup> AAIJ	14Y LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Excludes contributions from  $\psi(2S)$  and  $\chi_{c1}(3872)$  decaying to  $J/\psi(1S)\pi^+\pi^-$ .

$\Gamma(J/\psi(1S)f_1(1285))/\Gamma_{\text{total}}$   $\Gamma_{244}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$8.4^{+2.1}_{-2.0} \pm 0.5$	<sup>1</sup> AAIJ	14Y LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> AAIJ 14Y reports  $(8.37 \pm 1.95^{+0.71}_{-0.66} \pm 0.35) \times 10^{-6}$  from a measurement of  $[\Gamma(B^0 \rightarrow J/\psi(1S)f_1(1285))/\Gamma_{\text{total}}] \times [B(f_1(1285) \rightarrow 2\pi^+2\pi^-)]$  assuming  $B(f_1(1285) \rightarrow 2\pi^+2\pi^-) = 0.11^{+0.007}_{-0.006}$ , which we rescale to our best value  $B(f_1(1285) \rightarrow 2\pi^+2\pi^-) = (10.9 \pm 0.6) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(J/\psi(1S)K^*(892)^0\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{245}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
$6.6 \pm 1.9 \pm 1.1$	<sup>1</sup> AFFOLDER	02B CDF	$p\bar{p}$ 1.8 TeV

<sup>1</sup> Uses  $B^0 \rightarrow J/\psi(1S)K^*(892)^0$  decay as a reference and  $B(B^0 \rightarrow J/\psi(1S)K^0) = 12.4 \times 10^{-4}$ .

$\Gamma(\eta_{c2}(1D)K_S^0, \eta_{c2} \rightarrow h_c\gamma)/\Gamma_{\text{total}}$   $\Gamma_{246}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.5 \times 10^{-5}$	90	CHILIKIN	20 BELL	$e^+e^- \rightarrow \gamma(4S)$

$\Gamma(\eta_{c2}(1D)\pi^-K^+, \eta_{c2} \rightarrow h_c\gamma)/\Gamma_{\text{total}}$   $\Gamma_{247}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.0 \times 10^{-4}$	90	CHILIKIN	20 BELL	$e^+e^- \rightarrow \gamma(4S)$

$\Gamma(\chi_{c1}(3872)K^0)/\Gamma_{\text{total}}$		$\Gamma_{250}/\Gamma$				
VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT		
<b>1.4 ± 0.4</b>	<b>OUR AVERAGE</b>	Error includes scale factor of 1.1.				
3.9 $^{+1.1}_{-0.9}$ ± 1.4		<sup>1</sup> HIRATA	23	BELL	$e^+e^- \rightarrow \gamma(4S)$	
1.14 ± 0.33 $^{+0.30}_{-0.29}$		<sup>2</sup> CHOI	11	BELL	$e^+e^- \rightarrow \gamma(4S)$	
1.5 ± 0.8 ± 0.5		<sup>3</sup> DEL-AMO-SA..10B	BABR		$e^+e^- \rightarrow \gamma(4S)$	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●						
<3.1	90	<sup>4,5</sup> BHARDWAJ	11	BELL	$e^+e^- \rightarrow \gamma(4S)$	
2.9 ± 1.4 ± 1.0		<sup>5,6</sup> AUSHEV	10	BELL	$e^+e^- \rightarrow \gamma(4S)$	
<6	90	<sup>7,8</sup> AUBERT	09B	BABR	$e^+e^- \rightarrow \gamma(4S)$	
6.6 ± 3.4 $^{+2.3}_{-2.4}$		<sup>5,7,9</sup> AUBERT	08B	BABR	$e^+e^- \rightarrow \gamma(4S)$	
<1.7	90	<sup>10</sup> AUBERT	08Y	BABR	$e^+e^- \rightarrow \gamma(4S)$	
<2.9	90	<sup>11</sup> AUBERT	06	BABR	Repl. by AUBERT 08Y	
3.7 $^{+1.7}_{-1.8}$ $^{+1.8}_{-1.7}$		<sup>12,13</sup> GOKHROO	06	BELL	$e^+e^- \rightarrow \gamma(4S)$	
<sup>1</sup> HIRATA 23 reports $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \bar{D}^{*0}D^0)] = (1.30^{+0.36+0.12}_{-0.31-0.07}) \times 10^{-4}$ which we divide by our best value $B(\chi_{c1}(3872) \rightarrow \bar{D}^{*0}D^0) = (34 \pm 12) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.						
<sup>2</sup> CHOI 11 reports $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] / [B(B^+ \rightarrow \chi_{c1}(3872)K^+)] = 0.50 \pm 0.14 \pm 0.04$ which we multiply by our best value $B(B^+ \rightarrow \chi_{c1}(3872)K^+) = (2.3 \pm 0.6) \times 10^{-4}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.						
<sup>3</sup> DEL-AMO-SANCHEZ 10B reports $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \omega J/\psi(1S))] = (6 \pm 3 \pm 1) \times 10^{-6}$ which we divide by our best value $B(\chi_{c1}(3872) \rightarrow \omega J/\psi(1S)) = (4.1 \pm 1.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.						
<sup>4</sup> BHARDWAJ 11 reports $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \gamma J/\psi)] < 2.4 \times 10^{-6}$ which we divide by our best value $B(\chi_{c1}(3872) \rightarrow \gamma J/\psi) = 7.8 \times 10^{-3}$ .						
<sup>5</sup> Assumes equal production of $B^+$ and $B^0$ at the $\gamma(4S)$ .						
<sup>6</sup> AUSHEV 10 reports $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \bar{D}^{*0}D^0)] = (0.97 \pm 0.46 \pm 0.13) \times 10^{-4}$ which we divide by our best value $B(\chi_{c1}(3872) \rightarrow \bar{D}^{*0}D^0) = (34 \pm 12) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.						
<sup>7</sup> Uses $B(\gamma(4S) \rightarrow B^+B^-) = (51.6 \pm 0.6)\%$ and $B(\gamma(4S) \rightarrow B^0\bar{B}^0) = (48.4 \pm 0.6)\%$ .						
<sup>8</sup> AUBERT 09B reports $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \gamma J/\psi)] < 4.9 \times 10^{-6}$ which we divide by our best value $B(\chi_{c1}(3872) \rightarrow \gamma J/\psi) = 7.8 \times 10^{-3}$ .						
<sup>9</sup> AUBERT 08B reports $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \bar{D}^{*0}D^0)] = (2.22 \pm 1.05 \pm 0.42) \times 10^{-4}$ which we divide by our best value $B(\chi_{c1}(3872) \rightarrow \bar{D}^{*0}D^0) = (34 \pm 12) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.						
<sup>10</sup> AUBERT 08Y reports $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \pi^+\pi^- J/\psi(1S))] < 6.0 \times 10^{-6}$ which we divide by our best value $B(\chi_{c1}(3872) \rightarrow \pi^+\pi^- J/\psi(1S)) = 3.5 \times 10^{-2}$ .						



- <sup>11</sup> AUBERT 06 reports  $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S))] < 10.3 \times 10^{-6}$  which we divide by our best value  $B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S)) = 3.5 \times 10^{-2}$ .
- <sup>12</sup> GOKHROO 06 reports  $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow D^0\bar{D}^0\pi^0)] = (1.66 \pm 0.70^{+0.32}_{-0.37}) \times 10^{-4}$  which we divide by our best value  $B(\chi_{c1}(3872) \rightarrow D^0\bar{D}^0\pi^0) = (45 \pm 21) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.
- <sup>13</sup> Measure the near-threshold enhancements in the  $(D^0\bar{D}^0\pi^0)$  system at a mass  $3875.2 \pm 0.7^{+0.3}_{-1.6} \pm 0.8$  MeV/c<sup>2</sup>.

$\Gamma(\chi_{c1}(3872)^- K^+)/\Gamma_{\text{total}}$					$\Gamma_{248}/\Gamma$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
$< 5 \times 10^{-4}$	90	<sup>1</sup> AUBERT	06E	BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Perform measurements of absolute branching fractions using a missing mass technique.

$\Gamma(\chi_{c1}(3872)^- K^+, \chi_{c1}(3872)^- \rightarrow J/\psi(1S)\pi^-\pi^0)/\Gamma_{\text{total}}$					$\Gamma_{249}/\Gamma$
VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT	
$< 4.2$	90	<sup>1,2</sup> CHOI	11	BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 5.4$  90 <sup>2,3</sup> AUBERT 05B BABR  $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes  $\pi^+\pi^0$  originates from  $\rho^+$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>3</sup> The isovector- $X$  hypothesis is excluded with a likelihood test at  $1 \times 10^{-4}$  level.

$\Gamma(\chi_{c1}(3872)K^*(892)^0)/\Gamma_{\text{total}}$					$\Gamma_{251}/\Gamma$
VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT	
$1.1 \pm 0.4 \pm 0.3$ ■		<sup>1</sup> BALA	15	BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 4$  90 <sup>2,3</sup> AUBERT 09B BABR  $e^+e^- \rightarrow \gamma(4S)$

$< 4$  90 <sup>3,4</sup> AUBERT 09B BABR  $e^+e^- \rightarrow \gamma(4S)$

$4 \times 10^4$  ■

<sup>1</sup> BALA 15 reports  $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^*(892)^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S))] = (4.0 \pm 1.5 \pm 0.3) \times 10^{-6}$  which we divide by our best value  $B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S)) = (3.5 \pm 0.9) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> AUBERT 09B reports  $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^*(892)^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \gamma J/\psi)] < 2.8 \times 10^{-6}$  which we divide by our best value  $B(\chi_{c1}(3872) \rightarrow \gamma J/\psi) = 7.8 \times 10^{-3}$ .

<sup>3</sup> Uses  $B(\gamma(4S) \rightarrow B^+B^-) = (51.6 \pm 0.6)\%$  and  $B(\gamma(4S) \rightarrow B^0\bar{B}^0) = (48.4 \pm 0.6)\%$ .

<sup>4</sup> AUBERT 09B reports  $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^*(892)^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \gamma\psi(2S))] < 4.4 \times 10^{-6}$  which we divide by our best value  $B(\chi_{c1}(3872) \rightarrow \gamma\psi(2S)) = 0 \times 10^{-2}$ .

$\Gamma(\chi_{c1}(3872)K^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{252}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>2.2 \pm 0.4 \pm 0.6</math></b>		1,2 BALA	15	BELL $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> BALA 15 reports  $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)K^+\pi^-)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S))] = (7.9 \pm 1.3 \pm 0.4) \times 10^{-6}$  which we divide by our best value  $B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S)) = (3.5 \pm 0.9) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c1}(3872)\gamma)/\Gamma_{\text{total}}$   $\Gamma_{253}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 1.4 \times 10^{-5}</math></b>	90	1,2 CHOU	19	BELL $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at  $\Upsilon(4S)$ .

<sup>2</sup> CHOU 19 reports  $[\Gamma(B^0 \rightarrow \chi_{c1}(3872)\gamma)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S))] < 5.1 \times 10^{-7}$  which we divide by our best value  $B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S)) = 3.5 \times 10^{-2}$ .

$\Gamma(T_{c\bar{c}1}(4430)^\pm K^\mp, T_{c\bar{c}1}^\pm \rightarrow \psi(2S)\pi^\pm)/\Gamma_{\text{total}}$   $\Gamma_{254}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>6.0^{+1.7+2.5}_{-2.0-1.4}</math></b>		CHILIKIN	13	BELL $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 3.1$	95	<sup>1</sup> AUBERT	09AA BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$3.2^{+1.8+5.3}_{-0.9-1.6}$		<sup>1</sup> MIZUK	09	BELL $e^+e^- \rightarrow \Upsilon(4S)$
$4.1 \pm 1.0 \pm 1.4$		1,2 CHOI	08	BELL Repl. by MIZUK 09

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Establishes the  $(Z_c4430)^+$  with a significance of 6.5 sigma. Needs confirmation.

$\Gamma(T_{c\bar{c}1}(4430)^\pm K^\mp, T_{c\bar{c}1}^\pm \rightarrow J/\psi\pi^\pm)/\Gamma_{\text{total}}$   $\Gamma_{255}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>5.4^{+4.0+1.1}_{-1.0-0.6}</math></b>		CHILIKIN	14	BELL $\bar{B}^0 \rightarrow J/\psi K^- \pi^+$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 4$	95	<sup>1</sup> AUBERT	09AA BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(T_{c\bar{c}1}(3900)^\pm K^\mp, T_{c\bar{c}1}^\pm \rightarrow J/\psi\pi^\pm)/\Gamma_{\text{total}}$   $\Gamma_{256}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 9 \times 10^{-7}</math></b>		CHILIKIN	14	BELL $\bar{B}^0 \rightarrow J/\psi K^- \pi^+$

$\Gamma(T_{c\bar{c}1}(4200)^\pm K^\mp, T_{c\bar{c}1}^\pm \rightarrow J/\psi\pi^\pm)/\Gamma_{\text{total}}$   $\Gamma_{257}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>2.2^{+0.7+1.1}_{-0.5-0.6}</math></b>		CHILIKIN	14	BELL $\bar{B}^0 \rightarrow J/\psi K^- \pi^+$

$\Gamma(T_{c\bar{c}1}(3900)^\pm K^\mp, T_{c\bar{c}1}^\pm \rightarrow J/\psi\pi^\pm)/\Gamma(J/\psi(1S)K^*(892)^0)$		$\Gamma_{256}/\Gamma_{215}$		
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.5 \times 10^{-2}$	90	ABAZOV	18B D0	$p\bar{p}$ at 1.96 TeV

$\Gamma(J/\psi(1S)p\bar{p})/\Gamma_{\text{total}}$   $\Gamma_{258}/\Gamma$

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>4.51 \pm 0.40 \pm 0.44</math></b>		<sup>1</sup> AAIJ	19U LHCB	$pp$ at 7, 8, 13 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 5.2$	90	<sup>2</sup> AAIJ	13Z LHCB	Repl. by AAIJ 19U
$< 8.3$	90	<sup>3</sup> XIE	05 BELL	$e^+e^- \rightarrow \gamma(4S)$
$< 19$	90	<sup>3</sup> AUBERT	03K BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Measured relative to  $B_S^0 \rightarrow J/\psi\phi$  assuming  $B(B_S^0 \rightarrow J/\psi\phi) = (10.5 \pm 0.13 \pm 0.64) \times 10^{-4}$  and taking into account small  $K^+K^-$   $S$ -wave contribution. Measurement assumes  $f_s/f_d = 0.259 \pm 0.015$  for 7, 8 TeV data and  $f_s/f_d$  multiplied by  $1.068 \pm 0.046$  for 13 TeV data.

<sup>2</sup> Uses  $B(B_S^0 \rightarrow J/\psi(1S)\pi^+\pi^-) = (1.98 \pm 0.20) \times 10^{-4}$ .

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(J/\psi(1S)\gamma)/\Gamma_{\text{total}}$   $\Gamma_{259}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt;1.5</math></b>	90	<sup>1</sup> AAIJ	15BB LHCB	$pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<1.6$	90	<sup>2</sup> AUBERT,B	04T BABR	$e^+e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Branching fractions of normalization modes  $B^0 \rightarrow J/\psi\gamma X$  taken from PDG 14. Uses  $f_s/f_d = 0.259 \pm 0.015$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(J/\psi\mu^+\mu^-, J/\psi \rightarrow \mu^+\mu^-)/\Gamma_{\text{total}}$   $\Gamma_{260}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt;1.0 \times 10^{-9}</math></b>	95	AAIJ	22Q LHCB	$pp$ at 7, 8, 13 TeV

$\Gamma(J/\psi(1S)\bar{D}^0)/\Gamma_{\text{total}}$   $\Gamma_{261}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt;1.3</math></b>	90	<sup>1</sup> AUBERT	05U BABR	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<2.0$	90	<sup>1</sup> ZHANG	05B BELL	$e^+e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(\psi(2S)\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{262}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>1.17 \pm 0.17 \pm 0.08</math></b>	<sup>1</sup> CHOBANOVA 16	BELL	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(\psi(2S)K^0)/\Gamma_{\text{total}}$   $\Gamma_{263}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>5.8 ± 0.5</b>				<b>OUR FIT</b>
<b>5.8 ± 0.5</b>				<b>OUR AVERAGE</b>
4.7 ± 0.7 ± 0.7		1 AAIJ	14L	LHCB $pp$ at 7 TeV
6.46 ± 0.65 ± 0.51		2 AUBERT	05J	BABR $e^+e^- \rightarrow \Upsilon(4S)$
6.7 ± 1.1		2 ABE	03B	BELL $e^+e^- \rightarrow \Upsilon(4S)$
5.0 ± 1.1 ± 0.6		2 RICHICHI	01	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

6.9 ± 1.1 ± 1.1		2 AUBERT	02	BABR Repl. by AUBERT 05J
< 8	90	2 ALAM	94	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
< 15	90	2 BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
< 28	90	2 ALBRECHT	90J	ARG $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measured with  $B(B^0 \rightarrow \psi(2S)K_S^0) \times B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) / B(B^0 \rightarrow J/\psi K_S^0)$  using PDG 12 values for the involved branching fractions.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\psi(2S)K^0\pi^+\pi^-)/\Gamma(\psi(2S)K^0)$   $\Gamma_{264}/\Gamma_{263}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.480 ± 0.013 ± 0.032</b>	TUMASYAN 22AI	CMS	$pp$ at 13 TeV

$\Gamma(\psi(2S)K^0)/\Gamma(J/\psi(1S)K^0)$   $\Gamma_{263}/\Gamma_{213}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.82 ± 0.13 ± 0.12</b>	1 AUBERT	02	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\psi(3770)K^0, \psi \rightarrow \bar{D}^0 D^0)/\Gamma_{\text{total}}$   $\Gamma_{265}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.23</b>	90	1 AUBERT	08B	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\psi(3770)K^0, \psi \rightarrow D^- D^+)/\Gamma_{\text{total}}$   $\Gamma_{266}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.88</b>	90	1 AUBERT	08B	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$   $\Gamma_{267}/\Gamma_{224}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.56 ± 0.07 ± 0.05</b>	1 AAIJ	13AA	LHCB $pp$ at 7 TeV

<sup>1</sup> Assuming lepton universality for dimuon decay modes of  $J/\psi$  and  $\psi(2S)$  mesons, the ratio  $B(J/\psi \rightarrow \mu^+ \mu^-)/B(\psi(2S) \rightarrow \mu^+ \mu^-) = B(J/\psi \rightarrow e^+ e^-)/B(\psi(2S) \rightarrow e^+ e^-) = 7.69 \pm 0.19$  was used.

$\Gamma(\psi(2S)K^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{268}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>5.80±0.39</b>		1,2 CHILIKIN 13	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
5.57±0.16		3 AUBERT 09AA	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
5.68±0.13±0.42		2 MIZUK 09	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
<10	90	2 ALBRECHT 90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Combines measurements with  $\psi(2S) \rightarrow \ell^+\ell^-$  with measurement from MIZUK 09 which uses  $\psi(2S) \rightarrow J/\psi\pi^+\pi^-$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Does not report systematic uncertainties.

$\Gamma(\psi(2S)K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{269}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>5.9 ±0.4 OUR FIT</b>				
<b>6.0 <sup>+0.5</sup>/<sub>-0.7</sub> OUR AVERAGE</b>		Error includes scale factor of 1.1.		
5.55 <sup>+0.22+0.41</sup> / <sub>-0.23-0.84</sub>		1 CHILIKIN 13	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
6.49±0.59±0.97		1 AUBERT 05J	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
7.6 ±1.1 ±1.0		1 RICHICHI 01	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
9.0 ±2.2 ±0.9		2 ABE 98O	CDF	$p\bar{p}$ 1.8 TeV

● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●

5.52 <sup>+0.35+0.53</sup> / <sub>-0.32-0.58</sub>		1 MIZUK 09	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
<19	90	1 ALAM 94	CLE2	Repl. by RICHICHI 01
14 ±8 ±4		1 BORTOLETTO92	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<23	90	1 ALBRECHT 90J	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ABE 98O reports  $[B(B^0 \rightarrow \psi(2S)K^*(892)^0)]/[B(B^+ \rightarrow J/\psi(1S)K^+)] = 0.908 \pm 0.194 \pm 0.10$ . We multiply by our best value  $B(B^+ \rightarrow J/\psi(1S)K^+) = (9.9 \pm 1.0) \times 10^{-4}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\psi(2S)K^*(892)^0)/\Gamma(J/\psi(1S)K^*(892)^0)$   $\Gamma_{269}/\Gamma_{215}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.487±0.018±0.014</b>	1,2 AAIJ 12L	LHCB	$pp$ at 7 TeV

<sup>1</sup> AAIJ 12L reports  $0.476 \pm 0.014 \pm 0.010 \pm 0.012$  from a measurement of  $[\Gamma(B^0 \rightarrow \psi(2S)K^*(892)^0)/\Gamma(B^0 \rightarrow J/\psi(1S)K^*(892)^0)] \times [B(J/\psi(1S) \rightarrow e^+e^-)] / [B(\psi(2S) \rightarrow e^+e^-)]$  assuming  $B(J/\psi(1S) \rightarrow e^+e^-) = (5.94 \pm 0.06) \times 10^{-2}$ ,  $B(\psi(2S) \rightarrow e^+e^-) = (7.72 \pm 0.17) \times 10^{-3}$ , which we rescale to our best values  $B(J/\psi(1S) \rightarrow e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$ ,  $B(\psi(2S) \rightarrow e^+e^-) = (7.94 \pm 0.22) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best values.

<sup>2</sup> Assumes  $B(J/\psi \rightarrow \mu^+\mu^-) / B(\psi(2S) \rightarrow \mu^+\mu^-) = B(J/\psi \rightarrow e^+e^-) / B(\psi(2S) \rightarrow e^+e^-) = 7.69 \pm 0.19$ .

$\Gamma(\psi(2S)K^*(892)^0)/\Gamma(\psi(2S)K^0)$   $\Gamma_{269}/\Gamma_{263}$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>1.02±0.10 OUR FIT</b>				
<b>1.00±0.14±0.09</b>		AUBERT	05J BABR	$e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(\chi_{c0}K^0)/\Gamma_{total}$   $\Gamma_{270}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>195<sup>+42</sup><sub>-36</sub>±11</b>		<sup>1</sup> AAIJ	18F LHCB	$pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

145 <sup>+103</sup> <sub>-85</sub> ±9		<sup>2,3</sup> LEES	12I BABR	$e^+e^- \rightarrow \Upsilon(4S)$
148±30±13		<sup>2,4</sup> LEES	12O BABR	$e^+e^- \rightarrow \Upsilon(4S)$
142 <sup>+55</sup> <sub>-44</sub> ±22		<sup>2,5</sup> AUBERT	09AU BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 113	90	<sup>5</sup> GARMASH	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
<1240	90	<sup>2</sup> AUBERT	05K BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 500	90	<sup>6</sup> EDWARDS	01 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> AAIJ 18F uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays. For the branching fraction of the reference mode, the PDG 18 average  $B(B^0 \rightarrow K_S^0 \pi^+ \pi^-) = (4.96 \pm 0.20) \times 10^{-5}$  is used. We compute  $B(B^0 \rightarrow \chi_{c0} K^0)$  using the PDG value  $B(\chi_{c0} \rightarrow \pi\pi) = (8.51 \pm 0.33) \times 10^{-3}$  and 2/3 for the  $\pi^+ \pi^-$  fraction. Our first error is their experiment's error and the second error is systematic error from using our best value.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> LEES 12I reports  $[\Gamma(B^0 \rightarrow \chi_{c0} K^0)/\Gamma_{total}] \times [B(\chi_{c0}(1P) \rightarrow K_S^0 K_S^0)] = (0.46^{+0.25}_{-0.17} \pm 0.21) \times 10^{-6}$  which we divide by our best value  $B(\chi_{c0}(1P) \rightarrow K_S^0 K_S^0) = (3.17 \pm 0.19) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> Measured in the  $B^0 \rightarrow K_S^0 K^+ K^-$  decay.

<sup>5</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K^0 \pi^+ \pi^-$  final state decays.

<sup>6</sup> EDWARDS 01 assumes equal production of  $B^0$  and  $B^+$  at the  $\Upsilon(4S)$ . The correlated uncertainties (28.3)% from  $B(J/\psi(1S) \rightarrow \gamma \eta_c)$  in those modes have been accounted for.

$\Gamma(\chi_{c0}K^*(892)^0)/\Gamma_{total}$   $\Gamma_{271}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>1.7±0.3±0.2</b>		<sup>1</sup> AUBERT	08BD BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<7.7	90	<sup>1</sup> AUBERT	05K BABR	Repl. by AUBERT 08BD
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c1}\pi^0)/\Gamma_{total}$   $\Gamma_{272}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>1.12±0.25±0.12</b>		<sup>1</sup> KUMAR	08 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c1} K^0)/\Gamma_{\text{total}}$   $\Gamma_{273}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**3.95 ± 0.27 OUR AVERAGE**

15	$^{+5}_{-4} \pm 6$	<sup>1</sup> CHILIKIN	19	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
3.78	$^{+0.17}_{-0.16} \pm 0.33$	<sup>2</sup> BHARDWAJ	11	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
4.2	$\pm 0.3 \pm 0.3$	<sup>3</sup> AUBERT	09B	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
3.1	$^{+1.5}_{-1.1} \pm 0.1$	<sup>4</sup> AVERY	00	CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

3.51 ± 0.33 ± 0.45		<sup>2</sup> SONI	06	BELL Repl. by BHARDWAJ 11
4.53 ± 0.41 ± 0.51		<sup>2</sup> AUBERT	05J	BABR Repl. by AUBERT 09B
4.3 ± 1.4 ± 0.2		<sup>5</sup> AUBERT	02	BABR Repl. by AUBERT 05J
<27	90	<sup>2</sup> ALAM	94	CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> CHILIKIN 19 reports  $[\Gamma(B^0 \rightarrow \chi_{c1} K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(1P) \rightarrow p\bar{p}\pi^+\pi^-)] = (7.4^{+2.4+0.6}_{-2.0-0.4}) \times 10^{-7}$  which we divide by our best value  $B(\chi_{c1}(1P) \rightarrow p\bar{p}\pi^+\pi^-) = (5.0 \pm 1.9) \times 10^{-4}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Uses  $\chi_{c1,2} \rightarrow J/\psi\gamma$ . Assumes  $B(\Upsilon(4S) \rightarrow B^+ B^-) = (51.6 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = (48.4 \pm 0.6)\%$ .

<sup>4</sup> AVERY 00 reports  $(3.9^{+1.9}_{-1.3} \pm 0.4) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \chi_{c1} K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))]$  assuming  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = 0.273 \pm 0.016$ , which we rescale to our best value  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (34.3 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>5</sup> AUBERT 02 reports  $(5.4 \pm 1.4 \pm 1.1) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \chi_{c1} K^0)/\Gamma_{\text{total}}] \times [B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))]$  assuming  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = 0.273 \pm 0.016$ , which we rescale to our best value  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (34.3 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c1} K^0)/\Gamma(J/\psi(1S) K^0)$   $\Gamma_{273}/\Gamma_{213}$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.53 ± 0.16 ± 0.02** <sup>1</sup> AUBERT 02 BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> AUBERT 02 reports  $0.66 \pm 0.11 \pm 0.17$  from a measurement of  $[\Gamma(B^0 \rightarrow \chi_{c1} K^0)/\Gamma(B^0 \rightarrow J/\psi(1S) K^0)] \times [B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))]$  assuming  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = 0.273 \pm 0.016$ , which we rescale to our best value  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (34.3 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c1} \pi^- K^+)/\Gamma_{\text{total}}$   $\Gamma_{274}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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**4.97 ± 0.12 ± 0.28** <sup>1</sup> BHARDWAJ 16 BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

3.83 ± 0.10 ± 0.39 <sup>1</sup> MIZUK 08 BELL Repl. by BHARDWAJ 16

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c1} \pi^- K^+)/\Gamma(J/\psi(1S) K^+ \pi^-)$   $\Gamma_{274}/\Gamma_{214}$

VALUE	DOCUMENT ID	TECN
<b>0.476 ± 0.021 ± 0.018</b>	<sup>1</sup> LEES	12B BABR

<sup>1</sup> LEES 12B reports  $0.474 \pm 0.013 \pm 0.026$  from a measurement of  $[\Gamma(B^0 \rightarrow \chi_{c1} \pi^- K^+)/\Gamma(B^0 \rightarrow J/\psi(1S) K^+ \pi^-)] \times [B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))]$  assuming  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (34.4 \pm 1.5) \times 10^{-2}$ , which we rescale to our best value  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (34.3 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\chi_{c1} K^*(892)^0)/\Gamma_{total}$   $\Gamma_{275}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.38 ± 0.19 OUR FIT</b>				Error includes scale factor of 1.2.

**2.22<sup>+0.40</sup><sub>-0.31</sub> OUR AVERAGE** Error includes scale factor of 1.6.

2.5 ± 0.2 ± 0.2	<sup>1</sup> AUBERT	09B BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
1.73 <sup>+0.15+0.34</sup> <sub>-0.12-0.22</sub>	<sup>2</sup> MIZUK	08 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

3.14 ± 0.34 ± 0.72	<sup>2</sup> SONI	06 BELL	Repl. by MIZUK 08
3.27 ± 0.42 ± 0.64	<sup>2</sup> AUBERT	05J BABR	Repl. by AUBERT 09B
3.8 ± 1.3 ± 0.1	<sup>3</sup> AUBERT	02 BABR	Repl. by AUBERT 05J
<21	90	<sup>4</sup> ALAM	94 CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses  $\chi_{c1,2} \rightarrow J/\psi \gamma$ . Assumes  $B(\Upsilon(4S) \rightarrow B^+ B^-) = (51.6 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = (48.4 \pm 0.6)\%$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> AUBERT 02 reports  $(4.8 \pm 1.4 \pm 0.9) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \chi_{c1} K^*(892)^0)/\Gamma_{total}] \times [B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))]$  assuming  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = 0.273 \pm 0.016$ , which we rescale to our best value  $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (34.3 \pm 1.3) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> BORTOLETTO 92 assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c1} K^*(892)^0)/\Gamma(J/\psi(1S) K^*(892)^0)$   $\Gamma_{275}/\Gamma_{215}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>18.8 ± 1.5 OUR FIT</b>			Error includes scale factor of 1.1.
<b>19.8 ± 1.1 ± 1.5</b>	<sup>1</sup> AAIJ	13AC LHCB	$pp$ at 7 TeV

<sup>1</sup> Uses  $B(\chi_{c1} \rightarrow J/\psi \gamma) = (34.4 \pm 1.5)\%$ .

$\Gamma(\chi_{c1} K^*(892)^0)/\Gamma(\chi_{c1} K^0)$   $\Gamma_{275}/\Gamma_{273}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.72 ± 0.11 ± 0.12</b>	AUBERT	05J BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.89 ± 0.34 ± 0.17	<sup>1</sup> AUBERT	02 BABR	Repl. by AUBERT 05J
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .



$\Gamma(T_{c\bar{c}}(4050)^- K^+, T_{c\bar{c}}^- \rightarrow \chi_{c1} \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{276} / \Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$3.0^{+1.5+3.7}_{-0.8-1.6}$		<sup>1</sup> MIZUK	08	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.8                      90      <sup>1,2</sup> LEES                      12B    BABR

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses  $\chi_{c1} \rightarrow J/\psi \gamma$  mode. Uses  $\chi_{c1} \rightarrow J/\psi \gamma$  mode. Finds a good description of the data without this  $B^0 \rightarrow X(4051)^+ K^-$  decay mode in a fit.

$\Gamma(T_{c\bar{c}}(4250)^- K^+, T_{c\bar{c}}^- \rightarrow \chi_{c1} \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{277} / \Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$4.0^{+2.3+19.7}_{-0.9-0.5}$		<sup>1</sup> MIZUK	08	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<4.0                      90      <sup>1,2</sup> LEES                      12B    BABR

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses  $\chi_{c1} \rightarrow J/\psi \gamma$  mode. Finds a good description of the data without this  $B^0 \rightarrow X(4248)^+ K^-$  decay mode in a fit.

$\Gamma(\chi_{c1} \pi^+ \pi^- K^0) / \Gamma_{\text{total}}$   $\Gamma_{278} / \Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
$3.16 \pm 0.35 \pm 0.32$	<sup>1</sup> BHARDWAJ	16	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c1} \pi^- \pi^0 K^+) / \Gamma_{\text{total}}$   $\Gamma_{279} / \Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
$3.52 \pm 0.52 \pm 0.24$	<sup>1</sup> BHARDWAJ	16	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c2} K^0) / \Gamma_{\text{total}}$   $\Gamma_{280} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.5 \times 10^{-5}$	90	<sup>1</sup> BHARDWAJ	11	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<2.8 \times 10^{-5}$                       90      <sup>2</sup> AUBERT                      09B    BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

$<2.6 \times 10^{-5}$                       90      <sup>1</sup> SONI                              06    BELL    Repl. by BHARDWAJ 11

$<4.1 \times 10^{-5}$                       90      <sup>1</sup> AUBERT                      05K    BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses  $\chi_{c1,2} \rightarrow J/\psi \gamma$ . Assumes  $B(\Upsilon(4S) \rightarrow B^+ B^-) = (51.6 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = (48.4 \pm 0.6)\%$ .

$\Gamma(\chi_{c2} K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{281}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**4.9±1.2 OUR FIT** Error includes scale factor of 1.1.

**6.6±1.8±0.5** <sup>1</sup> AUBERT 09B BABR  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<7.1 90 <sup>2</sup> SONI 06 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

<3.6 90 <sup>2</sup> AUBERT 05K BABR Repl. by AUBERT 09B

<sup>1</sup> Uses  $\chi_{c1,2} \rightarrow J/\psi\gamma$ . Assumes  $B(\Upsilon(4S) \rightarrow B^+ B^-) = (51.6 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = (48.4 \pm 0.6)\%$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c2} K^*(892)^0)/\Gamma(\chi_{c1} K^*(892)^0)$   $\Gamma_{281}/\Gamma_{275}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
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**20 ±5 OUR FIT** Error includes scale factor of 1.1.

**17.1±5.0±2.0** <sup>1</sup> AAIJ 13AC LHCB  $pp$  at 7 TeV

<sup>1</sup> Uses  $B(\chi_{c1} \rightarrow J/\psi\gamma)/B(\chi_{c2} \rightarrow J/\psi\gamma) = 1.76 \pm 0.11$ .

$\Gamma(\chi_{c2} \pi^- K^+)/\Gamma_{\text{total}}$   $\Gamma_{282}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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**0.72±0.09±0.05** <sup>1</sup> BHARDWAJ 16 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c2} \pi^+ \pi^- K^0)/\Gamma_{\text{total}}$   $\Gamma_{283}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<1.70 × 10<sup>-4</sup> 90 <sup>1</sup> BHARDWAJ 16 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\chi_{c2} \pi^- \pi^0 K^+)/\Gamma_{\text{total}}$   $\Gamma_{284}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<0.74 × 10<sup>-4</sup> 90 <sup>1</sup> BHARDWAJ 16 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\psi(4660) K^0, \psi \rightarrow \Lambda_c^+ \Lambda_c^-)/\Gamma_{\text{total}}$   $\Gamma_{285}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<2.3 × 10<sup>-4</sup> 90 <sup>1</sup> LI 18D BELL  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 48.6 \pm 0.6\%$  and  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 6.23 \pm 0.33\%$ .

$\Gamma(\psi(4230)^0 K^0, \psi^0 \rightarrow J/\psi \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{286}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<17 × 10<sup>-6</sup> 90 <sup>1</sup> GARG 19 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^0$  and  $B^+$  at the  $\Upsilon(4S)$ .

$\Gamma(K^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{287}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>20.0 ± 0.4 OUR FIT</b>				
<b>20.0 ± 0.4 OUR AVERAGE</b>				
20.67 ± 0.37 ± 0.62		ADACHI	24	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
20.00 ± 0.34 ± 0.60		<sup>1</sup> DUH	13	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
19.1 ± 0.6 ± 0.6		<sup>1</sup> AUBERT	07B	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
18.0 + 2.3 + 1.2 - 2.1 - 0.9		<sup>1</sup> BORNHEIM	03	CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
19.9 ± 0.4 ± 0.8		<sup>1</sup> LIN	07A	BELL Repl. by DUH 13
18.5 ± 1.0 ± 0.7		<sup>1</sup> CHAO	04	BELL Repl. by LIN 07A
17.9 ± 0.9 ± 0.7		<sup>1</sup> AUBERT	02Q	BABR Repl. by AUBERT 07B
22.5 ± 1.9 ± 1.8		<sup>1</sup> CASEY	02	BELL Repl. by CHAO 04
19.3 + 3.4 + 1.5 - 3.2 - 0.6		<sup>1</sup> ABE	01H	BELL Repl. by CASEY 02
16.7 ± 1.6 ± 1.3		<sup>1</sup> AUBERT	01E	BABR Repl. by AUBERT 02Q
< 66	90	<sup>2</sup> ABE	00C	SLD $e^+ e^- \rightarrow Z$
17.2 + 2.5 ± 1.2 - 2.4		<sup>1</sup> CRONIN-HEN..	00	CLE2 Repl. by BORNHEIM 03
15 + 5. ± 1.4 - 4		GODANG	98	CLE2 Repl. by CRONIN-HENNESSY 00
24 + 17 ± 2 - 11		<sup>3</sup> ADAM	96D	DLPH $e^+ e^- \rightarrow Z$
< 17	90	ASNER	96	CLE2 Sup. by ADAM 96D
< 30	90	<sup>4</sup> BUSKULIC	96V	ALEP $e^+ e^- \rightarrow Z$
< 90	90	<sup>5</sup> ABREU	95N	DLPH Sup. by ADAM 96D
< 81	90	<sup>6</sup> AKERS	94L	OPAL $e^+ e^- \rightarrow Z$
< 26	90	<sup>7</sup> BATTLE	93	CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$
< 180	90	ALBRECHT	91B	ARG $e^+ e^- \rightarrow \Upsilon(4S)$
< 90	90	<sup>8</sup> AVERY	89B	CLEO $e^+ e^- \rightarrow \Upsilon(4S)$
< 320	90	AVERY	87	CLEO $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ABE 00C assumes  $B(Z \rightarrow b\bar{b}) = (21.7 \pm 0.1)\%$  and the  $B$  fractions  $f_{B^0} = f_{B^+} = (39.7^{+1.8}_{-2.2})\%$  and  $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$ .

<sup>3</sup> ADAM 96D assumes  $f_{B^0} = f_{B^-} = 0.39$  and  $f_{B_s} = 0.12$ . Contributions from  $B^0$  and  $B_s$  decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral  $B$  mesons.

<sup>4</sup> BUSKULIC 96V assumes PDG 96 production fractions for  $B^0$ ,  $B^+$ ,  $B_s$ ,  $b$  baryons.

<sup>5</sup> Assumes a  $B^0$ ,  $B^-$  production fraction of 0.39 and a  $B_s$  production fraction of 0.12. Contributions from  $B^0$  and  $B_s$  decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral  $B$  mesons.

<sup>6</sup> Assumes  $B(Z \rightarrow b\bar{b}) = 0.217$  and  $B^0_d$  ( $B^0_s$ ) fraction 39.5% (12%).

<sup>7</sup> BATTLE 93 assumes equal production of  $B^0\bar{B}^0$  and  $B^+B^-$  at  $\Upsilon(4S)$ .

<sup>8</sup> Assumes the  $\Upsilon(4S)$  decays 43% to  $B^0\bar{B}^0$ .

$\Gamma(K^+\pi^-)/\Gamma(K^0\pi^0)$					$\Gamma_{287}/\Gamma_{288}$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
<b>2.16±0.16±0.16</b>	LIN	07A	BELL	$e^+e^- \rightarrow \Upsilon(4S)$	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
$1.20^{+0.50+0.22}_{-0.58-0.32}$	<sup>1</sup> ABE	01H	BELL	Repl. by LIN 07A	
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .					

$[\Gamma(K^+\pi^-) + \Gamma(\pi^+\pi^-)]/\Gamma_{total}$					$(\Gamma_{287}+\Gamma_{422})/\Gamma$
<u>VALUE (units 10<sup>-6</sup>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>19± 6 OUR AVERAGE</b>					
$28^{+15}_{-10} \pm 20$		<sup>1</sup> ADAM	96D	DLPH	$e^+e^- \rightarrow Z$
$18^{+6+3}_{-5-4}$	17.2	ASNER	96	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
$24^{+8}_{-7} \pm 2$		<sup>2</sup> BATTLE	93	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$ . Contributions from $B^0$ and $B_s$ decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral $B$ mesons.					
<sup>2</sup> BATTLE 93 assumes equal production of $B^0\bar{B}^0$ and $B^+B^-$ at $\Upsilon(4S)$ .					

$\Gamma(K^0\pi^0)/\Gamma_{total}$					$\Gamma_{288}/\Gamma$
<u>VALUE (units 10<sup>-6</sup>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>10.1 ±0.4 OUR AVERAGE</b>					
$10.73 \pm 0.63 \pm 0.62$		<sup>1</sup> ADACHI	24	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$9.68 \pm 0.46 \pm 0.50$		<sup>2</sup> DUH	13	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$10.1 \pm 0.6 \pm 0.4$		<sup>2</sup> LEES	13D	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$12.8^{+4.0+1.7}_{-3.3-1.4}$		<sup>2</sup> BORNHEIM	03	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
$8.7 \pm 0.5 \pm 0.6$		<sup>2</sup> FUJIKAWA	10A	BELL	Repl. by DUH 13
$10.3 \pm 0.7 \pm 0.6$		<sup>2</sup> AUBERT	08E	BABR	Repl. by LEES 13D
$9.2 \pm 0.7 \pm 0.6$		<sup>2</sup> LIN	07A	BELL	Repl. by FUJIKAWA 10A
$11.4 \pm 0.9 \pm 0.6$		<sup>2</sup> AUBERT	05Y	BABR	Repl. by AUBERT 08E
$11.4 \pm 1.7 \pm 0.8$		<sup>2</sup> AUBERT	04M	BABR	Repl. by AUBERT 05Y
$11.7 \pm 2.3^{+1.2}_{-1.3}$		<sup>2</sup> CHAO	04	BELL	Repl. by LIN 07A
$8.0^{+3.3}_{-3.1} \pm 1.6$		<sup>2</sup> CASEY	02	BELL	Repl. by CHAO 04
$16.0^{+7.2+2.5}_{-5.9-2.7}$		<sup>2</sup> ABE	01H	BELL	Repl. by CASEY 02
$8.2^{+3.1}_{-2.7} \pm 1.2$		<sup>2</sup> AUBERT	01E	BABR	Repl. by AUBERT 04M
$14.6^{+5.9+2.4}_{-5.1-3.3}$		<sup>2</sup> CRONIN-HEN..00	CLE2		Repl. by BORNHEIM 03
<41	90	GODANG	98	CLE2	Repl. by CRONIN-HENNESSY 00
<40	90	ASNER	96	CLE2	Rep. by GODANG 98

<sup>1</sup>This is the combined result of this analysis (ADACHI 24) and the updated analysis of ADACHI 23E. The individual results are  $(10.40 \pm 0.66 \pm 0.60) \times 10^{-6}$  and  $(11.15 \pm 0.68 \pm 0.62) \times 10^{-6}$ , respectively.

<sup>2</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta' K^0)/\Gamma_{\text{total}}$   $\Gamma_{289}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>66 ± 4 OUR AVERAGE</b>	Error includes scale factor of 1.4.		
68.5 ± 2.2 ± 3.1	<sup>1</sup> AUBERT	09AV BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
58.9 <sup>+</sup> <sub>-</sub> 3.6 ± 4.3	<sup>1</sup> SCHUEMANN	06 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
89 <sup>+</sup> <sub>-16</sub> ± 9	<sup>1</sup> RICHICHI	00 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
66.6 ± 2.6 ± 2.8	<sup>1</sup> AUBERT	07AE BABR	Repl. by AUBERT 09AV
67.4 ± 3.3 ± 3.2	<sup>1</sup> AUBERT	05M BABR	AUBERT 07AE
60.6 ± 5.6 ± 4.6	<sup>1</sup> AUBERT	03W BABR	Repl. by AUBERT 05M
55 <sup>+</sup> <sub>-16</sub> ± 8	<sup>1</sup> ABE	01M BELL	Repl. by SCHUEMANN 06
42 <sup>+</sup> <sub>-11</sub> ± 4	<sup>1</sup> AUBERT	01G BABR	Repl. by AUBERT 03W
47 <sup>+</sup> <sub>-20</sub> ± 9	BEHRENS	98 CLE2	Repl. by RICHICHI 00

<sup>1</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta' K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{290}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.8 ± 0.6 OUR AVERAGE</b>				
2.6 ± 0.7 ± 0.2		<sup>1</sup> SATO	14 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
3.1 <sup>+</sup> <sub>-0.8</sub> ± 0.3		<sup>1</sup> DEL-AMO-SA..10A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.8 ± 1.1 ± 0.5		<sup>1</sup> AUBERT	07E BABR	Repl. by DEL-AMO-SANCHEZ 10A
< 2.6	90	<sup>1</sup> SCHUEMANN	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
< 7.6	90	<sup>1</sup> AUBERT,B	04D BABR	Repl. by AUBERT 07E
< 24	90	<sup>1</sup> RICHICHI	00 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
< 39	90	BEHRENS	98 CLE2	Repl. by RICHICHI 00

<sup>1</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta' K_0^*(1430)^0)/\Gamma_{\text{total}}$   $\Gamma_{291}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>6.3 ± 1.3 ± 0.9</b>	<sup>1</sup> DEL-AMO-SA..10A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta' K_2^*(1430)^0)/\Gamma_{\text{total}}$   $\Gamma_{292}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>13.7<sup>+</sup><sub>-2.9</sub> ± 1.2</b>	<sup>1</sup> DEL-AMO-SA..10A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta K^0)/\Gamma_{\text{total}}$   $\Gamma_{293}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**1.23<sup>+0.27</sup><sub>-0.24</sub> OUR AVERAGE**

1.27 <sup>+0.33</sup> <sub>-0.29</sub> ± 0.08		<sup>1</sup> HOI	12	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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1.15 <sup>+0.43</sup> <sub>-0.38</sub> ± 0.09		<sup>1</sup> AUBERT	09AV	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

< 1.9	90	<sup>1</sup> CHANG	07B	BELL	Repl. by HOI 12
< 2.9	90	<sup>1</sup> AUBERT,B	06V	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
< 2.5	90	<sup>1</sup> AUBERT,B	05K	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
< 2.0	90	<sup>1</sup> CHANG	05A	BELL	Repl. by CHANG 07B
< 5.2	90	<sup>1</sup> AUBERT	04H	BABR	Repl. by AUBERT,B 05K
< 9.3	90	<sup>1</sup> RICHICHI	00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
< 33	90	BEHRENS	98	CLE2	Repl. by RICHICHI 00

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{294}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**15.9 ± 1.0 OUR AVERAGE**

15.2 ± 1.2 ± 1.0		<sup>1</sup> WANG	07B	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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16.5 ± 1.1 ± 0.8		<sup>1</sup> AUBERT,B	06H	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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13.8 <sup>+5.5</sup> <sub>-4.6</sub> ± 1.6		<sup>1</sup> RICHICHI	00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

18.6 ± 2.3 ± 1.2		<sup>1</sup> AUBERT,B	04D	BABR	Repl. by AUBERT,B 06H
< 30	90	BEHRENS	98	CLE2	Repl. by RICHICHI 00

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta K_0^*(1430)^0)/\Gamma_{\text{total}}$   $\Gamma_{295}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>11.0 ± 1.6 ± 1.5</b>		<sup>1</sup> AUBERT,B	06H	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta K_2^*(1430)^0)/\Gamma_{\text{total}}$   $\Gamma_{296}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>9.6 ± 1.8 ± 1.1</b>		<sup>1</sup> AUBERT,B	06H	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega K^0)/\Gamma_{\text{total}}$   $\Gamma_{297}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**4.8 ± 0.4 OUR AVERAGE**

4.5 ± 0.4 ± 0.3		<sup>1</sup> CHOBANOVA	14	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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5.4 ± 0.8 ± 0.3		<sup>1</sup> AUBERT	07AE	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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10.0 <sup>+5.4</sup> <sub>-4.2</sub> ± 1.4		<sup>1</sup> JESSOP	00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$6.2 \pm 1.0 \pm 0.4$		<sup>1</sup> AUBERT,B	06E	BABR	Repl. by AUBERT 07AE
$4.4^{+0.8}_{-0.7} \pm 0.4$		<sup>1</sup> JEN	06	BELL	Repl. by CHOBANOVA 14
$5.9^{+1.6}_{-1.3} \pm 0.5$		<sup>1</sup> AUBERT	04H	BABR	Repl. by AUBERT,B 06E
$4.0^{+1.9}_{-1.6} \pm 0.5$		<sup>1</sup> WANG	04A	BELL	Repl. by JEN 06
<13	90	<sup>1</sup> AUBERT	01G	BABR	Repl. by AUBERT 04H
<57	90	<sup>1</sup> BERGFELD	98	CLE2	Repl. by JESSOP 00

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(a_0(980)^0 K^0, a_0^0 \rightarrow \eta \pi^0) / \Gamma_{\text{total}}$   $\Gamma_{298} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<7.8	90	<sup>1</sup> AUBERT,BE 04	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of charged and neutral  $B$  mesons at  $\Upsilon(4S)$ .

$\Gamma(b_1^0 K^0, b_1^0 \rightarrow \omega \pi^0) / \Gamma_{\text{total}}$   $\Gamma_{299} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<7.8	90	<sup>1</sup> AUBERT	08AG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(a_0(980)^\pm K^\mp, a_0^\pm \rightarrow \eta \pi^\pm) / \Gamma_{\text{total}}$   $\Gamma_{300} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<1.9	90	<sup>1</sup> AUBERT	07Y BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<2.1	90	<sup>1</sup> AUBERT,BE 04	BABR	Repl. by AUBERT 07Y
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(b_1^- K^+, b_1^- \rightarrow \omega \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{301} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$7.4 \pm 1.0 \pm 1.0$		<sup>1</sup> AUBERT	07BI BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(b_1^0 K^{*0}, b_1^0 \rightarrow \omega \pi^0) / \Gamma_{\text{total}}$   $\Gamma_{302} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< $8.0 \times 10^{-6}$	90	<sup>1</sup> AUBERT	09AF BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(b_1^- K^{*+}, b_1^- \rightarrow \omega \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{303} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< $5.0 \times 10^{-6}$	90	<sup>1</sup> AUBERT	09AF BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(a_0(1450)^\pm K^\mp, a_0^\pm \rightarrow \eta\pi^\pm)/\Gamma_{\text{total}}$   $\Gamma_{304}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;3.1</b>	90	<sup>1</sup> AUBERT	07Y BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_S^0 X^0 (\text{Familon}))/\Gamma_{\text{total}}$   $\Gamma_{305}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;53</b>	90	<sup>1</sup> AMMAR	01B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> AMMAR 01B searched for the two-body decay of the  $B$  meson to a massless neutral feebly-interacting particle  $X^0$  such as the familon, the Nambu-Goldstone boson associated with a spontaneously broken global family symmetry.

$\Gamma(\omega K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{306}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.0±0.5 OUR AVERAGE</b>				
2.2±0.6±0.2		<sup>1</sup> AUBERT	09H BABR	$e^+e^- \rightarrow \Upsilon(4S)$
1.8±0.7±0.3		<sup>1</sup> GOLDENZWE..08	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 4.2	90	<sup>1</sup> AUBERT,B	06T BABR	Repl. by AUBERT 09H
< 6.0	90	<sup>1</sup> AUBERT	05O BABR	Repl. by AUBERT,B 06T
<23	90	<sup>1</sup> BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega(K\pi)_0^{*0})/\Gamma_{\text{total}}$   $\Gamma_{307}/\Gamma$

$(K\pi)_0^{*0}$  is the total S-wave composed of  $K_0^*(1430)$  and nonresonant that are described using LASS shape.

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>18.4±1.8±1.7</b>	<sup>1</sup> AUBERT	09H BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega K_0^*(1430)^0)/\Gamma_{\text{total}}$   $\Gamma_{308}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>16.0±1.6±3.0</b>	<sup>1</sup> AUBERT	09H BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega K_2^*(1430)^0)/\Gamma_{\text{total}}$   $\Gamma_{309}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>10.1±2.0±1.1</b>	<sup>1</sup> AUBERT	09H BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega K^+ \pi^- \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{310}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>5.1±0.7±0.7</b>	<sup>1,2</sup> GOLDENZWE..08	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> For the  $K\pi$  mass range 0.755–1.250 GeV/ $c^2$ , excluding  $K^*(892)$ .



$\Gamma(K^+ \pi^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{311}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**37.8 ± 3.2 OUR AVERAGE**

38.5 ± 1.0 ± 3.9		1,2 LEES	11	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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36.6 <sup>+4.2</sup> <sub>-4.3</sub> ± 3.0		1 CHANG	04	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

35.7 <sup>+2.6</sup> <sub>-1.5</sub> ± 2.2		1 AUBERT	08AQ	BABR Repl. by LEES 11
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<40	90	1 ECKHART	02	CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

$\Gamma(K^+ \rho^-)/\Gamma_{\text{total}}$   $\Gamma_{312}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**7.0 ± 0.9 OUR AVERAGE**

6.6 ± 0.5 ± 0.8		1,2 LEES	11	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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15.1 <sup>+3.4</sup> <sub>-3.3</sub> ± 2.4		1 CHANG	04	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

8.0 <sup>+0.8</sup> <sub>-1.3</sub> ± 0.6		1 AUBERT	08AQ	BABR Repl. by LEES 11
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7.3 <sup>+1.3</sup> <sub>-1.2</sub> ± 1.3		1 AUBERT	03T	BABR Repl. by AUBERT 08AQ
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<32	90	1 JESSOP	00	CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$
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<35	90	ASNER	96	CLE2 Repl. by JESSOP 00
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

$\Gamma(K^+ \rho(1450)^-)/\Gamma_{\text{total}}$   $\Gamma_{313}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>2.4 ± 1.0 ± 0.6</b>		1,2 LEES	11	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<2.1	90	1 AUBERT	08AQ	BABR Repl. by LEES 11
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

$\Gamma(K^+ \rho(1700)^-)/\Gamma_{\text{total}}$   $\Gamma_{314}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>0.6 ± 0.6 ± 0.4</b>		1,2 LEES	11	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.1	90	1 AUBERT	08AQ	BABR Repl. by LEES 11
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

$\Gamma((K^+\pi^-\pi^0) \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{315}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b><math>2.8 \pm 0.5 \pm 0.4</math></b>		1,2 LEES	11 BABR	$e^+e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4.4 \pm 0.9 \pm 0.5$		1 AUBERT	08AQ BABR	Repl. by LEES 11
$< 9.4$	90	1 CHANG	04 BELL	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+\pi^-\pi^0$  decays. The quoted value is only for the flat part of the non-resonant component.

$\Gamma((K\pi)_0^{*+}\pi^-, (K\pi)_0^{*+} \rightarrow K^+\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{316}/\Gamma$

$(K\pi)_0^{*+}$  is the total S-wave composed of  $K_0^*(1430)$  and nonresonant that are described using LASS shape.

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
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<b><math>34.2 \pm 2.4 \pm 4.1</math></b>	1,2 LEES	11 BABR	$e^+e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$9.4^{+1.1+2.3}_{-1.3-2.1}$	1 AUBERT	08AQ BABR	Repl. by LEES 11

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+\pi^-\pi^0$  decays.

$\Gamma((K\pi)_0^{*0}\pi^0, (K\pi)_0^{*0} \rightarrow K^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{317}/\Gamma$

$(K\pi)_0^{*0}$  is the total S-wave composed of  $K_0^*(1430)$  and nonresonant that are described using LASS shape.

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
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<b><math>8.6 \pm 1.1 \pm 1.3</math></b>	1,2 LEES	11 BABR	$e^+e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$8.7^{+1.1+2.8}_{-0.9-2.6}$	1 AUBERT	08AQ BABR	Repl. by LEES 11

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+\pi^-\pi^0$  decays.

$\Gamma(K_2^*(1430)^0\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{318}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b><math>&lt; 4.0</math></b>	90	1 AUBERT	08AQ BABR	$e^+e^- \rightarrow \gamma(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\gamma(4S)$ .				

$\Gamma(K^*(1680)^0\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{319}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b><math>&lt; 7.5</math></b>	90	1 AUBERT	08AQ BABR	$e^+e^- \rightarrow \gamma(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\gamma(4S)$ .				

$\Gamma(K_x^{*0}\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{320}/\Gamma$

$K_x^{*0}$  stands for the possible candidates of  $K^*(1410)$ ,  $K_0^*(1430)$  and  $K_2^*(1430)$ .

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
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<b><math>6.1^{+1.6+0.5}_{-1.5-0.6}</math></b>	1 CHANG	04 BELL	$e^+e^- \rightarrow \gamma(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\gamma(4S)$ .			

$\Gamma(K^0 \pi^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{321} / \Gamma$

VALUE (units  $10^{-6}$ )      CL%      DOCUMENT ID      TECN      COMMENT

**49.7 ± 1.8 OUR FIT**  
**49.6 ± 2.0 OUR AVERAGE**

50.2 ± 1.5 ± 1.8	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
47.5 ± 2.4 ± 3.7	<sup>2</sup> GARMASH	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
50 <sup>+10</sup> / <sub>-9</sub> ± 7	<sup>1</sup> ECKHART	02 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

43.0 ± 2.3 ± 2.3	<sup>1</sup> AUBERT	06I BABR	Repl. by AUBERT 09AU
43.7 ± 3.8 ± 3.4	<sup>1</sup> AUBERT,B	04O BABR	Repl. by AUBERT 06I
45.4 ± 5.2 ± 5.9	<sup>1</sup> GARMASH	04 BELL	Repl. by GARMASH 07
<440	90 ALBRECHT	91E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K^0 \pi^+ \pi^-$  final state decays.

$\Gamma(K^0 \pi^+ \pi^- \text{ nonresonant}) / \Gamma_{\text{total}}$   $\Gamma_{322} / \Gamma$

VALUE (units  $10^{-6}$ )      DOCUMENT ID      TECN      COMMENT

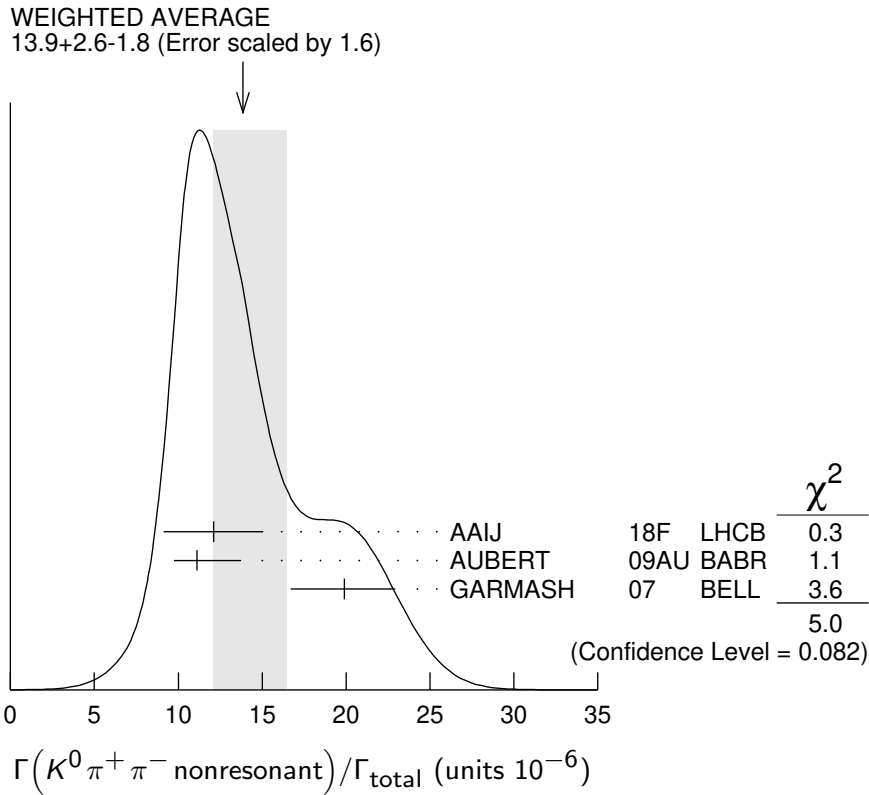
**13.9<sup>+2.6</sup>/<sub>-1.8</sub> OUR AVERAGE** Error includes scale factor of 1.6. See the ideogram below.

12.1 ± 0.6 ± 2.9	<sup>1</sup> AAIJ	18F LHCb	$pp$ at 7, 8 TeV
11.1 <sup>+2.5</sup> / <sub>-1.0</sub> ± 0.9	<sup>2</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
19.9 ± 2.5 <sup>+1.7</sup> / <sub>-2.0</sub>	<sup>3</sup> GARMASH	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays. For the branching fraction of the reference mode, the PDG 18 average  $B(B^0 \rightarrow K_S^0 \pi^+ \pi^-) = (4.96 \pm 0.20) \times 10^{-5}$  is used.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K^0 \pi^+ \pi^-$  final state decays.



$\Gamma(K^0 \rho^0)/\Gamma_{\text{total}}$   $\Gamma_{323}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>3.4 ±1.1 OUR AVERAGE</b>		Error includes scale factor of 2.3. See the ideogram below.		

1.89 <sup>+0.55</sup> <sub>-0.79</sub> ±0.40	1	AAIJ	18F LHCb	$pp$ at 7, 8 TeV
4.4 <sup>+0.7</sup> <sub>-0.6</sub> ±0.3	2	AUBERT	09AU BABR	$e^+e^- \rightarrow \Upsilon(4S)$
6.1 ±1.0 <sup>+1.1</sup> <sub>-1.2</sub>	3	GARMASH	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

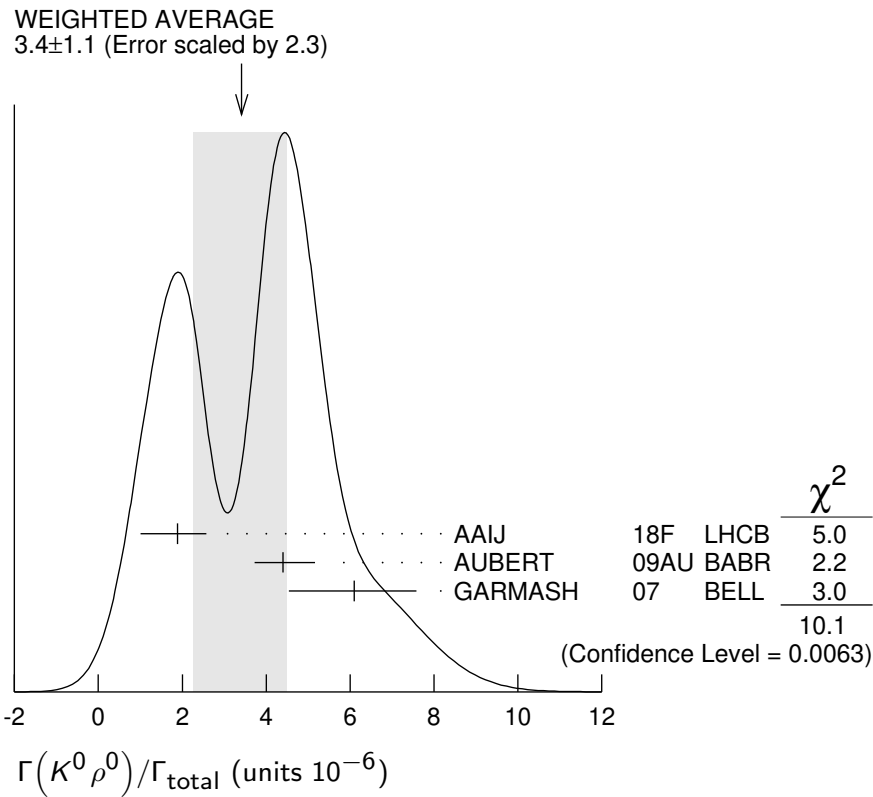
4.9 ±0.8 ±0.9	2	AUBERT	07F BABR	Repl. by AUBERT 09AU
< 39	90	ASNER	96 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<320	90	ALBRECHT	91B ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<500	90	4 AVERY	89B CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays. For the branching fraction of the reference mode, the PDG 18 average  $B(B^0 \rightarrow K_S^0 \pi^+ \pi^-) = (4.96 \pm 0.20) \times 10^{-5}$  is used.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K^0 \pi^+ \pi^-$  final state decays.

<sup>4</sup> AVERY 89B reports  $< 5.8 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.



**$\Gamma(K^*(892)^+ \pi^-) / \Gamma_{\text{total}}$**   **$\Gamma_{324} / \Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>7.5 \pm 0.4</math></b>	<b>OUR AVERAGE</b>			
$7.02 \pm 0.30 \pm 0.45$		1 AAIJ	18F LHCB	$pp$ at 7, 8 TeV
$8.0 \pm 1.1 \pm 0.8$		2,3 LEES	11 BABR	$e^+ e^- \rightarrow \gamma(4S)$
$8.3 \begin{smallmatrix} +0.9 \\ -0.8 \end{smallmatrix} \pm 0.8$		3,4 AUBERT	09AU BABR	$e^+ e^- \rightarrow \gamma(4S)$
$8.4 \pm 1.1 \begin{smallmatrix} +1.0 \\ -0.9 \end{smallmatrix}$		4 GARMASH	07 BELL	$e^+ e^- \rightarrow \gamma(4S)$
$16 \begin{smallmatrix} +6 \\ -5 \end{smallmatrix} \pm 2$		3 ECKHART	02 CLE2	$e^+ e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$12.6 \begin{smallmatrix} +2.7 \\ -1.6 \end{smallmatrix} \pm 0.9$		2,3 AUBERT	08AQ BABR	Repl. by LEES 11
$11.0 \pm 1.5 \pm 0.71$		3 AUBERT	06i BABR	Repl. by AUBERT 09AU
$12.9 \pm 2.4 \pm 1.4$		3 AUBERT,B	04o BABR	Repl. by AUBERT 06i
$14.8 \begin{smallmatrix} +4.6 \\ -4.4 \end{smallmatrix} \begin{smallmatrix} +2.8 \\ -1.3 \end{smallmatrix}$		3 CHANG	04 BELL	Repl. by GARMASH 07
< 72	90	ASNER	96 CLE2	$e^+ e^- \rightarrow \gamma(4S)$
< 620	90	ALBRECHT	91B ARG	$e^+ e^- \rightarrow \gamma(4S)$
< 380	90	5 AVERY	89B CLEO	$e^+ e^- \rightarrow \gamma(4S)$
< 560	90	6 AVERY	87 CLEO	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays. For the branching fraction of the reference mode, the PDG 18 average  $B(B^0 \rightarrow K_S^0 \pi^+ \pi^-) = (4.96 \pm 0.20) \times 10^{-5}$  is used.

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K^0 \pi^+ \pi^-$  final state decays.

<sup>5</sup> AVERY 89B reports  $< 4.4 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

<sup>6</sup> AVERY 87 reports  $< 7 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 40% to  $B^0 \bar{B}^0$ . We rescale to 50%.

**$\Gamma(K_0^*(1430)^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{325} / \Gamma$**

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>33 ± 7 OUR AVERAGE</b>	Error includes scale factor of 2.0.		
29.9 <sup>+2.3</sup> <sub>-1.7</sub> ± 3.6	1,2 AUBERT	09AU BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
49.7 ± 3.8 <sup>+6.8</sup> <sub>-8.2</sub>	<sup>2</sup> GARMASH	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K^0 \pi^+ \pi^-$  final state decays.

**$\Gamma(K_x^{*+} \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{326} / \Gamma$**

$K_x^{*+}$  stands for the possible candidates of  $K^*(1410)$ ,  $K_0^*(1430)$  and  $K_2^*(1430)$ .

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>5.1 ± 1.5<sup>+0.6</sup></b> <b>-0.7</b>	<sup>1</sup> CHANG	04 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(K^*(1410)^+ \pi^-, K^{*+} \rightarrow K^0 \pi^+) / \Gamma_{\text{total}}$   $\Gamma_{327} / \Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 3.8</b>	90	<sup>1</sup> GARMASH	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K^0 \pi^+ \pi^-$  final state decays.

**$\Gamma((K\pi)_0^{*+} \pi^-, (K\pi)_0^{*+} \rightarrow K^0 \pi^+) / \Gamma_{\text{total}}$   $\Gamma_{328} / \Gamma$**

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>16.2 ± 0.69 ± 1.15</b>	<sup>1</sup> AAIJ	18F LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays.  $(K\pi)_0^{*+}$  is the S-wave component of  $K^0 \pi^+$ . For the branching fraction of the reference mode, the PDG 18 average  $B(B^0 \rightarrow K_S^0 \pi^+ \pi^-) = (4.96 \pm 0.20) \times 10^{-5}$  is used.

**$\Gamma(f_0(980) K^0, f_0 \rightarrow \pi^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{329} / \Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>8.1 ± 0.8 OUR AVERAGE</b>	Error includes scale factor of 1.3. See the ideogram below.			
9.23 ± 0.40 ± 0.79		<sup>1</sup> AAIJ	18F LHCB	$pp$ at 7, 8 TeV
6.9 ± 0.8 ± 0.6		<sup>2</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
7.6 ± 1.7 <sup>+0.9</sup> -1.3		<sup>3</sup> GARMASH	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

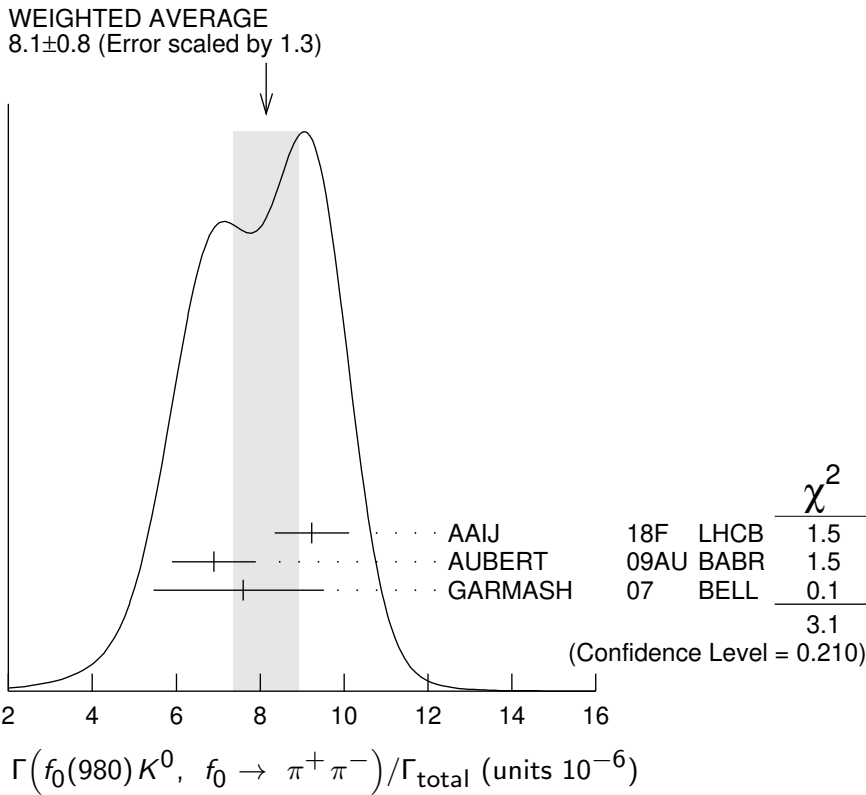
5.5 ± 0.7 ± 0.6                      <sup>2</sup> AUBERT                      06I BABR Repl. by AUBERT 09AU  
 <360                                      90                      <sup>4</sup> AVERY                      89B CLEO e<sup>+</sup>e<sup>-</sup> → γ(4S)

<sup>1</sup> Uses Dalitz plot analysis of the B<sup>0</sup> → K<sub>S</sub><sup>0</sup>π<sup>+</sup>π<sup>-</sup> final state decays. For the branching fraction of the reference mode, the PDG 18 average B(B<sup>0</sup> → K<sub>S</sub><sup>0</sup>π<sup>+</sup>π<sup>-</sup>) = (4.96 ± 0.20) × 10<sup>-5</sup> is used.

<sup>2</sup> Assumes equal production of B<sup>+</sup> and B<sup>0</sup> at the γ(4S).

<sup>3</sup> Uses Dalitz plot analysis of the B<sup>0</sup> → K<sup>0</sup>π<sup>+</sup>π<sup>-</sup> final state decays.

<sup>4</sup> AVERY 89B reports < 4.2 × 10<sup>-4</sup> assuming the γ(4S) decays 43% to B<sup>0</sup>B<sup>0</sup>. We rescale to 50%.



**Γ(K<sup>0</sup>f<sub>0</sub>(500))/Γ<sub>total</sub>**

**Γ<sub>330</sub>/Γ**

VALUE (units 10 <sup>-6</sup> )	DOCUMENT ID	TECN	COMMENT
<b>0.16<sup>+0.20</sup><sub>-0.04</sub> ± 0.15</b>	<sup>1</sup> AAIJ	18F	LHCB pp at 7, 8 TeV

<sup>1</sup> Uses Dalitz plot analysis of the B<sup>0</sup> → K<sub>S</sub><sup>0</sup>π<sup>+</sup>π<sup>-</sup> final state decays. For the branching fraction of the reference mode, the PDG 18 average B(B<sup>0</sup> → K<sub>S</sub><sup>0</sup>π<sup>+</sup>π<sup>-</sup>) = (4.96 ± 0.20) × 10<sup>-5</sup> is used.

**Γ(K<sup>0</sup>f<sub>0</sub>(1500))/Γ<sub>total</sub>**

**Γ<sub>331</sub>/Γ**

VALUE (units 10 <sup>-6</sup> )	DOCUMENT ID	TECN	COMMENT
<b>1.29 ± 0.27 ± 0.70</b>	<sup>1</sup> AAIJ	18F	LHCB pp at 7, 8 TeV

<sup>1</sup> Uses Dalitz plot analysis of the B<sup>0</sup> → K<sub>S</sub><sup>0</sup>π<sup>+</sup>π<sup>-</sup> final state decays. For the branching fraction of the reference mode, the PDG 18 average B(B<sup>0</sup> → K<sub>S</sub><sup>0</sup>π<sup>+</sup>π<sup>-</sup>) = (4.96 ± 0.20) × 10<sup>-5</sup> is used.

$\Gamma(f_2(1270)K^0)/\Gamma_{\text{total}}$   $\Gamma_{332}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$2.7^{+1.0}_{-0.8} \pm 0.9$		<sup>1</sup> AUBERT	09AU BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<2.5	90	<sup>2</sup> GARMASH	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> GARMASH 07 reports  $B(B^0 \rightarrow f_2(1270)K^0) \times B(f_2(1270) \rightarrow \pi^+\pi^-) < 1.4 \times 10^{-6}$  using Dalitz plot analysis. We compute  $B(B^0 \rightarrow f_2(1270)K^0)$  using the PDG value  $B(f_2(1270) \rightarrow \pi\pi) = 84.3 \times 10^{-2}$  and 2/3 for the  $\pi^+\pi^-$  fraction.

$\Gamma(f_x(1300)K^0, f_x \rightarrow \pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{333}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$1.81^{+0.55}_{-0.45} \pm 0.48$		<sup>1</sup> AUBERT	09AU BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^*(892)^0\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{334}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$3.3 \pm 0.5 \pm 0.4$		<sup>1,2</sup> LEES	11 BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$3.6 \pm 0.7 \pm 0.4$		<sup>1,2</sup> AUBERT	08AQ BABR	Repl. by LEES 11
< 3.5	90	<sup>2</sup> CHANG	04 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 3.6	90	JESSOP	00 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<28	90	ASNER	96 CLE2	Repl. by JESSOP 00

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+\pi^-\pi^0$  decays.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_2^*(1430)^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{335}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$3.65^{+0.15}_{-0.12} \pm 0.31$		<sup>1</sup> AAIJ	18F LHCb	$pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 16.2	90	<sup>2,3</sup> AUBERT	08AQ BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 6	90	<sup>4</sup> GARMASH	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 18	90	<sup>3</sup> GARMASH	04 BELL	Repl. by GARMASH 07
<2600	90	ALBRECHT	91B ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0\pi^+\pi^-$  final state decays. We compute  $B(B^0 \rightarrow K_2^*(1430)^+\pi^-)$  using the PDG 18 value  $B(K_2^*(1430) \rightarrow K\pi) = 49.9 \times 10^{-2}$  and 2/3 for the  $K^0\pi^+$  fraction. For the branching fraction of the reference mode, the PDG 18 average  $B(B^0 \rightarrow K_S^0\pi^+\pi^-) = (4.96 \pm 0.20) \times 10^{-5}$  is used.

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+\pi^-\pi^0$  decays.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> GARMASH 07 reports  $B(B^0 \rightarrow K_2^*(1430)^+\pi^-) \times B(K_2^* \rightarrow K^0\pi^+) < 2.1 \times 10^{-6}$  using Dalitz plot analysis. We compute  $B(B^0 \rightarrow K_2^*(1430)^+\pi^-)$  using the PDG value  $B(K_2^*(1430) \rightarrow K\pi) = 49.9 \times 10^{-2}$  and 2/3 for the  $K^0\pi^+$  fraction.



$\Gamma(K^*(1680)^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{336}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b><math>14.1 \pm 0.58 \pm 0.84</math></b>		<sup>1</sup> AAIJ	18F LHCb	$pp$ at 7, 8 TeV
<25	90	<sup>2,3</sup> AUBERT	08AQ BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<10	90	<sup>4</sup> GARMASH	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays. We compute  $B(B^0 \rightarrow K_2^{*+}(1430) \pi^-)$  using the PDG 18 value  $B(K_2^{*+}(1430) \rightarrow K \pi) = (49.9 \pm 1.2) \times 10^{-2}$  and 2/3 for the  $K^0 \pi^+$  fraction. For the branching fraction of the reference mode, the PDG 18 average  $B(B^0 \rightarrow K_S^0 \pi^+ \pi^-) = (4.96 \pm 0.20) \times 10^{-5}$  is used.

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> GARMASH 07 reports  $B(B^0 \rightarrow K^*(1680)^+ \pi^-) \times B(K^{*+} \rightarrow K^0 \pi^+) < 2.6 \times 10^{-6}$  using Dalitz plot analysis. We compute  $B(B^0 \rightarrow K^*(1680)^+ \pi^-)$  using the PDG value  $B(K^*(1680) \rightarrow K \pi) = 38.7 \times 10^{-2}$  and 2/3 for the  $K^0 \pi^+$  fraction.

$\Gamma(K^+ \pi^- \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{337}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b><math>&lt; 2.3 \times 10^{-4}</math></b>	90	<sup>1</sup> ADAM	96D DLPH	$e^+e^- \rightarrow Z$
$< 2.1 \times 10^{-4}$	90	<sup>2</sup> ABREU	95N DLPH	Sup. by ADAM 96D

• • • We do not use the following data for averages, fits, limits, etc. • • •

<sup>1</sup> ADAM 96D assumes  $f_{B^0} = f_{B^-} = 0.39$  and  $f_{B_s} = 0.12$ . Contributions from  $B^0$  and  $B_s$  decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral  $B$  mesons.

<sup>2</sup> Assumes a  $B^0, B^-$  production fraction of 0.39 and a  $B_s$  production fraction of 0.12. Contributions from  $B^0$  and  $B_s$  decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral  $B$  mesons.

$\Gamma(\rho^0 K^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{338}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
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<b><math>2.8 \pm 0.5 \pm 0.5</math></b>	<sup>1,2</sup> KYEONG	09 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Required  $0.75 < m_{K^+ \pi^-} < 1.20 \text{ GeV}/c^2$ .

$\Gamma(f_0(980) K^+ \pi^-, f_0 \rightarrow \pi \pi)/\Gamma_{\text{total}}$   $\Gamma_{339}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
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<b><math>1.4 \pm 0.4^{+0.3}_{-0.4}</math></b>	<sup>1,2</sup> KYEONG	09 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Required  $0.75 < m_{K^+ K^-} < 1.2 \text{ GeV}/c^2$ .

$\Gamma(K^+ \pi^- \pi^+ \pi^- \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{340}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b><math>&lt; 2.1 \times 10^{-6}</math></b>	90	<sup>1,2</sup> KYEONG	09 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Required  $0.55 < m_{\pi^+ \pi^-} < 1.42$  and  $0.75 < m_{K^+ \pi^-} < 1.20 \text{ GeV}/c^2$ .

$\Gamma(K^*(892)^0 \pi^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{341} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**54.5 ± 2.9 ± 4.3** <sup>1</sup> AUBERT 07AS BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$4.5^{+1.1+0.9}_{-1.0-1.6}$  <sup>1,2</sup> KYEONG 09 BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

<1400 90 ALBRECHT 91E ARG  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Required  $0.55 < m_{\pi^+ \pi^-} < 1.42 \text{ GeV}/c^2$ .

$\Gamma(K^*(892)^0 \rho^0) / \Gamma_{\text{total}}$   $\Gamma_{342} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**3.9 ± 1.3 OUR AVERAGE** Error includes scale factor of 1.9.

$5.1 \pm 0.6^{+0.6}_{-0.8}$  <sup>1</sup> LEES 12K BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

$2.1^{+0.8+0.9}_{-0.7-0.5}$  <sup>1</sup> KYEONG 09 BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$5.6 \pm 0.9 \pm 1.3$  <sup>1</sup> AUBERT,B 06G BABR Repl. by LEES 12K

< 34 90 <sup>2</sup> GODANG 02 CLE2  $e^+ e^- \rightarrow \Upsilon(4S)$

<286 90 <sup>3</sup> ABE 00C SLD  $e^+ e^- \rightarrow Z$

<460 90 ALBRECHT 91B ARG  $e^+ e^- \rightarrow \Upsilon(4S)$

<580 90 <sup>4</sup> AVERY 89B CLEO  $e^+ e^- \rightarrow \Upsilon(4S)$

<960 90 <sup>5</sup> AVERY 87 CLEO  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to  $2.4 \times 10^{-5}$ .

<sup>3</sup> ABE 00C assumes  $B(Z \rightarrow b\bar{b}) = (21.7 \pm 0.1)\%$  and the  $B$  fractions  $f_{B^0} = f_{B^+} = (39.7^{+1.8}_{-2.2})\%$  and  $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$ .

<sup>4</sup> AVERY 89B reports  $< 6.7 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

<sup>5</sup> AVERY 87 reports  $< 1.2 \times 10^{-3}$  assuming the  $\Upsilon(4S)$  decays 40% to  $B^0 \bar{B}^0$ . We rescale to 50%.

$\Gamma(K^*(892)^0 f_0(980), f_0 \rightarrow \pi\pi) / \Gamma_{\text{total}}$   $\Gamma_{343} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**3.9<sup>+2.1</sup><sub>-1.8</sub> OUR AVERAGE** Error includes scale factor of 3.9.

$5.7 \pm 0.6 \pm 0.4$  <sup>1</sup> LEES 12K BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

$1.4^{+0.6+0.6}_{-0.5-0.4}$  <sup>1,2</sup> KYEONG 09 BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 4.3 90 <sup>1</sup> AUBERT,B 06G BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

<170 90 <sup>3</sup> AVERY 89B CLEO  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> The upper limit is  $2.2 \times 10^{-6}$  at 90% CL.

<sup>3</sup> AVERY 89B reports  $< 2.0 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

$\Gamma(K_1(1270)^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{344} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.0 \times 10^{-5}$	90	<sup>1</sup> AUBERT	10D BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_1(1400)^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{345} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.7 \times 10^{-5}$	90	<sup>1</sup> AUBERT	10D BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<1.1 \times 10^{-3}$	90	ALBRECHT	91B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(a_1(1260)^- K^+) / \Gamma_{\text{total}}$   $\Gamma_{346} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$16.3 \pm 2.9 \pm 2.3$		<sup>1,2</sup> AUBERT	08F BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<230$	90	<sup>3</sup> ADAM	96D DLPH	$e^+ e^- \rightarrow Z$
$<390$	90	<sup>4</sup> ABREU	95N DLPH	Sup. by ADAM 96D

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .  
<sup>2</sup> Assumes  $a_1^\pm$  decays only to  $3\pi$  and  $B(a_1^\pm \rightarrow \pi^\pm \pi^\mp \pi^\pm) = 0.5$ .  
<sup>3</sup> ADAM 96D assumes  $f_{B^0} = f_{B^-} = 0.39$  and  $f_{B_s} = 0.12$ . Contributions from  $B^0$  and  $B_s$  decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral  $B$  mesons.  
<sup>4</sup> Assumes a  $B^0$ ,  $B^-$  production fraction of 0.39 and a  $B_s$  production fraction of 0.12. Contributions from  $B^0$  and  $B_s$  decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral  $B$  mesons.

$\Gamma(K^*(892)^+ \rho^-) / \Gamma_{\text{total}}$   $\Gamma_{347} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$10.3 \pm 2.3 \pm 1.3$		<sup>1</sup> LEES	12K BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<12.0$	90	<sup>1</sup> AUBERT,B	06G BABR	Repl. by LEES 12K

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_0^*(1430)^+ \rho^-) / \Gamma_{\text{total}}$   $\Gamma_{348} / \Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$28 \pm 10 \pm 6$	<sup>1</sup> LEES	12K BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_1(1400)^0 \rho^0) / \Gamma_{\text{total}}$   $\Gamma_{349} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.0 \times 10^{-3}$	90	ALBRECHT	91B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(K_0^*(1430)^0 \rho^0) / \Gamma_{\text{total}}$   $\Gamma_{350} / \Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$27 \pm 4 \pm 4$	<sup>1</sup> LEES	12K BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_0^*(1430)^0 f_0(980), f_0 \rightarrow \pi\pi)/\Gamma_{\text{total}}$   $\Gamma_{351}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>2.7±0.7±0.6</b>	<sup>1</sup> LEES	12K BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_2^*(1430)^0 f_0(980), f_0 \rightarrow \pi\pi)/\Gamma_{\text{total}}$   $\Gamma_{352}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>8.6±1.7±1.0</b>	<sup>1</sup> LEES	12K BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^+K^-)/\Gamma_{\text{total}}$   $\Gamma_{353}/\Gamma$

VALUE (units $10^{-8}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>7.80± 1.27± 0.84</b>		<sup>1</sup> AAIJ	17G LHCB	$pp$ at 7 and 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

10 ± 8 ± 4		<sup>2,3</sup> DUH	13 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
12 ± 8 ± 2		<sup>4</sup> AAIJ	12AR LHCB	Repl. by AAIJ 17G
23 ± 10 ± 10		<sup>5</sup> AALTONEN	12L CDF	$p\bar{p}$ at 1.96 TeV
< 70	90	<sup>6</sup> AALTONEN	09C CDF	Repl. by AALTONEN 12L
< 50	90	<sup>3</sup> AUBERT	07B BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 41	90	<sup>3</sup> LIN	07 BELL	Repl. by DUH 13
< 180	90	<sup>7</sup> ABULENCIA,A	06D CDF	Repl. by AALTONEN 09C
< 37	90	ABE	05G BELL	Repl. by LIN 07
< 70	90	CHAO	04 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 80	90	<sup>3</sup> BORNHEIM	03 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
< 60	90	<sup>3</sup> AUBERT	02Q BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 90	90	<sup>3</sup> CASEY	02 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 270	90	<sup>3</sup> ABE	01H BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 250	90	<sup>3</sup> AUBERT	01E BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 6600	90	<sup>8</sup> ABE	00C SLD	$e^+e^- \rightarrow Z$
< 190	90	<sup>3</sup> CRONIN-HEN.	00 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
< 430	90	GODANG	98 CLE2	Repl. by CRONIN-HENNESSY 00
< 4600		<sup>9</sup> ADAM	96D DLPH	$e^+e^- \rightarrow Z$
< 400	90	ASNER	96 CLE2	Repl. by GODANG 98
< 1800	90	<sup>10</sup> BUSKULIC	96V ALEP	$e^+e^- \rightarrow Z$
< 12000	90	<sup>11</sup> ABREU	95N DLPH	Sup. by ADAM 96D
< 700	90	<sup>3</sup> BATTLE	93 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Supercedes results of AAIJ 12AR.

<sup>2</sup> DUH 13 reports also for the same data  $B(B^0 \rightarrow K^+K^-) < 0.20 \times 10^{-6}$  at 90% CL.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> AAIJ 12AR reports  $[\Gamma(B^0 \rightarrow K^+K^-)/\Gamma_{\text{total}}] / [B(B_s^0 \rightarrow K^+K^-)] / [\Gamma(\bar{b} \rightarrow B_s^0)/\Gamma(\bar{b} \rightarrow B^0)] = 0.018^{+0.008}_{-0.007} \pm 0.009$  which we multiply by our best values  $B(B_s^0 \rightarrow K^+K^-) = (2.72 \pm 0.23) \times 10^{-5}$ ,  $\Gamma(\bar{b} \rightarrow B_s^0)/\Gamma(\bar{b} \rightarrow B^0) = 0.246 \pm 0.023$ . Our first error is their experiment's error and our second error is the systematic error from using our best values.

- <sup>5</sup> Reported a central value of  $(0.23 \pm 0.10 \pm 0.10) \times 10^{-6}$  using  $B(B^0 \rightarrow K^+ \pi^-) = (19.4 \pm 0.6) \times 10^{-6}$ .
- <sup>6</sup> Obtains this result from  $B(K^+ K^-)/B(K^+ \pi^-) = 0.020 \pm 0.008 \pm 0.006$ , assuming  $B(B^0 \rightarrow K^+ \pi^-) = (19.4 \pm 0.6) \times 10^{-6}$ .
- <sup>7</sup> ABULENCIA,A 06D obtains this from  $\Gamma(K^+ K^-)/\Gamma(K^+ \pi^-) < 0.10$  at 90% CL, assuming  $B(B^0 \rightarrow K^+ \pi^-) = (18.9 \pm 0.7) \times 10^{-6}$ .
- <sup>8</sup> ABE 00C assumes  $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$  and the  $B$  fractions  $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$  and  $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$ .
- <sup>9</sup> ADAM 96D assumes  $f_{B^0} = f_{B^-} = 0.39$  and  $f_{B_s} = 0.12$ . Contributions from  $B^0$  and  $B_s$  decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral  $B$  mesons.
- <sup>10</sup> BUSKULIC 96V assumes PDG 96 production fractions for  $B^0, B^+, B_s, b$  baryons.
- <sup>11</sup> Assumes a  $B^0, B^-$  production fraction of 0.39 and a  $B_s$  production fraction of 0.12. Contributions from  $B^0$  and  $B_s$  decays cannot be separated. Limits are given for the weighted average of the decay rates for the two neutral  $B$  mesons.

**$\Gamma(K^0 \bar{K}^0)/\Gamma_{\text{total}}$   $\Gamma_{354}/\Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>1.21±0.16 OUR AVERAGE</b>				
1.26±0.19±0.05		<sup>1</sup> DUH	13	BELL $e^+e^- \rightarrow \Upsilon(4S)$
1.08±0.28±0.11		<sup>1</sup> AUBERT,BE	06c	BABR $e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.87 <sup>+0.25</sup> <sub>-0.20</sub> ±0.09		<sup>1</sup> LIN	07	BELL Repl. by DUH 13
0.8 ±0.3 ±0.9		<sup>1</sup> ABE	05G	BELL Repl. by LIN 07
1.19 <sup>+0.40</sup> <sub>-0.35</sub> ±0.13		<sup>1</sup> AUBERT,BE	05E	BABR Repl. by AUBERT,BE 06c
< 1.8	90	<sup>1</sup> AUBERT	04M	BABR $e^+e^- \rightarrow \Upsilon(4S)$
< 1.5	90	<sup>1</sup> CHAO	04	BELL Repl. by ABE 05G
< 3.3	90	<sup>1</sup> BORNHEIM	03	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
< 4.1	90	<sup>1</sup> CASEY	02	BELL $e^+e^- \rightarrow \Upsilon(4S)$
<17	90	GODANG	98	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(K^0 \bar{K}^0)/\Gamma(K^0 \phi)$   $\Gamma_{354}/\Gamma_{363}$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.17±0.08±0.02</b>	<sup>1</sup> AAIJ	20F	LHCB $pp$ at 7, 8, 13 TeV

<sup>1</sup> Observed signal with a significance of 3.5  $\sigma$ .

**$\Gamma(K^0 K^- \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{355}/\Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>6.7±0.5 OUR FIT</b>				
<b>7.0±0.6 OUR AVERAGE</b>				
7.2±0.7±0.3		<sup>1</sup> LAI	19	BELL $e^+e^- \rightarrow \Upsilon(4S)$
6.4±1.0±0.6		<sup>1</sup> DEL-AMO-SA..10E	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<18	90	<sup>1</sup> GARMASH	04	BELL $e^+e^- \rightarrow \Upsilon(4S)$
<21	90	<sup>1</sup> ECKHART	02	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^*(892)^\pm K^\mp)/\Gamma_{\text{total}}$   $\Gamma_{356}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<0.4 \times 10^{-6}$	90	AAIJ	14BMLHCB	$pp$ at 7 TeV

$\Gamma(K^0 K^- \pi^+)/\Gamma(K^0 \pi^+ \pi^-)$   $\Gamma_{355}/\Gamma_{321}$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.134 ± 0.011 OUR FIT**

**0.123 ± 0.009 ± 0.015**      AAIJ      17BP LHCB       $pp$  at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.128 ± 0.017 ± 0.009      AAIJ      13BP LHCB      Repl. by AAIJ 17BP

$[\Gamma(K^{*0} K^0) + \Gamma(K^{*0} \bar{K}^0)]/\Gamma_{\text{total}}$   $\Gamma_{357}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**<0.96**      90      1 AAIJ      16 LHCB       $pp$  at 7 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.9      90      2 AUBERT, BE      06N BABR       $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes  $B(B^0 \rightarrow K^0 \pi^+ \pi^-) = (4.96 \pm 0.20) \times 10^{-5}$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^+ K^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{358}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**2.17 ± 0.60 ± 0.24**      1 GAUR      13 BELL       $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<19      90      1 ECKHART      02 CLE2       $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_S^0 K_S^0 \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{359}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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**<0.9 × 10<sup>-6</sup>**      90      1 AUBERT      09AD BABR       $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_S^0 K_S^0 \eta)/\Gamma_{\text{total}}$   $\Gamma_{360}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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**<1.0 × 10<sup>-6</sup>**      90      1 AUBERT      09AD BABR       $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_S^0 K_S^0 \eta')/\Gamma_{\text{total}}$   $\Gamma_{361}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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**<2.0 × 10<sup>-6</sup>**      90      1 AUBERT      09AD BABR       $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^0 K^+ K^-)/\Gamma_{\text{total}}$   $\Gamma_{362}/\Gamma$

<u>VALUE (units <math>10^{-6}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>26.8±1.1 OUR FIT</b>				
<b>26.6±1.2 OUR AVERAGE</b>				
26.5±0.9±0.8		<sup>1,2</sup> LEES	120 BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
28.3±3.3±4.0		<sup>1</sup> GARMASH	04 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
23.8±2.0±1.6		<sup>1</sup> AUBERT,B	04V BABR	Repl. by LEES 120
<1300	90	ALBRECHT	91E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .				
<sup>2</sup> All intermediate charmonium and charm resonances are removed, except of $\chi_{c0}$ .				

$\Gamma(K^0 K^+ K^-)/\Gamma(K^0 \pi^+ \pi^-)$   $\Gamma_{362}/\Gamma_{321}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.539±0.025 OUR FIT</b>			
<b>0.549±0.018±0.033</b>			
	AAIJ	17BP LHCB	$pp$ at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.385±0.031±0.023	AAIJ	13BP LHCB	Repl. by AAIJ 17BP

$\Gamma(K^0 \phi)/\Gamma_{\text{total}}$   $\Gamma_{363}/\Gamma$

<u>VALUE (units <math>10^{-6}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>7.3±0.7 OUR AVERAGE</b>				
7.1±0.6 <sup>+0.4</sup> <sub>-0.3</sub>		<sup>1</sup> LEES	120 BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
9.0 <sup>+2.2</sup> <sub>-1.8</sub> ±0.7		<sup>1</sup> CHEN	03B BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
8.4 <sup>+1.5</sup> <sub>-1.3</sub> ±0.5		<sup>1</sup> AUBERT	04A BABR	Repl. by LEES 120
8.1 <sup>+3.1</sup> <sub>-2.5</sub> ±0.8		<sup>1</sup> AUBERT	01D BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
< 12.3	90	<sup>1</sup> BRIERE	01 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
< 31	90	<sup>1</sup> BERGFELD	98 CLE2	
< 88	90	ASNER	96 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
< 720	90	ALBRECHT	91B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
< 420	90	<sup>2</sup> AVERY	89B CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
<1000	90	<sup>3</sup> AVERY	87 CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .				
<sup>2</sup> AVERY 89B reports $< 4.9 \times 10^{-4}$ assuming the $\Upsilon(4S)$ decays 43% to $B^0 \bar{B}^0$ . We rescale to 50%.				
<sup>3</sup> AVERY 87 reports $< 1.3 \times 10^{-3}$ assuming the $\Upsilon(4S)$ decays 40% to $B^0 \bar{B}^0$ . We rescale to 50%.				

$\Gamma(f_0(980)K^0, f_0 \rightarrow K^+ K^-)/\Gamma_{\text{total}}$   $\Gamma_{364}/\Gamma$

<u>VALUE (units <math>10^{-6}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>7.0<sup>+2.6</sup><sub>-1.8</sub>±2.4</b>			
	<sup>1</sup> LEES	120 BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .			

$\Gamma(f_0(1500)K^0)/\Gamma_{\text{total}}$   $\Gamma_{365}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$13.3^{+5.8}_{-4.4} \pm 3.2$	<sup>1</sup> LEES	120 BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(f'_2(1525)^0 K^0)/\Gamma_{\text{total}}$   $\Gamma_{366}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$0.29^{+0.27}_{-0.18} \pm 0.36$	<sup>1</sup> LEES	120 BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(f_0(1710)K^0, f_0 \rightarrow K^+K^-)/\Gamma_{\text{total}}$   $\Gamma_{367}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$4.4 \pm 0.7 \pm 0.5$	<sup>1</sup> LEES	120 BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(K^0 K^+ K^- \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{368}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$33 \pm 5 \pm 9$	<sup>1</sup> LEES	120 BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(K_S^0 K_S^0 K_S^0)/\Gamma_{\text{total}}$   $\Gamma_{369}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>6.0 ± 0.5 OUR AVERAGE</b> Error includes scale factor of 1.1.			
$6.19 \pm 0.48 \pm 0.19$	<sup>1</sup> LEES	12l BABR	$e^+e^- \rightarrow \gamma(4S)$
$4.2^{+1.6}_{-1.3} \pm 0.8$	<sup>1</sup> GARMASH	04 BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$6.9^{+0.9}_{-0.8} \pm 0.6$	<sup>1</sup> AUBERT,B	05 BABR	Repl. by LEES 12l
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(f_0(980)K^0, f_0 \rightarrow K_S^0 K_S^0)/\Gamma_{\text{total}}$   $\Gamma_{370}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$2.7^{+1.3}_{-1.2} \pm 1.3$	<sup>1,2</sup> LEES	12l BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K_S^0 K_S^0$  decay.

$\Gamma(f_0(1710)K^0, f_0 \rightarrow K_S^0 K_S^0)/\Gamma_{\text{total}}$   $\Gamma_{371}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$0.50^{+0.46}_{-0.24} \pm 0.11$	<sup>1,2</sup> LEES	12l BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K_S^0 K_S^0$  decay.



$\Gamma(f_2(2010)K^0, f_2 \rightarrow K_S^0 K_S^0)/\Gamma_{\text{total}}$   $\Gamma_{372}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$0.54^{+0.21}_{-0.20} \pm 0.52$	1,2 LEES	12l BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K_S^0 K_S^0$  decay.

$\Gamma(K_S^0 K_S^0 K_S^0 \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{373}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
$13.3^{+2.2}_{-2.3} \pm 2.2$	1,2 LEES	12l BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K_S^0 K_S^0$  decay.

$\Gamma(K_S^0 K_S^0 K_L^0)/\Gamma_{\text{total}}$   $\Gamma_{374}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$<16$	90	1 AUBERT,B	06R BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^*(892)^0 K^+ K^-)/\Gamma_{\text{total}}$   $\Gamma_{375}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$27.5 \pm 1.3 \pm 2.2$		1 AUBERT	07AS BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<610$	90	ALBRECHT	91E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^*(892)^0 \phi)/\Gamma_{\text{total}}$   $\Gamma_{376}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**10.0 ± 0.5 OUR FIT**

**10.0 ± 0.5 OUR AVERAGE**

10.4 ± 0.5 ± 0.6 <sup>1</sup> PRIM 13 BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

9.7 ± 0.5 ± 0.5 <sup>1</sup> AUBERT 08BG BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

11.5 <sup>+4.5+1.8</sup><sub>-3.7-1.7</sub> <sup>1</sup> BRIERE 01 CLE2  $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

9.2 ± 0.7 ± 0.6 <sup>1</sup> AUBERT 07D BABR Repl. by AUBERT 08BG

9.2 ± 0.9 ± 0.5 <sup>1</sup> AUBERT,B 04W BABR Repl. by AUBERT 07D

11.2 ± 1.3 ± 0.8 <sup>1</sup> AUBERT 03V BABR Repl. by AUBERT,B 04W

10.0 <sup>+1.6+0.7</sup><sub>-1.5-0.8</sub> <sup>1</sup> CHEN 03B BELL Repl. by PRIM 13

8.7 <sup>+2.5</sup><sub>-2.1</sub> ± 1.1 <sup>1</sup> AUBERT 01D BABR Repl. by AUBERT 03V

$<384$  90 <sup>2</sup> ABE 00C SLD  $e^+ e^- \rightarrow Z$

$<21$  90 <sup>1</sup> BERGFELD 98 CLE2

$<43$  90 ASNER 96 CLE2  $e^+ e^- \rightarrow \Upsilon(4S)$

$<320$  90 ALBRECHT 91B ARG  $e^+ e^- \rightarrow \Upsilon(4S)$

$<380$  90 <sup>3</sup> AVERY 89B CLEO  $e^+ e^- \rightarrow \Upsilon(4S)$

$<380$  90 <sup>4</sup> AVERY 87 CLEO  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ABE 00c assumes  $B(Z \rightarrow b\bar{b}) = (21.7 \pm 0.1)\%$  and the  $B$  fractions  $f_{B^0} = f_{B^+} = (39.7^{+1.8}_{-2.2})\%$  and  $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$ .

<sup>3</sup> AVERY 89B reports  $< 4.4 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0\bar{B}^0$ . We rescale to 50%.

<sup>4</sup> AVERY 87 reports  $< 4.7 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 40% to  $B^0\bar{B}^0$ . We rescale to 50%.

**$\Gamma(K^+K^-\pi^+\pi^- \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{377}/\Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;71.7</b>	90	1,2 CHIANG	10 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measured in the range  $0.7 < m_{K\pi} < 1.7$  and corrected using PS assumption for the full  $K\pi$  mass range.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(K^*(892)^0K^-\pi^+)/\Gamma_{\text{total}}$   $\Gamma_{378}/\Gamma$**

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>4.5 <math>\pm</math> 1.3 OUR AVERAGE</b>			

2.11<sup>+5.63+4.85</sup><sub>-5.26-4.75</sub> 1,2 CHIANG 10 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

4.6  $\pm$  1.1  $\pm$  0.8 <sup>2</sup> AUBERT 07AS BABR  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measured in the range  $0.7 < m_{K\pi} < 1.7$  and corrected using PS assumption for the full  $K\pi$  mass range. The quoted result is equivalent to the upper limit of  $< 13.9 \times 10^{-6}$  at 90% CL.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(K^*(892)^0\bar{K}^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{379}/\Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.83 <math>\pm</math> 0.24 OUR AVERAGE</b>				Error includes scale factor of 1.5. See the ideogram below.

0.85  $\pm$  0.07  $\pm$  0.20 <sup>1</sup> AAIJ 19L LHCb  $pp$  at 7 and 8 TeV

0.26<sup>+0.33+0.10</sup><sub>-0.29-0.08</sub> 2,3 CHIANG 10 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

1.28<sup>+0.35</sup><sub>-0.30</sub>  $\pm$  0.11 <sup>3</sup> AUBERT 08I BABR  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 22 90 <sup>4</sup> GODANG 02 CLE2  $e^+e^- \rightarrow \Upsilon(4S)$

< 469 90 <sup>5</sup> ABE 00C SLD  $e^+e^- \rightarrow Z$

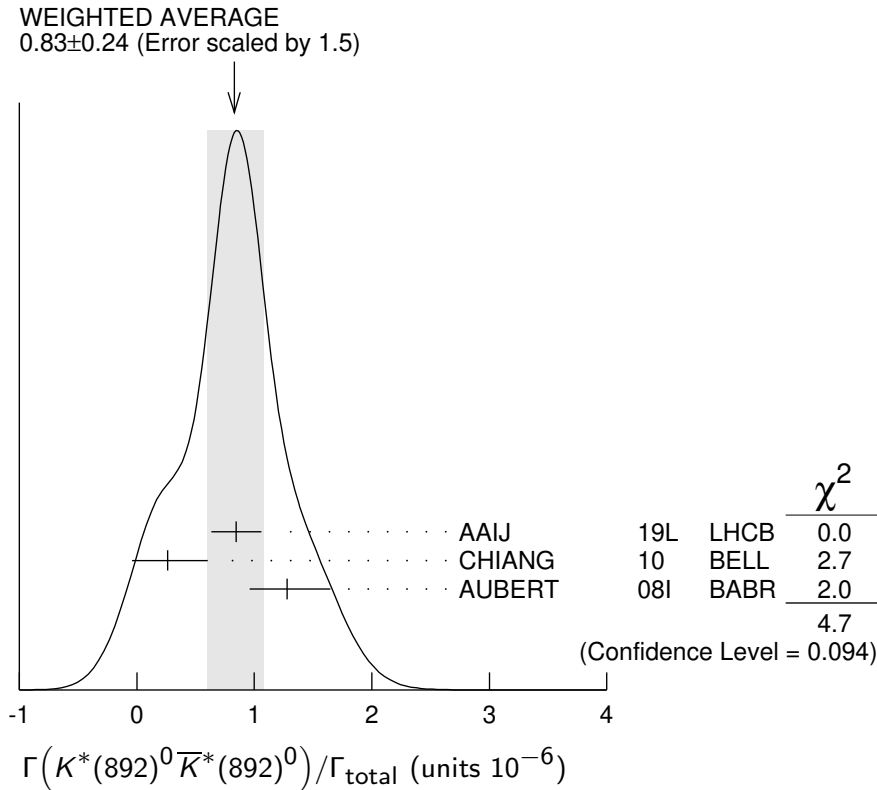
<sup>1</sup> AAIJ 19L reports  $[\Gamma(B^0 \rightarrow K^*(892)^0\bar{K}^*(892)^0)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow \bar{K}^*(892)^0K^*(892)^0)] = 0.0758 \pm 0.0057 \pm 0.0030$  which we multiply by our best value  $B(B^0 \rightarrow \bar{K}^*(892)^0K^*(892)^0) = (1.11 \pm 0.27) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Measured in the range  $0.7 < m_{K\pi} < 1.7$  and corrected using PS assumption for the full  $K\pi$  mass range. The quoted result is equivalent to the upper limit of  $< 0.8 \times 10^{-6}$  at 90% CL.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to  $1.9 \times 10^{-5}$ .

<sup>5</sup> ABE 00C assumes  $B(Z \rightarrow b\bar{b}) = (21.7 \pm 0.1)\%$  and the  $B$  fractions  $f_{B^0} = f_{B^+} = (39.7^{+1.8}_{-2.2})\%$  and  $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$ .



**$\Gamma(K^+ K^+ \pi^- \pi^- \text{nonresonant}) / \Gamma_{\text{total}}$   $\Gamma_{380} / \Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;6.0</b>	90	<sup>1</sup> CHIANG 10	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(K^*(892)^0 K^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{381} / \Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;2.2</b>	90	<sup>1</sup> AUBERT 07AS	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

••• We do not use the following data for averages, fits, limits, etc. •••

<7.6	90	<sup>1</sup> CHIANG 10	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(K^*(892)^0 K^*(892)^0) / \Gamma_{\text{total}}$   $\Gamma_{382} / \Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 0.2</b>	90	<sup>1</sup> CHIANG 10	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

••• We do not use the following data for averages, fits, limits, etc. •••

< 0.41	90	<sup>1</sup> AUBERT 08I	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<37	90	<sup>2</sup> GODANG 02	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to  $2.9 \times 10^{-5}$ .

$\Gamma(K^*(892)^+ K^*(892)^-)/\Gamma_{\text{total}}$   $\Gamma_{383}/\Gamma$ 

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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< 2.0	90	<sup>1</sup> AUBERT	08AP BABR	$e^+ e^- \rightarrow \gamma(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<141	90	<sup>2</sup> GODANG	02 CLE2	$e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to  $8.9 \times 10^{-5}$ .

 $\Gamma(K_1(1400)^0 \phi)/\Gamma_{\text{total}}$   $\Gamma_{384}/\Gamma$ 

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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< $5.0 \times 10^{-3}$	90	ALBRECHT	91B ARG	$e^+ e^- \rightarrow \gamma(4S)$
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 $\Gamma(\phi(K\pi)_0^{*0})/\Gamma_{\text{total}}$   $\Gamma_{385}/\Gamma$ 

This decay refers to the coherent sum of resonant and nonresonant  $J^P = 0^+ K\pi$  components with  $1.13 < m_{K\pi} < 1.53 \text{ GeV}/c^2$ .

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
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**4.3 ± 0.4 OUR AVERAGE**

$4.3 \pm 0.4 \pm 0.4$	<sup>1</sup> PRIM	13 BELL	$e^+ e^- \rightarrow \gamma(4S)$
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$4.3 \pm 0.6 \pm 0.4$	<sup>1</sup> AUBERT	08BG BABR	$e^+ e^- \rightarrow \gamma(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$5.0 \pm 0.8 \pm 0.3$	<sup>1</sup> AUBERT	07D BABR	Repl. by AUBERT 08BG
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(\phi(K\pi)_0^{*0} (1.60 < m_{K\pi} < 2.15))/\Gamma_{\text{total}}$   $\Gamma_{386}/\Gamma$ 

This decay refers to the coherent sum of resonant and nonresonant  $J^P = 0^+ K\pi$  components with  $1.60 < m_{K\pi} < 2.15 \text{ GeV}/c^2$ .

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<1.7	90	<sup>1</sup> AUBERT	07AO BABR	$e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(K_0^*(1430)^0 K^- \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{387}/\Gamma$ 

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<31.8	90	<sup>1,2</sup> CHIANG	10 BELL	$e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Measured in the range  $0.7 < m_{K\pi} < 1.7$  and corrected using PS assumption for the full  $K\pi$  mass range.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

 $\Gamma(K_0^*(1430)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{388}/\Gamma$ 

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<3.3	90	<sup>1,2</sup> CHIANG	10 BELL	$e^+ e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Measured in the range  $0.7 < m_{K\pi} < 1.7$  and corrected using PS assumption for the full  $K\pi$  mass range.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(K_0^*(1430)^0 \bar{K}_0^*(1430)^0) / \Gamma_{\text{total}}$   $\Gamma_{389} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;8.4</b>	90	1,2 CHIANG	10 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measured in the range  $0.7 < m_{K\pi} < 1.7$  and corrected using PS assumption for the full  $K\pi$  mass range.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_0^*(1430)^0 \phi) / \Gamma_{\text{total}}$   $\Gamma_{390} / \Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>3.9 \pm 0.5 \pm 0.6</math></b>	<sup>1</sup> AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$4.6 \pm 0.7 \pm 0.6$	<sup>1</sup> AUBERT	07D BABR	Repl. by AUBERT 08BG
seen	<sup>2</sup> AUBERT,B	04W BABR	Repl. by AUBERT 07D

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Observed  $181 \pm 17$  events with statistical significance greater than  $10 \sigma$ .

$\Gamma(K_0^*(1430)^0 K^*(892)^0) / \Gamma_{\text{total}}$   $\Gamma_{391} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;1.7</b>	90	<sup>1</sup> CHIANG	10 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_0^*(1430)^0 K_0^*(1430)^0) / \Gamma_{\text{total}}$   $\Gamma_{392} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;4.7</b>	90	<sup>1</sup> CHIANG	10 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^*(1680)^0 \phi) / \Gamma_{\text{total}}$   $\Gamma_{393} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;3.5</b>	90	<sup>1</sup> AUBERT	07AO BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^*(1780)^0 \phi) / \Gamma_{\text{total}}$   $\Gamma_{394} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;2.7</b>	90	<sup>1</sup> AUBERT	07AO BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^*(2045)^0 \phi) / \Gamma_{\text{total}}$   $\Gamma_{395} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;15.3</b>	90	<sup>1</sup> AUBERT	07AO BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K_2^*(1430)^0 \rho^0) / \Gamma_{\text{total}}$   $\Gamma_{396} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;1.1 <math>\times 10^3</math></b>	90	ALBRECHT	91B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(K_2^*(1430)^0 \phi) / \Gamma_{\text{total}}$   $\Gamma_{397} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>6.8 ± 0.9 OUR AVERAGE</b> Error includes scale factor of 1.2.				
$5.5^{+0.9}_{-0.7} \pm 1.0$		<sup>1</sup> PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$7.5 \pm 0.9 \pm 0.5$		<sup>1</sup> AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$7.8 \pm 1.1 \pm 0.6$		<sup>1</sup> AUBERT	07D BABR	Repl. by AUBERT 08BG
seen		<sup>2</sup> AUBERT,B	04W BABR	Repl. by AUBERT 07D
<1400	90	ALBRECHT	91B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> The angular distribution of  $B \rightarrow \phi K^*(1430)$  provides evidence with statistical significance of  $3.2 \sigma$ .

$\Gamma(K^0 \phi \phi) / \Gamma_{\text{total}}$   $\Gamma_{398} / \Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>3.7 ± 0.7 OUR AVERAGE</b> Error includes scale factor of 1.3.			
$3.02^{+0.75}_{-0.66} \pm 0.20$	<sup>1</sup> MOHANTY	21 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$4.5 \pm 0.8 \pm 0.3$	<sup>1</sup> LEES	11A BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$4.1^{+1.7}_{-1.4} \pm 0.4$	<sup>1</sup> AUBERT, BE	06H BABR	Repl. by LEES 11A

<sup>1</sup> Assumes equal production of  $B^0$  and  $B^+$  at the  $\Upsilon(4S)$  and the  $\phi\phi$  invariant mass below  $2.85 \text{ GeV}/c^2$ .

$\Gamma(\eta' \eta' K^0) / \Gamma_{\text{total}}$   $\Gamma_{399} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;31</b>	90	<sup>1</sup> AUBERT,B	06P BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta K^0 \gamma) / \Gamma_{\text{total}}$   $\Gamma_{400} / \Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b>7.6 ± 1.8 OUR AVERAGE</b>			
$7.1^{+2.1}_{-2.0} \pm 0.4$	<sup>1,2</sup> AUBERT	09 BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$8.7^{+3.1+1.9}_{-2.7-1.6}$	<sup>2,3</sup> NISHIDA	05 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$11.3^{+2.8}_{-1.6} \pm 0.6$	<sup>1,2</sup> AUBERT,B	06M BABR	Repl. by AUBERT 09
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<sup>1</sup>  $m_{\eta K} < 3.25 \text{ GeV}/c^2$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup>  $m_{\eta K} < 2.4 \text{ GeV}/c^2$

$\Gamma(\eta' K^0 \gamma)/\Gamma_{\text{total}}$   $\Gamma_{401}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;6.4</b>	90	1,2 WEDD	10	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<6.6	90	1,3 AUBERT,B	06M	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup>  $m_{\eta' K} < 3.4 \text{ GeV}/c^2$ .

<sup>3</sup>  $m_{\eta' K} < 3.25 \text{ GeV}/c^2$ .

$\Gamma(K^0 \phi \gamma)/\Gamma_{\text{total}}$   $\Gamma_{402}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.74 ± 0.60 ± 0.32</b>		<sup>1</sup> SAHOO	11A	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<2.7	90	<sup>1</sup> AUBERT	07Q	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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<8.3	90	<sup>1</sup> DRUTSKOY	04	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at  $\Upsilon(4S)$ .

$\Gamma(K^+ \pi^- \gamma)/\Gamma_{\text{total}}$   $\Gamma_{403}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>(4.6^{+1.3+0.5}_{-1.2-0.7}) \times 10^{-6}</math></b>	<sup>1,2</sup> NISHIDA	02	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup>  $1.25 \text{ GeV}/c^2 < M_{K\pi} < 1.6 \text{ GeV}/c^2$

$\Gamma(K^*(892)^0 \gamma)/\Gamma_{\text{total}}$   $\Gamma_{404}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>41.8 ± 2.5 OUR AVERAGE</b>		Error includes scale factor of 2.1.		
39.6 ± 0.7 ± 1.4		<sup>1</sup> HORIGUCHI	17	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
44.7 ± 1.0 ± 1.6		<sup>2</sup> AUBERT	09AO	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
45.5 <sup>+</sup> <sub>-</sub> 7.2 ± 3.4		<sup>3</sup> COAN	00	CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

39.2 ± 2.0 ± 2.4		<sup>4</sup> AUBERT,BE	04A	BABR Repl. by AUBERT 09AO
40.1 ± 2.1 ± 1.7		<sup>5</sup> NAKAO	04	BELL Repl. by HORIGUCHI 17
< 110	90	ACOSTA	02G	CDF $p\bar{p}$ at 1.8 TeV
42.3 ± 4.0 ± 2.2		<sup>5</sup> AUBERT	02C	BABR Repl. by AUBERT,BE 04A
< 210	90	<sup>6</sup> ADAM	96D	DLPH $e^+ e^- \rightarrow Z$
40 ± 17 ± 8		<sup>7</sup> AMMAR	93	CLE2 Repl. by COAN 00
< 420	90	ALBRECHT	89G	ARG $e^+ e^- \rightarrow \Upsilon(4S)$
< 240	90	<sup>8</sup> AVERY	89B	CLEO $e^+ e^- \rightarrow \Upsilon(4S)$
< 2100	90	AVERY	87	CLEO $e^+ e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> Uses  $B(\Upsilon(4S) \rightarrow B^+ B^-) = (51.4 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = (48.6 \pm 0.6)\%$ .  
<sup>2</sup> Uses  $B(\Upsilon(4S) \rightarrow B^+ B^-) = (51.6 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = (48.4 \pm 0.6)\%$ .  
<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ . No evidence for a nonresonant  $K\pi\gamma$  contamination was seen; the central value assumes no contamination.  
<sup>4</sup> Uses the production ratio of charged and neutral B from  $\Upsilon(4S)$  decays  $R^{+/0} = 1.006 \pm 0.048$ .  
<sup>5</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .  
<sup>6</sup> ADAM 96D assumes  $f_{B^0} = f_{B^-} = 0.39$  and  $f_{B_s} = 0.12$ .  
<sup>7</sup> AMMAR 93 observed  $6.6 \pm 2.8$  events above background.  
<sup>8</sup> AVERY 89B reports  $< 2.8 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

$\Gamma(K^*(1410)\gamma)/\Gamma_{\text{total}}$   $\Gamma_{405}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.3 \times 10^{-4}$	90	<sup>1</sup> NISHIDA	02	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^+ \pi^- \gamma \text{ nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{406}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.6 \times 10^{-6}$	90	<sup>1,2</sup> NISHIDA	02	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup>  $1.25 \text{ GeV}/c^2 < M_{K\pi} < 1.6 \text{ GeV}/c^2$

$\Gamma(K^*(892)^0 X(214), X \rightarrow \mu^+ \mu^-)/\Gamma_{\text{total}}$   $\Gamma_{407}/\Gamma$

$X(214)$  is a hypothetical particle of mass  $214 \text{ MeV}/c^2$  reported by the HyperCP experiment (PARK 05)

VALUE (units $10^{-8}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$<2.26$	90	<sup>1,2</sup> HYUN	10	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Based on scalar nature of  $X$  particle. With a vector  $X$  assumption, the upper limit is  $2.27 \times 10^{-8}$ .

$\Gamma(K^0 \pi^+ \pi^- \gamma)/\Gamma_{\text{total}}$   $\Gamma_{408}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.99 ± 0.18 OUR AVERAGE</b>			

$2.05 \pm 0.20^{+0.26}_{-0.22}$  <sup>1,2</sup> DEL-AMO-SA..16 BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

$1.85 \pm 0.21 \pm 0.12$  <sup>1,3</sup> AUBERT 07R BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

$2.40 \pm 0.4 \pm 0.3$  <sup>3,4</sup> YANG 05 BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>  $M_{K\pi\pi} < 1.8 \text{ GeV}/c^2$ .

<sup>2</sup> Uses  $B(\Upsilon(4S) \rightarrow B^+ B^-) = 0.513 \pm 0.006$ .

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup>  $M_{K\pi\pi} < 2.0 \text{ GeV}/c^2$ .

$\Gamma(K^+ \pi^- \pi^0 \gamma)/\Gamma_{\text{total}}$   $\Gamma_{409}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b>4.07 ± 0.22 ± 0.31</b>	<sup>1,2</sup> AUBERT	07R	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>  $M_{K\pi\pi} < 1.8 \text{ GeV}/c^2$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .



$\Gamma(K_1(1270)^0\gamma)/\Gamma_{\text{total}}$   $\Gamma_{410}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 5.8</b>	90	<sup>1</sup> YANG	05 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<700	90	<sup>2</sup> ALBRECHT	89G ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 89G reports  $< 0.0078$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.

$\Gamma(K_1(1400)^0\gamma)/\Gamma_{\text{total}}$   $\Gamma_{411}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.2</b>	90	<sup>1</sup> YANG	05 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<430	90	<sup>2</sup> ALBRECHT	89G ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 89G reports  $< 0.0048$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.

$\Gamma(K_2^*(1430)^0\gamma)/\Gamma_{\text{total}}$   $\Gamma_{412}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>1.24 \pm 0.24</math> OUR AVERAGE</b>				

$1.22 \pm 0.25 \pm 0.10$  <sup>1</sup> AUBERT,B 04U BABR  $e^+e^- \rightarrow \Upsilon(4S)$

$1.3 \pm 0.5 \pm 0.1$  <sup>1</sup> NISHIDA 02 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<40	90	<sup>2</sup> ALBRECHT	89G ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 89G reports  $< 4.4 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.

$\Gamma(K^*(1680)^0\gamma)/\Gamma_{\text{total}}$   $\Gamma_{413}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.0020</b>	90	<sup>1</sup> ALBRECHT	89G ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 89G reports  $< 0.0022$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.

$\Gamma(K_3^*(1780)^0\gamma)/\Gamma_{\text{total}}$   $\Gamma_{414}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 83</b>	90	<sup>1,2</sup> NISHIDA	05 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<10000	90	<sup>3</sup> ALBRECHT	89G ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses  $B(K_3^*(1780) \rightarrow \eta K) = 0.11^{+0.05}_{-0.04}$ .

<sup>3</sup> ALBRECHT 89G reports  $< 0.011$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.

$\Gamma(K_4^*(2045)^0 \gamma) / \Gamma_{\text{total}}$   $\Gamma_{415} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0043	90	<sup>1</sup> ALBRECHT	89G ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 89G reports < 0.0048 assuming the  $\Upsilon(4S)$  decays 45% to  $B^0 \bar{B}^0$ . We rescale to 50%.

$\Gamma(\rho^0 \gamma) / \Gamma_{\text{total}}$   $\Gamma_{416} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.86 ± 0.15 OUR AVERAGE</b>				
$0.97^{+0.24}_{-0.22} \pm 0.06$		<sup>1</sup> AUBERT	08BH BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.78^{+0.17+0.09}_{-0.16-0.10}$		<sup>1</sup> TANIGUCHI	08 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.79^{+0.22}_{-0.20} \pm 0.06$		<sup>1</sup> AUBERT	07L BABR	Repl. by AUBERT 08BH
$1.25^{+0.37+0.07}_{-0.33-0.06}$		<sup>1</sup> MOHAPATRA	06 BELL	Repl. by TANIGUCHI 08
$0.0 \pm 0.2 \pm 0.1$	90	<sup>1</sup> AUBERT	05 BABR	Repl. by AUBERT 07L
< 0.8	90	<sup>1</sup> MOHAPATRA	05 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
< 1.2	90	<sup>1</sup> AUBERT	04c BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
< 17	90	<sup>1</sup> COAN	00 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\rho^0 X(214), X \rightarrow \mu^+ \mu^-) / \Gamma_{\text{total}}$   $\Gamma_{417} / \Gamma$

$X(214)$  is a hypothetical particle of mass 214 MeV/ $c^2$  reported by the HyperCP experiment (PARK 05)

VALUE (units $10^{-8}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<1.73	90	<sup>1,2</sup> HYUN	10 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> The result is the same for a scalar or vector  $X$  particle.

$\Gamma(\rho^0 \gamma) / \Gamma(K^*(892)^0 \gamma)$   $\Gamma_{416} / \Gamma_{404}$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>2.06<sup>+0.45+0.14</sup><sub>-0.43-0.16</sub></b>	TANIGUCHI	08 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(\omega \gamma) / \Gamma_{\text{total}}$   $\Gamma_{418} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.44<sup>+0.18</sup><sub>-0.16</sub> OUR AVERAGE</b>				
$0.50^{+0.27}_{-0.23} \pm 0.09$		<sup>1</sup> AUBERT	08BH BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.40^{+0.19}_{-0.17} \pm 0.13$		<sup>1</sup> TANIGUCHI	08 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.40^{+0.24}_{-0.20} \pm 0.05$		<sup>1</sup> AUBERT	07L	BABR	Repl. by AUBERT 08BH
$0.56^{+0.34+0.05}_{-0.27-0.10}$		<sup>1</sup> MOHAPATRA	06	BELL	Repl. by TANIGUCHI 08
<1.0	90	<sup>1</sup> AUBERT	05	BABR	Repl. by AUBERT 07L
<0.8	90	<sup>1</sup> MOHAPATRA	05	BELL	Repl. by MOHAPATRA 06
<1.0	90	<sup>1</sup> AUBERT	04C	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<9.2	90	<sup>1</sup> COAN	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\phi\gamma)/\Gamma_{total}$   $\Gamma_{419}/\Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.0 × 10 <sup>-7</sup>	90	<sup>1</sup> KING	16	BELL $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<8.5 × 10 <sup>-7</sup>	90	<sup>1</sup> AUBERT, BE	05C	BABR $e^+e^- \rightarrow \Upsilon(4S)$
<3.3 × 10 <sup>-6</sup>	90	<sup>1</sup> COAN	00	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(f_2(1270)\gamma, f_2 \rightarrow (KS)^0(KS)^0)/\Gamma_{total}$   $\Gamma_{420}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<3.1 × 10 <sup>-7</sup>	JEON	22	BELL $e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(f'_2(1525)\gamma, f'_2 \rightarrow (KS)^0(KS)^0)/\Gamma_{total}$   $\Gamma_{421}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<2.1 × 10 <sup>-7</sup>	JEON	22	BELL $e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$   $\Gamma_{422}/\Gamma$

<u>VALUE (units 10<sup>-6</sup>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**5.37 ± 0.20 OUR FIT** Error includes scale factor of 1.3.

**5.43 ± 0.26 OUR AVERAGE** Error includes scale factor of 1.4. See the ideogram

below.

5.83 ± 0.22 ± 0.17		ADACHI	24	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
5.04 ± 0.21 ± 0.18		<sup>1</sup> DUH	13	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
5.5 ± 0.4 ± 0.3		<sup>1</sup> AUBERT	07B	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
4.5 <sup>+1.4</sup> <sub>-1.2</sub> <sup>+0.5</sup> <sub>-0.4</sub>		<sup>1</sup> BORNHEIM	03	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

5.1 ± 0.2 ± 0.2		<sup>1</sup> LIN	07A	BELL	Repl. by DUH 13
4.4 ± 0.6 ± 0.3		<sup>1</sup> CHAO	04	BELL	Repl. by LIN 07A
4.7 ± 0.6 ± 0.2		<sup>1</sup> AUBERT	02Q	BABR	Repl. by AUBERT 07B
5.4 ± 1.2 ± 0.5		<sup>1</sup> CASEY	02	BELL	Repl. by CHAO 04
5.6 <sup>+2.3</sup> <sub>-2.0</sub> <sup>+0.4</sup> <sub>-0.5</sub>		<sup>1</sup> ABE	01H	BELL	Repl. by CASEY 02
4.1 ± 1.0 ± 0.7		<sup>1</sup> AUBERT	01E	BABR	Repl. by AUBERT 02Q
< 67	90	<sup>2</sup> ABE	00C	SLD	$e^+e^- \rightarrow Z$
4.3 <sup>+1.6</sup> <sub>-1.4</sub> ± 0.5		<sup>1</sup> CRONIN-HEN..	00	CLE2	Repl. by BORNHEIM 03
< 15	90	GODANG	98	CLE2	Repl. by CRONIN-HENNESSY 00
< 45	90	<sup>3</sup> ADAM	96D	DLPH	$e^+e^- \rightarrow Z$

< 20	90	ASNER	96	CLE2	Repl. by GODANG 98
< 41	90	4 BUSKULIC	96V	ALEP	$e^+e^- \rightarrow Z$
< 55	90	5 ABREU	95N	DLPH	Sup. by ADAM 96D
< 47	90	6 AKERS	94L	OPAL	$e^+e^- \rightarrow Z$
< 29	90	1 BATTLE	93	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<130	90	1 ALBRECHT	90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
< 77	90	7 BORTOLETTO	89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<260	90	7 BEBEK	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<500	90	GILES	84	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ABE 00C assumes  $B(Z \rightarrow b\bar{b}) = (21.7 \pm 0.1)\%$  and the  $B$  fractions  $f_{B^0} = f_{B^+} = (39.7^{+1.8}_{-2.2})\%$  and  $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$ .

<sup>3</sup> ADAM 96D assumes  $f_{B^0} = f_{B^-} = 0.39$  and  $f_{B_s} = 0.12$ .

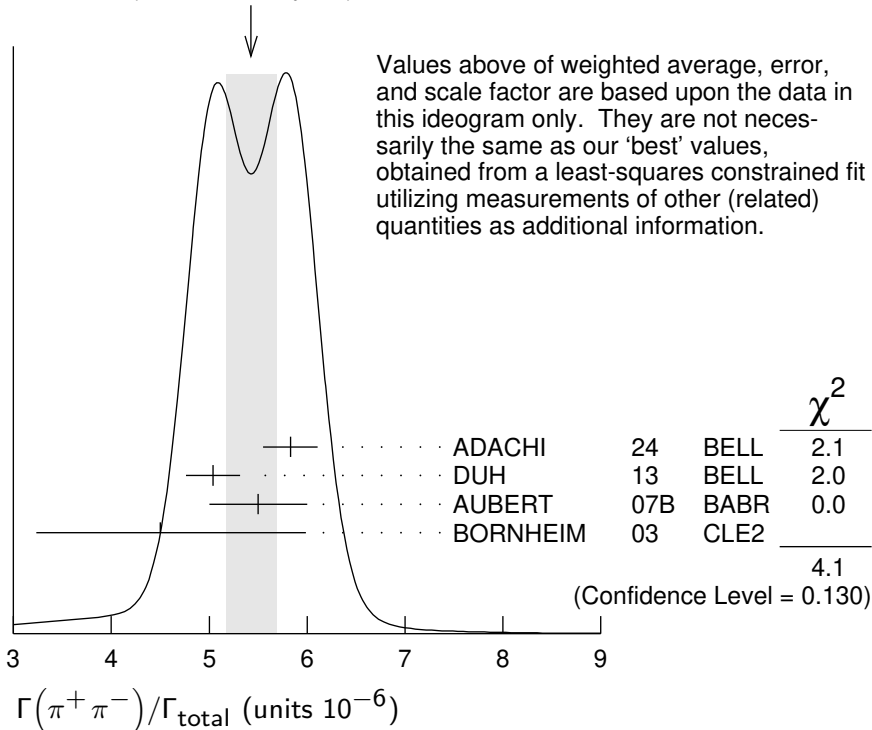
<sup>4</sup> BUSKULIC 96V assumes PDG 96 production fractions for  $B^0$ ,  $B^+$ ,  $B_s$ ,  $b$  baryons.

<sup>5</sup> Assumes a  $B^0$ ,  $B^-$  production fraction of 0.39 and a  $B_s$  production fraction of 0.12.

<sup>6</sup> Assumes  $B(Z \rightarrow b\bar{b}) = 0.217$  and  $B_d^0$  ( $B_s^0$ ) fraction 39.5% (12%).

<sup>7</sup> Paper assumes the  $\Upsilon(4S)$  decays 43% to  $B^0\bar{B}^0$ . We rescale to 50%.

WEIGHTED AVERAGE  
5.43±0.26 (Error scaled by 1.4)



$\Gamma(\pi^+\pi^-)/\Gamma(K^+\pi^-)$

$\Gamma_{422}/\Gamma_{287}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.268±0.010 OUR FIT</b>	Error includes scale factor of 1.2.		
<b>0.261±0.015 OUR AVERAGE</b>			
0.262±0.009±0.017	AAIJ	12AR	LHCB $pp$ at 7 TeV
0.259±0.017±0.016	AALTONEN	11N	CDF $p\bar{p}$ at 1.96 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.21 ±0.05 ±0.03	ABULENCIA,A	06D	CDF Repl. by AALTONEN 11N

$\Gamma(\pi^0\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{423}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**1.55 ± 0.17 OUR AVERAGE** Error includes scale factor of 1.1.

1.38 ± 0.27 ± 0.22 ABUDINEN 23E BELL  $e^+e^- \rightarrow \Upsilon(4S)$

1.31 ± 0.19 ± 0.19 <sup>1</sup> JULIUS 17 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

1.83 ± 0.21 ± 0.13 <sup>1</sup> LEES 13D BABR  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.47 ± 0.25 ± 0.12 <sup>1</sup> AUBERT 07BC BABR Repl. by LEES 13D

1.17 ± 0.32 ± 0.10 <sup>1</sup> AUBERT 05L BABR Repl. by AUBERT 07BC

2.3 <sup>+0.4</sup> <sub>-0.5</sub> <sup>+0.2</sup> <sub>-0.3</sub> <sup>1</sup> CHAO 05 BELL Repl. by JULIUS 17

< 3.6 90 <sup>1</sup> AUBERT 03L BABR  $e^+e^- \rightarrow \Upsilon(4S)$

2.1 ± 0.6 ± 0.3 <sup>1</sup> AUBERT 03S BABR Repl. by AUBERT 05L

< 4.4 90 <sup>1</sup> BORNHEIM 03 CLE2  $e^+e^- \rightarrow \Upsilon(4S)$

1.7 ± 0.6 ± 0.2 <sup>1</sup> LEE 03 BELL Repl. by CHAO 05

< 5.7 90 <sup>1</sup> ASNER 02 CLE2  $e^+e^- \rightarrow \Upsilon(4S)$

< 6.4 90 <sup>1</sup> CASEY 02 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

< 9.3 90 GODANG 98 CLE2 Repl. by ASNER 02

< 9.1 90 ASNER 96 CLE2 Repl. by GODANG 98

< 60 90 <sup>2</sup> ACCIARRI 95H L3  $e^+e^- \rightarrow Z$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ACCIARRI 95H assumes  $f_{B^0} = 39.5 \pm 4.0$  and  $f_{B_s} = 12.0 \pm 3.0\%$ .

$\Gamma(\eta\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{424}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**0.41 <sup>+0.17</sup> <sub>-0.15</sub> <sup>+0.05</sup> <sub>-0.07</sub>** 1,2 PAL 15 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 1.5 90 <sup>2</sup> AUBERT 08AH BABR  $e^+e^- \rightarrow \Upsilon(4S)$

< 1.3 90 <sup>2</sup> AUBERT 06W BABR Repl. by AUBERT 08AH

< 2.5 90 <sup>2</sup> CHANG 05A BELL Repl. by PAL 15

< 2.5 90 <sup>2</sup> AUBERT,B 04D BABR Repl. by AUBERT 06W

< 2.9 90 <sup>2</sup> RICHICHI 00 CLE2  $e^+e^- \rightarrow \Upsilon(4S)$

< 8 90 BEHRENS 98 CLE2 Repl. by RICHICHI 00

< 250 90 <sup>3</sup> ACCIARRI 95H L3  $e^+e^- \rightarrow Z$

< 1800 90 <sup>2</sup> ALBRECHT 90B ARG  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> PAL 15 signal significance is 3.0 standard deviations. The measurement corresponds to 90% CL upper limit of  $< 6.5 \times 10^{-7}$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> ACCIARRI 95H assumes  $f_{B^0} = 39.5 \pm 4.0$  and  $f_{B_s} = 12.0 \pm 3.0\%$ .

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$   $\Gamma_{425}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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< **1.0** 90 <sup>1</sup> AUBERT 09AV BABR  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 1.8	90	<sup>1</sup> AUBERT,B	06V	BABR	Repl. by AUBERT 09AV
< 2.0	90	<sup>1</sup> CHANG	05A	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 2.8	90	<sup>1</sup> AUBERT,B	04X	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 18	90	BEHRENS	98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<410	90	<sup>2</sup> ACCIARRI	95H	L3	$e^+e^- \rightarrow Z$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ACCIARRI 95H assumes  $f_{B^0} = 39.5 \pm 4.0$  and  $f_{B_s} = 12.0 \pm 3.0\%$ .

**$\Gamma(\eta' \pi^0)/\Gamma_{\text{total}}$**   **$\Gamma_{426}/\Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>1.2±0.6 OUR AVERAGE</b>		Error includes scale factor of 1.7.		
0.9±0.4±0.1		<sup>1</sup> AUBERT	08AH	BABR $e^+e^- \rightarrow \Upsilon(4S)$
2.8±1.0±0.3		<sup>1</sup> SCHUEMANN	06	BELL $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.8^{+0.8}_{-0.6} \pm 0.1$		<sup>1</sup> AUBERT	06W	BABR	Repl. by AUBERT 08AH
$1.0^{+1.4}_{-1.0} \pm 0.8$	90	<sup>1</sup> AUBERT,B	04D	BABR	Repl. by AUBERT 06W
< 5.7	90	<sup>1</sup> RICHICHI	00	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<11	90	BEHRENS	98	CLE2	Repl. by RICHICHI 00

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(\eta' \eta')/\Gamma_{\text{total}}$**   **$\Gamma_{427}/\Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.7</b>	90	<sup>1</sup> AUBERT	09AV	BABR $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 6.5	90	<sup>1</sup> SCHUEMANN	07	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 2.4	90	<sup>1</sup> AUBERT,B	06V	BABR	Repl. by AUBERT 09AV
<10	90	<sup>1</sup> AUBERT,B	04X	BABR	Repl. by AUBERT,B 06V
<47	90	BEHRENS	98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(\eta' \eta)/\Gamma_{\text{total}}$**   **$\Gamma_{428}/\Gamma$**

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.2</b>	90	<sup>1</sup> AUBERT	08AH	BABR $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 4.5	90	<sup>1</sup> SCHUEMANN	07	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 1.7	90	<sup>1</sup> AUBERT	06W	BABR	Repl. by AUBERT 08AH
< 4.6	90	<sup>1</sup> AUBERT,B	04X	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<27	90	BEHRENS	98	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta' \rho^0)/\Gamma_{\text{total}}$   $\Gamma_{429}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.3</b>	90	<sup>1</sup> SCHUEMANN 07	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
< 2.8	90	<sup>1</sup> DEL-AMO-SA...10A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
< 3.7	90	AUBERT 07E	BABR	Repl. by DEL-AMO-SANCHEZ 10A
< 4.3	90	<sup>1</sup> AUBERT,B 04D	BABR	Repl. by AUBERT 07E
<12	90	<sup>1</sup> RICHICHI 00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
<23	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta' f_0(980), f_0 \rightarrow \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{430}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.9</b>	90	<sup>1</sup> DEL-AMO-SA...10A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<1.5	90	AUBERT 07E	BABR	Repl. by DEL-AMO-SANCHEZ 10A

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta \rho^0)/\Gamma_{\text{total}}$   $\Gamma_{431}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.5</b>	90	<sup>1</sup> AUBERT 07Y	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
< 1.9	90	<sup>1</sup> WANG 07B	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
< 1.5	90	<sup>1</sup> AUBERT,B 04D	BABR	Repl. by AUBERT 07Y
<10	90	<sup>1</sup> RICHICHI 00	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
<13	90	BEHRENS 98	CLE2	Repl. by RICHICHI 00

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta f_0(980), f_0 \rightarrow \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{432}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.4</b>	90	<sup>1</sup> AUBERT 07Y	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega \eta)/\Gamma_{\text{total}}$   $\Gamma_{433}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>0.94^{+0.35}_{-0.30} \pm 0.09</math></b>		<sup>1</sup> AUBERT 09AV	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
< 1.9	90	<sup>1</sup> AUBERT,B 05K	BABR	Repl. by AUBERT 09AV
$4.0^{+1.3}_{-1.2} \pm 0.4$		<sup>1</sup> AUBERT,B 04X	BABR	Repl. by AUBERT,B 05K
<12	90	<sup>1</sup> BERGFELD 98	CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega\eta')/\Gamma_{\text{total}}$   $\Gamma_{434}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$1.01^{+0.46}_{-0.38} \pm 0.09$		<sup>1</sup> AUBERT	09AV BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 2.2	90	<sup>1</sup> SCHUEMANN	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 2.8	90	<sup>1</sup> AUBERT,B	04X BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<60	90	<sup>1</sup> BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega\rho^0)/\Gamma_{\text{total}}$   $\Gamma_{435}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
< 1.6	90	<sup>1</sup> AUBERT	09H BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 1.5	90	<sup>1</sup> AUBERT,B	06T BABR	Repl. by AUBERT 09H
< 3.3	90	<sup>1</sup> AUBERT	05O BABR	Repl. by AUBERT,B 06T
<11	90	<sup>1</sup> BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega f_0(980), f_0 \rightarrow \pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{436}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<1.5	90	<sup>1</sup> AUBERT	09H BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.5	90	<sup>1</sup> AUBERT,B	06T BABR	Repl. by AUBERT 09H
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\omega\omega)/\Gamma_{\text{total}}$   $\Gamma_{437}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$1.2 \pm 0.3^{+0.3}_{-0.2}$		<sup>1</sup> LEES	14 BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 4.0	90	<sup>1</sup> AUBERT,B	06T BABR	Repl. by LEES 14
<19	90	<sup>1</sup> BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\phi\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{438}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<0.15	90	<sup>1</sup> KIM	12A BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.28	90	<sup>1</sup> AUBERT,B	06C BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<1.0	90	<sup>1</sup> AUBERT,B	04D BABR	Repl. by AUBERT,B 06C
<5	90	<sup>1</sup> BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .



$\Gamma(\phi\eta)/\Gamma_{\text{total}}$   $\Gamma_{439}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.5</b>	90	<sup>1</sup> AUBERT	09AV BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<0.6	90	<sup>1</sup> AUBERT,B	06v BABR	Repl. by AUBERT 09AV
<1.0	90	<sup>1</sup> AUBERT,B	04x BABR	Repl. by AUBERT,B 06v
<9	90	<sup>1</sup> BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\phi\eta')/\Gamma_{\text{total}}$   $\Gamma_{440}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 0.5</b>	90	<sup>1</sup> SCHUEMANN 07	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
< 1.1	90	<sup>1</sup> AUBERT	09AV BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 1.0	90	<sup>1</sup> AUBERT,B	06v BABR	Repl. by AUBERT 09AV
< 4.5	90	<sup>1</sup> AUBERT,B	04x BABR	Repl. by AUBERT,B 06v
<31	90	<sup>1</sup> BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{441}/\Gamma$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>1.82 \pm 0.25 \pm 0.43</math></b>	<sup>1</sup> AAIJ	17A LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Signal evidence is 4.5 standard deviations.

$\Gamma(\phi\rho^0)/\Gamma_{\text{total}}$   $\Gamma_{442}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 0.33</b>	90	<sup>1</sup> AUBERT	08BK BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<156	90	<sup>2</sup> ABE	00c SLD	$e^+e^- \rightarrow Z$
< 13	90	<sup>1</sup> BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ABE 00c assumes  $B(Z \rightarrow b\bar{b}) = (21.7 \pm 0.1)\%$  and the  $B$  fractions  $f_{B^0} = f_{B^+} = (39.7^{+1.8}_{-2.2})\%$  and  $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$ .

$\Gamma(\phi f_0(980), f_0 \rightarrow \pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{443}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.38</b>	90	<sup>1</sup> AUBERT	08BK BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\phi\omega)/\Gamma_{\text{total}}$   $\Gamma_{444}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 0.7</b>	90	<sup>1</sup> LEES	14 BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
< 1.2	90	<sup>1</sup> AUBERT,B	06T BABR	Repl. by LEES 14
<21	90	<sup>1</sup> BERGFELD	98 CLE2	

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\phi\phi)/\Gamma_{\text{total}}$   $\Gamma_{445}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.7 \times 10^{-8}$	90	AAIJ	19AP LHCB	$p\bar{p}$ at 7, 8 and 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<2.8 \times 10^{-8}$	90	AAIJ	15AS LHCB	Repl. by AAIJ 19AP
$<2 \times 10^{-7}$	90	<sup>1</sup> AUBERT	08BK BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$<1.5 \times 10^{-6}$	90	<sup>1</sup> AUBERT,B	04X BABR	Repl. by AUBERT 08BK
$<3.21 \times 10^{-4}$	90	<sup>2</sup> ABE	00C SLD	$e^+e^- \rightarrow Z$
$<1.2 \times 10^{-5}$	90	<sup>1</sup> BERGFELD	98 CLE2	
$<3.9 \times 10^{-5}$	90	ASNER	96 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ABE 00C assumes  $B(Z \rightarrow b\bar{b})=(21.7 \pm 0.1)\%$  and the  $B$  fractions  $f_{B^0}=f_{B^+}=(39.7^{+1.8}_{-2.2})\%$  and  $f_{B_s}=(10.5^{+1.8}_{-2.2})\%$ .

$\Gamma(a_0(980)^\pm \pi^\mp, a_0^\pm \rightarrow \eta\pi^\pm)/\Gamma_{\text{total}}$   $\Gamma_{446}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$<3.1$	90	<sup>1</sup> AUBERT	07Y BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<5.1$	90	<sup>1</sup> AUBERT,BE	04 BABR	Repl. by AUBERT 07Y

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(a_0(1450)^\pm \pi^\mp, a_0^\pm \rightarrow \eta\pi^\pm)/\Gamma_{\text{total}}$   $\Gamma_{447}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$<2.3$	90	<sup>1</sup> AUBERT	07Y BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{448}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<7.2 \times 10^{-4}$	90	<sup>1</sup> ALBRECHT	90B ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 90B limit assumes equal production of  $B^0\bar{B}^0$  and  $B^+B^-$  at  $\Upsilon(4S)$ .

$\Gamma(\rho^0\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{449}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.0 ± 0.5 OUR AVERAGE</b>				
$3.0 \pm 0.5 \pm 0.7$		<sup>1,2</sup> KUSAKA	08 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$1.4 \pm 0.6 \pm 0.3$		<sup>1</sup> AUBERT	04Z BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$1.6^{+2.0}_{-1.4} \pm 0.8$		<sup>1</sup> JESSOP	00 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$3.12^{+0.88+0.60}_{-0.82-0.76}$		<sup>1</sup> DRAGIC	06 BELL	Repl. by KUSAKA 08
$5.1 \pm 1.6 \pm 0.9$		DRAGIC	04 BELL	Repl. by DRAGIC 06
$< 5.3$	90	<sup>1</sup> GORDON	02 BELL	Repl. by DRAGIC 04
$< 24$	90	ASNER	96 CLEO	Repl. by JESSOP 00
$<400$	90	<sup>1</sup> ALBRECHT	90B ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> This is the first measurement that excludes contributions from  $\rho(1450)$  and  $\rho(1570)$  resonances.

$\Gamma(\rho^\mp \pi^\pm)/\Gamma_{\text{total}}$   $\Gamma_{450}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>23.0±2.3 OUR AVERAGE</b>				
$22.6 \pm 1.1 \pm 4.4$		<sup>1,2</sup> KUSAKA	08 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$22.6 \pm 1.8 \pm 2.2$		<sup>1</sup> AUBERT	03T BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$27.6^{+8.4}_{-7.4} \pm 4.2$		<sup>1</sup> JESSOP	00 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$20.8^{+6.0+2.8}_{-6.3-3.1}$		<sup>1</sup> GORDON	02 BELL	Repl. by KUSAKA 08
< 88	90	ASNER	96 CLE2	Repl. by JESSOP 00
< 520	90	<sup>1</sup> ALBRECHT	90B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
< 5200	90	<sup>3</sup> BEBEK	87 CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> This is the first measurement that excludes contributions from  $\rho(1450)$  and  $\rho(1570)$  resonances.

<sup>3</sup> BEBEK 87 reports  $< 6.1 \times 10^{-3}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

$\Gamma(\pi^+ \pi^- \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{451}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 11.2 × 10<sup>-6</sup></b>	90	<sup>1</sup> VANHOEFER	14 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 23.1 × 10 <sup>-6</sup>	90	<sup>1</sup> AUBERT	08BB BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
< 19.3 × 10 <sup>-6</sup>	90	<sup>1</sup> CHIANG	08 BELL	Repl. by VANHOEFER 14
< 2.3 × 10 <sup>-4</sup>	90	<sup>2</sup> ADAM	96D DLPH	$e^+ e^- \rightarrow Z$
< 2.8 × 10 <sup>-4</sup>	90	<sup>3</sup> ABREU	95N DLPH	Sup. by ADAM 96D
< 6.7 × 10 <sup>-4</sup>	90	<sup>1</sup> ALBRECHT	90B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ADAM 96D assumes  $f_{B^0} = f_{B^-} = 0.39$  and  $f_{B_s} = 0.12$ .

<sup>3</sup> Assumes a  $B^0, B^-$  production fraction of 0.39 and a  $B_s$  production fraction of 0.12.

$\Gamma(\rho^0 \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{452}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 8.8</b>	90	<sup>1</sup> AUBERT	08BB BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 12.0	90	<sup>1</sup> VANHOEFER	14 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
< 12.0	90	<sup>1</sup> CHIANG	08 BELL	Repl. by VANHOEFER 14

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\rho^0 \rho^0)/\Gamma_{\text{total}}$   $\Gamma_{453}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.96±0.15 OUR FIT</b>				
<b>0.97±0.24 OUR AVERAGE</b>				
$1.02 \pm 0.30 \pm 0.15$		<sup>1,2</sup> VANHOEFER	14 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.92 \pm 0.32 \pm 0.14$		<sup>2</sup> AUBERT	08BB BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.4 \pm 0.4 \begin{smallmatrix} +0.2 \\ -0.3 \end{smallmatrix}$		<sup>2</sup> CHIANG	08	BELL	Repl. by VANHOEFER 14
$1.07 \pm 0.33 \pm 0.19$		<sup>2</sup> AUBERT	07G	BABR	Repl. by AUBERT 08BB
< 1.1	90	<sup>2</sup> AUBERT	05I	BABR	Repl. by AUBERT 07G
< 2.1	90	<sup>2</sup> AUBERT	03V	BABR	Repl. by AUBERT 05I
< 18	90	<sup>3</sup> GODANG	02	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
<136	90	<sup>4</sup> ABE	00C	SLD	$e^+e^- \rightarrow Z$
<280	90	<sup>2</sup> ALBRECHT	90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<290	90	<sup>5</sup> BORTOLETTO	089	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<430	90	<sup>5</sup> BEBEK	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Signal significance 3.4 standard deviations.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Assumes a helicity 00 configuration. For a helicity 11 configuration, the limit decreases to  $1.4 \times 10^{-5}$ .

<sup>4</sup> ABE 00C assumes  $B(Z \rightarrow b\bar{b}) = (21.7 \pm 0.1)\%$  and the  $B$  fractions  $f_{B^0} = f_{B^+} = (39.7^{+1.8}_{-2.2})\%$  and  $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$ .

<sup>5</sup> Paper assumes the  $\Upsilon(4S)$  decays 43% to  $B^0\bar{B}^0$ . We rescale to 50%.

### $\Gamma(\rho^0\rho^0)/\Gamma(K^*(892)^0\phi)$

$\Gamma_{453}/\Gamma_{376}$

<u>VALUE (units <math>10^{-2}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>9.5 \pm 1.5</math></b>				<b>OUR FIT</b>
<b><math>9.4 \pm 1.7 \pm 0.9</math></b>		AAIJ	15T	LHCB $pp$ at 7, 8 TeV

### $\Gamma(f_0(980)\pi^+\pi^-, f_0 \rightarrow \pi^+\pi^-)/\Gamma_{\text{total}}$

$\Gamma_{454}/\Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>&lt; 3.0 \times 10^{-6}</math></b>	90	<sup>1</sup> VANHOEFER 14	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 3.8 \times 10^{-6}$	90	<sup>1</sup> CHIANG	08	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

### $\Gamma(\rho^0 f_0(980), f_0 \rightarrow \pi^+\pi^-)/\Gamma_{\text{total}}$

$\Gamma_{455}/\Gamma$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>7.8 \pm 2.2 \pm 1.1</math></b>		<sup>1,2</sup> VANHOEFER 14	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<8.1	90	AAIJ	15T	LHCB	$pp$ at 7, 8 TeV
<4.0	90	<sup>2</sup> AUBERT	08BB	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<3	90	<sup>2</sup> CHIANG	08	BELL	Repl. by VANHOEFER 14
<5.3	90	<sup>2</sup> AUBERT	07G	BABR	Repl. by AUBERT 08BB

<sup>1</sup> Signal significance of 3.1 standard deviations.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

### $\Gamma(f_0(980)f_0(980), f_0 \rightarrow \pi^+\pi^-, f_0 \rightarrow \pi^+\pi^-)/\Gamma_{\text{total}}$

$\Gamma_{456}/\Gamma$

<u>VALUE (units <math>10^{-6}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b><math>&lt; 0.19</math></b>	90	<sup>1</sup> AUBERT	08BB	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.2	90	<sup>1</sup> VANHOEFER	14	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
<0.1	90	<sup>1</sup> CHIANG	08	BELL	Repl. by VANHOEFER 14
<0.16	90	<sup>1</sup> AUBERT	07G	BABR	Repl. by AUBERT 08BB

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(f_0(980)f_0(980), f_0 \rightarrow \pi^+\pi^-, f_0 \rightarrow K^+K^-)/\Gamma_{total}$**   **$\Gamma_{457}/\Gamma$**

<u>VALUE (units <math>10^{-6}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;0.23</b>	90	<sup>1</sup> AUBERT	08BK BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(a_1(1260)^\mp \pi^\pm)/\Gamma_{total}$**   **$\Gamma_{458}/\Gamma$**

<u>VALUE (units <math>10^{-6}</math>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>26 ± 5 OUR AVERAGE</b>		Error includes scale factor of 1.9.		
22.2 ± 2.0 ± 2.8		<sup>1,2</sup> DALSENO	12 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
33.2 ± 3.8 ± 3.0		<sup>2,3</sup> AUBERT	06V BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 630	90	<sup>2</sup> ALBRECHT	90B ARG	$e^+e^- \rightarrow \Upsilon(4S)$
< 490	90	<sup>4</sup> BORTOLETTO89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<1000	90	<sup>4</sup> BEBEK	87 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> DALSENO 12 reports  $B(B^0 \rightarrow a_1^\pm \pi^\mp) B(a_1^\pm \rightarrow \pi^\pm \pi^+ \pi^-) = (11.1 \pm 1.0 \pm 1.4) \times 10^{-6}$  which we rescaled assuming  $a_1(1260)$  decays only to  $3\pi$  and  $B(a_1^\pm \rightarrow \pi^\pm \pi^+ \pi^-) = 0.5$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Assumes  $a_1(1260)$  decays only to  $3\pi$  and  $B(a_1^\pm \rightarrow \pi^\pm \pi^\mp \pi^\pm) = 0.5$ .

<sup>4</sup> Paper assumes the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

**$\Gamma(a_2(1320)^\mp \pi^\pm)/\Gamma_{total}$**   **$\Gamma_{459}/\Gamma$**

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;6.3 × 10<sup>-6</sup></b>	90	<sup>1</sup> DALSENO	12 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<3.0 × 10 <sup>-4</sup>	90	<sup>2</sup> BORTOLETTO89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<1.4 × 10 <sup>-3</sup>	90	<sup>2</sup> BEBEK	87 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> DALSENO 12 reports  $B(B^0 \rightarrow a_2^\pm \pi^\mp) B(a_2^\pm \rightarrow \pi^\pm \pi^+ \pi^-) < 2.2 \times 10^{-6}$  which we rescaled using  $B(a_2^\pm \rightarrow \pi^\pm \pi^+ \pi^-) = 1/2 B(a_2^\pm \rightarrow 3\pi) = 0.35 \pm 0.013$ .

<sup>2</sup> Paper assumes the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

**$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$**   **$\Gamma_{460}/\Gamma$**

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;3.1 × 10<sup>-3</sup></b>	90	<sup>1</sup> ALBRECHT	90B ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 90B limit assumes equal production of  $B^0 \bar{B}^0$  and  $B^+ B^-$  at  $\Upsilon(4S)$ .

$\Gamma(\rho^+ \rho^-)/\Gamma_{\text{total}}$   $\Gamma_{461}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**27.7 ± 1.9 OUR AVERAGE**

28.3 ± 1.5 ± 1.5		<sup>1</sup> VANHOEFER	16 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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25.5 ± 2.1 <sup>+3.6</sup> / <sub>-3.9</sub>		<sup>1</sup> AUBERT	07BF BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

22.8 ± 3.8 <sup>+2.3</sup> / <sub>-2.6</sub>		<sup>1</sup> SOMOV	06 BELL	Repl. by VANHOEFER 16
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25 <sup>+7</sup> / <sub>-6</sub> <sup>+5</sup> / <sub>-6</sub>		<sup>1</sup> AUBERT	04G BABR	Repl. by AUBERT,B 04R
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30 ± 4 ± 5		<sup>1,2</sup> AUBERT,B	04R BABR	Repl. by AUBERT 07BF
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<2200	90	<sup>1</sup> ALBRECHT	90B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> The quoted result is obtained after combining with AUBERT 04G result by AUBERT 04R alone gives  $(33 \pm 4 \pm 5) \times 10^{-6}$ .

$\Gamma(a_1(1260)^0 \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{462}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<1.1 × 10 <sup>-3</sup>	90	<sup>1</sup> ALBRECHT	90B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> ALBRECHT 90B limit assumes equal production of  $B^0 \bar{B}^0$  and  $B^+ B^-$  at  $\Upsilon(4S)$ .

$\Gamma(\omega \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{463}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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< 0.5	90	<sup>1</sup> AUBERT	08AH BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

< 2.0	90	<sup>1</sup> JEN	06 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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< 1.2	90	<sup>1</sup> AUBERT,B	04D BABR	Repl. by AUBERT 08AH
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< 1.9	90	<sup>1</sup> WANG	04A BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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< 3	90	<sup>1</sup> AUBERT	01G BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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< 5.5	90	<sup>1</sup> JESSOP	00 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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< 14	90	<sup>1</sup> BERGFELD	98 CLE2	Repl. by JESSOP 00
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<460	90	<sup>2</sup> ALBRECHT	90B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ALBRECHT 90B limit assumes equal production of  $B^0 \bar{B}^0$  and  $B^+ B^-$  at  $\Upsilon(4S)$ .

$\Gamma(\pi^+ \pi^+ \pi^- \pi^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{464}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<9.0 × 10 <sup>-3</sup>	90	<sup>1</sup> ALBRECHT	90B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> ALBRECHT 90B limit assumes equal production of  $B^0 \bar{B}^0$  and  $B^+ B^-$  at  $\Upsilon(4S)$ .

$\Gamma(a_1(1260)^+ \rho^-)/\Gamma_{\text{total}}$   $\Gamma_{465}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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< 61	90	<sup>1,2</sup> AUBERT,B	06O BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<3400	90	<sup>1</sup> ALBRECHT	90B ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Assumes  $a_1(1260)$  decays only to  $3\pi$  and  $B(a_1^\pm \rightarrow \pi^\pm \pi^\mp \pi^\pm) = 0.5$ .

$\Gamma(a_1(1260)^0 \rho^0)/\Gamma_{\text{total}}$   $\Gamma_{466}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.4 \times 10^{-3}$	90	<sup>1</sup> ALBRECHT 90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 90B limit assumes equal production of  $B^0 \bar{B}^0$  and  $B^+ B^-$  at  $\Upsilon(4S)$ .

$\Gamma(b_1^\mp \pi^\pm, b_1^\mp \rightarrow \omega \pi^\mp)/\Gamma_{\text{total}}$   $\Gamma_{467}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$10.9 \pm 1.2 \pm 0.9$		<sup>1</sup> AUBERT 07BI	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(b_1^0 \pi^0, b_1^0 \rightarrow \omega \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{468}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$<1.9$	90	<sup>1</sup> AUBERT 08AG	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(b_1^- \rho^+, b_1^- \rightarrow \omega \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{469}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.4 \times 10^{-6}$	90	<sup>1</sup> AUBERT 09AF	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(b_1^0 \rho^0, b_1^0 \rightarrow \omega \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{470}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.4 \times 10^{-6}$	90	<sup>1</sup> AUBERT 09AF	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{471}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.0 \times 10^{-3}$	90	<sup>1</sup> ALBRECHT 90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 90B limit assumes equal production of  $B^0 \bar{B}^0$  and  $B^+ B^-$  at  $\Upsilon(4S)$ .

$\Gamma(a_1(1260)^+ a_1(1260)^-, a_1^+ \rightarrow 2\pi^+ \pi^-, a_1^- \rightarrow 2\pi^- \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{472}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$11.8 \pm 2.6 \pm 1.6$		<sup>1</sup> AUBERT 09AL	BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<6000$	90	<sup>1</sup> ALBRECHT 90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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$<2800$	90	<sup>2</sup> BORTOLETTO89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^0 \bar{B}^0$  and  $B^+ B^-$  at  $\Upsilon(4S)$ .

<sup>2</sup> BORTOLETTO 89 reports  $< 3.2 \times 10^{-3}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

$\Gamma(\pi^+ \pi^+ \pi^+ \pi^- \pi^- \pi^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{473}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.1 \times 10^{-2}$	90	<sup>1</sup> ALBRECHT 90B	ARG	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> ALBRECHT 90B limit assumes equal production of  $B^0 \bar{B}^0$  and  $B^+ B^-$  at  $\Upsilon(4S)$ .

$\Gamma(p\bar{p})/\Gamma_{\text{total}}$   $\Gamma_{474}/\Gamma$

VALUE (units $10^{-8}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>1.27 ± 0.13 ± 0.06</b>		<sup>1</sup> AAIJ	23T LHCb	$pp$ at 7, 8 and 13 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1.25 ± 0.27 ± 0.18		<sup>1</sup> AAIJ	17BJ LHCb	Repl. by AAIJ 23T
1.47 <sup>+0.62+0.35</sup> <sub>-0.51-0.14</sub>		<sup>2</sup> AAIJ	13BQ LHCb	Repl. by AAIJ 17BJ
< 11	90	<sup>3</sup> TSAI	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 41	90	<sup>3</sup> CHANG	05 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 27	90	<sup>3</sup> AUBERT	04U BABR	$e^+e^- \rightarrow \Upsilon(4S)$
< 140	90	<sup>3</sup> BORNHEIM	03 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
< 120	90	<sup>3</sup> ABE	02O BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 700	90	<sup>3</sup> COAN	99 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
< 1800	90	<sup>4</sup> BUSKULIC	96V ALEP	$e^+e^- \rightarrow Z$
< 35000	90	<sup>5</sup> ABREU	95N DLPH	Sup. by ADAM 96D
< 3400	90	<sup>6</sup> BORTOLETTO89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
< 12000	90	<sup>7</sup> ALBRECHT	88F ARG	$e^+e^- \rightarrow \Upsilon(4S)$
< 17000	90	<sup>6</sup> BEBEK	87 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> Uses normalization mode  $B(B^0 \rightarrow K^+\pi^-) = (19.6 \pm 0.5) \times 10^{-6}$ .
- <sup>2</sup> Uses normalization mode  $B(B^0 \rightarrow K^+\pi^-) = (19.55 \pm 0.54) \times 10^{-6}$ .
- <sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .
- <sup>4</sup> BUSKULIC 96V assumes PDG 96 production fractions for  $B^0$ ,  $B^+$ ,  $B_s$ ,  $b$  baryons.
- <sup>5</sup> Assumes a  $B^0$ ,  $B^-$  production fraction of 0.39 and a  $B_s$  production fraction of 0.12.
- <sup>6</sup> Paper assumes the  $\Upsilon(4S)$  decays 43% to  $B^0\bar{B}^0$ . We rescale to 50%.
- <sup>7</sup> ALBRECHT 88F reports  $< 1.3 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.

$\Gamma(p\bar{p}\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{475}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>2.87 ± 0.15 ± 0.11</b>		<sup>1,2</sup> AAIJ	17BD LHCb	$pp$ at 7, 8 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.83 ± 0.17 ± 0.17		<sup>3</sup> CHU	20 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
< 950	90	<sup>4</sup> ABREU	95N DLPH	Sup. by ADAM 96D
< 250	90	<sup>5</sup> BEBEK	89 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
540 ± 180 ± 200		<sup>6</sup> ALBRECHT	88F ARG	$e^+e^- \rightarrow \Upsilon(4S)$

- <sup>1</sup> AAIJ 17BD reports  $[\Gamma(B^0 \rightarrow p\bar{p}\pi^+\pi^-)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow J/\psi(1S)K^*(892)^0)] / [B(J/\psi(1S) \rightarrow p\bar{p})] / [B(K^*(892) \rightarrow (K\pi)^\pm)] = 1.07 \pm 0.04 \pm 0.04$  which we multiply by our best values  $B(B^0 \rightarrow J/\psi(1S)K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$ ,  $B(J/\psi(1S) \rightarrow p\bar{p}) = (2.120 \pm 0.029) \times 10^{-3}$ ,  $B(K^*(892) \rightarrow (K\pi)^\pm) = (99.902 \pm 0.009) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best values.
- <sup>2</sup> The branching ratio is given for  $m_{p\bar{p}} < 2.85$  GeV.
- <sup>3</sup> Assumes equal production of  $B^0$  and  $B^+$  from  $\Upsilon(4S)$  decays. This measurement is quoted for  $M(\pi^+\pi^-) < 1.22$  GeV excluding the  $0.46 < M(\pi^+\pi^-) < 0.53$  GeV region.
- <sup>4</sup> Assumes a  $B^0$ ,  $B^-$  production fraction of 0.39 and a  $B_s$  production fraction of 0.12.
- <sup>5</sup> BEBEK 89 reports  $< 2.9 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0\bar{B}^0$ . We rescale to 50%.
- <sup>6</sup> ALBRECHT 88F reports  $6.0 \pm 2.0 \pm 2.2$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.



$\Gamma(p\bar{p}\pi^+\pi^-)/\Gamma(p\bar{p}K^+\pi^-)$   $\Gamma_{475}/\Gamma_{476}$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.46 \pm 0.02 \pm 0.02$		<sup>1</sup> AAIJ	17BD LHCB	$pp$ at 7, 8 TeV
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<sup>1</sup> The ratio is given for  $m_{p\bar{p}} < 2.85$  GeV.

$\Gamma(p\bar{p}K^0)/\Gamma_{total}$   $\Gamma_{477}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**$2.66 \pm 0.32$  OUR AVERAGE**

$2.51^{+0.35}_{-0.29} \pm 0.21$		<sup>1,2</sup> CHEN	08C BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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$3.0 \pm 0.5 \pm 0.3$		<sup>2</sup> AUBERT	07AV BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$2.40^{+0.64}_{-0.44} \pm 0.28$		<sup>2,3,4</sup> WANG	05A BELL	Repl. by CHEN 08C
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$1.88^{+0.77}_{-0.60} \pm 0.23$		<sup>2,3,5</sup> WANG	04 BELL	Repl. by WANG 05A
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$< 7.2$	90	<sup>2,3</sup> ABE	02K BELL	Repl. by WANG 04
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<sup>1</sup> Explicitly vetoes resonant production of  $p\bar{p}$  from charmonium states.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Explicitly vetoes resonant production of  $p\bar{p}$  from charmonium states and  $pK^0$  production from  $\Lambda_c$ .

<sup>4</sup> Provides also results with  $M_{p\bar{p}} < 2.85$  GeV/ $c^2$  and angular asymmetry of  $p\bar{p}$  system.

<sup>5</sup> The branching fraction for  $M_{p\bar{p}} < 2.85$  is also reported.

$\Gamma(\Theta(1540)^+\bar{p}, \Theta^+ \rightarrow pK_S^0)/\Gamma_{total}$   $\Gamma_{478}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b><math>&lt; 0.05</math></b>	90	<sup>1</sup> AUBERT	07AV BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 0.23$	90	<sup>1</sup> WANG	05A BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(f_J(2220)K^0, f_J \rightarrow p\bar{p})/\Gamma_{total}$   $\Gamma_{479}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b><math>&lt; 0.45</math></b>	90	<sup>1</sup> AUBERT	07AV BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(p\bar{p}K^+\pi^-)/\Gamma_{total}$   $\Gamma_{476}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b><math>6.3 \pm 0.5 \pm 0.2</math></b>		<sup>1,2</sup> AAIJ	17BD LHCB	$pp$ at 7, 8 TeV
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<sup>1</sup> AAIJ 17BD reports  $[\Gamma(B^0 \rightarrow p\bar{p}K^+\pi^-)/\Gamma_{total}] / [B(B^0 \rightarrow J/\psi(1S)K^*(892)^0)] / [B(J/\psi(1S) \rightarrow p\bar{p})] / [B(K^*(892) \rightarrow (K\pi)^\pm)] = 2.34 \pm 0.12 \pm 0.12$  which we multiply by our best values  $B(B^0 \rightarrow J/\psi(1S)K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$ ,  $B(J/\psi(1S) \rightarrow p\bar{p}) = (2.120 \pm 0.029) \times 10^{-3}$ ,  $B(K^*(892) \rightarrow (K\pi)^\pm) = (99.902 \pm 0.009) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best values.

<sup>2</sup> The branching ratio is given for  $m_{p\bar{p}} < 2.85$  GeV.

$\Gamma(\rho\bar{p}K^*(892)^0)/\Gamma_{\text{total}}$   $\Gamma_{480}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**1.24<sup>+0.28</sup><sub>-0.25</sub> OUR AVERAGE**

1.18 <sup>+0.29</sup> <sub>-0.25</sub> ± 0.11		1,2 CHEN	08C BELL	$e^+e^- \rightarrow \Upsilon(4S)$
1.47 ± 0.45 ± 0.40		2 AUBERT	07AV BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<7.6	90	2 WANG	04 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<sup>1</sup> Explicitly vetoes resonant production of  $\rho\bar{p}$  from charmonium states.  
<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\rho\bar{p}\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{483}/\Gamma$

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
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**5.0 ± 1.8 ± 0.6** PAL 19 BELL  $e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(f_J(2220)K^*_0, f_J \rightarrow \rho\bar{p})/\Gamma_{\text{total}}$   $\Gamma_{481}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**<0.15** 90 <sup>1</sup> AUBERT 07AV BABR  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\rho\bar{p}K^+K^-)/\Gamma_{\text{total}}$   $\Gamma_{482}/\Gamma$

VALUE (units $10^{-8}$ )	DOCUMENT ID	TECN	COMMENT
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**12.1 ± 3.1 ± 0.5** <sup>1,2</sup> AAIJ 17BD LHCB  $pp$  at 7, 8 TeV

<sup>1</sup> AAIJ 17BD reports  $[\Gamma(B^0 \rightarrow \rho\bar{p}K^+K^-)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow J/\psi(1S)K^*(892)^0)] / [B(J/\psi(1S) \rightarrow \rho\bar{p})] / [B(K^*(892) \rightarrow (K\pi)^\pm)] = 0.045 \pm 0.011 \pm 0.004$  which we multiply by our best values  $B(B^0 \rightarrow J/\psi(1S)K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$ ,  $B(J/\psi(1S) \rightarrow \rho\bar{p}) = (2.120 \pm 0.029) \times 10^{-3}$ ,  $B(K^*(892) \rightarrow (K\pi)^\pm) = (99.902 \pm 0.009) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best values.  
<sup>2</sup> The branching ratio is given for  $m_{\rho\bar{p}} < 2.85$  GeV.

$\Gamma(\rho\bar{p}K^+K^-)/\Gamma(\rho\bar{p}K^+\pi^-)$   $\Gamma_{482}/\Gamma_{476}$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.9 ± 0.5 ± 0.2 <sup>1</sup> AAIJ 17BD LHCB  $pp$  at 7, 8 TeV

<sup>1</sup> The ratio is given for  $m_{\rho\bar{p}} < 2.85$  GeV.

$\Gamma(\rho\bar{p}\rho\bar{p})/\Gamma_{\text{total}}$   $\Gamma_{484}/\Gamma$

VALUE (units $10^{-8}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**2.2 ± 0.4 ± 0.1** <sup>1</sup> AAIJ 23AD LHCB  $pp$  at 7, 8, 13 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

<20 90 <sup>2</sup> LEES 18C BABR  $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> AAIJ 23AD reports  $(2.2 \pm 0.4 \pm 0.1 \pm 0.1) \times 10^{-8}$  from a measurement of  $[\Gamma(B^0 \rightarrow \rho\bar{p}\rho\bar{p})/\Gamma_{\text{total}}] / [B(B^0 \rightarrow J/\psi(1S)K^*(892)^0)] / [B(J/\psi(1S) \rightarrow \rho\bar{p})]$  assuming  $B(B^0 \rightarrow J/\psi(1S)K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$ ,  $B(J/\psi(1S) \rightarrow \rho\bar{p}) = (2.120 \pm 0.029) \times 10^{-3}$ . It also includes  $B(K^*(892)^0 \rightarrow K^+\pi^-) = 2/3$ .  
<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\rho\bar{\Lambda}\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{485}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**3.16 ± 0.24 OUR AVERAGE**

3.21 <sup>+0.28</sup> <sub>-0.25</sub> ± 0.16	1	CHANG	23	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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3.07 ± 0.31 ± 0.23	1	AUBERT	09AC	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

3.23 <sup>+0.33</sup> <sub>-0.29</sub> ± 0.29	1	WANG	07C	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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2.62 <sup>+0.44</sup> <sub>-0.40</sub> ± 0.31	1,2	WANG	05A	BELL	Repl. by WANG 07C
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3.97 <sup>+1.00</sup> <sub>-0.80</sub> ± 0.56	1	WANG	03	BELL	Repl. by WANG 05A
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< 13	90	1	COAN	99	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
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< 180	90	3	ALBRECHT	88F	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Provides also results with  $M_{p\bar{p}} < 2.85 \text{ GeV}/c^2$  and angular asymmetry of  $p\bar{\Lambda}$  system.

<sup>3</sup> ALBRECHT 88F reports  $< 2.0 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.

$\Gamma(\rho\bar{\Lambda}\pi^-\gamma)/\Gamma_{\text{total}}$   $\Gamma_{486}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt; 6.5 × 10<sup>-7</sup></b>	90	1	LAI	14	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\rho\bar{\Sigma}(1385)^-)/\Gamma_{\text{total}}$   $\Gamma_{487}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt; 0.26</b>	90	1	WANG	07C	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$[\Gamma(\Delta(1232)^+\bar{p}) + \Gamma(\Delta(1232)^-\rho)]/\Gamma_{\text{total}}$   $\Gamma_{488}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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<b>&lt; 1.6 × 10<sup>-6</sup></b>	PAL	19	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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$\Gamma(\Delta^0\bar{\Lambda})/\Gamma_{\text{total}}$   $\Gamma_{489}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt; 0.93</b>	90	1	WANG	07C	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\rho\bar{\Lambda}K^-)/\Gamma_{\text{total}}$   $\Gamma_{490}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt; 0.82</b>	90	1	WANG	03	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\rho\bar{\Lambda}D^-)/\Gamma_{\text{total}}$   $\Gamma_{491}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
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<b>25.1 ± 2.6 ± 3.5</b>	1	CHANG	15	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\rho\bar{\Lambda}D^{*-})/\Gamma_{\text{total}}$   $\Gamma_{492}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>33.6 \pm 6.3 \pm 4.4</math></b>		<sup>1</sup> CHANG	15	BELL $e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .				

$\Gamma(\rho\bar{\Sigma}^0\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{493}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>1.17^{+0.43}_{-0.40} \pm 0.07</math></b>		<sup>1</sup> CHANG	23	BELL $e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<3.8	90	<sup>1</sup> WANG	03	BELL $e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .				

$\Gamma(\bar{\Lambda}\Lambda)/\Gamma_{\text{total}}$   $\Gamma_{494}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.32</b>	90	<sup>1</sup> TSAI	07	BELL $e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<0.69	90	<sup>1</sup> CHANG	05	BELL Repl. by TSAI 07
<1.2	90	<sup>1</sup> BORNHEIM	03	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
<1.0	90	<sup>1</sup> ABE	020	BELL Repl. by CHANG 05
<3.9	90	<sup>1</sup> COAN	99	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .				

$\Gamma(\bar{\Lambda}\Lambda K^0)/\Gamma_{\text{total}}$   $\Gamma_{495}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>4.76^{+0.84}_{-0.68} \pm 0.61</math></b>		<sup>1,2</sup> CHANG	09	BELL $e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Excluding charmonium events in $2.85 < m_{\Lambda\bar{\Lambda}} < 3.128 \text{ GeV}/c^2$ and $3.315 < m_{\Lambda\bar{\Lambda}} < 3.735 \text{ GeV}/c^2$ . Measurements in various $m_{\Lambda\bar{\Lambda}}$ bins are also reported.				
<sup>2</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .				

$\Gamma(\bar{\Lambda}\Lambda K^{*0})/\Gamma_{\text{total}}$   $\Gamma_{496}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>2.46^{+0.87}_{-0.72} \pm 0.34</math></b>		<sup>1,2</sup> CHANG	09	BELL $e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Excluding charmonium events in $2.85 < m_{\Lambda\bar{\Lambda}} < 3.128 \text{ GeV}/c^2$ and $3.315 < m_{\Lambda\bar{\Lambda}} < 3.735 \text{ GeV}/c^2$ . Measurements in various $m_{\Lambda\bar{\Lambda}}$ bins are also reported.				
<sup>2</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .				

$\Gamma(\bar{\Lambda}\Lambda D^0)/\Gamma_{\text{total}}$   $\Gamma_{497}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>1.00^{+0.30}_{-0.26}</math> OUR AVERAGE</b>				
$0.98^{+0.29}_{-0.26} \pm 0.19$		<sup>1,2</sup> LEES	14B	BABR $e^+e^- \rightarrow \Upsilon(4S)$
$1.05^{+0.57}_{-0.44} \pm 0.14$		<sup>2</sup> CHANG	09	BELL $e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Evidence for 3.4 st. dev. signal significance.				
<sup>2</sup> Assumes equal production of $B^+$ and $B^0$ at the $\Upsilon(4S)$ .				

$\Gamma(D^0 \Sigma^0 \bar{\Lambda} + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_{498}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.1 \times 10^{-5}$	90	1,2 LEES	14B	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Here  $\Sigma^0 \rightarrow \Lambda\gamma$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\Delta^0 \bar{\Delta}^0)/\Gamma_{\text{total}}$   $\Gamma_{499}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<0.0015$	90	<sup>1</sup> BORTOLETTO89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> BORTOLETTO 89 reports  $< 0.0018$  assuming  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

$\Gamma(\Delta^{++} \bar{\Delta}^{--})/\Gamma_{\text{total}}$   $\Gamma_{500}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.1 \times 10^{-4}$	90	<sup>1</sup> BORTOLETTO89	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> BORTOLETTO 89 reports  $< 1.3 \times 10^{-4}$  assuming  $\Upsilon(4S)$  decays 43% to  $B^0 \bar{B}^0$ . We rescale to 50%.

$\Gamma(\bar{D}^0 \rho \bar{p})/\Gamma_{\text{total}}$   $\Gamma_{501}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.04 ± 0.07 OUR AVERAGE</b>			

1.02 ± 0.04 ± 0.06 <sup>1,2</sup> DEL-AMO-SA..12 BABR  $e^+e^- \rightarrow \Upsilon(4S)$

1.18 ± 0.15 ± 0.16 <sup>2</sup> ABE 02W BELL  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.13 ± 0.06 ± 0.08 <sup>2</sup> AUBERT,B 06S BABR Repl. by DEL-AMO-SANCHEZ 12

<sup>1</sup> Uses the values of  $D$  and  $D^*$  branching fractions from PDG 08.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D_s^- \bar{\Lambda} \rho)/\Gamma_{\text{total}}$   $\Gamma_{502}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b>2.8 ± 0.8 ± 0.3</b>	1,2 MEDVEDEVA 07	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> MEDVEDEVA 07 reports  $(2.9 \pm 0.7 \pm 0.5 \pm 0.4) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow D_s^- \bar{\Lambda} \rho)/\Gamma_{\text{total}}] \times [B(D_s^+ \rightarrow \phi \pi^+)]$  assuming  $B(D_s^+ \rightarrow \phi \pi^+) = (4.4 \pm 0.6) \times 10^{-2}$ , which we rescale to our best value  $B(D_s^+ \rightarrow \phi \pi^+) = (4.5 \pm 0.4) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\bar{D}^*(2007)^0 \rho \bar{p})/\Gamma_{\text{total}}$   $\Gamma_{503}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.99 ± 0.11 OUR AVERAGE</b>			

0.97 ± 0.07 ± 0.09 <sup>1,2</sup> DEL-AMO-SA..12 BABR  $e^+e^- \rightarrow \Upsilon(4S)$

1.20  $^{+0.33}_{-0.29}$  ± 0.21 <sup>2</sup> ABE 02W BELL  $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.01 ± 0.10 ± 0.09 <sup>2</sup> AUBERT,B 06S BABR Repl. by DEL-AMO-SANCHEZ 12

<sup>1</sup> Uses the values of  $D$  and  $D^*$  branching fractions from PDG 08.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^*(2010)^- \rho \bar{\pi})/\Gamma_{\text{total}}$   $\Gamma_{504}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
$14.5^{+3.4}_{-3.0} \pm 2.7$	<sup>1</sup> ANDERSON 01	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^- \rho \bar{\rho} \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{505}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
$3.32 \pm 0.10 \pm 0.29$	<sup>1,2</sup> DEL-AMO-SA..12	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$3.38 \pm 0.14 \pm 0.29$	<sup>2</sup> AUBERT,B 06s	BABR	Repl. by DEL-AMO-SANCHEZ 12
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<sup>1</sup> Uses the values of  $D$  and  $D^*$  branching fractions from PDG 08.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(D^*(2010)^- \rho \bar{\rho} \pi^+)/\Gamma_{\text{total}}$   $\Gamma_{506}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>4.7 \pm 0.5</math> OUR AVERAGE</b>	Error includes scale factor of 1.2.		

$4.55 \pm 0.16 \pm 0.39$	<sup>1,2</sup> DEL-AMO-SA..12	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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$6.5^{+1.3}_{-1.2} \pm 1.0$	<sup>2</sup> ANDERSON 01	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$4.81 \pm 0.22 \pm 0.44$	<sup>2</sup> AUBERT,B 06s	BABR	Repl. by DEL-AMO-SANCHEZ 12
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<sup>1</sup> Uses the values of  $D$  and  $D^*$  branching fractions from PDG 08.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{D}^0 \rho \bar{\rho} \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{507}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.99 \pm 0.21 \pm 0.45</math></b>	<sup>1,2</sup> DEL-AMO-SA..12	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses the values of  $D$  and  $D^*$  branching fractions from PDG 08.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{D}^{*0} \rho \bar{\rho} \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{508}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>1.91 \pm 0.36 \pm 0.29</math></b>	<sup>1,2</sup> DEL-AMO-SA..12	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses the values of  $D$  and  $D^*$  branching fractions from PDG 08.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\Theta_c \bar{\rho} \pi^+, \Theta_c \rightarrow D^- \rho)/\Gamma_{\text{total}}$   $\Gamma_{509}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 9</math></b>	90	<sup>1</sup> AUBERT,B 06s	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\Theta_c \bar{\rho} \pi^+, \Theta_c \rightarrow D^{*-} \rho)/\Gamma_{\text{total}}$   $\Gamma_{510}/\Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 14</math></b>	90	<sup>1</sup> AUBERT,B 06s	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{\Sigma}_c^{--} \Delta^{++})/\Gamma_{\text{total}}$	$\Gamma_{511}/\Gamma$			
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 8 \times 10^{-4}$	90	<sup>1</sup> PROCARIO 94	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> PROCARIO 94 reports  $< 0.0012$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{\Sigma}_c^{--} \Delta^{++})/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 0.043$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 6.24 \times 10^{-2}$ .

$\Gamma(\bar{\Lambda}_c^- p \pi^+ \pi^-)/\Gamma_{\text{total}}$	$\Gamma_{512}/\Gamma$		
VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.02 ± 0.14 OUR AVERAGE</b>	Error includes scale factor of 1.3. See the ideogram below.		

1.23 ± 0.05 ± 0.33 <sup>1,2</sup> LEES 13H BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

0.90 ± 0.11 ± 0.04 <sup>1,3</sup> PARK 07 BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

1.34  $^{+0.22}_{-0.20}$  ± 0.06 <sup>4</sup> DYTMAN 02 CLE2  $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.88 ± 0.16 ± 0.04 <sup>5</sup> GABYSHEV 02 BELL Repl. by PARK 07

1.33  $^{+0.46}_{-0.42}$  ± 0.37 <sup>6</sup> FU 97 CLE2 Repl. by DYTMAN 02

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

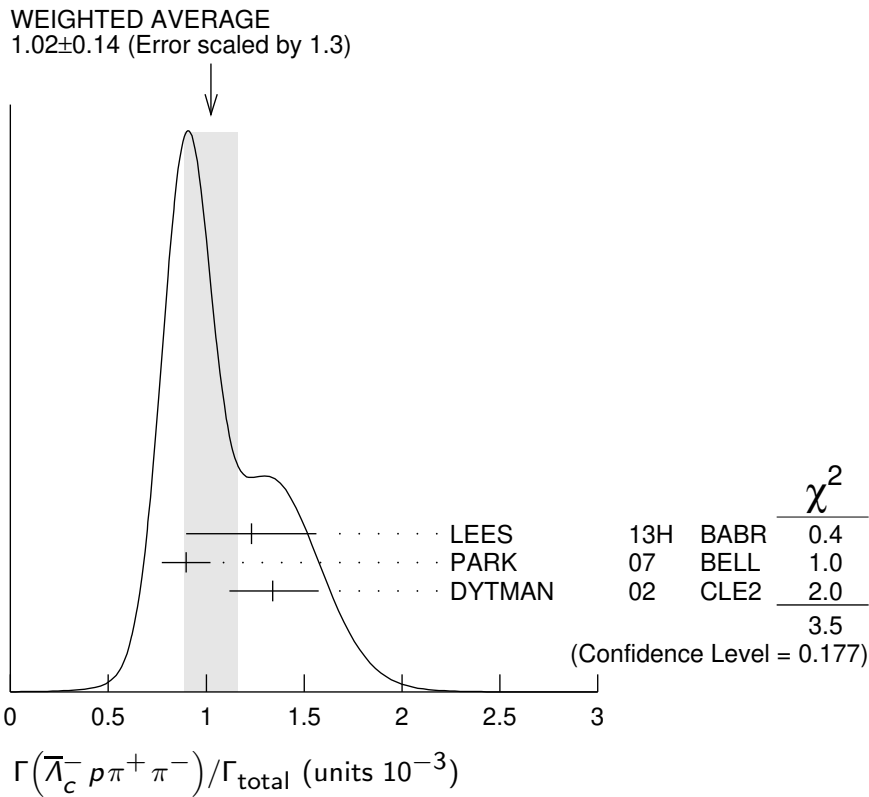
<sup>2</sup> Uses  $\Lambda_c^+ \rightarrow p K^- \pi^+$  mode. The second error includes the uncertainty of the branching fraction of the  $\Lambda_c$  decay,  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3)\%$ .

<sup>3</sup> PARK 07 reports  $(11.2 \pm 0.5 \pm 3.2) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{\Lambda}_c^- p \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> DYTMAN 02 reports  $(1.67^{+0.27}_{-0.25}) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{\Lambda}_c^- p \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 0.05$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>5</sup> GABYSHEV 02 reports  $(1.1 \pm 0.2) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{\Lambda}_c^- p \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 0.05$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>6</sup> FU 97 uses PDG 96 values of  $\Lambda_c$  branching fraction.



$\Gamma(\bar{\Lambda}_c^- p) / \Gamma_{\text{total}}$   $\Gamma_{513} / \Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>1.55±0.17 OUR AVERAGE</b>				
1.51±0.17±0.07		1,2 AUBERT	08BN BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
2.19 <sup>+0.56</sup> <sub>-0.49</sub> ±0.65		1,3 GABYSHEV	03 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
2.10 <sup>+0.67 +0.77</sup> <sub>-0.55 -0.46</sub>		1,4 AUBERT	07AV BABR	Repl. by AUBERT 08BN
< 9	90	1,5 DYTMAN	02 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
< 3.1	90	1,4 GABYSHEV	02 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
<21	90	<sup>6</sup> FU	97 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> AUBERT 08BN reports  $(1.89 \pm 0.21 \pm 0.49) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{\Lambda}_c^- p) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> The second error for GABYSHEV 03 includes the systematic and the error of  $\Lambda_c \rightarrow \bar{p} K^+ \pi^-$  decay branching fraction.

<sup>4</sup> Uses the value for  $\Lambda_c \rightarrow p K^- \pi^+$  branching ratio  $(5.0 \pm 1.3)\%$ .

<sup>5</sup> DYTMAN 02 measurement uses  $B(\Lambda_c^- \rightarrow \bar{p} K^+ \pi^-) = 5.0 \pm 1.3\%$ . The second error includes the systematic and the uncertainty of the branching ratio.

<sup>6</sup> FU 97 uses PDG 96 values of  $\Lambda_c$  branching ratio.



$\Gamma(\bar{\Lambda}_c^- p \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{514}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>1.55 ± 0.17 ± 0.07</b>		1,2 AUBERT	10H BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<5.9	90	<sup>3</sup> FU	97 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup>AUBERT 10H reports  $(1.94 \pm 0.17 \pm 0.52) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{\Lambda}_c^- p \pi^0)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup>FU 97 uses PDG 96 values of  $\Lambda_c$  branching ratio.

$\Gamma(\Lambda_c^- p K^+ K^-)/\Gamma_{\text{total}}$   $\Gamma_{527}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
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<b>2.0 ± 0.4 ± 0.1</b>	1,2 LEES	15B BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup>LEES 15B reports  $[\Gamma(B^0 \rightarrow \Lambda_c^- p K^+ K^-)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)] = (12.5 \pm 2.0 \pm 1.0) \times 10^{-7}$  which we divide by our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\Lambda_c^- p \phi)/\Gamma_{\text{total}}$   $\Gamma_{528}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;1.0 × 10<sup>-5</sup></b>	90	1,2 LEES	15B BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup>LEES 15B reports  $< 1.2 \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \Lambda_c^- p \phi)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 6.24 \times 10^{-2}$ .

<sup>2</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\Sigma_c(2455)^- p)/\Gamma_{\text{total}}$   $\Gamma_{515}/\Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
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<b>&lt;24</b>	1,2 AUBERT	10H BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup>AUBERT 10H reports  $[\Gamma(B^0 \rightarrow \Sigma_c(2455)^- p)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)] < 1.5 \times 10^{-6}$  which we divide by our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 6.24 \times 10^{-2}$ .

<sup>2</sup>Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{\Lambda}_c^- p \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{516}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;5.07 × 10<sup>-3</sup></b>	90	<sup>1</sup> FU	97 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup>FU 97 uses PDG 96 values of  $\Lambda_c$  branching ratio.

$\Gamma(\bar{\Lambda}_c^- p \pi^+ \pi^- \pi^+ \pi^-)/\Gamma_{\text{total}}$					$\Gamma_{517}/\Gamma$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
$<2.74 \times 10^{-3}$	90	<sup>1</sup> FU	97	CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup>FU 97 uses PDG 96 values of  $\Lambda_c$  branching ratio.

$\Gamma(\bar{\Lambda}_c^- p \pi^+ \pi^- (\text{nonresonant}))/\Gamma_{\text{total}}$					$\Gamma_{518}/\Gamma$
VALUE (units $10^{-4}$ )		DOCUMENT ID	TECN	COMMENT	
<b>5.5 ± 1.0 OUR AVERAGE</b>	Error includes scale factor of 1.3.				
7.9 ± 0.4 ± 2.0		<sup>1,2</sup> LEES	13H	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
5.1 ± 0.8 ± 0.2		<sup>1,3</sup> PARK	07	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses  $\Lambda_c^+ \rightarrow p K^- \pi^+$  mode. The second error includes the uncertainty of the branching fraction of the  $\Lambda_c$  decay,  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3)\%$ .

<sup>3</sup> PARK 07 reports  $(6.4 \pm 0.4 \pm 1.9) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{\Lambda}_c^- p \pi^+ \pi^- (\text{nonresonant}))/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\bar{\Sigma}_c(2520)^{--} p \pi^+)/\Gamma_{\text{total}}$					$\Gamma_{519}/\Gamma$
VALUE (units $10^{-4}$ )		DOCUMENT ID	TECN	COMMENT	
<b>1.02 ± 0.18 OUR AVERAGE</b>					
1.15 ± 0.10 ± 0.30		<sup>1,2</sup> LEES	13H	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
0.96 ± 0.22 ± 0.04		<sup>1,3</sup> PARK	07	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.3 ± 0.5 ± 0.1		<sup>4</sup> GABYSHEV	02	BELL	Repl. by PARK 07

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Uses  $\Lambda_c^+ \rightarrow p K^- \pi^+$  mode. The second error includes the uncertainty of the branching fraction of the  $\Lambda_c$  decay,  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3)\%$ .

<sup>3</sup> PARK 07 reports  $(1.2 \pm 0.1 \pm 0.4) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{\Sigma}_c(2520)^{--} p \pi^+)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> GABYSHEV 02 reports  $(1.63_{-0.58}^{+0.64}) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \bar{\Sigma}_c(2520)^{--} p \pi^+)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 0.05$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{\Sigma}_c(2520)^0 p \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{520} / \Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;0.31 × 10<sup>-4</sup></b>	90	1,2 LEES	13H BABR	e <sup>+</sup> e <sup>-</sup> → $\Upsilon(4S)$
<0.38 × 10 <sup>-4</sup>	90	<sup>1</sup> PARK	07 BELL	e <sup>+</sup> e <sup>-</sup> → $\Upsilon(4S)$
<1.21 × 10 <sup>-4</sup>	90	1,2 GABYSHEV	02 BELL	Repl. by PARK 07

• • • We do not use the following data for averages, fits, limits, etc. • • •

<sup>1</sup> Assumes equal production of B<sup>+</sup> and B<sup>0</sup> at the  $\Upsilon(4S)$ .  
<sup>2</sup> Uses the value for  $\Lambda_c \rightarrow p K^- \pi^+$  branching ratio (5.0 ± 1.3)%.

$\Gamma(\overline{\Sigma}_c(2455)^0 N^0, N^0 \rightarrow p \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{522} / \Gamma$

$N^0$  is the N(1440) P<sub>11</sub> or N(1535) S<sub>11</sub> or an admixture of the two baryonic states.

<u>VALUE (units 10<sup>-4</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.64 ± 0.16 ± 0.03</b>	1,2 KIM	08 BELL	e <sup>+</sup> e <sup>-</sup> → $\Upsilon(4S)$

<sup>1</sup> Assumes equal production of B<sup>+</sup> and B<sup>0</sup> at the  $\Upsilon(4S)$ .  
<sup>2</sup> KIM 08 reports (0.80 ± 0.15 ± 0.25) × 10<sup>-4</sup> from a measurement of  $[\Gamma(B^0 \rightarrow \overline{\Sigma}_c(2455)^0 N^0, N^0 \rightarrow p \pi^-) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{\Sigma}_c(2455)^0 p \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{521} / \Gamma$

<u>VALUE (units 10<sup>-4</sup>)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.08 ± 0.09 OUR AVERAGE</b>				

1.09 ± 0.06 ± 0.07		LI	23E BELL	e <sup>+</sup> e <sup>-</sup> → $\Upsilon(4S)$
0.91 ± 0.07 ± 0.24		1,2 LEES	13H BABR	e <sup>+</sup> e <sup>-</sup> → $\Upsilon(4S)$
1.8 ± 0.6 ± 0.1		<sup>3</sup> DYTMAN	02 CLE2	e <sup>+</sup> e <sup>-</sup> → $\Upsilon(4S)$
1.12 ± 0.21 ± 0.05		1,4 PARK	07 BELL	Repl. by LI 23E.
0.38 <sup>+0.37</sup> <sub>-0.33</sub> ± 0.02	90	<sup>5</sup> GABYSHEV	02 BELL	Repl. by PARK 07

<sup>1</sup> Assumes equal production of B<sup>+</sup> and B<sup>0</sup> at the  $\Upsilon(4S)$ .  
<sup>2</sup> Uses  $\Lambda_c^+ \rightarrow p K^- \pi^+$  mode. The second error includes the uncertainty of the branching fraction of the  $\Lambda_c$  decay,  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3)\%$ .  
<sup>3</sup> DYTMAN 02 reports (2.2 ± 0.7) × 10<sup>-4</sup> from a measurement of  $[\Gamma(B^0 \rightarrow \overline{\Sigma}_c(2455)^0 p \pi^-) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 0.05$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.  
<sup>4</sup> PARK 07 reports (1.4 ± 0.2 ± 0.4) × 10<sup>-4</sup> from a measurement of  $[\Gamma(B^0 \rightarrow \overline{\Sigma}_c(2455)^0 p \pi^-) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.  
<sup>5</sup> GABYSHEV 02 reports (0.48<sup>+0.46</sup><sub>-0.41</sub>) × 10<sup>-4</sup> from a measurement of  $[\Gamma(B^0 \rightarrow \overline{\Sigma}_c(2455)^0 p \pi^-) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) =$

0.05, which we rescale to our best value  $B(\Lambda_C^+ \rightarrow pK^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{\Sigma}_c(2455)^{--} p\pi^+)/\Gamma_{\text{total}}$   $\Gamma_{523}/\Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b>1.89±0.15 OUR AVERAGE</b>			
1.84±0.11±0.12	LI	23E	BELL $e^+e^- \rightarrow \gamma(4S)$
2.13±0.10±0.56	1,2 LEES	13H	BABR $e^+e^- \rightarrow \gamma(4S)$
3.0 ±0.9 ±0.1	3 DYTMAN	02	CLE2 $e^+e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1.68±0.26 <sup>+0.08</sup> <sub>-0.07</sub>	1,4 PARK	07	BELL Repl. by LI 23E.
1.9 ±0.6 ±0.1	5 GABYSHEV	02	BELL Repl. by PARK 07

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Uses  $\Lambda_C^+ \rightarrow pK^- \pi^+$  mode. The second error includes the uncertainty of the branching fraction of the  $\Lambda_C$  decay,  $B(\Lambda_C^+ \rightarrow pK^- \pi^+) = (5.0 \pm 1.3)\%$ .

<sup>3</sup> DYTMAN 02 reports  $(3.7 \pm 1.1) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \overline{\Sigma}_c(2455)^{--} p\pi^+)/\Gamma_{\text{total}}] \times [B(\Lambda_C^+ \rightarrow pK^- \pi^+)]$  assuming  $B(\Lambda_C^+ \rightarrow pK^- \pi^+) = 0.05$ , which we rescale to our best value  $B(\Lambda_C^+ \rightarrow pK^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>4</sup> PARK 07 reports  $(2.1 \pm 0.2 \pm 0.6) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \overline{\Sigma}_c(2455)^{--} p\pi^+)/\Gamma_{\text{total}}] \times [B(\Lambda_C^+ \rightarrow pK^- \pi^+)]$  assuming  $B(\Lambda_C^+ \rightarrow pK^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_C^+ \rightarrow pK^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>5</sup> GABYSHEV 02 reports  $(2.38^{+0.75}_{-0.69}) \times 10^{-4}$  from a measurement of  $[\Gamma(B^0 \rightarrow \overline{\Sigma}_c(2455)^{--} p\pi^+)/\Gamma_{\text{total}}] \times [B(\Lambda_C^+ \rightarrow pK^- \pi^+)]$  assuming  $B(\Lambda_C^+ \rightarrow pK^- \pi^+) = 0.05$ , which we rescale to our best value  $B(\Lambda_C^+ \rightarrow pK^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda_c^- pK^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{524}/\Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b>3.5±0.7±0.2</b>			
	1,2 AUBERT	09AG	BABR $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> AUBERT 09AG reports  $(4.33 \pm 0.82 \pm 0.33 \pm 1.13) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \Lambda_c^- pK^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow pK^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(\overline{\Sigma}_c(2455)^{--} pK^+, \overline{\Sigma}_c^{--} \rightarrow \overline{\Lambda}_c^- \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{525} / \Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>0.89 \pm 0.25 \pm 0.04</math></b>		1,2 AUBERT	09AG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> AUBERT 09AG reports  $(1.11 \pm 0.30 \pm 0.09 \pm 0.29) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \overline{\Sigma}_c(2455)^{--} pK^+, \overline{\Sigma}_c^{--} \rightarrow \overline{\Lambda}_c^- \pi^-) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow pK^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\Lambda_c^- pK^*(892)^0) / \Gamma_{\text{total}}$   $\Gamma_{526} / \Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt;2.42</math></b>	90	<sup>1</sup> AUBERT	09AG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\Lambda_c^- p\overline{p}p) / \Gamma_{\text{total}}$   $\Gamma_{529} / \Gamma$

VALUE (units $10^{-6}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt;2.8</math></b>		<sup>1</sup> LEES	14C BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$  and  $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = 0.050 \pm 0.013$ .

$\Gamma(\overline{\Lambda}_c^- \Lambda K^+) / \Gamma_{\text{total}}$   $\Gamma_{530} / \Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>4.8 \pm 1.0 \pm 0.2</math></b>		1,2 LEES	11F BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^0$  and  $B^+$  from Upsilon(4S) decays.

<sup>2</sup> LEES 11F reports  $(3.8 \pm 0.8 \pm 0.2 \pm 1.0) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \overline{\Lambda}_c^- \Lambda K^+) / \Gamma_{\text{total}}] / [B(\Lambda_c^+ \rightarrow pK^- \pi^+)] / [B(\Lambda \rightarrow p\pi^-)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ ,  $B(\Lambda \rightarrow p\pi^-) = (63.9 \pm 0.5) \times 10^{-2}$ , which we rescale to our best values  $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ ,  $B(\Lambda \rightarrow p\pi^-) = (64.1 \pm 0.5) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best values. The reported uncertainties are statistical, systematic, and  $\overline{\Lambda}_c^-$  branching fraction uncertainty.

$\Gamma(\overline{\Lambda}_c^- \Lambda_c^+) / \Gamma_{\text{total}}$   $\Gamma_{531} / \Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt;1.6</math></b>	95	<sup>1</sup> AAIJ	14AA LHCB	$pp$ at 7 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<6.2$	90	<sup>2</sup> UCHIDA	08 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Uses  $B(\overline{B}^0 \rightarrow D^+ D_s^-) = (7.2 \pm 0.8) \times 10^{-3}$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{\Lambda}_c(2593)^- / \bar{\Lambda}_c(2625)^- \rho) / \Gamma_{\text{total}}$   $\Gamma_{532} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.1 \times 10^{-4}$	90	1,2 DYTMAN	02 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> DYTMAN 02 measurement uses  $B(\Lambda_c^- \rightarrow \bar{p}K^+\pi^-) = 5.0 \pm 1.3\%$ . The second error includes the systematic and the uncertainty of the branching ratio.

$\Gamma(\Xi_c^- \Lambda_c^+) / \Gamma_{\text{total}}$   $\Gamma_{533} / \Gamma$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
$1.2 \pm 0.8 \pm 0.1$	1,2 LI	19C BELL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses fully reconstructed  $B^0$  on tag side with recoil against  $\Lambda_c^+$ .

<sup>2</sup> LI 19C reports  $(1.16 \pm 0.74 \pm 0.33) \times 10^{-3}$  from a measurement of  $[\Gamma(B^0 \rightarrow \Xi_c^- \Lambda_c^+) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow pK^-\pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (6.28 \pm 0.32) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Xi_c^- \Lambda_c^+, \Xi_c^- \rightarrow \Xi^+ \pi^- \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{534} / \Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.4 \pm 1.1</math> OUR AVERAGE</b>	Error includes scale factor of 1.8.		

$3.3 \pm 0.8^{+0.2}_{-0.1}$	1 LI	19C BELL	$e^+e^- \rightarrow \Upsilon(4S)$
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$1.2 \pm 0.9 \pm 0.1$	2,3 AUBERT	08H BABR	$e^+e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$7.5^{+3.3}_{-2.7} \pm 0.3$	3,4 CHISTOV	06A BELL	Repl. by LI 19C
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<sup>1</sup> LI 19C reports  $(3.32 \pm 0.74 \pm 0.33) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \Xi_c^- \Lambda_c^+, \Xi_c^- \rightarrow \Xi^+ \pi^- \pi^-) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow pK^-\pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (6.28 \pm 0.32) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> AUBERT 08H reports  $(1.5 \pm 1.07 \pm 0.44) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \Xi_c^- \Lambda_c^+, \Xi_c^- \rightarrow \Xi^+ \pi^- \pi^-) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow pK^-\pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> CHISTOV 06A reports  $(9.3^{+3.7}_{-2.8} \pm 3.1) \times 10^{-5}$  from a measurement of  $[\Gamma(B^0 \rightarrow \Xi_c^- \Lambda_c^+, \Xi_c^- \rightarrow \Xi^+ \pi^- \pi^-) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow pK^-\pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Xi_c^- \Lambda_c^+, \Xi_c^- \rightarrow \bar{p} K^+ \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{535} / \Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>5.3 \pm 1.6 \pm 0.2</math></b>	<sup>1</sup> LI	19C	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> LI 19C reports  $(5.27 \pm 1.51 \pm 0.69) \times 10^{-6}$  from a measurement of  $[\Gamma(B^0 \rightarrow \Xi_c^- \Lambda_c^+, \Xi_c^- \rightarrow \bar{p} K^+ \pi^-) / \Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.28 \pm 0.32) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (6.24 \pm 0.28) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda_c^+ \Lambda_c^- K^0) / \Gamma_{\text{total}}$   $\Gamma_{536} / \Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>4.0 \pm 0.9</math> OUR AVERAGE</b>			
$3.99 \pm 0.76 \pm 0.51$	<sup>1</sup> LI	18D	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
$3.8 \pm 3.1 \pm 2.1$	<sup>2,3</sup> AUBERT	08H	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
$7.9^{+2.9}_{-2.3} \pm 4.3$	<sup>2,3</sup> GABYSHEV	06	BELL Repl. by LI 18D

• • • We do not use the following data for averages, fits, limits, etc. • • •

<sup>1</sup> Assumes  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 48.6 \pm 0.6\%$  and  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 6.23 \pm 0.33\%$ .  
<sup>2</sup> Assumes  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 5.0 \pm 1.3\%$ .  
<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\bar{\Lambda}_c(2910)^- p, \bar{\Lambda}_c^- \rightarrow \bar{\Sigma}_c(2455)^- \pi^+) / \Gamma_{\text{total}}$   $\Gamma_{537} / \Gamma$

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>1.24 \pm 0.35 \pm 0.10</math></b>	LI	23E	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(\bar{\Lambda}_c(2910)^- p, \bar{\Lambda}_c^- \rightarrow \bar{\Sigma}_c(2455)^0 \pi^-) / \Gamma_{\text{total}}$   $\Gamma_{538} / \Gamma$

VALUE (units $10^{-6}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>9.5 \pm 3.6 \pm 1.6</math></b>	LI	23E	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma(\Xi_c(2930)^- \Lambda_c^+, \Xi_c^- \rightarrow \Lambda_c^- K^0) / \Gamma_{\text{total}}$   $\Gamma_{539} / \Gamma$

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.37 \pm 0.51 \pm 0.31</math></b>	<sup>1</sup> LI	18D	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 48.6 \pm 0.6\%$  and  $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = 6.23 \pm 0.33\%$ .

$\Gamma(\Lambda \psi_{DS}) / \Gamma_{\text{total}}$   $\Gamma_{540} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 0.13\text{--}5.2 \times 10^{-5}</math></b>	90	<sup>1</sup> LEES	23B	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 2.1 \times 10^{-5}$	90	<sup>2</sup> HADJIVASILIOU22	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> LEES 23B searched for  $\psi_{DS}$  in the recoil mass against  $\Lambda$  and the fully reconstructed accompanying  $B$  meson. The cited upper limit is for  $m(\psi_{DS})$  between 1 and 4.1  $\text{GeV}/c^2$ .

<sup>2</sup> HADJIVASILIOU 22 searched for  $\psi_{DS}$ , in the mass range 1–3.9  $\text{GeV}/c^2$ , in the recoil mass against  $\Lambda$  and the accompanying  $B$  meson. The cited upper limit is for  $m(\psi_{DS}) = 2.0 \text{ GeV}/c^2$  and is the most stringent. The least stringent limit is  $< 3.8 \times 10^{-5}$  at  $m(\psi_{DS}) = 3.9 \text{ GeV}/c^2$ .

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{541}/\Gamma$

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 3.2 \times 10^{-7}$	90	<sup>1</sup> DEL-AMO-SA..11A	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$< 6.2 \times 10^{-7}$	90	<sup>1</sup> VILLA	06	BELL $e^+e^- \rightarrow \Upsilon(4S)$
$< 1.7 \times 10^{-6}$	90	<sup>1</sup> AUBERT	01l	BABR $e^+e^- \rightarrow \Upsilon(4S)$
$< 3.9 \times 10^{-5}$	90	<sup>2</sup> ACCIARRI	95l	L3 $e^+e^- \rightarrow Z$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> ACCIARRI 95l assumes  $f_{B^0} = 39.5 \pm 4.0$  and  $f_{B_s} = 12.0 \pm 3.0\%$ .

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$   $\Gamma_{542}/\Gamma$

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 2.5 \times 10^{-9}$	90	<sup>1</sup> AAIJ	20W	LHCB $pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$< 8.3 \times 10^{-8}$	90	AALTONEN	09P	CDF $p\bar{p}$ at 1.96 TeV
$< 11.3 \times 10^{-8}$	90	<sup>2</sup> AUBERT	08P	BABR $e^+e^- \rightarrow \Upsilon(4S)$
$< 6.1 \times 10^{-8}$	90	<sup>2</sup> AUBERT	05W	BABR Repl. by AUBERT 08P
$< 1.9 \times 10^{-7}$	90	<sup>2</sup> CHANG	03	BELL $e^+e^- \rightarrow \Upsilon(4S)$
$< 8.3 \times 10^{-7}$	90	<sup>2</sup> BERGFELD	00B	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
$< 1.4 \times 10^{-5}$	90	<sup>3</sup> ACCIARRI	97B	L3 $e^+e^- \rightarrow Z$
$< 5.9 \times 10^{-6}$	90	AMMAR	94	CLE2 Repl. by BERGFELD 00B
$< 2.6 \times 10^{-5}$	90	<sup>4</sup> AVERY	89B	CLEO $e^+e^- \rightarrow \Upsilon(4S)$
$< 7.6 \times 10^{-5}$	90	<sup>5</sup> ALBRECHT	87D	ARG $e^+e^- \rightarrow \Upsilon(4S)$
$< 6.4 \times 10^{-5}$	90	<sup>6</sup> AVERY	87	CLEO $e^+e^- \rightarrow \Upsilon(4S)$
$< 3 \times 10^{-4}$	90	GILES	84	CLEO Repl. by AVERY 87

<sup>1</sup> Assumes no contribution from  $B_s^0 \rightarrow e^+e^-$  decays.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> ACCIARRI 97B assume PDG 96 production fractions for  $B^+$ ,  $B^0$ ,  $B_s$ , and  $\Lambda_b$ .

<sup>4</sup> AVERY 89B reports  $< 3 \times 10^{-5}$  assuming the  $\Upsilon(4S)$  decays 43% to  $B^0\bar{B}^0$ . We rescale to 50%.

<sup>5</sup> ALBRECHT 87D reports  $< 8.5 \times 10^{-5}$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.

<sup>6</sup> AVERY 87 reports  $< 8 \times 10^{-5}$  assuming the  $\Upsilon(4S)$  decays 40% to  $B^0\bar{B}^0$ . We rescale to 50%.

$\Gamma(e^+e^-\gamma)/\Gamma_{\text{total}}$   $\Gamma_{543}/\Gamma$

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.2 \times 10^{-7}$	90	AUBERT	08C	BABR $e^+e^- \rightarrow \Upsilon(4S)$

$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$   $\Gamma_{544}/\Gamma$

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-10}$ )	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.5$	90	<sup>1,2</sup> TUMASYAN	23A	CMS $pp$ at 13 TeV



• • • We do not use the following data for averages, fits, limits, etc. • • •

	$1.2^{+0.8}_{-0.7} \pm 0.1$		3	AAIJ	22	LHCB	$pp$ at 7, 8, 13 TeV
<	3.6	95	4	SIRUNYAN	20AG		$pp$ at 7, 8, 13 TeV
–	$1.9 \pm 1.6$		5,6	AABOUD	19L	ATLS	$pp$ at 7, 8, 13 TeV
	$1.5^{+1.2+0.2}_{-1.0-0.1}$		7	AAIJ	17A	LHCB	Repl. by AAIJ 22
–	$2.5 \pm 2.0$		8	AABOUD	16L	ATLS	Repl. by AABOUD 19L
	$3.9^{+1.6}_{-1.4}$		9	KHACHATRY...	15BE	LHC	$pp$ at 7, 8 TeV
<	8.0	90	10	AAIJ	13B	LHCB	Repl. by AAIJ 13BA
<	6.3	90	11	AAIJ	13BA	LHCB	Repl. by KHACHA- TRYAN 15BE
<	38	90	12	AALTONEN	13F	CDF	$p\bar{p}$ at 1.96 TeV
	$3.5^{+2.1}_{-1.8}$		13	CHATRCHYAN	13AW	CMS	Repl. by SIRUN- YAN 20AG
<	26	90	10	AAIJ	12A	LHCB	Repl. by AAIJ 12W
<	8.1	90	14	AAIJ	12W	LHCB	Repl. by AAIJ 13B
<	14	90	14	CHATRCHYAN	12A	CMS	$pp$ at 7 TeV
<	120	90	15	AAIJ	11B	LHCB	Repl. by AAIJ 12A
<	50	90	14	AALTONEN	11AG	CDF	$p\bar{p}$ at 1.96 TeV
<	37	90	14	CHATRCHYAN	11T	CMS	Repl. by CHA- TRCHYAN 12A

<sup>1</sup> Corresponds to a 95% CL upper limit of  $< 1.9 \times 10^{-10}$ .

<sup>2</sup> Uses normalization mode  $B(B^+ \rightarrow J/\psi K^+) = (1.020 \pm 0.019) \times 10^{-3}$ ,  $B(J/\psi \rightarrow \mu^+ \mu^-) = (5.961 \pm 0.033) \times 10^{-2}$ .

<sup>3</sup> Corresponds to a 95% CL upper limit of  $< 2.6 \times 10^{-10}$ .

<sup>4</sup> Uses normalization mode  $B(B^+ \rightarrow J/\psi K^+) = (1.01 \pm 0.03) \times 10^{-3}$ .

<sup>5</sup> Corresponds to a 95% CL upper limit of  $< 2.1 \times 10^{-10}$ .

<sup>6</sup> Uses normalization mode  $B(B^+ \rightarrow J/\psi K^+) = (1.010 \pm 0.029) \times 10^{-3}$  and  $B$  production ratio  $f(b \rightarrow B_s^0)/f(b \rightarrow B^0) = 0.256 \pm 0.013$ .

<sup>7</sup> Corresponds to a 95% CL upper limit of  $< 3.4 \times 10^{-10}$ .

<sup>8</sup> This value is obtained from a profile-likelihood fit, see Fig. 9. It corresponds to an upper limit of  $< 0.42 \times 10^{-9}$  at 95% C.L.

<sup>9</sup> Derived from the combined fit to CMS and LHCb data. Uncertainty includes both statistical and systematic component. Also reports  $B(B^0 \rightarrow \mu^+ \mu^-)/B(B_s^0 \rightarrow \mu^+ \mu^-) = 0.14^{+0.08}_{-0.06}$ .

<sup>10</sup> Uses  $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.01 \pm 0.21) \times 10^{-5}$  and  $B(B^0 \rightarrow K^+ \pi^-) = (1.94 \pm 0.06) \times 10^{-5}$  for normalization.

<sup>11</sup> Reports also a limit of  $< 7.4 \times 10^{-10}$  at 95% CL. Uses normalization modes  $B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+$  and  $B^0 \rightarrow K^+ \pi^-$ .

<sup>12</sup> Uses normalization mode  $B(B^+ \rightarrow J/\psi K^+) = (10.22 \pm 0.35) \times 10^{-4}$ .

<sup>13</sup> Reports also a limit of  $< 9.2 \times 10^{-10}$  at 90% CL. and uses  $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.0 \pm 0.2) \times 10^{-5}$  for normalization.

<sup>14</sup> Uses  $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.01 \pm 0.21) \times 10^{-5}$ .

<sup>15</sup> Uses  $B$  production ratio  $f(\bar{b} \rightarrow B^+)/f(\bar{b} \rightarrow B_s^0) = 3.71 \pm 0.47$  and three normalization modes.

### $\Gamma(\mu^+ \mu^- \gamma)/\Gamma_{\text{total}}$

### $\Gamma_{545}/\Gamma$

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.6 \times 10^{-7}$	90	AUBERT	08C	BABR $e^+ e^- \rightarrow \gamma(4S)$

$\Gamma(\tau^+\tau^-)/\Gamma_{\text{total}}$   $\Gamma_{549}/\Gamma$

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.1 \times 10^{-3}$	95	<sup>1</sup> AAIJ	17AJ LHCB	$pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<4.1 \times 10^{-3}$	90	<sup>2</sup> AUBERT	06S BABR	$e^+e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Assuming no contribution from  $B_S^0 \rightarrow \tau^+\tau^-$ .

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(\mu^+\mu^-\mu^+\mu^-)/\Gamma_{\text{total}}$   $\Gamma_{546}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.8 \times 10^{-10}$	95	AAIJ	22Q LHCB	$pp$ at 7, 8, 13 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<6.9 \times 10^{-10}$	95	AAIJ	17N LHCB	$pp$ at 7, 8 TeV
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$<6.6 \times 10^{-9}$	95	<sup>1</sup> AAIJ	13AW LHCB	Repl. by AAIJ 17N
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<sup>1</sup> Also reports a limit of  $< 5.3 \times 10^{-9}$  at 90% CL.

$\Gamma(SP, S \rightarrow \mu^+\mu^-, P \rightarrow \mu^+\mu^-)/\Gamma_{\text{total}}$   $\Gamma_{547}/\Gamma$

Here  $S$  and  $P$  are the hypothetical scalar and pseudoscalar particles with masses of 2.5 GeV/ $c^2$  and 214.3 MeV/ $c^2$ , respectively.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<6.0 \times 10^{-10}$	95	AAIJ	17N LHCB	$pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<5.1 \times 10^{-9}$	90	<sup>1</sup> AAIJ	13AW LHCB	Repl. by AAIJ 17N
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<sup>1</sup> Also reports a limit of  $< 6.3 \times 10^{-9}$  at 95% CL.

$\Gamma(aa, a \rightarrow \mu^+\mu^-)/\Gamma_{\text{total}}$   $\Gamma_{548}/\Gamma$

Here particle  $a$  is a scalar with a mass of 1 GeV/ $c^2$ .

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.3 \times 10^{-10}$	95	AAIJ	22Q LHCB	$pp$ at 7, 8, 13 TeV

$\Gamma(\pi^0 \ell^+ \ell^-)/\Gamma_{\text{total}}$   $\Gamma_{550}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5.3 \times 10^{-8}$	90	<sup>1</sup> LEES	13M BABR	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<1.5 \times 10^{-7}$	90	<sup>1</sup> WEI	08A BELL	$e^+e^- \rightarrow \gamma(4S)$
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$<1.2 \times 10^{-7}$	90	<sup>1</sup> AUBERT	07AG BABR	Repl. by LEES 13M
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(\pi^0 \nu \bar{\nu})/\Gamma_{\text{total}}$   $\Gamma_{556}/\Gamma$

Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interaction.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<0.9 \times 10^{-5}$	90	<sup>1</sup> GRYGIER	17 BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<6.9 \times 10^{-5}$	90	<sup>1</sup> LUTZ	13 BELL	$e^+e^- \rightarrow \gamma(4S)$
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$<2.2 \times 10^{-4}$	90	<sup>1</sup> CHEN	07D BELL	Repl. by LUTZ 13
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{\text{total}}$   $\Gamma_{551}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$<8.4 \times 10^{-8}$	90	<sup>1</sup> LEES	13M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$<2.3 \times 10^{-7}$	90	<sup>1</sup> WEI	08A BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$<1.4 \times 10^{-7}$	90	<sup>1</sup> AUBERT	07AG BABR	Repl. by LEES 13M

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\pi^0 \mu^+ \mu^-)/\Gamma_{\text{total}}$   $\Gamma_{552}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$<6.9 \times 10^{-8}$	90	<sup>1</sup> LEES	13M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$<1.8 \times 10^{-7}$	90	<sup>1</sup> WEI	08A BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$<5.1 \times 10^{-7}$	90	<sup>1</sup> AUBERT	07AG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta \ell^+ \ell^-)/\Gamma_{\text{total}}$   $\Gamma_{553}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$<6.4 \times 10^{-8}$	90	<sup>1</sup> LEES	13M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta e^+ e^-)/\Gamma_{\text{total}}$   $\Gamma_{554}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$<10.8 \times 10^{-8}$	90	<sup>1</sup> LEES	13M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\eta \mu^+ \mu^-)/\Gamma_{\text{total}}$   $\Gamma_{555}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$<11.2 \times 10^{-8}$	90	<sup>1</sup> LEES	13M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^0 \ell^+ \ell^-)/\Gamma_{\text{total}}$   $\Gamma_{557}/\Gamma$

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**3.3 ± 0.6 OUR AVERAGE**

$3.51^{+0.69}_{-0.60} \pm 0.10$		CHOU DHURY	21 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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$2.1^{+1.5}_{-1.3} \pm 0.2$		<sup>1</sup> AUBERT	09T BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$3.4^{+0.9}_{-0.8} \pm 0.2$		<sup>1,2</sup> WEI	09A BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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$2.9^{+1.6}_{-1.3} \pm 0.3$		<sup>1</sup> AUBERT,B	06J BABR	Repl. by AUBERT 09T
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$<6.8$	90	<sup>1</sup> ISHIKAWA	03 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ .

<sup>2</sup> Superseded by CHOU DHURY 21.

**$\Gamma(K^0 e^+ e^-)/\Gamma_{\text{total}}$**   **$\Gamma_{558}/\Gamma$**

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**$2.5^{+1.1}_{-0.9}$  OUR AVERAGE** Error includes scale factor of 1.3.

$3.1^{+1.0}_{-0.9} \pm 0.08$  CHOUDHURY 21 BELL  $e^+ e^- \rightarrow \gamma(4S)$

$0.8^{+1.5}_{-1.2} \pm 0.1$  <sup>1</sup>AUBERT 09T BABR  $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$2.0^{+1.4}_{-1.0} \pm 0.1$  <sup>1,2</sup>WEI 09A BELL  $e^+ e^- \rightarrow \gamma(4S)$

$1.3^{+1.6}_{-1.1} \pm 0.2$  <sup>1</sup>AUBERT,B 06J BABR Repl. by AUBERT 09T

–  $2.1^{+2.3}_{-1.6} \pm 0.8$  <sup>1</sup>AUBERT 03U BABR  $e^+ e^- \rightarrow \gamma(4S)$

< 5.4 90 <sup>3</sup>ISHIKAWA 03 BELL  $e^+ e^- \rightarrow \gamma(4S)$

< 27 90 <sup>1</sup>ABE 02 BELL Repl. by ISHIKAWA 03

< 38 90 <sup>1</sup>AUBERT 02L BABR  $e^+ e^- \rightarrow \gamma(4S)$

< 84.5 90 <sup>4</sup>ANDERSON 01B CLE2  $e^+ e^- \rightarrow \gamma(4S)$

< 3000 90 ALBRECHT 91E ARG  $e^+ e^- \rightarrow \gamma(4S)$

< 5200 90 <sup>5</sup>AVERY 87 CLEO  $e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Superseded by CHOUDHURY 21.

<sup>3</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\gamma(4S)$ .

<sup>4</sup> The result is for di-lepton masses above 0.5 GeV.

<sup>5</sup> AVERY 87 reports  $< 6.5 \times 10^{-4}$  assuming the  $\gamma(4S)$  decays 40% to  $B^0 \bar{B}^0$ . We rescale to 50%.

**$\Gamma(K^0 \nu \bar{\nu})/\Gamma_{\text{total}}$**   **$\Gamma_{560}/\Gamma$**

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interaction.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<  **$2.6 \times 10^{-5}$**  90 <sup>1</sup>GRYGIER 17 BELL  $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<  $4.9 \times 10^{-5}$  90 <sup>1,2</sup>LEES 13i BABR  $e^+ e^- \rightarrow \gamma(4S)$

<  $19.4 \times 10^{-5}$  90 <sup>1</sup>LUTZ 13 BELL  $e^+ e^- \rightarrow \gamma(4S)$

<  $5.6 \times 10^{-5}$  90 <sup>1</sup>DEL-AMO-SA..10Q BABR Repl. by LEES 13i

<  $1.6 \times 10^{-4}$  90 <sup>1</sup>CHEN 07D BELL  $e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Also reported a limit  $< 8.1 \times 10^{-5}$  at 90% CL obtained using a fully reconstructed hadronic  $B$ -tag evnets.

**$\Gamma(\rho^0 \nu \bar{\nu})/\Gamma_{\text{total}}$**   **$\Gamma_{561}/\Gamma$**

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interaction.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<  **$4.0 \times 10^{-5}$**  90 <sup>1</sup>GRYGIER 17 BELL  $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<  $2.08 \times 10^{-4}$  90 <sup>1</sup>LUTZ 13 BELL  $e^+ e^- \rightarrow \gamma(4S)$

<  $4.4 \times 10^{-4}$  90 <sup>1</sup>CHEN 07D BELL Repl. by LUTZ 13

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(K^0 \mu^+ \mu^-) / \Gamma_{\text{total}}$   $\Gamma_{559} / \Gamma$   
 Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>3.39 ± 0.35 OUR FIT</b> Error includes scale factor of 1.1.				
<b>3.39 ± 0.35 OUR AVERAGE</b>				
3.9 $^{+1.0}_{-0.8}$ ± 0.3		CHOUDHURY 21	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
3.27 ± 0.34 ± 0.17		<sup>1</sup> AAIJ	14M LHCb	$pp$ at 7, 8 TeV
4.9 $^{+2.9}_{-2.5}$ ± 0.3		<sup>2</sup> AUBERT	09T BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.1 $^{+0.7}_{-0.6}$		AAIJ	12AH LHCb	Repl. by AAIJ 14M
4.4 $^{+1.3}_{-1.1}$ ± 0.3		<sup>2,3</sup> WEI	09A BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
5.9 $^{+3.3}_{-2.6}$ ± 0.7		<sup>2</sup> AUBERT,B	06J BABR	Repl. by AUBERT 09T
1.63 $^{+0.82}_{-0.63}$ ± 0.14		<sup>2</sup> AUBERT	03U BABR	Repl. by AUBERT,B 06J
5.6 $^{+2.9}_{-2.3}$ ± 0.5		<sup>4</sup> ISHIKAWA	03 BELL	Repl. by WEI 09A
<33	90	<sup>2</sup> ABE	02 BELL	Repl. by ISHIKAWA 03
<36	90	AUBERT	02L BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
<66.4	90	<sup>5</sup> ANDERSON	01B CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
<5200	90	ALBRECHT	91E ARG	$e^+ e^- \rightarrow \Upsilon(4S)$
<3600	90	<sup>6</sup> AVERY	87 CLEO	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses  $B(B^0 \rightarrow J/\psi(1S)K^0) = (0.928 \pm 0.013 \pm 0.037) \times 10^{-3}$  for normalization.  
<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .  
<sup>3</sup> Superseded by CHOUDHURY 21.  
<sup>4</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ . The second error is a total of systematic uncertainties including model dependence.  
<sup>5</sup> The result is for di-lepton masses above 0.5 GeV.  
<sup>6</sup> AVERY 87 reports  $< 4.5 \times 10^{-4}$  assuming the  $\Upsilon(4S)$  decays 40% to  $B^0 \bar{B}^0$ . We rescale to 50%.

$\Gamma(K^0 \mu^+ \mu^-) / \Gamma(J/\psi(1S)K^0)$   $\Gamma_{559} / \Gamma_{213}$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.38 ± 0.04 OUR FIT</b> Error includes scale factor of 1.1.			
<b>0.37 ± 0.12 ± 0.02</b>	AALTONEN	11A1 CDF	$p\bar{p}$ at 1.96 TeV

$\Gamma(K^*(892)^0 \ell^+ \ell^-) / \Gamma_{\text{total}}$   $\Gamma_{562} / \Gamma$   
 Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	DOCUMENT ID	TECN	COMMENT
<b>9.9 <math>^{+1.2}_{-1.1}</math> OUR AVERAGE</b>			
10.3 $^{+2.2}_{-2.1}$ ± 0.7	<sup>1</sup> AUBERT	09T BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
9.7 $^{+1.3}_{-1.1}$ ± 0.7	<sup>1</sup> WEI	09A BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
8.1 $^{+2.1}_{-1.9}$ ± 0.9	<sup>1</sup> AUBERT,B	06J BABR	Repl. by AUBERT 09T
11.7 $^{+3.0}_{-2.7}$ ± 0.9	<sup>1</sup> ISHIKAWA	03 BELL	Repl. by WEI 09A

<sup>1</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ .

$\Gamma(K^*(892)^0 e^+ e^-)/\Gamma_{\text{total}}$   $\Gamma_{563}/\Gamma$

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**10.3<sup>+1.9</sup><sub>-1.7</sub> OUR AVERAGE**

8.6 <sup>+2.6</sup> <sub>-2.4</sub> ± 0.5	1	AUBERT	09T	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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11.8 <sup>+2.7</sup> <sub>-2.2</sub> ± 0.9	1	WEI	09A	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

10.4 <sup>+3.3</sup> <sub>-2.9</sub> ± 1.1	1	AUBERT,B	06J	BABR Repl. by AUBERT 09T
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11.1 <sup>+5.6</sup> <sub>-4.7</sub> ± 1.1	1	AUBERT	03U	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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$< 24$	90	2 ISHIKAWA	03	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
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$< 64$	90	1 ABE	02	BELL Repl. by ISHIKAWA 03
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$< 67$	90	1 AUBERT	02L	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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$< 2900$	90	ALBRECHT	91E	ARG $e^+ e^- \rightarrow \Upsilon(4S)$
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<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>2</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ .

$\Gamma(K^*(892)^0 \mu^+ \mu^-)/\Gamma_{\text{total}}$   $\Gamma_{564}/\Gamma$

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE (units $10^{-7}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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**9.4 ± 0.5 OUR FIT**

**9.4 ± 0.6 OUR AVERAGE**

9.04 <sup>+0.16</sup> <sub>-0.15</sub> ± 0.62	1	AAIJ	17Q	LHCB $pp$ at 7, 8 TeV
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13.5 <sup>+4.0</sup> <sub>-3.7</sub> ± 1.0	2	AUBERT	09T	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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10.6 <sup>+1.9</sup> <sub>-1.4</sub> ± 0.7	2	WEI	09A	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

10.36 <sup>+0.18</sup> <sub>-0.17</sub> ± 0.71	1	AAIJ	16AO	LHCB Repl. by AAIJ 17Q
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8.7 <sup>+3.8</sup> <sub>-3.3</sub> ± 1.2	2	AUBERT,B	06J	BABR Repl. by AUBERT 09T
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8.6 <sup>+7.9</sup> <sub>-5.8</sub> ± 1.1	2	AUBERT	03U	BABR Repl. by AUBERT,B 06J
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13.3 <sup>+4.2</sup> <sub>-3.7</sub> ± 1.1	3	ISHIKAWA	03	BELL Repl. by WEI 09A
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$< 42$	90	2 ABE	02	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
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$< 33$	90	AUBERT	02L	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
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$< 40$	90	4 AFFOLDER	99B	CDF $p\bar{p}$ at 1.8 TeV
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<sup>1</sup> Uses  $B(B^0 \rightarrow J/\psi K^*(892)^0) = (1.19 \pm 0.01 \pm 0.08) \times 10^{-3}$ . The second error is the total systematic uncertainty.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>3</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ . The second error is a total of systematic uncertainties including model dependence.

<sup>4</sup> AFFOLDER 99B measured relative to  $B^0 \rightarrow J/\psi(1S) K^*(892)^0$ .

$\Gamma(K^*(892)^0 \mu^+ \mu^-) / \Gamma(J/\psi(1S) K^*(892)^0)$   $\Gamma_{564} / \Gamma_{215}$

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>0.75 \pm 0.05</math> OUR FIT</b>			
<b><math>0.77 \pm 0.08 \pm 0.03</math></b>	AALTONEN 11A	CDF	$p\bar{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.80 \pm 0.10 \pm 0.06$	AALTONEN 11L	CDF	Repl. by AALTONEN 11A
$0.61 \pm 0.23 \pm 0.07$	AALTONEN 09B	CDF	Repl. by AALTONEN 11L

$\Gamma(K^*(892)^0 \chi, \chi \rightarrow \mu^+ \mu^-) / \Gamma_{\text{total}}$   $\Gamma_{565} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< \sim 10^{-9}$	95	<sup>1</sup> AAIJ	15AZ	LHCB $pp$ at 7, 8 TeV

<sup>1</sup> The limit is obtained as a function of di-muon mass. A normalizing mode branching fraction value of  $B(B^0 \rightarrow K^{*0} \mu^+ \mu^-) = (1.6 \pm 0.3) \times 10^{-7}$  is used.

$\Gamma(K^*(892)^0 \tau^+ \tau^-) / \Gamma_{\text{total}}$   $\Gamma_{566} / \Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 3.1 \times 10^{-3}$	90	<sup>1</sup> DONG	23	BELL $e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses full reconstruction of companion neutral  $B$ .

$\Gamma(\pi^+ \pi^- \mu^+ \mu^-) / \Gamma_{\text{total}}$   $\Gamma_{567} / \Gamma$

VALUE (units $10^{-8}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>2.1 \pm 0.5 \pm 0.1</math></b>	<sup>1</sup> AAIJ	15S	LHCB $pp$ at 7, 8 TeV

<sup>1</sup> AAIJ 15S reports  $(2.11 \pm 0.51 \pm 0.15 \pm 0.16) \times 10^{-8}$  from a measurement of  $[\Gamma(B^0 \rightarrow \pi^+ \pi^- \mu^+ \mu^-) / \Gamma_{\text{total}}] / [B(B^0 \rightarrow J/\psi(1S) K^*(892)^0)]$  assuming  $B(B^0 \rightarrow J/\psi(1S) K^*(892)^0) = (1.3 \pm 0.1) \times 10^{-3}$ , which we rescale to our best value  $B(B^0 \rightarrow J/\psi(1S) K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^0 \nu \bar{\nu}) / \Gamma_{\text{total}}$   $\Gamma_{568} / \Gamma$

Test for  $\Delta B=1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.8 \times 10^{-5}$	90	<sup>1</sup> GRYGIER	17	BELL $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 1.2 \times 10^{-4}$	90	<sup>1,2</sup> LEES	13I	BABR $e^+ e^- \rightarrow \gamma(4S)$
$< 5.5 \times 10^{-5}$	90	<sup>1</sup> LUTZ	13	BELL $e^+ e^- \rightarrow \gamma(4S)$
$< 1.2 \times 10^{-4}$	90	AUBERT	08BC	BABR Repl. by LEES 13I
$< 3.4 \times 10^{-4}$	90	<sup>1</sup> CHEN	07D	BELL $e^+ e^- \rightarrow \gamma(4S)$
$< 1.0 \times 10^{-3}$	90	<sup>3</sup> ADAM	96D	DLPH $e^+ e^- \rightarrow Z$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

<sup>2</sup> Also reported a limit  $< 9.3 \times 10^{-5}$  at 90% CL obtained using a fully reconstructed hadronic  $B$ -tag evnets.

<sup>3</sup> ADAM 96D assumes  $f_{B^0} = f_{B^-} = 0.39$  and  $f_{B_s} = 0.12$ .

$\Gamma(\text{invisible})/\Gamma_{\text{total}}$   $\Gamma_{569}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 2.4</b>	90	<sup>1</sup> LEES	12T BABR	$e^+e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
< 7.8	90	<sup>2</sup> KU	20 BELL	$e^+e^- \rightarrow \gamma(4S)$
< 13	90	<sup>3</sup> HSU	12 BELL	$e^+e^- \rightarrow \gamma(4S)$
< 22	90	<sup>1</sup> AUBERT,B	04J BABR	$e^+e^- \rightarrow \gamma(4S)$

- <sup>1</sup> Uses the fully reconstructed  $B^0 \rightarrow D^{(*)-} \ell^+ \nu_\ell$  events as a tag.
- <sup>2</sup> Identified by fully reconstructing a hadronic decay of the accompanying  $B$  meson .
- <sup>3</sup> Identified by fully reconstructing a hadronic decay of the accompanying  $B$  meson and requiring no other particles in the event.

$\Gamma(\nu\bar{\nu}\gamma)/\Gamma_{\text{total}}$   $\Gamma_{570}/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.6</b>	90	<sup>1</sup> KU	20 BELL	$e^+e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
< 1.7	90	<sup>2</sup> LEES	12T BABR	$e^+e^- \rightarrow \gamma(4S)$
< 4.7	90	<sup>2</sup> AUBERT,B	04J BABR	Repl. by LEES 12T

- <sup>1</sup> Identified by fully reconstructing a hadronic decay of the accompanying  $B$  meson .
- <sup>2</sup> Uses the fully reconstructed  $B^0 \rightarrow D^{(*)-} \ell^+ \nu_\ell$  events as a tag.

$\Gamma(\phi\mu^+\mu^-)/\Gamma_{\text{total}}$   $\Gamma_{571}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 3.2 × 10<sup>-9</sup></b>	90	<sup>1</sup> AAIJ	22S LHCB	$pp$ at 7, 8, 13 TeV

- <sup>1</sup> Using  $B(B_S^0 \rightarrow \phi\mu^+\mu^-)$  as normalization. The limit is set for the full  $q^2$  phase space.

$\Gamma(\phi\nu\bar{\nu})/\Gamma_{\text{total}}$   $\Gamma_{572}/\Gamma$

Test for  $\Delta B = 1$  weak neutral current. Allowed by higher-order electroweak interaction.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.27 × 10<sup>-4</sup></b>	90	<sup>1</sup> LUTZ	13 BELL	$e^+e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
< 5.8 × 10 <sup>-5</sup>	90	<sup>1</sup> CHEN	07D BELL	Repl. by LUTZ 13

- <sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\gamma(4S)$ .

$\Gamma(e^\pm\mu^\mp)/\Gamma_{\text{total}}$   $\Gamma_{573}/\Gamma$

Test of lepton family number conservation. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt; 1.0 × 10<sup>-9</sup></b>	90	<sup>1</sup> AAIJ	18T LHCB	$pp$ at 7, 8 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
< 2.8 × 10 <sup>-9</sup>	90	<sup>2</sup> AAIJ	13BMLHCB	Repl. by AAIJ 18T
< 6.4 × 10 <sup>-8</sup>	90	AALTONEN	09P CDF	$p\bar{p}$ at 1.96 TeV
< 9.2 × 10 <sup>-8</sup>	90	<sup>3</sup> AUBERT	08P BABR	$e^+e^- \rightarrow \gamma(4S)$
< 1.8 × 10 <sup>-7</sup>	90	<sup>3</sup> AUBERT	05W BABR	$e^+e^- \rightarrow \gamma(4S)$
< 1.7 × 10 <sup>-7</sup>	90	<sup>3</sup> CHANG	03 BELL	$e^+e^- \rightarrow \gamma(4S)$
< 15 × 10 <sup>-7</sup>	90	<sup>3</sup> BERGFELD	00B CLE2	$e^+e^- \rightarrow \gamma(4S)$
< 3.5 × 10 <sup>-6</sup>	90	ABE	98V CDF	$p\bar{p}$ at 1.8 TeV



$< 1.6 \times 10^{-5}$	90	<sup>4</sup> ACCIARRI	97B	L3	$e^+e^- \rightarrow Z$
$< 5.9 \times 10^{-6}$	90	AMMAR	94	CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
$< 3.4 \times 10^{-5}$	90	<sup>5</sup> AVERY	89B	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$< 4.5 \times 10^{-5}$	90	<sup>6</sup> ALBRECHT	87D	ARG	$e^+e^- \rightarrow \Upsilon(4S)$
$< 7.7 \times 10^{-5}$	90	<sup>7</sup> AVERY	87	CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
$< 3 \times 10^{-4}$	90	GILES	84	CLEO	Repl. by AVERY 87

<sup>1</sup> AAIJ 18T uses normalization modes  $B(B^0 \rightarrow K^+\pi^-) = (19.6 \pm 0.5) \times 10^{-6}$  and  $B(B^+ \rightarrow J/\psi K^+) = (1.026 \pm 0.031) \times 10^{-3}$ .

<sup>2</sup> Uses normalization mode  $B(B^0 \rightarrow K^+\pi^-) = (19.4 \pm 0.6) \times 10^{-6}$ .

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

<sup>4</sup> ACCIARRI 97B assume PDG 96 production fractions for  $B^+$ ,  $B^0$ ,  $B_s^+$ , and  $\Lambda_b$ .

<sup>5</sup> Paper assumes the  $\Upsilon(4S)$  decays 43% to  $B^0\bar{B}^0$ . We rescale to 50%.

<sup>6</sup> ALBRECHT 87D reports  $< 5 \times 10^{-5}$  assuming the  $\Upsilon(4S)$  decays 45% to  $B^0\bar{B}^0$ . We rescale to 50%.

<sup>7</sup> AVERY 87 reports  $< 9 \times 10^{-5}$  assuming the  $\Upsilon(4S)$  decays 40% to  $B^0\bar{B}^0$ . We rescale to 50%.

**$\Gamma(\pi^0 e^\pm \mu^\mp)/\Gamma_{\text{total}}$**   **$\Gamma_{574}/\Gamma$**

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.4 \times 10^{-7}$	90	<sup>1</sup> AUBERT	07AG	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(K^0 e^\pm \mu^\mp)/\Gamma_{\text{total}}$**   **$\Gamma_{575}/\Gamma$**

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 3.8 \times 10^{-8}$	90	CHOU DHURY 21	BELL	$e^+e^- \rightarrow \Upsilon(4S)$

••• We do not use the following data for averages, fits, limits, etc. •••

$< 2.7 \times 10^{-7}$	90	<sup>1</sup> AUBERT,B	06J	BABR $e^+e^- \rightarrow \Upsilon(4S)$
$< 40 \times 10^{-7}$	90	<sup>1</sup> AUBERT	02L	BABR Repl. by AUBERT,B 06J

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

**$\Gamma(K^*(892)^0 e^+ \mu^-)/\Gamma_{\text{total}}$**   **$\Gamma_{576}/\Gamma$**

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 6.8 \times 10^{-9}$	90	<sup>1</sup> AAIJ	23G	LHCB $pp$ at 7, 8, 13 TeV

••• We do not use the following data for averages, fits, limits, etc. •••

$< 1.6 \times 10^{-7}$	90	<sup>2</sup> SANDILYA	18	BELL $e^+e^- \rightarrow \Upsilon(4S)$
$< 5.3 \times 10^{-7}$	90	<sup>3</sup> AUBERT,B	06J	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses the uniform phase space model for the signal decays.

<sup>2</sup> Uses  $B(\Upsilon(4S) \rightarrow B^0\bar{B}^0) = 0.486 \pm 0.006$ .

<sup>3</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ .

**$\Gamma(K^*(892)^0 e^- \mu^+)/\Gamma_{\text{total}}$**   **$\Gamma_{577}/\Gamma$**

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 5.7 \times 10^{-9}$	90	<sup>1</sup> AAIJ	23G	LHCB $pp$ at 7, 8, 13 TeV

••• We do not use the following data for averages, fits, limits, etc. •••

$< 1.2 \times 10^{-7}$	90	<sup>2</sup> SANDILYA	18	BELL $e^+e^- \rightarrow \Upsilon(4S)$
$< 3.4 \times 10^{-7}$	90	<sup>3</sup> AUBERT,B	06J	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses the uniform phase space model for the signal decays.

<sup>2</sup> Uses  $B(\Upsilon(4S) \rightarrow B^0\bar{B}^0) = 0.486 \pm 0.006$ .

<sup>3</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ .

$\Gamma(K^*(892)^0 e^\pm \mu^\mp)/\Gamma_{\text{total}}$   $\Gamma_{578}/\Gamma$

Test of lepton family number conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.01 \times 10^{-8}$	90	<sup>1</sup> AAIJ	23G LHCB	$pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$< 1.8 \times 10^{-7}$	90	<sup>2</sup> SANDILYA	18 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 5.8 \times 10^{-7}$	90	<sup>3</sup> AUBERT,B	06J BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 34 \times 10^{-7}$	90	<sup>3</sup> AUBERT	02L BABR	Repl. by AUBERT,B 06J

<sup>1</sup> Uses the uniform phase space model for the signal decays.

<sup>2</sup> Uses  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = 0.486 \pm 0.006$ .

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(K^*(892)^0 \tau^+ \mu^-)/\Gamma_{\text{total}}$   $\Gamma_{579}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.0 \times 10^{-5}$	90	<sup>1</sup> AAIJ	23F LHCB	$pp$ at 7, 8, 13 TeV

<sup>1</sup> Using  $B^0 \rightarrow D^- D_s^+$  as normalisation decay.

$\Gamma(K^*(892)^0 \tau^- \mu^+)/\Gamma_{\text{total}}$   $\Gamma_{580}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 8.2 \times 10^{-6}$	90	<sup>1</sup> AAIJ	23F LHCB	$pp$ at 7, 8, 13 TeV

<sup>1</sup> Using  $B^0 \rightarrow D^- D_s^+$  as normalisation decay.

$\Gamma(e^\pm \tau^\mp)/\Gamma_{\text{total}}$   $\Gamma_{581}/\Gamma$

Test of lepton family number conservation. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.6 \times 10^{-5}$	90	<sup>1</sup> ATMACAN	21 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$< 2.8 \times 10^{-5}$	90	<sup>2</sup> AUBERT	08AD BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 1.1 \times 10^{-4}$	90	BORNHEIM	04 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 5.3 \times 10^{-4}$	90	AMMAR	94 CLE2	Repl. by BORNHEIM 04

<sup>1</sup> Uses events in which one  $B$  meson is fully reconstructed in a hadronic decay mode.

<sup>2</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(\mu^\pm \tau^\mp)/\Gamma_{\text{total}}$   $\Gamma_{582}/\Gamma$

Test of lepton family number conservation. Allowed by higher-order electroweak interactions.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.4 \times 10^{-5}$	95	<sup>1</sup> AAIJ	19AK LHCB	$pp$ at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$< 1.5 \times 10^{-5}$	90	<sup>2</sup> ATMACAN	21 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 2.2 \times 10^{-5}$	90	<sup>3</sup> AUBERT	08AD BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 3.8 \times 10^{-5}$	90	BORNHEIM	04 CLE2	$e^+ e^- \rightarrow \Upsilon(4S)$
$< 8.3 \times 10^{-4}$	90	AMMAR	94 CLE2	Repl. by BORNHEIM 04

<sup>1</sup> Assuming no contribution from  $B_s^0 \rightarrow \mu^\pm \tau^\mp$ .

<sup>2</sup> Uses events in which one  $B$  meson is fully reconstructed in a hadronic decay mode.

<sup>3</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma(p\mu^-)/\Gamma_{\text{total}}$				$\Gamma_{583}/\Gamma$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.6 \times 10^{-9}$	90	<sup>1</sup> AAIJ	23Y	$pp$ at 7, 8, 13 TeV

<sup>1</sup> Assumes that  $B^0$  decay branching fractions to  $p\mu^-$  and  $\bar{p}\mu^+$  are the same .

$\Gamma(\Lambda_c^+ \mu^-)/\Gamma_{\text{total}}$					$\Gamma_{584}/\Gamma$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
$<1.4 \times 10^{-6}$	90	<sup>1,2</sup> DEL-AMO-SA..11K	BABR	$e^+e^- \rightarrow \Upsilon(4S)$	

<sup>1</sup> DEL-AMO-SANCHEZ 11K reports  $< 180 \times 10^{-8}$  from a measurement of  $[\Gamma(B^0 \rightarrow \Lambda_c^+ \mu^-)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow pK^-\pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = 6.24 \times 10^{-2}$ .  
<sup>2</sup> Uses  $B(\Upsilon(4S) \rightarrow B^0\bar{B}^0) = (51.6 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^+B^-) = (48.4 \pm 0.6)\%$ .

$\Gamma(\Lambda_c^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{585}/\Gamma$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
$<4 \times 10^{-6}$	90	<sup>1,2</sup> DEL-AMO-SA..11K	BABR	$e^+e^- \rightarrow \Upsilon(4S)$	

<sup>1</sup> DEL-AMO-SANCHEZ 11K reports  $< 520 \times 10^{-8}$  from a measurement of  $[\Gamma(B^0 \rightarrow \Lambda_c^+ e^-)/\Gamma_{\text{total}}] \times [B(\Lambda_c^+ \rightarrow pK^-\pi^+)]$  assuming  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (5.0 \pm 1.3) \times 10^{-2}$ , which we rescale to our best value  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = 6.24 \times 10^{-2}$ .  
<sup>2</sup> Uses  $B(\Upsilon(4S) \rightarrow B^0\bar{B}^0) = (51.6 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^+B^-) = (48.4 \pm 0.6)\%$ .

### $B_s^0$ CROSS-PARTICLE BRANCHING RATIOS

$\Gamma([K^+K^-]_D K^*(892)^0)/\Gamma_{\text{total}} \times B(B_s^0 \rightarrow [K^+K^-]_D K^*(892)^0)$					$\Gamma_{154}/\Gamma \times B$
VALUE		DOCUMENT ID	TECN	COMMENT	
$0.10 \pm 0.02 \pm 0.01$		AAIJ	14BN LHCB	$pp$ at 7, 8 TeV	

$\Gamma([\pi^+\pi^-]_D K^*(892)^0)/\Gamma_{\text{total}} \times B(B_s^0 \rightarrow [\pi^+\pi^-]_D K^*(892)^0)$					$\Gamma_{155}/\Gamma \times B$
VALUE		DOCUMENT ID	TECN	COMMENT	
$0.15 \pm 0.04 \pm 0.01$		AAIJ	14BN LHCB	$pp$ at 7, 8 TeV	

See the related review(s):

[Polarization in  \$B\$  Decays](#)

### POLARIZATION IN $B^0$ DECAY

In decays involving two vector mesons, one can distinguish among the states in which meson polarizations are both longitudinal ( $L$ ) or both are transverse and parallel ( $\parallel$ ) or perpendicular ( $\perp$ ) to each other with the parameters  $\Gamma_L/\Gamma$ ,  $\Gamma_{\perp}/\Gamma$ , and the relative phases  $\phi_{\parallel}$  and  $\phi_{\perp}$ . See the

definitions in the note on “Polarization in  $B$  Decays” review in the  $B^0$  Particle Listings.

### $\Gamma_L/\Gamma$ in $B^0 \rightarrow J/\psi(1S)K^*(892)^0$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.571±0.007 OUR AVERAGE</b>				
0.572±0.006±0.014		<sup>1</sup> AAIJ	13AT LHCB	$pp$ at 7 TeV
0.587±0.011±0.013		<sup>2</sup> ABAZOV	09E D0	$p\bar{p}$ at 1.96 TeV
0.556±0.009±0.010		<sup>3</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.562±0.026±0.018		ACOSTA	05 CDF	$p\bar{p}$ at 1.96 TeV
0.574±0.012±0.009		ITOH	05 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.59 ±0.06 ±0.01		<sup>4</sup> AFFOLDER	00N CDF	$p\bar{p}$ at 1.8 TeV
0.52 ±0.07 ±0.04		<sup>5</sup> JESSOP	97 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.65 ±0.10 ±0.04	65	ABE	95Z CDF	$p\bar{p}$ at 1.8 TeV
0.97 ±0.16 ±0.15	13	<sup>6</sup> ALBRECHT	94G ARG	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.566±0.012±0.005		<sup>3</sup> AUBERT	05P BABR	Repl. by AUBERT 07AD
0.62 ±0.02 ±0.03		<sup>7</sup> ABE	02N BELL	Repl. by ITOH 05
0.597±0.028±0.024		<sup>8</sup> AUBERT	01H BABR	Repl. by AUBERT 07AD
0.80 ±0.08 ±0.05	42	<sup>6</sup> ALAM	94 CLE2	Sup. by JESSOP 97

<sup>1</sup> AAIJ 13AT obtains  $\Gamma_{\parallel}/\Gamma = 0.227 \pm 0.004 \pm 0.011$ . The relation  $1 = (\Gamma_L + \Gamma_{\perp} + \Gamma_{\parallel})/\Gamma$  is used to obtain  $\Gamma_L/\Gamma$ .

<sup>2</sup> Measured the angular and lifetime parameters for the time-dependent angular untagged decays  $B_d^0 \rightarrow J/\psi K^{*0}$  and  $B_s^0 \rightarrow J/\psi \phi$ .

<sup>3</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.

<sup>4</sup> AFFOLDER 00N measurements are based on 190  $B^0$  candidates obtained from a data sample of  $89 \text{ pb}^{-1}$ . The  $P$ -wave fraction is found to be  $0.13^{+0.12}_{-0.09} \pm 0.06$ .

<sup>5</sup> JESSOP 97 is the average over a mixture of  $B^0$  and  $B^+$  decays. The  $P$ -wave fraction is found to be  $0.16 \pm 0.08 \pm 0.04$ .

<sup>6</sup> Averaged over an admixture of  $B^0$  and  $B^+$  decays.

<sup>7</sup> Averaged over an admixture of  $B^0$  and  $B^+$  decays and the  $P$  wave fraction is  $(19 \pm 2 \pm 3)\%$ .

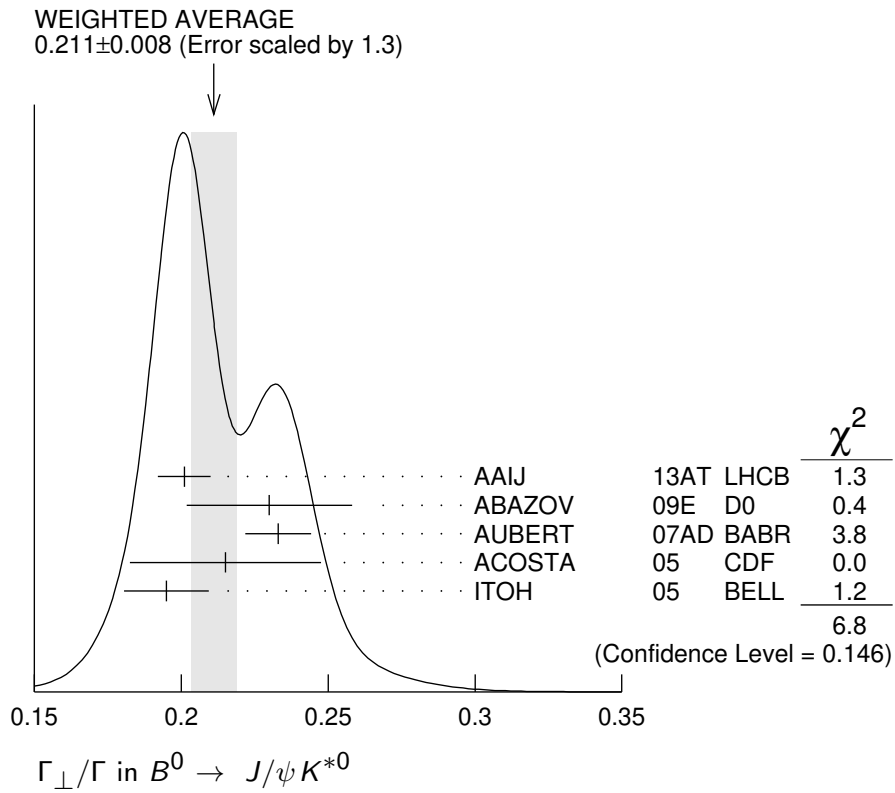
<sup>8</sup> Averaged over an admixture of  $B^0$  and  $B^-$  decays and the  $P$  wave fraction is  $(16.0 \pm 3.2 \pm 1.4) \times 10^{-2}$ .

### $\Gamma_{\perp}/\Gamma$ in $B^0 \rightarrow J/\psi K^{*0}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.211±0.008 OUR AVERAGE</b> Error includes scale factor of 1.3. See the ideogram below.			
0.201±0.004±0.008	AAIJ	13AT LHCB	$pp$ at 7 TeV
0.230±0.013±0.025	<sup>1</sup> ABAZOV	09E D0	$p\bar{p}$ at 1.96 TeV
0.233±0.010±0.005	<sup>2</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.215±0.032±0.006	ACOSTA	05 CDF	$p\bar{p}$ at 1.96 TeV
0.195±0.012±0.008	ITOH	05 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Measured the angular and lifetime parameters for the time-dependent angular untagged decays  $B_d^0 \rightarrow J/\psi K^{*0}$  and  $B_s^0 \rightarrow J/\psi \phi$ .

<sup>2</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.

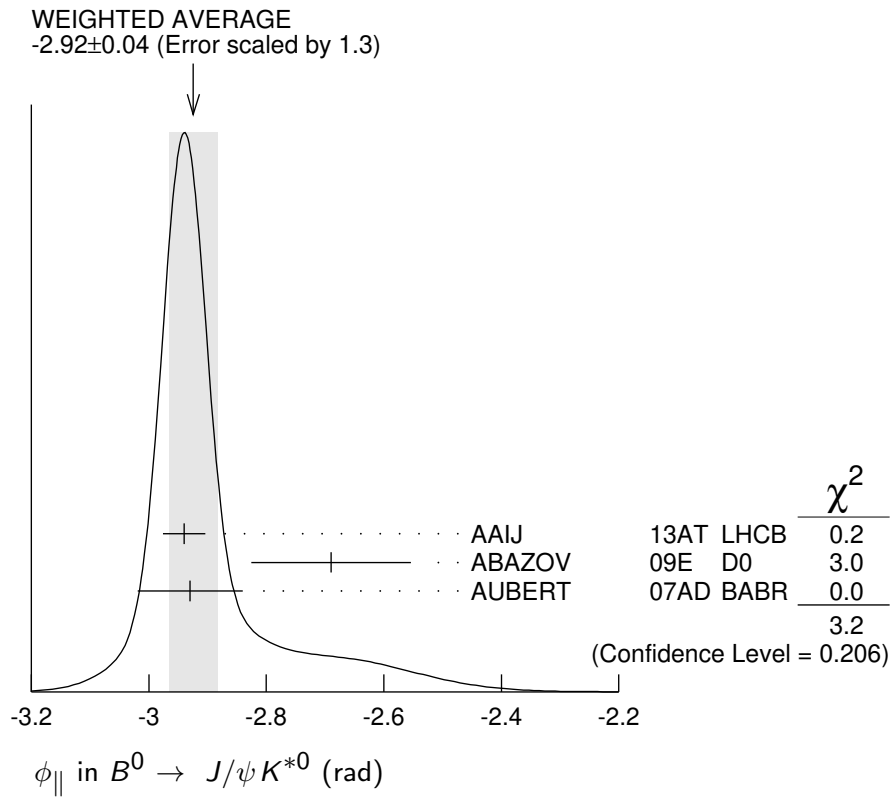


**$\phi_{\parallel}$  in  $B^0 \rightarrow J/\psi K^{*0}$**

VALUE (rad)	DOCUMENT ID	TECN	COMMENT
<b><math>-2.92 \pm 0.04</math> OUR AVERAGE</b>	Error includes scale factor of 1.3. See the ideogram below.		
$-2.94 \pm 0.02 \pm 0.03$	AAIJ	13AT LHCB	$pp$ at 7 TeV
$-2.69 \pm 0.08 \pm 0.11$	<sup>1</sup> ABAZOV	09E D0	$p\bar{p}$ at 1.96 TeV
$-2.93 \pm 0.08 \pm 0.04$	<sup>2</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Obtained  $\phi_{\parallel}$  as  $\delta_2 - \delta_1$ , assuming they are uncorrelated.

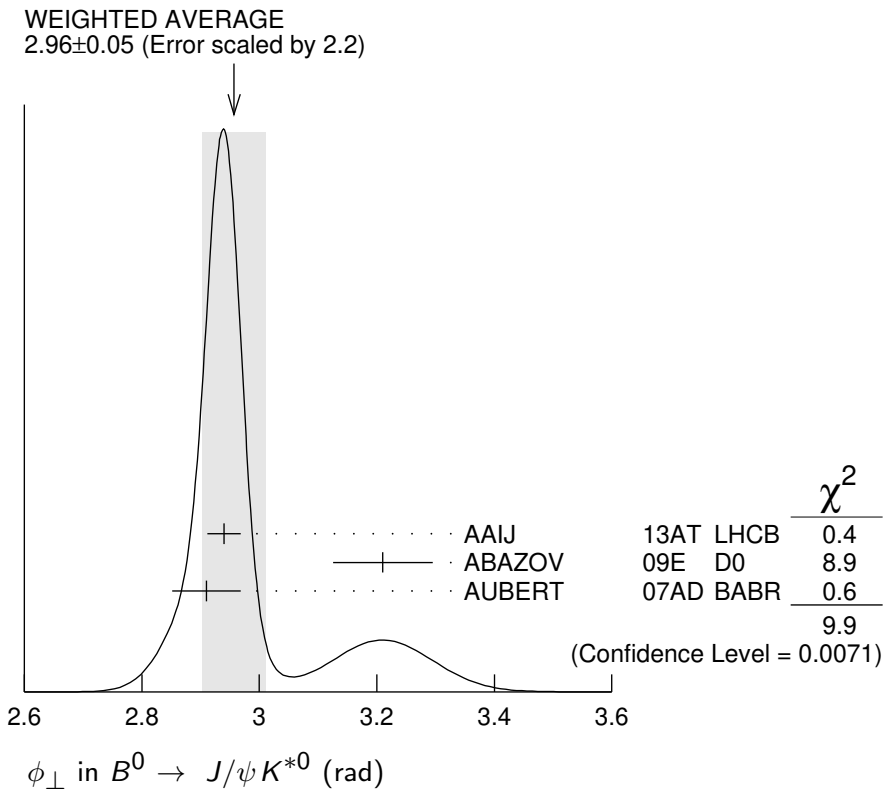
<sup>2</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.



**$\phi_{\perp}$  in  $B^0 \rightarrow J/\psi K^{*0}$**

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>2.96 \pm 0.05</math> OUR AVERAGE</b>	Error includes scale factor of 2.2. See the ideogram below.		
$2.94 \pm 0.02 \pm 0.02$	AAIJ	13AT LHCb	$pp$ at 7 TeV
$3.21 \pm 0.06 \pm 0.06$	ABAZOV	09E D0	$p\bar{p}$ at 1.96 TeV
$2.91 \pm 0.05 \pm 0.03$	<sup>1</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.



**$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \psi(2S)K^{*0}$**

VALUE	DOCUMENT ID	TECN	COMMENT
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**$0.463^{+0.028}_{-0.040}$  OUR AVERAGE**

$0.455^{+0.031}_{-0.029} +0.014_{-0.049}$	CHILIKIN	13	BELL $e^+e^- \rightarrow \gamma(4S)$
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$0.48 \pm 0.05 \pm 0.02$	<sup>1</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \gamma(4S)$
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$0.45 \pm 0.11 \pm 0.04$	<sup>2</sup> RICHICHI	01 CLE2	$e^+e^- \rightarrow \gamma(4S)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.448^{+0.040}_{-0.027} +0.040_{-0.053}$	MIZUK	09	BELL $e^+e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.

<sup>2</sup> Averages between charged and neutral  $B$  mesons.

**$\Gamma_{\perp}/\Gamma$  in  $B^0 \rightarrow \psi(2S)K^{*0}$**

VALUE	DOCUMENT ID	TECN	COMMENT
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<b><math>0.30 \pm 0.06 \pm 0.02</math></b>	<sup>1</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.

**$\phi_{\parallel}$  in  $B^0 \rightarrow \psi(2S)K^{*0}$**

VALUE (rad)	DOCUMENT ID	TECN	COMMENT
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<b><math>-2.8 \pm 0.4 \pm 0.1</math></b>	<sup>1</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.

$\phi_{\perp}$  in  $B^0 \rightarrow \psi(2S)K^{*0}$

VALUE (rad)	DOCUMENT ID	TECN	COMMENT
<b><math>2.8 \pm 0.3 \pm 0.1</math></b>	<sup>1</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \chi_{c1}K^*(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.83^{+0.06}_{-0.08}</math> OUR AVERAGE</b>	Error includes scale factor of 1.3.		

$0.947^{+0.038+0.046}_{-0.048-0.099}$	MIZUK	08 BELL	$e^+e^- \rightarrow \gamma(4S)$
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$0.77 \pm 0.07 \pm 0.04$	<sup>1</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.

$\Gamma_{\perp}/\Gamma$  in  $B^0 \rightarrow \chi_{c1}K^*(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.03 \pm 0.04 \pm 0.02</math></b>	<sup>1</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.

$\phi_{\parallel}$  in  $B^0 \rightarrow \chi_{c1}K^*(892)^0$

VALUE (rad)	DOCUMENT ID	TECN	COMMENT
<b><math>0.0 \pm 0.3 \pm 0.1</math></b>	<sup>1</sup> AUBERT	07AD BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Obtained by combining the  $B^0$  and  $B^+$  modes.

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow D^{*-}\ell^+\nu_{\ell}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.487 \pm 0.017 \pm 0.005</math></b>	PRIM	23 BELL	$e^+e^- \rightarrow \gamma(4S)$

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow D^{*-}e^+\nu_e$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.516 \pm 0.013</math> OUR AVERAGE</b>	Error includes scale factor of 1.9.		

$0.520 \pm 0.005 \pm 0.005$	ADACHI	23J BELL	$e^+e^- \rightarrow \gamma(4S)$
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$0.471 \pm 0.024 \pm 0.007$	PRIM	23 BELL	$e^+e^- \rightarrow \gamma(4S)$
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$\Gamma_L/\Gamma$  in  $B^0 \rightarrow D^{*-}\mu^+\nu_{\mu}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.525 \pm 0.007</math> OUR AVERAGE</b>			

$0.527 \pm 0.005 \pm 0.005$	ADACHI	23J BELL	$e^+e^- \rightarrow \gamma(4S)$
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$0.504 \pm 0.023 \pm 0.007$	PRIM	23 BELL	$e^+e^- \rightarrow \gamma(4S)$
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$\Delta(\Gamma_L/\Gamma)$  in  $B^0 \rightarrow D^{*-}\ell^+\nu_{\ell}$

$$\Delta(\Gamma_L/\Gamma) = (\Gamma_L/\Gamma)^{\mu} - (\Gamma_L/\Gamma)^e$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.008 \pm 0.008</math> OUR AVERAGE</b>			

$0.006 \pm 0.007 \pm 0.005$	ADACHI	23J BELL	$e^+e^- \rightarrow \gamma(4S)$
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$0.033 \pm 0.033 \pm 0.010$	PRIM	23 BELL	$e^+e^- \rightarrow \gamma(4S)$
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### $\Gamma_L/\Gamma$ in $B^0 \rightarrow D_s^{*+} D^{*-}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.574±0.014 OUR AVERAGE</b>			
0.578±0.010±0.011	<sup>1</sup> AAIJ	21S	LHCB $pp$ at 13 TeV
0.519±0.050±0.028	<sup>2</sup> AUBERT	03I	BABR $e^+e^- \rightarrow \Upsilon(4S)$
0.506±0.139±0.036	AHMED	00B	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> AAIJ 21S uses  $D_s^{*+} \rightarrow D_s^+ \gamma$  decays.

<sup>2</sup> Measurement performed using partial reconstruction of  $D^{*-}$  decay.

### $|H_+|$ in $B^0 \rightarrow D_s^{*+} D^{*-}$

$H_+$ ,  $H_-$  define parity-even ( $\parallel$ ) and parity-odd ( $\perp$ ) polarization transversity amplitudes

$$A_{\parallel,\perp} = (H_+ \pm H_-)/\sqrt{2}.$$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.195±0.022±0.032</b>	<sup>1</sup> AAIJ	21S	BELL $pp$ at 13 TeV

<sup>1</sup> AAIJ 21S uses  $D_s^{*+} \rightarrow D_s^+ \gamma$  decays.

### $|H_-|$ in $B^0 \rightarrow D_s^{*+} D^{*-}$

$H_+$ ,  $H_-$  define parity-even ( $\parallel$ ) and parity-odd ( $\perp$ ) polarization transversity amplitudes

$$A_{\parallel,\perp} = (H_+ \pm H_-)/\sqrt{2}.$$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.620±0.011±0.013</b>	<sup>1</sup> AAIJ	21S	LHCB $pp$ at 13 TeV

<sup>1</sup> AAIJ 21S uses  $D_s^{*+} \rightarrow D_s^+ \gamma$  decays.

### $\phi_+$ in $B^0 \rightarrow D_s^{*+} D^{*-}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.046±0.102±0.020</b>	<sup>1</sup> AAIJ	21S	LHCB $pp$ at 13 TeV

<sup>1</sup> AAIJ 21S uses  $D_s^{*+} \rightarrow D_s^+ \gamma$  decays.

### $\phi_-$ in $B^0 \rightarrow D_s^{*+} D^{*-}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.108±0.170±0.051</b>	<sup>1</sup> AAIJ	21S	LHCB $pp$ at 13 TeV

<sup>1</sup> AAIJ 21S uses  $D_s^{*+} \rightarrow D_s^+ \gamma$  decays.

### $\Gamma_L/\Gamma$ in $B^0 \rightarrow D^{*-} \rho^+$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.885±0.016±0.012</b>		CSORNA	03	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.93 ±0.05 ±0.05	76	ALAM	94	CLE2 $e^+e^- \rightarrow \Upsilon(4S)$

### $\Gamma_L/\Gamma$ in $B^0 \rightarrow D_s^{*+} \rho^-$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.84<sup>+0.26</sup><sub>-0.28</sub>±0.13</b>	<sup>1</sup> AUBERT	08AJ	BABR $e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow D_s^{*+} K^{*-}$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.92^{+0.37}_{-0.31} \pm 0.07$	<sup>1</sup> AUBERT	08AJ BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Assumes equal production of  $B^+$  and  $B^0$  at the  $\Upsilon(4S)$ .

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow D^{*+} D^{*-}$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.624 \pm 0.029 \pm 0.011$	KRONENBIT...12	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.57 \pm 0.08 \pm 0.02$	MIYAKE	05 BELL	Repl. by KRONENBITTER 12

$\Gamma_{\perp}/\Gamma$  in  $B^0 \rightarrow D^{*+} D^{*-}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.147 ± 0.019 OUR AVERAGE</b>			
$0.138 \pm 0.024 \pm 0.006$	KRONENBIT...12	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.158 \pm 0.028 \pm 0.006$	AUBERT	09C BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.125 \pm 0.043 \pm 0.023$	VERVINK	09 BELL	Repl. by KRONENBITTER 12
$0.143 \pm 0.034 \pm 0.008$	AUBERT	07BO BABR	Repl. by AUBERT 09C
$0.125 \pm 0.044 \pm 0.007$	AUBERT, BE	05A BABR	Repl. by AUBERT 07BO
$0.19 \pm 0.08 \pm 0.01$	MIYAKE	05 BELL	Repl. by VERVINK 09
$0.063 \pm 0.055 \pm 0.009$	AUBERT	03Q BABR	Repl. by AUBERT, BE 05A

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \bar{D}^{*0} \omega$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.665 \pm 0.047 \pm 0.015$	LEES	11M BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \bar{D}_1(2430)^0 \omega$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
$63.0 \pm 9.1^{+6.5}_{-6.0}$	<sup>1,2</sup> MATVIENKO	15 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Obtained by amplitude analysis of  $\bar{B}^0 \rightarrow D^{*-} \omega \pi^+$ . The second uncertainty combines in quadrature experimental systematic and model uncertainties.

<sup>2</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ .

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \bar{D}_1(2420)^0 \omega$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
$67.1 \pm 11.7^{+2.3}_{-5.0}$	<sup>1,2</sup> MATVIENKO	15 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Obtained by amplitude analysis of  $\bar{B}^0 \rightarrow D^{*-} \omega \pi^+$ . The second uncertainty combines in quadrature experimental systematic and model uncertainties.

<sup>2</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ .

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \bar{D}_2^*(2460)^0 \omega$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
$76.0^{+18.3+3.5}_{-8.5-2.8}$	<sup>1,2</sup> MATVIENKO	15 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Obtained by amplitude analysis of  $\bar{B}^0 \rightarrow D^{*-} \omega \pi^+$ . The second uncertainty combines in quadrature experimental systematic and model uncertainties.

<sup>2</sup> Assumes equal production of  $B^0$  and  $B^+$  at  $\Upsilon(4S)$ .

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow D^{*-} \omega \pi^+$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.654 \pm 0.042 \pm 0.016</math></b>	<sup>1</sup> AUBERT	06L	BABR $e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup>Invariant mass of the  $[\omega\pi]$  system is restricted in the region 1.1 and 1.9 GeV.

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \omega K^{*0}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.69 \pm 0.11</math> OUR AVERAGE</b>			
$0.68 \pm 0.17 \pm 0.16$	AAIJ	19J	LHCB $pp$ at 7, 8 TeV
$0.72 \pm 0.14 \pm 0.02$	AUBERT	09H	BABR $e^+ e^- \rightarrow \gamma(4S)$
$0.56 \pm 0.29^{+0.18}_{-0.08}$	GOLDENZWE..08	BELL	$e^+ e^- \rightarrow \gamma(4S)$

$\Gamma_{\perp}/\Gamma$  in  $B^0 \rightarrow \omega K^{*}(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.10 \pm 0.09 \pm 0.09</math></b>	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$A_{CP}^0$  in  $B^0 \rightarrow \omega K^{*}(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.13 \pm 0.27 \pm 0.13</math></b>	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$A_{CP}^{\perp}$  in  $B^0 \rightarrow \omega K^{*}(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.3 \pm 0.8 \pm 0.4</math></b>	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$A_{CP}^{\parallel}$  in  $B^0 \rightarrow \omega K^{*}(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.26 \pm 0.55 \pm 0.22</math></b>	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$\phi_0$  in  $B^0 \rightarrow \omega K^{*}(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.86 \pm 0.29 \pm 0.71</math></b>	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$\phi_{\perp}$  in  $B^0 \rightarrow \omega K^{*}(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>1.6 \pm 0.4 \pm 0.6</math></b>	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$\phi_{\parallel}$  in  $B^0 \rightarrow \omega K^{*}(892)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-1.83 \pm 0.29 \pm 0.32</math></b>	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \omega K_2^{*}(1430)^0$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.45 \pm 0.12 \pm 0.02</math></b>	AUBERT	09H	BABR $e^+ e^- \rightarrow \gamma(4S)$

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow K^{*0} \bar{K}^{*0}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.74 \pm 0.05</math> OUR AVERAGE</b>			
$0.724 \pm 0.051 \pm 0.016$	<sup>1</sup> AAIJ	19L	LHCB $pp$ at 7 and 8 TeV
$0.80^{+0.10}_{-0.12} \pm 0.06$	AUBERT	08I	BABR $e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup>Untagged and time-integrated analysis within 150 MeV of the  $K^{*0}$  mass.

### $\Gamma_L/\Gamma$ in $B^0 \rightarrow \phi K^*(892)^0$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.497±0.017 OUR AVERAGE</b>			
0.497±0.019±0.015	AAIJ	14AMLHCB	$pp$ at 7 TeV
0.499±0.030±0.018	PRIM	13 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.494±0.034±0.013	AUBERT	08BG BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.506±0.040±0.015	AUBERT	07D BABR	Repl. by AUBERT 08BG
0.45 ±0.05 ±0.02	CHEN	05A BELL	Repl. by PRIM 13
0.52 ±0.05 ±0.02	<sup>1</sup> AUBERT,B	04W BABR	Repl. by AUBERT 07D
0.65 ±0.07 ±0.02	AUBERT	03V BABR	Repl. by AUBERT,B 04W
0.41 ±0.10 ±0.04	CHEN	03B BELL	Repl. by CHEN 05A

<sup>1</sup> AUBERT,B 04W also measures the fraction of parity-odd transverse contribution  $f_{\perp} = 0.22 \pm 0.05 \pm 0.02$  and the phases of the parity-even and parity-odd transverse amplitudes relative to the longitudinal amplitude.

### $\Gamma_{\perp}/\Gamma$ in $B^0 \rightarrow \phi K^*(892)^0$

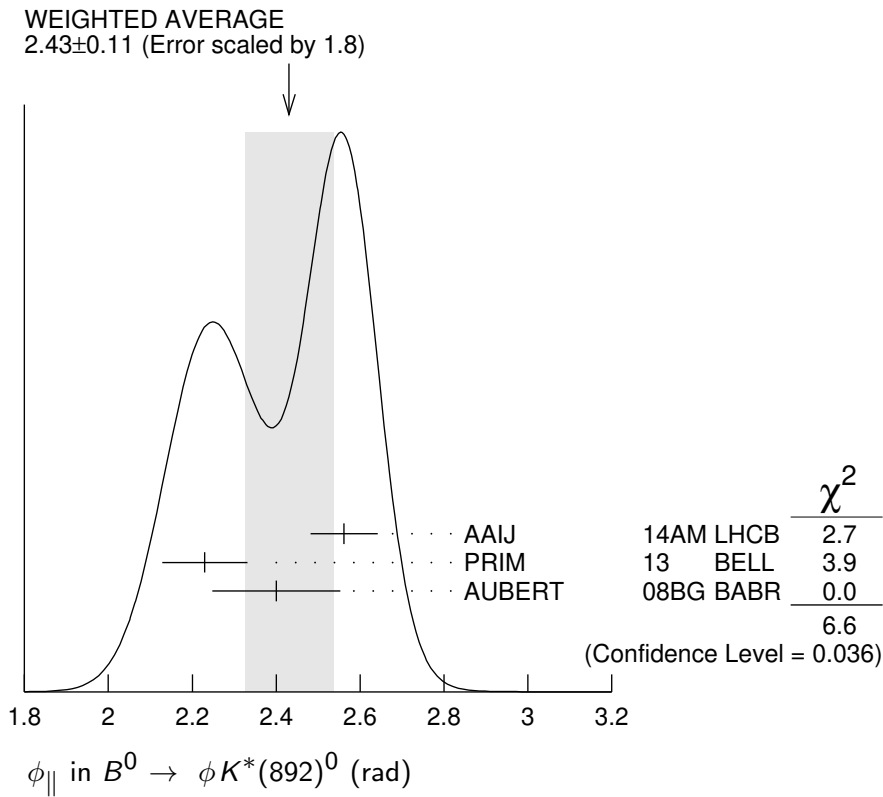
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.224±0.015 OUR AVERAGE</b>			
0.221±0.016±0.013	AAIJ	14AMLHCB	$pp$ at 7 TeV
0.238±0.026±0.008	PRIM	13 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.212±0.032±0.013	AUBERT	08BG BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.227±0.038±0.013	AUBERT	07D BABR	Repl. by AUBERT 08BG
0.31 <sup>+0.06</sup> <sub>-0.05</sub> ±0.02	<sup>1</sup> CHEN	05A BELL	Repl. by PRIM 13
0.22 ±0.05 ±0.02	AUBERT,B	04W BABR	Repl. by AUBERT 07D

<sup>1</sup> This quantity was recalculated by the BELLE authors from numbers in the original paper.

### $\phi_{\parallel}$ in $B^0 \rightarrow \phi K^*(892)^0$

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2.43 ±0.11 OUR AVERAGE</b> Error includes scale factor of 1.8. See the ideogram below.			
2.562±0.069±0.040	AAIJ	14AMLHCB	$pp$ at 7 TeV
2.23 ±0.10 ±0.02	PRIM	13 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
2.40 ±0.13 ±0.08	AUBERT	08BG BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2.31 ±0.14 ±0.08	AUBERT	07D BABR	Repl. by AUBERT 08BG
2.40 <sup>+0.28</sup> <sub>-0.24</sub> ±0.07	<sup>1</sup> CHEN	05A BELL	Repl. by PRIM 13
2.34 <sup>+0.23</sup> <sub>-0.20</sub> ±0.05	AUBERT,B	04W BABR	Repl. by AUBERT 07D

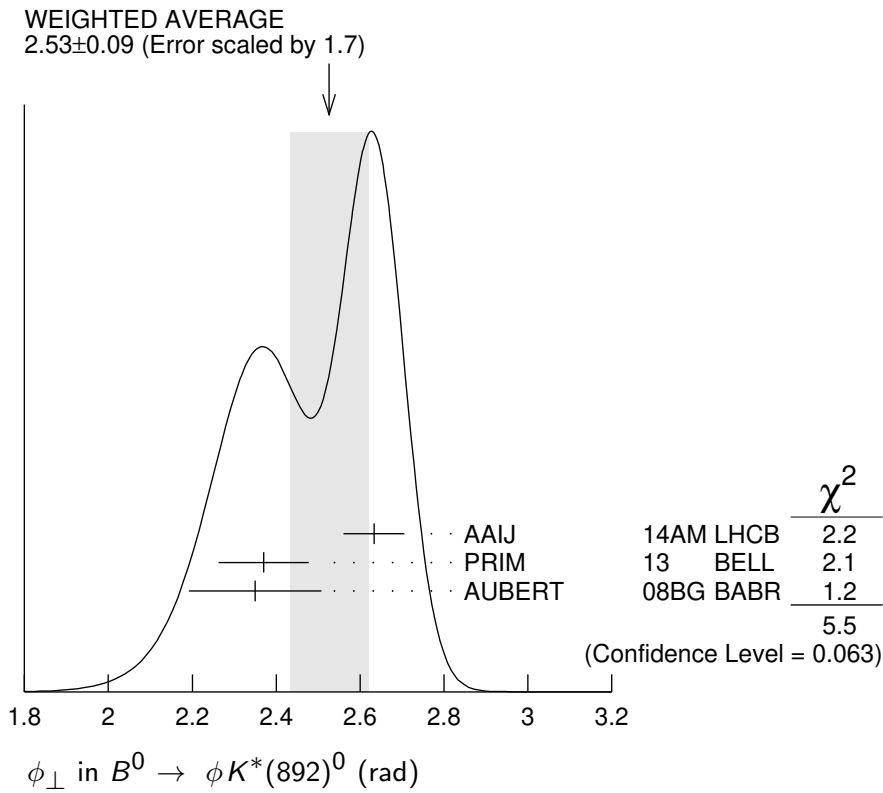
<sup>1</sup> This quantity was recalculated by the BELLE authors from numbers in the original paper.



**$\phi_{\perp}$  in  $B^0 \rightarrow \phi K^*(892)^0$**

VALUE (rad)	DOCUMENT ID	TECN	COMMENT
<b><math>2.53 \pm 0.09</math> OUR AVERAGE</b>	Error includes scale factor of 1.7. See the ideogram below.		
$2.633 \pm 0.062 \pm 0.037$	AAIJ	14AMLHCB	$pp$ at 7 TeV
$2.37 \pm 0.10 \pm 0.04$	PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$2.35 \pm 0.13 \pm 0.09$	AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$2.24 \pm 0.15 \pm 0.09$	AUBERT	07D BABR	Repl. by AUBERT 08BG
$2.51 \pm 0.25 \pm 0.06$	<sup>1</sup> CHEN	05A BELL	Repl. by PRIM 13
$2.47 \pm 0.25 \pm 0.05$	AUBERT,B	04W BABR	Repl. by AUBERT 07D

<sup>1</sup> This quantity was recalculated by the BELLE authors from numbers in the original paper.



**$\delta_0(B^0 \rightarrow \phi K^*(892)^0)$**

VALUE (rad)	DOCUMENT ID	TECN	COMMENT
<b><math>2.88 \pm 0.10</math> OUR AVERAGE</b>			
$2.91 \pm 0.10 \pm 0.08$	PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$2.82 \pm 0.15 \pm 0.09$	AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$2.78 \pm 0.17 \pm 0.09$	AUBERT	07D BABR	Repl. by AUBERT 08BG

**$A_{CP}^0$  in  $B^0 \rightarrow \phi K^*(892)^0$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.007 \pm 0.030</math> OUR AVERAGE</b>			
$-0.003 \pm 0.038 \pm 0.005$	AAIJ	14AMLHCB	$pp$ at 7 TeV
$-0.030 \pm 0.061 \pm 0.007$	PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.01 \pm 0.07 \pm 0.02$	AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.03 \pm 0.08 \pm 0.02$	AUBERT	07D BABR	Repl. by AUBERT 08BG
$0.13 \pm 0.12 \pm 0.04$	<sup>1</sup> CHEN	05A BELL	Repl. by PRIM 13
$-0.06 \pm 0.10 \pm 0.01$	AUBERT,B	04W BABR	Repl. by AUBERT 07D

<sup>1</sup> This quantity was recalculated by the BELLE authors from numbers in the original paper.

**$A_{CP}^{\perp}$  in  $B^0 \rightarrow \phi K^*(892)^0$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.02 \pm 0.06</math> OUR AVERAGE</b>			
$0.047 \pm 0.074 \pm 0.009$	AAIJ	14AMLHCB	$pp$ at 7 TeV
$-0.14 \pm 0.11 \pm 0.01$	PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$-0.04 \pm 0.15 \pm 0.06$	AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.03 \pm 0.16 \pm 0.05$	AUBERT	07D	BABR	Repl. by AUBERT 08BG
$-0.20 \pm 0.18 \pm 0.04$	<sup>1</sup> CHEN	05A	BELL	Repl. by PRIM 13
$-0.10 \pm 0.24 \pm 0.05$	AUBERT,B	04W	BABR	Repl. by AUBERT 07D

<sup>1</sup> This quantity was recalculated by the BELLE authors from numbers in the original paper.

### $\Delta\phi_{\parallel}$ in $B^0 \rightarrow \phi K^*(892)^0$

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.05 ± 0.05 OUR AVERAGE</b>			
$0.045 \pm 0.069 \pm 0.015$	AAIJ	14AMLHCB	$p\bar{p}$ at 7 TeV
$-0.02 \pm 0.10 \pm 0.01$	PRIM	13 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.22 \pm 0.12 \pm 0.08$	AUBERT	08BG BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.24 \pm 0.14 \pm 0.08$	AUBERT	07D	BABR	Repl. by AUBERT 08BG
$-0.32 \pm 0.27 \pm 0.07$	<sup>1</sup> CHEN	05A	BELL	Repl. by PRIM 13
$0.27 \begin{smallmatrix} +0.20 \\ -0.23 \end{smallmatrix} \pm 0.05$	AUBERT,B	04W	BABR	Repl. by AUBERT 07D

<sup>1</sup> This quantity was recalculated by the BELLE authors from numbers in the original paper.

### $\Delta\phi_{\perp}$ in $B^0 \rightarrow \phi K^*(892)^0$

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.08 ± 0.05 OUR AVERAGE</b>			
$0.062 \pm 0.062 \pm 0.005$	AAIJ	14AMLHCB	$p\bar{p}$ at 7 TeV
$0.05 \pm 0.10 \pm 0.02$	PRIM	13 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.21 \pm 0.13 \pm 0.08$	AUBERT	08BG BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.19 \pm 0.15 \pm 0.08$	AUBERT	07D	BABR	Repl. by AUBERT 08BG
$-0.30 \pm 0.25 \pm 0.06$	<sup>1</sup> CHEN	05A	BELL	Repl. by PRIM 13
$0.36 \pm 0.25 \pm 0.05$	AUBERT,B	04W	BABR	Repl. by AUBERT 07D

<sup>1</sup> This quantity was recalculated by the BELLE authors from numbers in the original paper.

### $\Delta\delta_0(B^0 \rightarrow \phi K^*(892)^0)$

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.13 ± 0.09 OUR AVERAGE</b>			
$0.08 \pm 0.10 \pm 0.01$	PRIM	13 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.27 \pm 0.14 \pm 0.08$	AUBERT	08BG BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.21 \pm 0.17 \pm 0.08$	AUBERT	07D	BABR	Repl. by AUBERT 08BG
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### $\Delta\phi_{00}(B^0 \rightarrow \phi K_0^*(1430)^0)$

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.28 ± 0.42 ± 0.04</b>	AUBERT	08BG BABR	$e^+e^- \rightarrow \Upsilon(4S)$

### $\Gamma_{\perp}/\Gamma$ in $B^0 \rightarrow \phi K_2^*(1430)^0$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.913^{+0.028}_{-0.050}</math> OUR AVERAGE</b>			
$0.918^{+0.029}_{-0.060} \pm 0.012$	PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.901^{+0.046}_{-0.058} \pm 0.037$	AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.853^{+0.061}_{-0.069} \pm 0.036$	AUBERT	07D BABR	Repl. by AUBERT 08BG

### $\Gamma_{\perp}/\Gamma$ in $B^0 \rightarrow \phi K_2^*(1430)^0$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.027^{+0.031}_{-0.025}</math> OUR AVERAGE</b>			Error includes scale factor of 1.1.
$0.056^{+0.050}_{-0.035} \pm 0.009$	PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.002^{+0.018}_{-0.002} \pm 0.031$	AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.045^{+0.049}_{-0.040} \pm 0.013$	AUBERT	07D BABR	Repl. by AUBERT 08BG

### $\phi_{\parallel}$ in $B^0 \rightarrow \phi K_2^*(1430)^0$

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>4.0 \pm 0.4</math> OUR AVERAGE</b>			
$3.76 \pm 2.88 \pm 1.32$	PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$3.96 \pm 0.38 \pm 0.06$	AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$2.90 \pm 0.39 \pm 0.06$	AUBERT	07D BABR	Repl. by AUBERT 08BG

### $\phi_{\perp}$ in $B^0 \rightarrow \phi K_2^*(1430)^0$

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>4.45^{+0.43}_{-0.38} \pm 0.13</math></b>	PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$5.72^{+0.55}_{-0.87} \pm 0.11$	AUBERT	07D BABR	Repl. by AUBERT 08BG

### $\delta_0(B^0 \rightarrow \phi K_2^*(1430)^0)$

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>3.46 \pm 0.14</math> OUR AVERAGE</b>			
$3.53 \pm 0.11 \pm 0.19$	PRIM	13 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$3.41 \pm 0.13 \pm 0.13$	AUBERT	08BG BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$3.54^{+0.12}_{-0.14} \pm 0.06$	AUBERT	07D BABR	Repl. by AUBERT 08BG



**$A_{CP}^0$  in  $B^0 \rightarrow \phi K_2^*(1430)^0$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.03 \pm 0.04</math> OUR AVERAGE</b>			
$-0.016^{+0.066}_{-0.051} \pm 0.008$	PRIM	13 BELL	$e^+e^- \rightarrow \gamma(4S)$
$-0.05 \pm 0.06 \pm 0.01$	AUBERT	08BG BABR	$e^+e^- \rightarrow \gamma(4S)$

**$A_{CP}^\perp$  in  $B^0 \rightarrow \phi K_2^*(1430)^0$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.01^{+0.85}_{-0.67} \pm 0.09</math></b>			
	PRIM	13 BELL	$e^+e^- \rightarrow \gamma(4S)$

**$\Delta\phi_{\parallel}(B^0 \rightarrow \phi K_2^*(1430)^0)$**

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.9 \pm 0.4</math> OUR AVERAGE</b>			
$-0.02 \pm 1.08 \pm 1.01$	PRIM	13 BELL	$e^+e^- \rightarrow \gamma(4S)$
$-1.00 \pm 0.38 \pm 0.09$	AUBERT	08BG BABR	$e^+e^- \rightarrow \gamma(4S)$

**$\Delta\phi_{\perp}(B^0 \rightarrow \phi K_2^*(1430)^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.19 \pm 0.42 \pm 0.11</math></b>			
	PRIM	13 BELL	$e^+e^- \rightarrow \gamma(4S)$

**$\Delta\delta_0$  in  $B^0 \rightarrow \phi K_2^*(1430)^0$**

<u>VALUE (rad)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.08 \pm 0.09</math> OUR AVERAGE</b>			
$0.06 \pm 0.11 \pm 0.02$	PRIM	13 BELL	$e^+e^- \rightarrow \gamma(4S)$
$0.11 \pm 0.13 \pm 0.06$	AUBERT	08BG BABR	$e^+e^- \rightarrow \gamma(4S)$

**$\Gamma_L/\Gamma$  in  $B^0 \rightarrow K^*(892)^0 \rho^0$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.173 \pm 0.026</math> OUR AVERAGE</b>			
$0.164 \pm 0.015 \pm 0.022$	AAIJ	19J LHCB	$pp$ at 7, 8 TeV
$0.40 \pm 0.08 \pm 0.11$	LEES	12K BABR	$e^+e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.57 \pm 0.09 \pm 0.08$	AUBERT,B	06G BABR	Repl. by LEES 12K

**$\Gamma_{\perp}/\Gamma$  in  $B^0 \rightarrow K^*(892)^0 \rho^0$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.401 \pm 0.016 \pm 0.037</math></b>			
	AAIJ	19J LHCB	$pp$ at 7, 8 TeV

**$A_{CP}^0$  in  $B^0 \rightarrow K^*(892)^0 \rho^0$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.62 \pm 0.09 \pm 0.09</math></b>			
	AAIJ	19J LHCB	$pp$ at 7, 8 TeV

**$A_{CP}^\perp$  in  $B^0 \rightarrow K^*(892)^0 \rho^0$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.050 \pm 0.039 \pm 0.015</math></b>			
	AAIJ	19J LHCB	$pp$ at 7, 8 TeV

**$A_{CP}^{\parallel}$  in  $B^0 \rightarrow K^*(892)^0 \rho^0$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.188 \pm 0.037 \pm 0.022</math></b>			
	AAIJ	19J LHCB	$pp$ at 7, 8 TeV

$\phi_0$  in  $B^0 \rightarrow K^*(892)^0 \rho^0$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$1.57 \pm 0.08 \pm 0.18$	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$\phi_{\perp}$  in  $B^0 \rightarrow K^*(892)^0 \rho^0$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-2.365 \pm 0.032 \pm 0.054$	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$\phi_{\parallel}$  in  $B^0 \rightarrow K^*(892)^0 \rho^0$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.795 \pm 0.030 \pm 0.068$	AAIJ	19J	LHCB $pp$ at 7, 8 TeV

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow K^{*+} \rho^-$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.38 \pm 0.13 \pm 0.03$	LEES	12K	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \rho^+ \rho^-$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**0.990<sup>+0.021</sup><sub>-0.019</sub> OUR AVERAGE**

0.988 ± 0.012 ± 0.023 VANHOEFER 16 BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

0.992 ± 0.024<sup>+0.026</sup><sub>-0.013</sub> AUBERT 07BF BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.941<sup>+0.034</sup><sub>-0.040</sub> ± 0.030 SOMOV 06 BELL Repl. by VANHOEFER 16

0.978 ± 0.014<sup>+0.021</sup><sub>-0.029</sub> AUBERT,B 05C BABR Repl. by AUBERT 07BF

0.98<sup>+0.02</sup><sub>-0.08</sub> ± 0.03 AUBERT 04G BABR Repl. by AUBERT,B 04R

0.99 ± 0.03<sup>+0.04</sup><sub>-0.03</sub> AUBERT,B 04R BABR Repl. by AUBERT,B 05C

$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \rho^0 \rho^0$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**0.71<sup>+0.08</sup><sub>-0.09</sub> OUR AVERAGE** Error includes scale factor of 1.6. See the ideogram below.

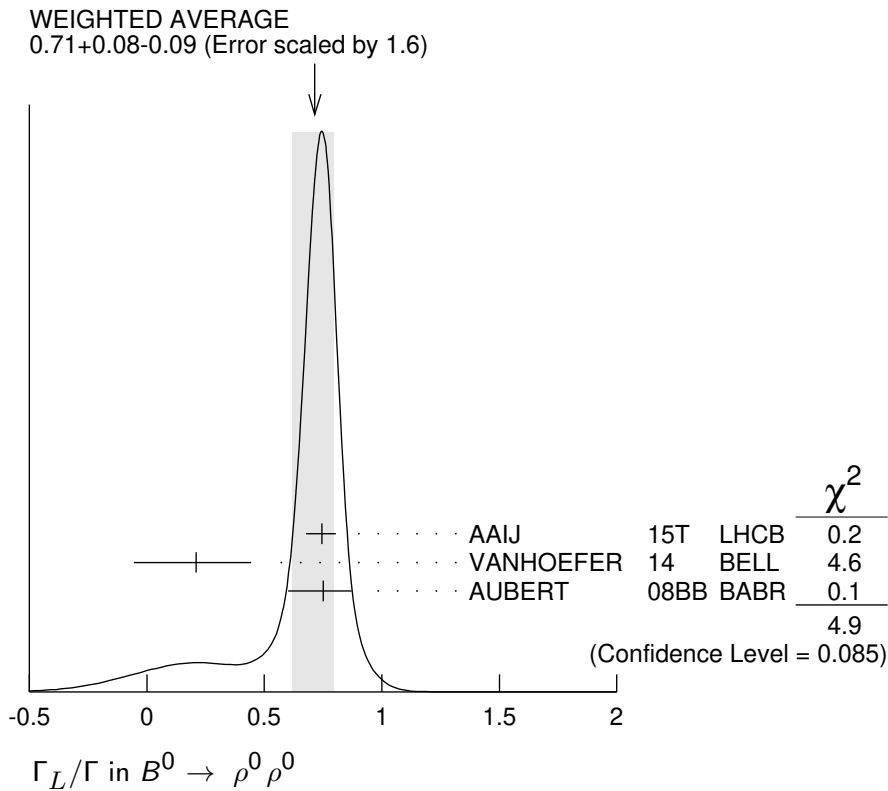
0.745<sup>+0.048</sup><sub>-0.058</sub> ± 0.034 AAIJ 15T LHCB  $pp$  at 7, 8 TeV

0.21<sup>+0.18</sup><sub>-0.22</sub> ± 0.15 VANHOEFER 14 BELL  $e^+ e^- \rightarrow \Upsilon(4S)$

0.75<sup>+0.11</sup><sub>-0.14</sub> ± 0.05 AUBERT 08BB BABR  $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.87 ± 0.13 ± 0.04 AUBERT 07G BABR Repl. by AUBERT 08BB



**$\Gamma_L/\Gamma$  in  $B^0 \rightarrow a_1(1260)^+ a_1(1260)^-$**

VALUE	DOCUMENT ID	TECN	COMMENT
$0.31 \pm 0.22 \pm 0.10$	AUBERT	09AL BABR	$e^+ e^- \rightarrow \gamma(4S)$

**$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \rho^- \bar{p} K^*(892)^0$**

VALUE	DOCUMENT ID	TECN	COMMENT
$1.01 \pm 0.13 \pm 0.03$	CHEN	08c BELL	$e^+ e^- \rightarrow \gamma(4S)$

**$\Gamma_L/\Gamma$  in  $B^0 \rightarrow \Lambda \bar{\Lambda} K^*(892)^0$**

VALUE	DOCUMENT ID	TECN	COMMENT
$0.60 \pm 0.22 \pm 0.08$	CHANG	09 BELL	$e^+ e^- \rightarrow \gamma(4S)$

**$\Gamma_L/\Gamma$  in  $B^0 \rightarrow K^*(892)^0 \mu^+ \mu^-$  ( $0.04 < q^2 < 6.0 \text{ GeV}^2/c^4$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
$0.50 \pm 0.06 \pm 0.04$	<sup>1</sup> AABOUD	18BY ATLS	$pp$ at 8 TeV

<sup>1</sup> A set of angular parameters obtained for this decay is also presented.

**$\Gamma_L/\Gamma$  in  $B^0 \rightarrow K^*(892)^0 e^+ e^-$  (at low  $q^2$ )**

VALUE	DOCUMENT ID	TECN	COMMENT
$0.044 \pm 0.026 \pm 0.014$	<sup>1</sup> AAIJ	20AO LHCb	$pp$ at 7, 8, 13 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.16 \pm 0.06 \pm 0.03$	<sup>2</sup> AAIJ	15Z LHCb	Repl. by AAIJ 20AO
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<sup>1</sup> Determined in the effective dielectron invariant mass range  $0.0008 < q^2 < 0.257 \text{ GeV}^2/c^4$ .

<sup>2</sup> Determined in the effective dielectron invariant mass range  $0.002 < q^2 < 1.120 \text{ GeV}^2/c^4$ .

### $A_T^{(2)}$ in $B^0 \rightarrow K^*(892)^0 e^+ e^-$ (at low $q^2$ )

VALUE	DOCUMENT ID	TECN	COMMENT
$0.11 \pm 0.10 \pm 0.02$	<sup>1</sup> AAIJ	20AO LHCB	$pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.23 \pm 0.23 \pm 0.05$	<sup>2</sup> AAIJ	15Z LHCB	Repl. by AAIJ 20AO
<sup>1</sup> Determined in the effective dielectron invariant mass range $0.0008 < q^2 < 0.257 \text{ GeV}^2/c^4$ .			
<sup>2</sup> Determined in the effective dielectron invariant mass range $0.002 < q^2 < 1.120 \text{ GeV}^2/c^4$ .			

### $A_T^{Im}$ in $B^0 \rightarrow K^*(892)^0 e^+ e^-$ (at low $q^2$ )

VALUE	DOCUMENT ID	TECN	COMMENT
$0.02 \pm 0.10 \pm 0.01$	<sup>1</sup> AAIJ	20AO LHCB	$pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.14 \pm 0.22 \pm 0.05$	<sup>2</sup> AAIJ	15Z LHCB	Repl. by AAIJ 20AO
<sup>1</sup> Determined in the effective dielectron invariant mass range $0.0008 < q^2 < 0.257 \text{ GeV}^2/c^4$ .			
<sup>2</sup> Determined in the effective dielectron invariant mass range $0.002 < q^2 < 1.120 \text{ GeV}^2/c^4$ .			

### $A_T^{Re}$ in $B^0 \rightarrow K^*(892)^0 e^+ e^-$ (at low $q^2$ )

Related to  $A_{FB}$ ,  $F_L$  by  $A_T^{Re} = (4/3) A_{FB} / (1 - F_L)$ .

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.06 \pm 0.08 \pm 0.02$	<sup>1</sup> AAIJ	20AO LHCB	$pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.10 \pm 0.18 \pm 0.05$	<sup>2</sup> AAIJ	15Z LHCB	Repl. by AAIJ 20AO
<sup>1</sup> Determined in the effective dielectron invariant mass range $0.0008 < q^2 < 0.257 \text{ GeV}^2/c^4$ .			
<sup>2</sup> Determined in the effective dielectron invariant mass range $0.002 < q^2 < 1.120 \text{ GeV}^2/c^4$ .			

See the related review(s):

[B<sup>0</sup> — B<sup>0</sup> Mixing](#)

## B<sup>0</sup>-B<sup>0</sup> MIXING PARAMETERS

For a discussion of  $B^0$ - $\bar{B}^0$  mixing see the note on “ $B^0$ - $\bar{B}^0$  Mixing” in the  $B^0$  Particle Listings above.

$\chi_d$  is a measure of the time-integrated  $B^0$ - $\bar{B}^0$  mixing probability that a produced  $B^0$  ( $\bar{B}^0$ ) decays as a  $\bar{B}^0$  ( $B^0$ ). Mixing violates  $\Delta B \neq 2$  rule.

$$\chi_d = \frac{x_d^2}{2(1+x_d^2)}$$

$$x_d = \frac{\Delta m_{B^0}}{\Gamma_{B^0}} = (m_{B_H^0} - m_{B_L^0}) \tau_{B^0},$$

where  $H, L$  stand for heavy and light states of two  $B^0$   $CP$  eigenstates and

$$\tau_{B^0} = \frac{1}{0.5(\Gamma_{B_H^0} + \Gamma_{B_L^0})}.$$

### $\chi_d$

This  $B^0\text{-}\bar{B}^0$  mixing parameter is the probability (integrated over time) that a produced  $B^0$  (or  $\bar{B}^0$ ) decays as a  $\bar{B}^0$  (or  $B^0$ ), e.g. for inclusive lepton decays

$$\chi_d = \Gamma(B^0 \rightarrow \ell^- X \text{ (via } \bar{B}^0)) / \Gamma(B^0 \rightarrow \ell^\pm X) \\ = \Gamma(\bar{B}^0 \rightarrow \ell^+ X \text{ (via } B^0)) / \Gamma(\bar{B}^0 \rightarrow \ell^\pm X)$$

Where experiments have measured the parameter  $r = \chi/(1-\chi)$ , we have converted to  $\chi$ . Mixing violates the  $\Delta B \neq 2$  rule.

Note that the measurement of  $\chi$  at energies higher than the  $\Upsilon(4S)$  have not separated  $\chi_d$  from  $\chi_s$  where the subscripts indicate  $B^0(\bar{b}d)$  or  $B_s^0(\bar{b}s)$ . They are listed in the  $B^\pm/B^0/B_s^0/b$ -baryon ADMIXTURE section.

The experiments at  $\Upsilon(4S)$  make an assumption about the  $B^0\bar{B}^0$  fraction and about the ratio of the  $B^\pm$  and  $B^0$  semileptonic branching ratios (usually that it equals one).

“OUR EVALUATION” is an average using rescaled values of the data listed below. The averaging/rescaling procedure takes into account correlations between the measurements, includes  $\chi_d$  calculated from  $\Delta m_{B^0}$  and  $\tau_{B^0}$ .

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>0.1860 ± 0.0011 OUR EVALUATION</b>		(Produced by HFLAV)		
<b>0.182 ± 0.015 OUR AVERAGE</b>				
0.198 ± 0.013 ± 0.014		<sup>1</sup> BEHRENS	00B CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.16 ± 0.04 ± 0.04		<sup>2</sup> ALBRECHT	94 ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.149 ± 0.023 ± 0.022		<sup>3</sup> BARTELT	93 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
0.171 ± 0.048		<sup>4</sup> ALBRECHT	92L ARG	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.20 ± 0.13 ± 0.12		<sup>5</sup> ALBRECHT	96D ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.19 ± 0.07 ± 0.09		<sup>6</sup> ALBRECHT	96D ARG	$e^+e^- \rightarrow \Upsilon(4S)$
0.24 ± 0.12		<sup>7</sup> ELSEN	90 JADE	$e^+e^-$ 35–44 GeV
0.158 <sup>+0.052</sup> / <sub>-0.059</sub>		ARTUSO	89 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
0.17 ± 0.05		<sup>8</sup> ALBRECHT	87I ARG	$e^+e^- \rightarrow \Upsilon(4S)$
<0.19	90	<sup>9</sup> BEAN	87B CLEO	$e^+e^- \rightarrow \Upsilon(4S)$
<0.27	90	<sup>10</sup> AVERY	84 CLEO	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> BEHRENS 00B uses high-momentum lepton tags and partially reconstructed  $\bar{B}^0 \rightarrow D^{*+}\pi^-, \rho^-$  decays to determine the flavor of the  $B$  meson.

<sup>2</sup> ALBRECHT 94 reports  $r=0.194 \pm 0.062 \pm 0.054$ . We convert to  $\chi$  for comparison. Uses tagged events (lepton + pion from  $D^*$ ).

<sup>3</sup> BARTELT 93 analysis performed using tagged events (lepton+pion from  $D^*$ ). Using dilepton events they obtain  $0.157 \pm 0.016^{+0.033}_{-0.028}$ .

<sup>4</sup> ALBRECHT 92L is a combined measurement employing several lepton-based techniques. It uses all previous ARGUS data in addition to new data and therefore supersedes ALBRECHT 87I. A value of  $r = 20.6 \pm 7.0\%$  is directly measured. The value can be used to measure  $x = \Delta M/\Gamma = 0.72 \pm 0.15$  for the  $B_d$  meson. Assumes  $f_{+-}/f_0 = 1.0 \pm 0.05$  and uses  $\tau_{B^\pm}/\tau_{B^0} = (0.95 \pm 0.14) (f_{+-}/f_0)$ .

<sup>5</sup> Uses  $D^{*+} K^\pm$  correlations.

<sup>6</sup> Uses  $(D^{*+} \ell^-) K^\pm$  correlations.

<sup>7</sup> These experiments see a combination of  $B_s$  and  $B_d$  mesons.

<sup>8</sup> ALBRECHT 87I is inclusive measurement with like-sign dileptons, with tagged  $B$  decays plus leptons, and one fully reconstructed event. Measures  $r=0.21 \pm 0.08$ . We convert to  $\chi$  for comparison. Superseded by ALBRECHT 92L.

<sup>9</sup> BEAN 87B measured  $r < 0.24$ ; we converted to  $\chi$ .

<sup>10</sup> Same-sign dilepton events. Limit assumes semileptonic BR for  $B^+$  and  $B^0$  equal. If  $B^0/B^\pm$  ratio  $< 0.58$ , no limit exists. The limit was corrected in BEAN 87B from  $r < 0.30$  to  $r < 0.37$ . We converted this limit to  $\chi$ .

$$\Delta m_{B^0} = m_{B_H^0} - m_{B_L^0}$$

$\Delta m_{B^0}$  is a measure of  $2\pi$  times the  $B^0-\bar{B}^0$  oscillation frequency in time-dependent mixing experiments.

“OUR EVALUATION” is an average using rescaled values of the data listed below. The averaging/rescaling procedure takes into account correlations between the measurements and includes  $\Delta m_d$  calculated from  $\chi_d$  measured at  $\Upsilon(4S)$ .

VALUE ( $10^{12} \hbar s^{-1}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.5069 ± 0.0019 OUR EVALUATION</b> (Produced by HFLAV)			
0.516 ± 0.008 ± 0.005	<sup>1</sup> ABUDINEN	23D BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.5050 ± 0.0021 ± 0.0010	<sup>2</sup> AAIJ	16AV LHCb	$pp$ at 7, 8 TeV
0.503 ± 0.011 ± 0.013	<sup>3</sup> AAIJ	13CF LHCb	$pp$ at 7 TeV
0.5156 ± 0.0051 ± 0.0033	<sup>4</sup> AAIJ	13F LHCb	$pp$ at 7 TeV
0.499 ± 0.032 ± 0.003	<sup>5</sup> AAIJ	12I LHCb	$pp$ at 7 TeV
0.506 ± 0.020 ± 0.016	<sup>6</sup> ABAZOV	06W D0	$p\bar{p}$ at 1.96 TeV
0.511 ± 0.007 <sup>+0.007</sup> <sub>-0.006</sub>	<sup>7</sup> AUBERT	06G BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.511 ± 0.005 ± 0.006	<sup>8</sup> ABE	05B BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.531 ± 0.025 ± 0.007	<sup>9</sup> ABDALLAH	03B DLPH	$e^+e^- \rightarrow Z$
0.492 ± 0.018 ± 0.013	<sup>10</sup> AUBERT	03C BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.503 ± 0.008 ± 0.010	<sup>11</sup> HASTINGS	03 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.509 ± 0.017 ± 0.020	<sup>12</sup> ZHENG	03 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.516 ± 0.016 ± 0.010	<sup>13</sup> AUBERT	02I BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.493 ± 0.012 ± 0.009	<sup>14</sup> AUBERT	02J BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.497 ± 0.024 ± 0.025	<sup>15</sup> ABBIENDI,G	00B OPAL	$e^+e^- \rightarrow Z$
0.503 ± 0.064 ± 0.071	<sup>16</sup> ABE	99K CDF	$p\bar{p}$ at 1.8 TeV
0.500 ± 0.052 ± 0.043	<sup>17</sup> ABE	99Q CDF	$p\bar{p}$ at 1.8 TeV
0.516 ± 0.099 <sup>+0.029</sup> <sub>-0.035</sub>	<sup>18</sup> AFFOLDER	99C CDF	$p\bar{p}$ at 1.8 TeV
0.471 <sup>+0.078</sup> <sub>-0.068</sub> <sup>+0.033</sup> <sub>-0.034</sub>	<sup>19</sup> ABE	98C CDF	$p\bar{p}$ at 1.8 TeV
0.458 ± 0.046 ± 0.032	<sup>20</sup> ACCIARRI	98D L3	$e^+e^- \rightarrow Z$
0.437 ± 0.043 ± 0.044	<sup>21</sup> ACCIARRI	98D L3	$e^+e^- \rightarrow Z$
0.472 ± 0.049 ± 0.053	<sup>22</sup> ACCIARRI	98D L3	$e^+e^- \rightarrow Z$
0.523 ± 0.072 ± 0.043	<sup>23</sup> ABREU	97N DLPH	$e^+e^- \rightarrow Z$
0.493 ± 0.042 ± 0.027	<sup>21</sup> ABREU	97N DLPH	$e^+e^- \rightarrow Z$
0.499 ± 0.053 ± 0.015	<sup>24</sup> ABREU	97N DLPH	$e^+e^- \rightarrow Z$
0.480 ± 0.040 ± 0.051	<sup>20</sup> ABREU	97N DLPH	$e^+e^- \rightarrow Z$
0.444 ± 0.029 <sup>+0.020</sup> <sub>-0.017</sub>	<sup>21</sup> ACKERSTAFF	97U OPAL	$e^+e^- \rightarrow Z$
0.430 ± 0.043 <sup>+0.028</sup> <sub>-0.030</sub>	<sup>20</sup> ACKERSTAFF	97V OPAL	$e^+e^- \rightarrow Z$

0.482 ±0.044 ±0.024	25	BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
0.404 ±0.045 ±0.027	21	BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
0.452 ±0.039 ±0.044	20	BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
0.539 ±0.060 ±0.024	26	ALEXANDER	96V	OPAL	$e^+e^- \rightarrow Z$
0.567 ±0.089 $\begin{smallmatrix} +0.029 \\ -0.023 \end{smallmatrix}$	27	ALEXANDER	96V	OPAL	$e^+e^- \rightarrow Z$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
0.516 ±0.016 ±0.010	28	AUBERT	02N	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.494 ±0.012 ±0.015	29	HARA	02	BELL	Repl. by ABE 05B
0.528 ±0.017 ±0.011	30	TOMURA	02	BELL	Repl. by ABE 05B
0.463 ±0.008 ±0.016	14	ABE	01D	BELL	Repl. by HASTINGS 03
0.444 ±0.028 ±0.028	31	ACCIARRI	98D	L3	$e^+e^- \rightarrow Z$
0.497 ±0.035	32	ABREU	97N	DLPH	$e^+e^- \rightarrow Z$
0.467 ±0.022 $\begin{smallmatrix} +0.017 \\ -0.015 \end{smallmatrix}$	33	ACKERSTAFF	97V	OPAL	$e^+e^- \rightarrow Z$
0.446 ±0.032	34	BUSKULIC	97D	ALEP	$e^+e^- \rightarrow Z$
0.531 $\begin{smallmatrix} +0.050 \\ -0.046 \end{smallmatrix}$ ±0.078	35	ABREU	96Q	DLPH	Sup. by ABREU 97N
0.496 $\begin{smallmatrix} +0.055 \\ -0.051 \end{smallmatrix}$ ±0.043	20	ACCIARRI	96E	L3	Repl. by ACCIARRI 98D
0.548 ±0.050 $\begin{smallmatrix} +0.023 \\ -0.019 \end{smallmatrix}$	36	ALEXANDER	96V	OPAL	$e^+e^- \rightarrow Z$
0.496 ±0.046	37	AKERS	95J	OPAL	Repl. by ACKERSTAFF 97V
0.462 $\begin{smallmatrix} +0.040 \\ -0.053 \end{smallmatrix}$ $\begin{smallmatrix} +0.052 \\ -0.035 \end{smallmatrix}$	20	AKERS	95J	OPAL	Repl. by ACKERSTAFF 97V
0.50 ±0.12 ±0.06	23	ABREU	94M	DLPH	Sup. by ABREU 97N
0.508 ±0.075 ±0.025	26	AKERS	94C	OPAL	Repl. by ALEXANDER 96V
0.57 ±0.11 ±0.02	27	AKERS	94H	OPAL	Repl. by ALEXANDER 96V
0.50 $\begin{smallmatrix} +0.07 \\ -0.06 \end{smallmatrix}$ $\begin{smallmatrix} +0.11 \\ -0.10 \end{smallmatrix}$	20	BUSKULIC	94B	ALEP	Sup. by BUSKULIC 97D
0.52 $\begin{smallmatrix} +0.10 \\ -0.11 \end{smallmatrix}$ $\begin{smallmatrix} +0.04 \\ -0.03 \end{smallmatrix}$	27	BUSKULIC	93K	ALEP	Sup. by BUSKULIC 97D

<sup>1</sup> Measured using  $B^0 \rightarrow D^{(*)-} \pi^+$  decays.

<sup>2</sup> Uses semileptonic decays of  $B^0 \rightarrow D^- \mu^+ \nu_\mu X$  and  $B^0 \rightarrow D^{(*)-} \mu^+ \nu_\mu X$ , where the  $D$  mesons are reconstructed in  $D^- \rightarrow K^+ \pi^- \pi^-$  and  $D^{(*)-} \rightarrow \bar{D}^0 \pi^-$  with  $\bar{D}^0 \rightarrow K^+ \pi^-$ .

<sup>3</sup> Uses semileptonic decays of  $B^0 \rightarrow D^- \mu^+ \nu_\mu X$  where the  $D^-$  mesons are reconstructed in  $D^- \rightarrow K^+ K^- \pi^-$ .

<sup>4</sup> Measured using  $B^0 \rightarrow D^- \pi^+$  and  $B^0 \rightarrow J/\psi K^*(892)^0$  decays.

<sup>5</sup> Measured using  $B^0 \rightarrow D^- \pi^+$ .

<sup>6</sup> Uses opposite-side flavor-tagging with  $B \rightarrow D^{(*)} \mu \nu_\mu X$  events.

<sup>7</sup> Measured using a simultaneous fit of the  $B^0$  lifetime and  $\bar{B}^0 B^0$  oscillation frequency  $\Delta m_d$  in the partially reconstructed  $B^0 \rightarrow D^{*-} \ell \nu$  decays.

<sup>8</sup> Measurement performed using a combined fit of  $CP$ -violation, mixing and lifetimes.

<sup>9</sup> Events with a high transverse momentum lepton were removed and an inclusively reconstructed vertex was required.

<sup>10</sup> AUBERT 03C uses a sample of approximately 14,000 exclusively reconstructed  $B^0 \rightarrow D^{*(2010)^-} \ell \nu$  and simultaneously measures the lifetime and oscillation frequency.

<sup>11</sup> HASTINGS 03 measurement based on the time evolution of dilepton events. It also reports  $f_+/f_0 = 1.01 \pm 0.03 \pm 0.09$  and  $CP$ T violation parameters in  $B^0$ - $\bar{B}^0$  mixing.

<sup>12</sup> ZHENG 03 data analyzed using partially reconstructed  $\bar{B}^0 \rightarrow D^{*-} \pi^+$  decay and a flavor tag based on the charge of the lepton from the accompanying  $B$  decay.

- 13 Uses a tagged sample of fully-reconstructed neutral  $B$  decays at  $\Upsilon(4S)$ .
- 14 Measured based on the time evolution of dilepton events in  $\Upsilon(4S)$  decays.
- 15 Data analyzed using partially reconstructed  $\bar{B}^0 \rightarrow D^{*+} \ell^- \bar{\nu}$  decay and a combination of flavor tags from the rest of the event.
- 16 Uses di-muon events.
- 17 Uses jet-charge and lepton-flavor tagging.
- 18 Uses  $\ell^- D^{*+} - \ell$  events.
- 19 Uses  $\pi-B$  in the same side.
- 20 Uses  $\ell-\ell$ .
- 21 Uses  $\ell-Q_{\text{hem}}$ .
- 22 Uses  $\ell-\ell$  with impact parameters.
- 23 Uses  $D^{*\pm}-Q_{\text{hem}}$ .
- 24 Uses  $\pi_S^\pm \ell-Q_{\text{hem}}$ .
- 25 Uses  $D^{*\pm}-\ell/Q_{\text{hem}}$ .
- 26 Uses  $D^{*\pm} \ell-Q_{\text{hem}}$ .
- 27 Uses  $D^{*\pm}-\ell$ .
- 28 AUBERT 02N result based on the same analysis and data sample reported in AUBERT 02I.
- 29 Uses a tagged sample of  $B^0$  decays reconstructed in the mode  $B^0 \rightarrow D^* \ell \nu$ .
- 30 Uses a tagged sample of fully-reconstructed hadronic  $B^0$  decays at  $\Upsilon(4S)$ .
- 31 ACCIARRI 98D combines results from  $\ell-\ell$ ,  $\ell-Q_{\text{hem}}$ , and  $\ell-\ell$  with impact parameters.
- 32 ABREU 97N combines results from  $D^{*\pm}-Q_{\text{hem}}$ ,  $\ell-Q_{\text{hem}}$ ,  $\pi_S^\pm \ell-Q_{\text{hem}}$ , and  $\ell-\ell$ .
- 33 ACKERSTAFF 97V combines results from  $\ell-\ell$ ,  $\ell-Q_{\text{hem}}$ ,  $D^*-l$ , and  $D^{*\pm}-Q_{\text{hem}}$ .
- 34 BUSKULIC 97D combines results from  $D^{*\pm}-\ell/Q_{\text{hem}}$ ,  $\ell-Q_{\text{hem}}$ , and  $\ell-\ell$ .
- 35 ABREU 96Q analysis performed using lepton, kaon, and jet-charge tags.
- 36 ALEXANDER 96V combines results from  $D^{*\pm}-\ell$  and  $D^{*\pm} \ell-Q_{\text{hem}}$ .
- 37 AKERS 95J combines results from charge measurement,  $D^{*\pm} \ell-Q_{\text{hem}}$  and  $\ell-\ell$ .

$$\chi_d = \Delta m_{B^0} / \Gamma_{B^0}$$

“OUR EVALUATION” is an average using rescaled values of the data listed below. The averaging/rescaling procedure takes into account correlations between the measurements and includes  $\Delta m_d$  calculated from  $\chi_d$  measured at  $\Upsilon(4S)$ .

VALUE	DOCUMENT ID
<b>0.7697 ± 0.0035 OUR EVALUATION</b>	(Produced by HFLAV)

### Re( $\lambda_{CP}$ / $|\lambda_{CP}|$ ) Re(z)

The  $\lambda_{CP}$  characterizes  $B^0$  and  $\bar{B}^0$  decays to states of charmonium plus  $K_L^0$ . Parameter  $z$  is used to describe  $CPT$  violation in mixing, see the review on “ $CP$  Violation” in the reviews section.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.047 ± 0.022 ± 0.003</b>	<sup>1</sup> LEES	16E	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.014 ± 0.035 ± 0.034	<sup>2</sup> AUBERT,B	04C	BABR Repl. by LEES 16E
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<sup>1</sup> The first uncertainty is the uncertainty from Re(z) and the second uncertainty is from Re( $\lambda/|\lambda|$ ).

<sup>2</sup> Corresponds to 90% confidence range [−0.072, 0.101].



### $\Delta\Gamma \operatorname{Re}(z)$

<u>VALUE (ps<sup>-1</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.0071 ± 0.0039 ± 0.0020</b>	AUBERT	06T	BABR $e^+e^- \rightarrow \Upsilon(4S)$

### $\operatorname{Re}(z)$

<u>VALUE (units 10<sup>-2</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-4 ± 4 OUR AVERAGE</b>	Error includes scale factor of 1.4.		
-6.5 ± 2.8 ± 1.4	<sup>1</sup> LEES	16E	BABR $e^+e^- \rightarrow \Upsilon(4S)$
1.9 ± 3.7 ± 3.3	<sup>2</sup> HIGUCHI	12	BELL $e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0 ± 12 ± 1	<sup>3</sup> HASTINGS	03	BELL Repl. by HIGUCHI 12
<sup>1</sup> Measurement uses decays $B^0/\bar{B}^0 \rightarrow c\bar{c}K_S^0/K_L^0$ .			
<sup>2</sup> Measured using $B^0 \rightarrow J/\psi K_S^0, J/\psi K_L^0, D^-\pi^+, D^{*-}\pi^+, D^{*-}\rho^+, \text{ and } D^{*-}\ell^+\nu$ decays.			
<sup>3</sup> Measured using inclusive dilepton events from $B^0$ decay.			

### $\operatorname{Im}(z)$

<u>VALUE (units 10<sup>-2</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.8 ± 0.4 OUR AVERAGE</b>			
1.0 ± 3.0 ± 1.3	<sup>1</sup> LEES	16E	BABR $e^+e^- \rightarrow \Upsilon(4S)$
-0.57 ± 0.33 ± 0.33	<sup>2</sup> HIGUCHI	12	BELL $e^+e^- \rightarrow \Upsilon(4S)$
-1.39 ± 0.73 ± 0.32	<sup>3</sup> AUBERT	06T	BABR $e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
3.8 ± 2.9 ± 2.5	<sup>4</sup> AUBERT,B	04C	BABR Repl. by AUBERT 06T
-3 ± 1 ± 3	<sup>5</sup> HASTINGS	03	BELL Repl. by HIGUCHI 12
<sup>1</sup> Measurement uses decays $B^0/\bar{B}^0 \rightarrow c\bar{c}K_S^0/K_L^0$ .			
<sup>2</sup> Measured using $B^0 \rightarrow J/\psi K_S^0, J/\psi K_L^0, D^-\pi^+, D^{*-}\pi^+, D^{*-}\rho^+, \text{ and } D^{*-}\ell^+\nu$ decays.			
<sup>3</sup> Measurement uses $B^0/\bar{B}^0 \rightarrow \ell^+X/\ell^-X$ decays. Assuming $\Delta\Gamma = 0$ , the result becomes $\operatorname{Im}(z) = (-0.37 \pm 0.54) \times 10^{-2}$ .			
<sup>4</sup> Corresponds to 90% confidence range [-0.028, 0.104].			
<sup>5</sup> Measured using inclusive dilepton events from $B^0$ decay.			

## CP VIOLATION PARAMETERS

### $\operatorname{Re}(\epsilon_{B^0})/(1+|\epsilon_{B^0}|^2)$

$CP$  impurity in  $B_d^0$  system. It is obtained from either  $a_{\ell\ell}$ , the charge asymmetry in like-sign dilepton events or  $a_{CP}$ , the time-dependent asymmetry of inclusive  $B^0$  and  $\bar{B}^0$  decays.

"OUR EVALUATION" is the result of a fit to  $B_d$  and  $B_s$   $CP$  asymmetries, which includes the  $B_d$  measurements listed below and the  $B_s$  measurements listed in the  $B_s$  section, taking into account correlations between those measurements.

VALUE (units $10^{-3}$ )	DOCUMENT ID	TECN	COMMENT
<b>– 0.5 ± 0.4</b>	<b>OUR EVALUATION</b> (Produced by HFLAV)		
<b>– 0.1 ± 0.4</b>	<b>OUR AVERAGE</b>		
– 0.05 ± 0.48 ± 0.75	<sup>1</sup> AAIJ	15F LHCb	$p\bar{p}$ at 7, 8 TeV
– 0.975 ± 0.875 ± 0.475	<sup>2</sup> LEES	15A BABR	$e^+e^- \rightarrow \gamma(4S)$
1.55 ± 1.05	<sup>3</sup> ABAZOV	14 D0	$p\bar{p}$ at 1.96 TeV
0.15 ± 0.42 <sup>+0.94</sup> <sub>–0.81</sub>	<sup>4</sup> LEES	13N BABR	$e^+e^- \rightarrow \gamma(4S)$
– 1.7 ± 1.1 ± 0.4	<sup>5</sup> ABAZOV	12AC D0	$p\bar{p}$ at 1.96 TeV
0.4 ± 1.3 ± 0.9	<sup>6</sup> AUBERT	06T BABR	$e^+e^- \rightarrow \gamma(4S)$
– 0.3 ± 2.0 ± 2.1	<sup>7</sup> NAKANO	06 BELL	$e^+e^- \rightarrow \gamma(4S)$
3.5 ± 10.3 ± 1.5	<sup>8</sup> JAFFE	01 CLE2	$e^+e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
– 0.3 ± 1.3	<sup>9</sup> ABAZOV	11U D0	Repl. by ABAZOV 14
– 2.3 ± 1.1 ± 0.8	<sup>10</sup> ABAZOV	06S D0	Repl. by ABAZOV 11U
– 14.7 ± 6.7 ± 5.7	<sup>11</sup> AUBERT,B	04C BABR	Repl. by AUBERT 06T
1.2 ± 2.9 ± 3.6	<sup>2</sup> AUBERT	02K BABR	Repl. by LEES 15A
– 3.2 ± 6.5	<sup>12</sup> BARATE	01D ALEP	$e^+e^- \rightarrow Z$
4 ± 18 ± 3	<sup>13</sup> BEHRENS	00B CLE2	Repl. by JAFFE 01
1.2 ± 13.8 ± 3.2	<sup>14</sup> ABBIENDI	99J OPAL	$e^+e^- \rightarrow Z$
2 ± 7 ± 3	<sup>15</sup> ACKERSTAFF	97U OPAL	$e^+e^- \rightarrow Z$
< 45	<sup>16</sup> BARTELT	93 CLE2	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> AAIJ 15F uses semileptonic  $B^0$  decays in the inclusive final states  $D^- \mu^+$  and  $D^{*-} \mu^+$ , where the  $D^-$  meson decays into the  $K^+ \pi^- \pi^-$  final state, and the  $D^{*-}$  meson into the  $\bar{D}^0 (\rightarrow K^+ \pi^-) \pi^-$  final state. Reports  $A_{SL}^d = (-0.02 \pm 0.19 \pm 0.30)\%$ , which equals to  $4\text{Re}(\epsilon_{B^0})/(1+|\epsilon_{B^0}|^2)$ .

<sup>2</sup> Uses the charge asymmetry in like-sign dilepton events. LEES 15A reports  $A_{SL}^d = (-3.9 \pm 3.5 \pm 1.9) \times 10^{-3}$ .

<sup>3</sup> ABAZOV 14 uses the dimuon charge asymmetry with different impact parameters from which it reports  $A_{SL}^d = (-0.62 \pm 0.42) \times 10^{-2}$ .

<sup>4</sup> Uses  $B^0 \rightarrow D^{*-} X \ell^+ \nu_\ell$  and a kaon-tagged sample which yields measurement of  $A_{SL}^d = (0.06 \pm 0.17^{+0.38}_{-0.32})\%$ , corresponding to  $\Delta_{CP} = 1 - |q/p| = (0.29 \pm 0.84^{+1.88}_{-1.61}) \times 10^{-3}$ .

<sup>5</sup> ABAZOV 12AC uses  $B^0 \rightarrow D^- \mu^+ X$  and  $B^0 \rightarrow D^{*-} \mu^+ X$  decays without initial state flavor tagging which yields measurement of  $A_{SL}^d = (6.8 \pm 4.5 \pm 1.4) \times 10^{-3}$ .

<sup>6</sup> AUBERT 06T reports  $|q/p| - 1 = (-0.8 \pm 2.7 \pm 1.9) \times 10^{-3}$ . We convert to  $(1 - |q/p|^2)/4$ .

<sup>7</sup> Uses the charge asymmetry in like-sign dilepton events and reports  $|q/p| = 1.0005 \pm 0.0040 \pm 0.0043$ .

<sup>8</sup> JAFFE 01 finds  $a_{\ell\ell} = 0.013 \pm 0.050 \pm 0.005$  and combines with the previous BEHRENS 00B independent measurement.

<sup>9</sup> ABAZOV 11U uses the dimuon charge asymmetry with different impact parameters from which it reports  $A_{SL}^d = (-1.2 \pm 5.2) \times 10^{-3}$ .

<sup>10</sup> Uses the dimuon charge asymmetry.

<sup>11</sup> AUBERT 04C reports  $|q/p| = 1.029 \pm 0.013 \pm 0.011$  and we converted it to  $(1 - |q/p|^2)/4$ .

<sup>12</sup> BARATE 01D measured by investigating time-dependent asymmetries in semileptonic and fully inclusive  $B_d^0$  decays.

<sup>13</sup> BEHRENS 00B uses high-momentum lepton tags and partially reconstructed  $\bar{B}^0 \rightarrow D^{*+} \pi^-$ ,  $\rho^-$  decays to determine the flavor of the  $B$  meson.

- <sup>14</sup> Data analyzed using the time-dependent asymmetry of inclusive  $B^0$  decay. The production flavor of  $B^0$  mesons is determined using both the jet charge and the charge of secondary vertex in the opposite hemisphere.
- <sup>15</sup> ACKERSTAFF 97U assumes  $CPT$  and is based on measuring the charge asymmetry in a sample of  $B^0$  decays defined by lepton and  $Q_{\text{hem}}$  tags. If  $CPT$  is not invoked,  $\text{Re}(\epsilon_B) = -0.006 \pm 0.010 \pm 0.006$  is found. The indirect  $CPT$  violation parameter is determined to  $\text{Im}(\delta B) = -0.020 \pm 0.016 \pm 0.006$ .
- <sup>16</sup> BARTELT 93 finds  $a_{\ell\ell} = 0.031 \pm 0.096 \pm 0.032$  which corresponds to  $|a_{\ell\ell}| < 0.18$ , which yields the above  $|\text{Re}(\epsilon_{B^0})/(1+|\epsilon_{B^0}|^2)|$ .

### $A_{T/CP}$

$A_{T/CP}$  is defined as

$$\frac{P(\bar{B}^0 \rightarrow B^0) - P(B^0 \rightarrow \bar{B}^0)}{P(\bar{B}^0 \rightarrow B^0) + P(B^0 \rightarrow \bar{B}^0)},$$

the  $CPT$  invariant asymmetry between the oscillation probabilities  $P(\bar{B}^0 \rightarrow B^0)$  and  $P(B^0 \rightarrow \bar{B}^0)$ .

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.005±0.012±0.014</b>	<sup>1</sup> AUBERT	02K BABR	$e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> AUBERT 02K uses the charge asymmetry in like-sign dilepton events.

### $A_{CP}(B^0 \rightarrow D^*(2010)^+ D^-)$

$A_{CP}$  is defined as

$$\frac{B(\bar{B}^0 \rightarrow \bar{f}) - B(B^0 \rightarrow f)}{B(\bar{B}^0 \rightarrow \bar{f}) + B(B^0 \rightarrow f)},$$

the  $CP$ -violation charge asymmetry of exclusive  $B^0$  and  $\bar{B}^0$  decay.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.013±0.014 OUR AVERAGE</b>			
0.008±0.014±0.006	AAIJ	20L LHCb	$pp$ at 7, 8, 13 TeV
0.06 ±0.05 ±0.02	ROHRKEN	12 BELL	$e^+e^- \rightarrow \gamma(4S)$
0.008±0.048±0.013	AUBERT	09C BABR	$e^+e^- \rightarrow \gamma(4S)$
0.07 ±0.08 ±0.04	<sup>1</sup> AUSHEV	04 BELL	$e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

-0.12 ±0.06 ±0.02	AUBERT	07AI BABR	Repl. by AUBERT 09C
-0.03 ±0.10 ±0.02	AUBERT,B	06A BABR	Repl. by AUBERT 07AI
-0.03 ±0.11 ±0.05	AUBERT	03J BABR	Repl. by AUBERT,B 06B

<sup>1</sup> Combines results from fully and partially reconstructed  $B^0 \rightarrow D^{*\pm} D^\mp$  decays.

### $A_{CP}(B^0 \rightarrow \bar{D}^0 \pi^0)$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.42±2.05±1.22</b>	BLOOMFIELD 22	BELL	$e^+e^- \rightarrow \gamma(4S)$

### $A_{CP}(B^0 \rightarrow [K^+ K^-]_D K^*(892)^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.05±0.10±0.01</b>	AAIJ	19N LHCb	$pp$ at 7, 8, 13 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

-0.20±0.15±0.02	AAIJ	14BN LHCb	Repl. by AAIJ 16S
-0.45±0.23±0.02	AAIJ	13L LHCb	Repl. by AAIJ 14BN

**$A_{CP}(B^0 \rightarrow [K^+\pi^-]_D K^*(892)^0)$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.047 \pm 0.027 \pm 0.010</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.03 \pm 0.04 \pm 0.02$	AAIJ	14BN	LHCB Repl. by AAIJ 19N
$-0.08 \pm 0.08 \pm 0.01$	AAIJ	13L	LHCB Repl. by AAIJ 14BN

**$A_{CP}(B^0 \rightarrow [K^+\pi^-\pi^+\pi^-]_D K^*(892)^0)$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.037 \pm 0.032 \pm 0.010</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV

**$A_{CP}(B^0 \rightarrow [K^-\pi^+]_D K^*(892)^0)$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.19 \pm 0.19 \pm 0.01</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV

**$A_{CP}(B^0 \rightarrow [K^-\pi^+\pi^+\pi^-]_D K^*(892)^0)$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.01 \pm 0.24 \pm 0.01</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV

**$R_d^+ = \Gamma(B^0 \rightarrow [\pi^+K^-]_D K^{*0}) / \Gamma(B^0 \rightarrow [\pi^-K^+]_D K^{*0})$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.064 \pm 0.021 \pm 0.002</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.06 \pm 0.03 \pm 0.01$	AAIJ	14BN	LHCB Repl. by AAIJ 19N

**$R_d^- = \Gamma(\bar{B}^0 \rightarrow [\pi^-K^+]_D K^{*0}) / \Gamma(\bar{B}^0 \rightarrow [\pi^+K^-]_D K^{*0})$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.095 \pm 0.021 \pm 0.003</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.06 \pm 0.03 \pm 0.01$	AAIJ	14BN	LHCB Repl. by AAIJ 19N

**$A_{CP}(B^0 \rightarrow [\pi^+\pi^-]_D K^*(892)^0)$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.18 \pm 0.14 \pm 0.01</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.09 \pm 0.22 \pm 0.02$	AAIJ	14BN	LHCB Repl. by AAIJ 16S

**$A_{CP}(B^0 \rightarrow [\pi^+\pi^-\pi^+\pi^-]_D K^*(892)^0)$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.03 \pm 0.15 \pm 0.01</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV

**$R_d^+ = \Gamma(B^0 \rightarrow [\pi^+K^-\pi^+\pi^-]_D K^{*0}) / \Gamma(B^0 \rightarrow [\pi^-K^+\pi^+\pi^-]_D K^{*0})$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.074 \pm 0.026 \pm 0.002</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV

**$R_d^- = \Gamma(\bar{B}^0 \rightarrow [\pi^-K^+\pi^+\pi^-]_D K^{*0}) / \Gamma(\bar{B}^0 \rightarrow [\pi^+K^-\pi^+\pi^-]_D K^{*0})$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.072 \pm 0.025 \pm 0.003</math></b>	AAIJ	19N	LHCB $pp$ at 7, 8, 13 TeV

### $A_{CP}(B^0 \rightarrow K^+\pi^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>−0.0831±0.0031 OUR AVERAGE</b>			
−0.072 ±0.019 ±0.007	ADACHI	24 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
−0.0824±0.0033±0.0033	AAIJ	21O LHCB	$pp$ at 13 TeV
−0.084 ±0.004 ±0.003	AAIJ	18O LHCB	$pp$ at 7, 8 TeV
−0.083 ±0.013 ±0.004	AALTONEN	14P CDF	$p\bar{p}$ at 1.96 TeV
−0.069 ±0.014 ±0.007	DUH	13 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
−0.107 ±0.016 $\begin{smallmatrix} +0.006 \\ -0.004 \end{smallmatrix}$	LEES	13D BABR	$e^+e^- \rightarrow \Upsilon(4S)$
−0.04 ±0.16	<sup>1</sup> CHEN	00 CLE2	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
−0.080 ±0.007 ±0.003	AAIJ	13AX LHCB	Repl. by AAIJ 18O
−0.088 ±0.011 ±0.008	AAIJ	12V LHCB	Repl. by AAIJ 13AX
−0.086 ±0.023 ±0.009	AALTONEN	11N CDF	Repl. by AALTONEN 14P
−0.094 ±0.018 ±0.008	LIN	08 BELL	Repl. by DUH 13
−0.107 ±0.018 $\begin{smallmatrix} +0.007 \\ -0.004 \end{smallmatrix}$	AUBERT	07AF BABR	Repl. by LEES 13D
−0.013 ±0.078 ±0.012	ABULENCIA,A	06D CDF	Repl. by AALTONEN 11N
−0.088 ±0.035 ±0.013	<sup>2</sup> CHAO	05A BELL	Repl. by CHAO 04B
−0.133 ±0.030 ±0.009	<sup>3</sup> AUBERT,B	04K BABR	Repl. by AUBERT 07AF
−0.101 ±0.025 ±0.005	<sup>4</sup> CHAO	04B BELL	Repl. by LIN 08
−0.07 ±0.08 ±0.02	<sup>5</sup> AUBERT	02D BABR	Repl. by AUBERT 02Q
−0.102 ±0.050 ±0.016	<sup>6</sup> AUBERT	02Q BABR	Repl. by AUBERT,B 04K
−0.06 ±0.09 $\begin{smallmatrix} +0.01 \\ -0.02 \end{smallmatrix}$	<sup>7</sup> CASEY	02 BELL	Repl. by CHAO 04B
0.044 $\begin{smallmatrix} +0.186 \\ -0.167 \end{smallmatrix}$ $\begin{smallmatrix} +0.018 \\ -0.021 \end{smallmatrix}$	<sup>8</sup> ABE	01K BELL	Repl. by CASEY 02
−0.19 ±0.10 ±0.03	<sup>9</sup> AUBERT	01E BABR	Repl. by AUBERT 02Q

<sup>1</sup> Corresponds to 90% confidence range  $-0.30 < A_{CP} < 0.22$ .

<sup>2</sup> Corresponds to a 90% CL interval of  $-0.15 < A_{CP} < -0.03$ .

<sup>3</sup> Based on a total signal yield of  $N(K^-\pi^+) + N(K^+\pi^-) = 1606 \pm 51$  events.

<sup>4</sup> CHAO 04B reports significance of 3.9 standard deviation for deviation of  $A_{CP}$  from zero.

<sup>5</sup> Corresponds to 90% confidence range  $-0.21 < A_{CP} < 0.07$ .

<sup>6</sup> Corresponds to 90% confidence range  $-0.188 < A_{CP} < -0.016$ .

<sup>7</sup> Corresponds to 90% confidence range  $-0.21 < A_{CP} < +0.09$ .

<sup>8</sup> Corresponds to 90% confidence range  $-0.25 < A_{CP} < 0.37$ .

<sup>9</sup> Corresponds to 90% confidence range  $-0.35 < A_{CP} < -0.03$ .

### $A_{CP}(B^0 \rightarrow \eta' K^*(892)^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>−0.07±0.18 OUR AVERAGE</b>			
−0.22±0.29±0.07	SATO	14 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
0.02±0.23±0.02	DEL-AMO-SA..10A	BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.08±0.25±0.02	<sup>1</sup> AUBERT	07E BABR	Repl. by DEL-AMO-SANCHEZ 10A

<sup>1</sup> Reports  $A_{CP}$  with the opposite sign convention.

**$A_{CP}(B^0 \rightarrow \eta' K_0^*(1430)^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-0.19 \pm 0.17 \pm 0.02$	DEL-AMO-SA..10A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

**$A_{CP}(B^0 \rightarrow \eta' K_2^*(1430)^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.14 \pm 0.18 \pm 0.02$	DEL-AMO-SA..10A	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

**$A_{CP}(B^0 \rightarrow \eta K^*(892)^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.19 ± 0.05 OUR AVERAGE</b>			
0.17 ± 0.08 ± 0.01	WANG	07B BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
0.21 ± 0.06 ± 0.02	AUBERT,B	06H BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.02 ± 0.11 ± 0.02	AUBERT,B	04D BABR	Repl. by AUBERT,B 06H

**$A_{CP}(B^0 \rightarrow \eta K_0^*(1430)^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.06 \pm 0.13 \pm 0.02$	AUBERT,B	06H BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

**$A_{CP}(B^0 \rightarrow \eta K_2^*(1430)^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-0.07 \pm 0.19 \pm 0.02$	AUBERT,B	06H BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

**$A_{CP}(B^0 \rightarrow b_1 K^+)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-0.07 \pm 0.12 \pm 0.02$	AUBERT	07BI BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

**$A_{CP}(B^0 \rightarrow \omega K^{*0})$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.45 \pm 0.25 \pm 0.02$	AUBERT	09H BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

**$A_{CP}(B^0 \rightarrow \omega (K\pi)_0^{*0})$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-0.07 \pm 0.09 \pm 0.02$	AUBERT	09H BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

**$A_{CP}(B^0 \rightarrow \omega K_2^*(1430)^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-0.37 \pm 0.17 \pm 0.02$	AUBERT	09H BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

**$A_{CP}(B^0 \rightarrow K^+ \pi^- \pi^0)$**

<u>VALUE (units <math>10^{-2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0 ± 6 OUR AVERAGE</b>			
$-3.0^{+4.5}_{-5.1} \pm 5.5$	<sup>1</sup> AUBERT	08AQ BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$7 \pm 11 \pm 1$	<sup>2</sup> CHANG	04 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

<sup>2</sup> Corresponds to 90% confidence range  $-0.12 < A_{CP} < 0.26$ .

### $A_{CP}(B^0 \rightarrow \rho^- K^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.20 \pm 0.11</math> OUR AVERAGE</b>			
$0.20 \pm 0.09 \pm 0.08$	<sup>1</sup> LEES	11	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
$0.22^{+0.22+0.06}_{-0.23-0.02}$	<sup>2</sup> CHANG	04	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.11^{+0.14}_{-0.15} \pm 0.07$	<sup>1</sup> AUBERT	08AQ	BABR Repl. by LEES 11
$-0.28 \pm 0.17 \pm 0.08$	<sup>3</sup> AUBERT	03T	BABR Repl. by AUBERT 08AQ

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

<sup>2</sup> Corresponds to 90% confidence range  $-0.18 < A_{CP} < 0.64$ .

<sup>3</sup> The result reported corresponds to  $-A_{CP}$ .

### $A_{CP}(B^0 \rightarrow \rho(1450)^- K^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.10 \pm 0.32 \pm 0.09</math></b>	<sup>1</sup> LEES	11	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

### $A_{CP}(B^0 \rightarrow \rho(1700)^- K^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.36 \pm 0.57 \pm 0.23</math></b>	<sup>1</sup> LEES	11	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

### $A_{CP}(B^0 \rightarrow K^+ \pi^- \pi^0 \text{ nonresonant})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.10 \pm 0.16 \pm 0.08</math></b>	<sup>1</sup> LEES	11	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.23^{+0.19+0.11}_{-0.27-0.10}$	<sup>1</sup> AUBERT	08AQ	BABR Repl. by LEES 11
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<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays. The quoted value is only for the flat part of the non-resonant component.

### $A_{CP}(B^0 \rightarrow K^0 \pi^+ \pi^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.01 \pm 0.05 \pm 0.01</math></b>	<sup>1</sup> AUBERT	09AU	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

### $A_{CP}(B^0 \rightarrow K^*(892)^+ \pi^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.27 \pm 0.04</math> OUR AVERAGE</b>			
$-0.308 \pm 0.060 \pm 0.016$	<sup>1</sup> AAIJ	18F	LHCB $pp$ at 7, 8 TeV
$-0.29 \pm 0.11 \pm 0.02$	<sup>2</sup> LEES	11	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
$-0.21 \pm 0.10 \pm 0.02$	<sup>3,4</sup> AUBERT	09AU	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
$-0.21 \pm 0.11 \pm 0.07$	<sup>5</sup> DALSENO	09	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
$0.26^{+0.33+0.10}_{-0.34-0.08}$	<sup>6</sup> EISENSTEIN	03	CLE2 $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.19^{+0.20}_{-0.15} \pm 0.04$	<sup>2</sup> AUBERT	08AQ BABR	Repl. by LEES 11
$-0.11 \pm 0.14 \pm 0.05$	<sup>3</sup> AUBERT	06i BABR	Repl. by AUBERT 09AU
$0.23 \pm 0.18^{+0.09}_{-0.06}$	AUBERT,B	04O BABR	Repl. by AUBERT 06i

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays.

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

<sup>3</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays.

<sup>4</sup> The first of two equivalent solutions is used.

<sup>5</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two consistent solutions that may be preferred.

<sup>6</sup> Corresponds to 90% confidence range  $-0.31 < A_{CP} < 0.78$ .

### $A_{CP}(B^0 \rightarrow (K\pi)_0^{*+} \pi^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.02 \pm 0.04</math> OUR AVERAGE</b>			

$-0.032 \pm 0.047 \pm 0.031$	<sup>1</sup> AAIJ	18F LHCB	$pp$ at 7, 8 TeV
$0.07 \pm 0.14 \pm 0.01$	<sup>2</sup> LEES	11 BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.09 \pm 0.07 \pm 0.03$	<sup>3</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.17^{+0.11}_{-0.16} \pm 0.22$	<sup>2</sup> AUBERT	08AQ BABR	Repl. by LEES 11
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<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final states decays.

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

<sup>3</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

### $A_{CP}(B^0 \rightarrow K_2^{*(1430)+} \pi^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.29 \pm 0.22 \pm 0.09</math></b>	<sup>1</sup> AAIJ	18F LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays.

### $A_{CP}(B^0 \rightarrow K^*(1680)^+ \pi^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.07 \pm 0.13 \pm 0.04</math></b>	<sup>1</sup> AAIJ	18F LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays.

### $A_{CP}(B^0 \rightarrow f_0(980) K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.28 \pm 0.27 \pm 0.15</math></b>	<sup>1</sup> AAIJ	18F LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 \pi^+ \pi^-$  final state decays.

### $A_{CP}(B^0 \rightarrow (K\pi)_0^{*0} \pi^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.15 \pm 0.10 \pm 0.04</math></b>	<sup>1</sup> LEES	11 BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.22 \pm 0.12^{+0.30}_{-0.29}$	<sup>1</sup> AUBERT	08AQ BABR	Repl. by LEES 11
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<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.



**$A_{CP}(B^0 \rightarrow K^{*0} \pi^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.15 \pm 0.12 \pm 0.04</math></b>	<sup>1</sup> LEES	11	BABR $e^+ e^- \rightarrow \gamma(4S)$
$-0.09^{+0.21}_{-0.24} \pm 0.09$	<sup>1</sup> AUBERT	08AQ	BABR Repl. by LEES 11

• • • We do not use the following data for averages, fits, limits, etc. • • •

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^+ \pi^- \pi^0$  decays.

**$A_{CP}(B^0 \rightarrow K^*(892)^0 \pi^+ \pi^-)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.07 \pm 0.04 \pm 0.03</math></b>	AUBERT	07AS	BABR $e^+ e^- \rightarrow \gamma(4S)$

**$A_{CP}(B^0 \rightarrow K^*(892)^0 \rho^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.06 \pm 0.09 \pm 0.02</math></b>	LEES	12K	BABR $e^+ e^- \rightarrow \gamma(4S)$
$0.09 \pm 0.19 \pm 0.02$	AUBERT,B	06G	BABR Repl. by LEES 12K

• • • We do not use the following data for averages, fits, limits, etc. • • •

**$A_{CP}(B^0 \rightarrow K^{*0} f_0(980))$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.07 \pm 0.10 \pm 0.02</math></b>	LEES	12K	BABR $e^+ e^- \rightarrow \gamma(4S)$
$-0.17 \pm 0.28 \pm 0.02$	AUBERT,B	06G	BABR Repl. by LEES 12K

• • • We do not use the following data for averages, fits, limits, etc. • • •

**$A_{CP}(B^0 \rightarrow K^{*+} \rho^-)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.21 \pm 0.15 \pm 0.02</math></b>	LEES	12K	BABR $e^+ e^- \rightarrow \gamma(4S)$

**$A_{CP}(B^0 \rightarrow K^*(892)^0 K^+ K^-)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.01 \pm 0.05 \pm 0.02</math></b>	AUBERT	07AS	BABR $e^+ e^- \rightarrow \gamma(4S)$

**$A_{CP}(B^0 \rightarrow a_1^- K^+)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.16 \pm 0.12 \pm 0.01</math></b>	AUBERT	08F	BABR $e^+ e^- \rightarrow \gamma(4S)$

**$A_{CP}(B^0 \rightarrow K^0 K^0)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.58^{+0.73}_{-0.66} \pm 0.04</math></b>	LIN	07	BELL $e^+ e^- \rightarrow \gamma(4S)$

**$A_{CP}(B^0 \rightarrow K^*(892)^0 \phi)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.00 \pm 0.04</math> OUR AVERAGE</b>			
$-0.007 \pm 0.048 \pm 0.021$	PRIM	13	BELL $e^+ e^- \rightarrow \gamma(4S)$
$0.01 \pm 0.06 \pm 0.03$	AUBERT	08BG	BABR $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.03 \pm 0.07 \pm 0.03$	AUBERT	07D	BABR	Repl. by AUBERT 08BG
$0.02 \pm 0.09 \pm 0.02$	<sup>1</sup> CHEN	05A	BELL	Repl. by PRIM 13
$-0.01 \pm 0.09 \pm 0.02$	AUBERT,B	04W	BABR	Repl. by AUBERT 07D
$0.04 \pm 0.12 \pm 0.02$	AUBERT	03V	BABR	Repl. by AUBERT 04W
$0.07 \pm 0.15 \pm^{+0.05}_{-0.03}$	<sup>2</sup> CHEN	03B	BELL	Repl. by CHEN 05A
$0.00 \pm 0.27 \pm 0.03$	<sup>3</sup> AUBERT	02E	BABR	Repl. by AUBERT 03V

<sup>1</sup> Corresponds to 90% confidence range  $-0.14 < A_{CP} < 0.17$ .

<sup>2</sup> Corresponds to 90% confidence range  $-0.18 < A_{CP} < 0.33$ .

<sup>3</sup> Corresponds to 90% confidence range  $-0.44 < A_{CP} < 0.44$ .

### $A_{CP}(B^0 \rightarrow K^*(892)^0 K^- \pi^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.22 \pm 0.33 \pm 0.20</math></b>	AUBERT	07AS	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

### $A_{CP}(B^0 \rightarrow \phi(K\pi)_0^{*0})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.12 \pm 0.08</math> OUR AVERAGE</b>			
$0.093 \pm 0.094 \pm 0.017$	PRIM	13	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
$0.20 \pm 0.14 \pm 0.06$	AUBERT	08BG	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.17 \pm 0.15 \pm 0.03$	AUBERT	07D	BABR	Repl. by AUBERT 08BG
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### $A_{CP}(B^0 \rightarrow \phi K_2^{*0}(1430)^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.11 \pm 0.10</math> OUR AVERAGE</b>			
$-0.155 \pm^{+0.152}_{-0.133} \pm 0.033$	PRIM	13	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
$-0.08 \pm 0.12 \pm 0.05$	AUBERT	08BG	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.12 \pm 0.14 \pm 0.04$	AUBERT	07D	BABR	Repl. by AUBERT 08BG
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### $A_{CP}(B^0 \rightarrow K^*(892)^0 \gamma)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.006 \pm 0.011</math> OUR AVERAGE</b>			
$-0.013 \pm 0.017 \pm 0.004$	<sup>1</sup> HORIGUCHI	17	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
$0.008 \pm 0.017 \pm 0.009$	AAIJ	13	LHCB $pp$ at 7 TeV
$-0.016 \pm 0.022 \pm 0.007$	AUBERT	09A0	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses  $B(\Upsilon(4S) \rightarrow B^+ B^-) = (51.4 \pm 0.6)\%$  and  $B(\Upsilon(4S) \rightarrow B^0 \bar{B}^0) = (48.6 \pm 0.6)\%$ .

### $A_{CP}(B^0 \rightarrow K_2^{*0}(1430)^0 \gamma)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.08 \pm 0.15 \pm 0.01</math></b>	AUBERT,B	04U	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

### $A_{CP}(B^0 \rightarrow X_s \gamma)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.0094 \pm 0.0174 \pm 0.0047</math></b>	<sup>1</sup> WATANUKI	19	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Using a sum-of-exclusive technique with  $m_{X_s} < 2.8 \text{ GeV}/c^2$ .

### $A_{CP}(B^0 \rightarrow \rho^+ \pi^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.13 \pm 0.06</math> OUR AVERAGE</b>	Error includes scale factor of 1.1.		
$0.09^{+0.05}_{-0.06} \pm 0.04$	<sup>1</sup> LEES	13J BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.21 \pm 0.08 \pm 0.04$	<sup>1</sup> KUSAKA	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.03 \pm 0.07 \pm 0.04$	AUBERT	07AA BABR	Repl. by LEES 13J
$-0.02 \pm 0.16^{+0.05}_{-0.02}$	WANG	05 BELL	Repl. by KUSAKA 07
$-0.18 \pm 0.08 \pm 0.03$	AUBERT	03T BABR	Repl. by AUBERT 07AA
<sup>1</sup> Uses time-dependent Dalitz plot analysis of $B^0 \rightarrow \pi^+ \pi^- \pi^0$ decays.			

### $A_{CP}(B^0 \rightarrow \rho^- \pi^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.08 \pm 0.08</math> OUR AVERAGE</b>			
$-0.12 \pm 0.08^{+0.04}_{-0.05}$	<sup>1</sup> LEES	13J BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.08 \pm 0.16 \pm 0.11$	<sup>1</sup> KUSAKA	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.37 \pm 0.16^{+0.09}_{-0.10}$	AUBERT	07AA BABR	Repl. by LEES 13J
$-0.53 \pm 0.29^{+0.09}_{-0.04}$	WANG	05 BELL	Repl. by KUSAKA 07
<sup>1</sup> Uses time-dependent Dalitz plot analysis of $B^0 \rightarrow \pi^+ \pi^- \pi^0$ decays.			

### $A_{CP}(B^0 \rightarrow a_1(1260)^\pm \pi^\mp)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.07 \pm 0.06</math> OUR AVERAGE</b>			
$-0.06 \pm 0.05 \pm 0.07$	DALSENO	12 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$-0.07 \pm 0.07 \pm 0.02$	AUBERT	07O BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

### $A_{CP}(B^0 \rightarrow b_1^- \pi^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.05 \pm 0.10 \pm 0.02</math></b>	AUBERT	07BI BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

### $A_{CP}(B^0 \rightarrow \rho \bar{p} K^*(892)^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.05 \pm 0.12</math> OUR AVERAGE</b>			
$-0.08 \pm 0.20 \pm 0.02$	CHEN	08C BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.11 \pm 0.13 \pm 0.06$	AUBERT	07AV BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

### $A_{CP}(B^0 \rightarrow \rho \bar{\Lambda} \pi^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.04 \pm 0.07</math> OUR AVERAGE</b>			
$0.10 \pm 0.10 \pm 0.02$	AUBERT	09AC BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$-0.02 \pm 0.10 \pm 0.03$	WANG	07C BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

### $A_{CP}(B^0 \rightarrow K^{*0} \ell^+ \ell^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.05 \pm 0.10</math> OUR AVERAGE</b>			
$0.02 \pm 0.20 \pm 0.02$	AUBERT	09T BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$-0.08 \pm 0.12 \pm 0.02$	WEI	09A BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

### $A_{CP}(B^0 \rightarrow K^{*0} e^+ e^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.21 \pm 0.19 \pm 0.02$	WEI	09A	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

### $A_{CP}(B^0 \rightarrow K^{*0} \mu^+ \mu^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.034 \pm 0.024</math> OUR AVERAGE</b>			
$-0.035 \pm 0.024 \pm 0.003$	AAIJ	14AN	LHCB $pp$ at 7, 8 TeV
$0.00 \pm 0.15 \pm 0.03$	WEI	09A	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$-0.072 \pm 0.040 \pm 0.005$	AAIJ	13E	LHCB Repl. by AAIJ 14AN

### $C_{D^{*(2010)^- D^+}(B^0 \rightarrow D^{*(2010)^- D^+})$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.02 \pm 0.08</math> OUR AVERAGE</b>			
$-0.028 \pm 0.130 \pm 0.026$	<sup>1</sup> AAIJ	20L	LHCB $pp$ at 7, 8, 13 TeV
$-0.13 \pm 0.16 \pm 0.05$	<sup>2</sup> ROHRKEN	12	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
$0.00 \pm 0.17 \pm 0.03$	AUBERT	09C	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
$0.23 \pm 0.25 \pm 0.06$	<sup>3</sup> AUSHEV	04	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●

$0.23 \pm 0.15 \pm 0.04$	AUBERT	07AI	BABR Repl. by AUBERT 09C
$0.17 \pm 0.24 \pm 0.04$	AUBERT,B	05Z	BABR Repl. by AUBERT 07AI
$-0.22 \pm 0.37 \pm 0.10$	AUBERT	03J	BABR Repl. by AUBERT,B 05Z

<sup>1</sup> AAIJ 20L reports the measurements of  $C = -0.059 \pm 0.092 \pm 0.020$  and  $\Delta C = -0.031 \pm 0.092 \pm 0.016$  such that  $C_{D^{*(2010)^- D^+} = C - \Delta C$ .

<sup>2</sup> ROHRKEN 12 reports the measurements of  $C = -0.01 \pm 0.11 \pm 0.04$  and  $\Delta C = 0.12 \pm 0.11 \pm 0.03$  such that  $C_{D^{*(2010)^- D^+} = C - \Delta C$ .

<sup>3</sup> Combines results from fully and partially reconstructed  $B^0 \rightarrow D^{*\pm} D^\mp$  decays.

### $S_{D^{*(2010)^- D^+}(B^0 \rightarrow D^{*(2010)^- D^+})$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.83 \pm 0.09</math> OUR AVERAGE</b>			
$-0.880 \pm 0.107 \pm 0.022$	<sup>1</sup> AAIJ	20L	LHCB $pp$ at 7, 8, 13 TeV
$-0.65 \pm 0.22 \pm 0.07$	<sup>2</sup> ROHRKEN	12	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
$-0.73 \pm 0.23 \pm 0.050$	AUBERT	09C	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
$-0.96 \pm 0.43 \pm 0.12$	<sup>3</sup> AUSHEV	04	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●

$-0.44 \pm 0.22 \pm 0.06$	AUBERT	07AI	BABR Repl. by AUBERT 09C
$-0.29 \pm 0.33 \pm 0.07$	AUBERT,B	05Z	BABR Repl. by AUBERT 07AI
$-0.24 \pm 0.69 \pm 0.12$	AUBERT	03J	BABR Repl. by AUBERT,B 05Z

<sup>1</sup> AAIJ 20L reports the measurements of  $S = -0.861 \pm 0.077 \pm 0.019$  and  $\Delta S = 0.019 \pm 0.075 \pm 0.012$  such that  $S_{D^{*(2010)^- D^+} = S - \Delta S$ .

<sup>2</sup> ROHRKEN 12 reports the measurements of  $S = -0.78 \pm 0.15 \pm 0.05$  and  $\Delta S = -0.13 \pm 0.15 \pm 0.04$  such that  $S_{D^{*(2010)^+ D^-} = S - \Delta S$ .

<sup>3</sup> Combines results from fully and partially reconstructed  $B^0 \rightarrow D^{*\pm} D^\mp$  decays.

### $C_{D^*(2010)^+ D^-} (B^0 \rightarrow D^*(2010)^+ D^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
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<b>-0.03 ± 0.09 OUR AVERAGE</b>	Error includes scale factor of 1.1.		
-0.090 ± 0.130 ± 0.026	<sup>1</sup> AAIJ	20L	LHCB $pp$ at 7, 8, 13 TeV
0.11 ± 0.14 ± 0.06	<sup>2</sup> ROHRKEN	12	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
0.08 ± 0.17 ± 0.04	AUBERT	09C	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
-0.37 ± 0.22 ± 0.06	<sup>3</sup> AUSHEV	04	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.18 ± 0.15 ± 0.04	AUBERT	07Ai	BABR Repl. by AUBERT 09C
0.09 ± 0.25 ± 0.06	AUBERT,B	05Z	BABR Repl. by AUBERT 07Ai
-0.47 ± 0.40 ± 0.12	AUBERT	03J	BABR Repl. by AUBERT,B 05Z

<sup>1</sup> AAIJ 20L reports the measurements of  $C = -0.059 \pm 0.092 \pm 0.020$  and  $\Delta C = -0.031 \pm 0.092 \pm 0.016$  such that  $C_{D^*(2010)^+ D^-} = C + \Delta C$ .

<sup>2</sup> ROHRKEN 12 reports the measurements of  $C = -0.01 \pm 0.11 \pm 0.04$  and  $\Delta C = 0.12 \pm 0.11 \pm 0.03$  such that  $C_{D^*(2010)^+ D^-} = C + \Delta C$ .

<sup>3</sup> Combines results from fully and partially reconstructed  $B^0 \rightarrow D^{*\pm} D^\mp$  decays.

### $S_{D^*(2010)^+ D^-} (B^0 \rightarrow D^*(2010)^+ D^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
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<b>-0.80 ± 0.09 OUR AVERAGE</b>	Error includes scale factor of 1.1.		
-0.842 ± 0.107 ± 0.022	<sup>1</sup> AAIJ	20L	LHCB $pp$ at 7, 8, 13 TeV
-0.90 ± 0.21 ± 0.07	<sup>2</sup> ROHRKEN	12	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
-0.62 ± 0.21 ± 0.03	AUBERT	09C	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
-0.55 ± 0.39 ± 0.12	<sup>3</sup> AUSHEV	04	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.79 ± 0.21 ± 0.06	AUBERT	07Ai	BABR Repl. by AUBERT 09C
-0.54 ± 0.35 ± 0.07	AUBERT,B	05Z	BABR Repl. by AUBERT 07Ai
-0.82 ± 0.75 ± 0.14	AUBERT	03J	BABR Repl. by AUBERT,B 05Z

<sup>1</sup> AAIJ 20L reports the measurements of  $S = -0.861 \pm 0.077 \pm 0.019$  and  $\Delta S = 0.019 \pm 0.075 \pm 0.012$  such that  $S_{D^*(2010)^+ D^-} = S + \Delta S$ .

<sup>2</sup> ROHRKEN 12 reports the measurements of  $S = -0.78 \pm 0.15 \pm 0.05$  and  $\Delta S = -0.13 \pm 0.15 \pm 0.04$  such that  $S_{D^*(2010)^+ D^-} = S + \Delta S$ .

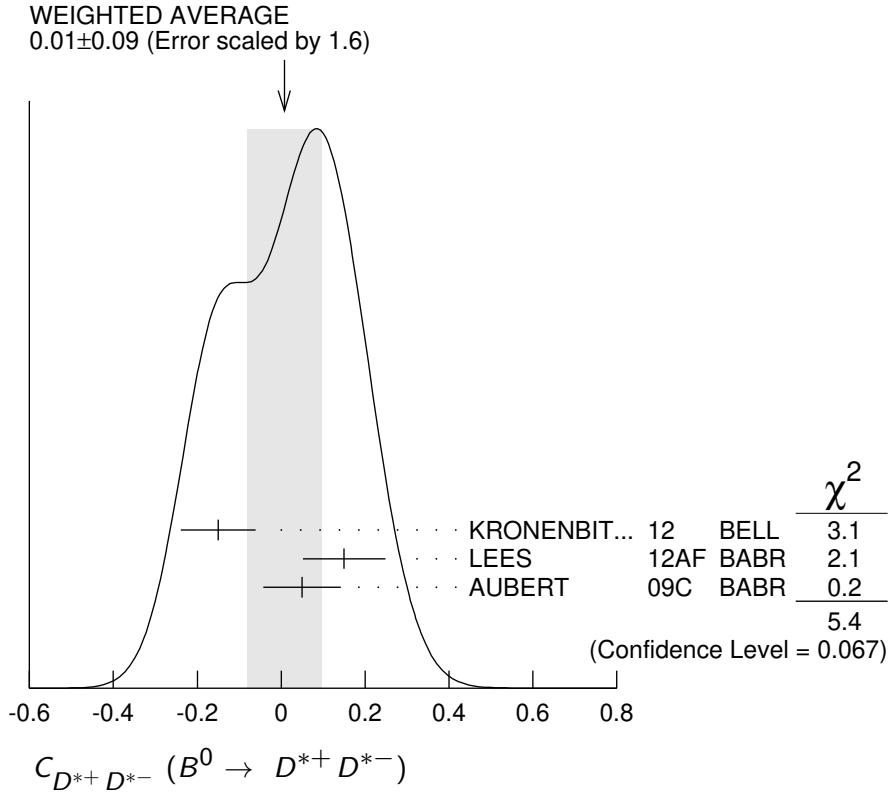
<sup>3</sup> Combines results from fully and partially reconstructed  $B^0 \rightarrow D^{*\pm} D^\mp$  decays.

### $C_{D^{*+} D^{*-}} (B^0 \rightarrow D^{*+} D^{*-})$

VALUE	DOCUMENT ID	TECN	COMMENT
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<b>0.01 ± 0.09 OUR AVERAGE</b>	Error includes scale factor of 1.6. See the ideogram below.		
-0.15 ± 0.08 ± 0.04	<sup>1,2</sup> KRONENBIT...12	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
+0.15 ± 0.09 ± 0.04	<sup>3</sup> LEES	12AF	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
0.05 ± 0.09 ± 0.02	AUBERT	09C	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.15 ± 0.13 ± 0.04	<sup>2</sup> VERVINK	09	BELL Repl. by KRONENBITTER 12
-0.02 ± 0.11 ± 0.02	<sup>1</sup> AUBERT	07B0	BABR Repl. by AUBERT 09C
0.26 ± 0.26 ± 0.06	<sup>2</sup> MIYAKE	05	BELL Repl. by VERVINK 09
0.28 ± 0.23 ± 0.02	<sup>4</sup> AUBERT	03Q	BABR Repl. by AUBERT 07B0

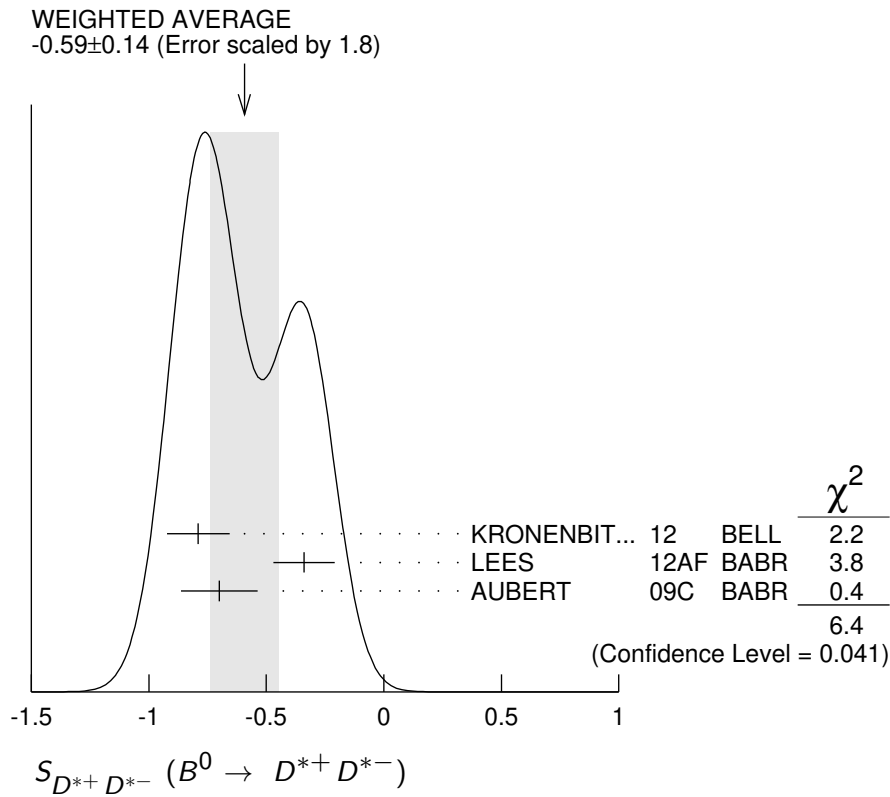
- <sup>1</sup> Assumes both *CP*-even and *CP*-odd states having the *CP* asymmetry.
- <sup>2</sup> Belle Collab. quotes  $A_{D^{*+}D^{*-}}$  which is equal to  $-C_{D^{*+}D^{*-}}$ .
- <sup>3</sup> Measured partially reconstructed candidates when one  $D^0$  meson is not explicitly reconstructed. Analysis does not separate *CP*-even and *CP*-odd component.
- <sup>4</sup> AUBERT 03Q reports  $|\lambda|=0.75 \pm 0.19 \pm 0.02$  and  $\text{Im}(\lambda)=0.05 \pm 0.29 \pm 0.10$ . We convert them to *S* and *C* parameters taking into account correlations.



**$S_{D^{*+}D^{*-}} (B^0 \rightarrow D^{*+}D^{*-})$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.59±0.14 OUR AVERAGE</b>	Error includes scale factor of 1.8. See the ideogram below.		
-0.79±0.13±0.03	<sup>1</sup> KRONENBIT...12	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
-0.34±0.12±0.05	<sup>2</sup> LEES	12AF BABR	$e^+e^- \rightarrow \Upsilon(4S)$
-0.70±0.16±0.03	<sup>1</sup> AUBERT	09C BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.96±0.25 <sup>+0.13</sup> <sub>-0.16</sub>	VERVINK	09 BELL	Repl. by KRONENBITTER 12
-0.66±0.19±0.04	<sup>1</sup> AUBERT	07B0 BABR	Repl. by AUBERT 09C
-0.75±0.56±0.12	MIYAKE	05 BELL	Repl. by VERVINK 09
0.06±0.37±0.13	<sup>3</sup> AUBERT	03Q BABR	Repl. by AUBERT 07B0

- <sup>1</sup> Assumes both *CP*-even and *CP*-odd states having the *CP* asymmetry.
- <sup>2</sup> Measured partially reconstructed candidates when one  $D^0$  meson is not explicitly reconstructed. Analysis does not separate *CP*-even and *CP*-odd component.
- <sup>3</sup> AUBERT 03Q reports  $|\lambda|=0.75 \pm 0.19 \pm 0.02$  and  $\text{Im}(\lambda)=0.05 \pm 0.29 \pm 0.10$ . We convert them to *S* and *C* parameters taking into account correlations.



### $C_+ (B^0 \rightarrow D^{*+}D^{*-})$

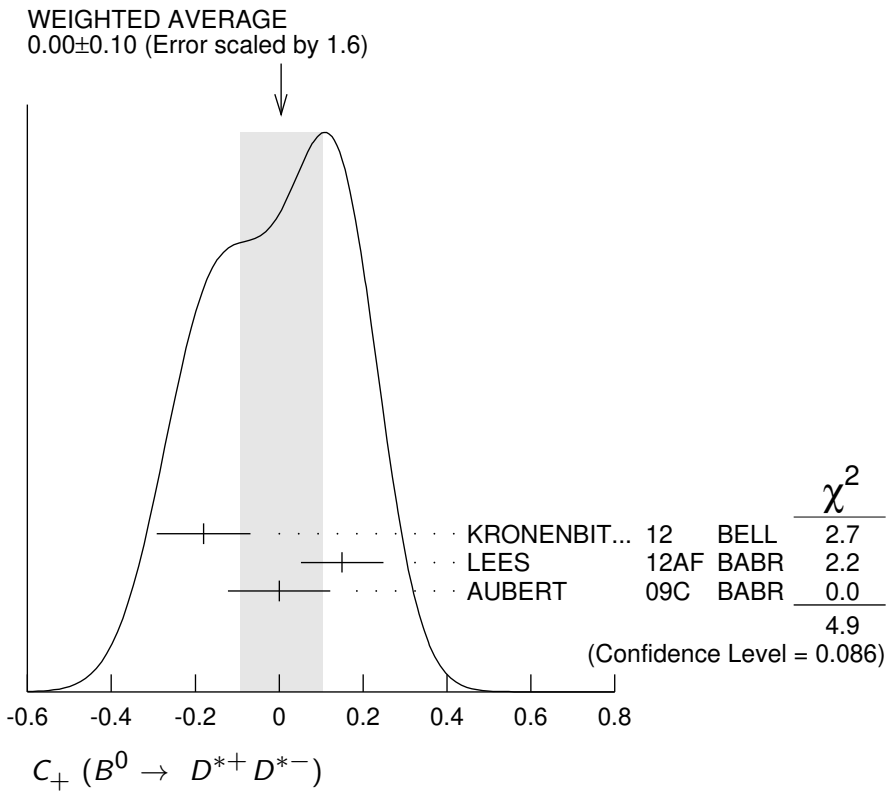
See the note in the  $C_{\pi\pi}$  datablock, but for  $CP$  even final state.

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.00 \pm 0.10</math> OUR AVERAGE</b>	Error includes scale factor of 1.6. See the ideogram below.		
$-0.18 \pm 0.10 \pm 0.05$	<sup>1</sup> KRONENBIT...	12 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$+0.15 \pm 0.09 \pm 0.04$	<sup>2</sup> LEES	12AF BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$0.00 \pm 0.12 \pm 0.02$	AUBERT	09C BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$-0.05 \pm 0.14 \pm 0.02$	AUBERT	07B0 BABR	Repl. by AUBERT 09C
$0.06 \pm 0.17 \pm 0.03$	<sup>3</sup> AUBERT, BE	05A BABR	Repl. by AUBERT 07B0

<sup>1</sup> Belle Collab. quotes  $A_{D^{*+}D^{*-}}$  which is equal to  $-C_{D^{*+}D^{*-}}$ .

<sup>2</sup> Measured partially reconstructed candidates when one  $D^0$  meson is not explicitly reconstructed. Extracted under assumption of equal  $C_+$  and  $C_-$ .

<sup>3</sup> AUBERT, BE 05A reports a  $CP$ -odd fraction  $R_{\perp} = 0.125 \pm 0.044 \pm 0.007$ .



### $S_+ (B^0 \rightarrow D^{*+} D^{*-})$

See the note in the  $S_{\pi\pi}$  datablock, but for  $CP$  even final state.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.73±0.09 OUR AVERAGE</b>			
-0.81±0.13±0.03	KRONENBIT...12	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
-0.49±0.18±0.08	<sup>1</sup> LEES	12AF BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
-0.76±0.16±0.04	AUBERT	09C BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
••• We do not use the following data for averages, fits, limits, etc. •••			
-0.72±0.19±0.05	AUBERT	07BO BABR	Repl. by AUBERT 09C
-0.75±0.25±0.03	<sup>2</sup> AUBERT,BE	05A BABR	Repl. by AUBERT 07BO

<sup>1</sup> Measured partially reconstructed candidates when one  $D^0$  meson is not explicitly reconstructed. Analysis does not separate  $CP$ -even and  $CP$ -odd component. Value is obtained from  $S = -0.34 \pm 0.12 \pm 0.05$  using  $S = S_+ (1 - 2 R_\perp)$  with  $R_\perp = 0.158 \pm 0.029$ .

<sup>2</sup> AUBERT,BE 05A reports a  $CP$ -odd fraction  $R_\perp = 0.125 \pm 0.044 \pm 0.007$ .

### $C_- (B^0 \rightarrow D^{*+} D^{*-})$

See the note in the  $C_{\pi\pi}$  datablock, but for  $CP$  odd final state.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.19±0.31 OUR AVERAGE</b>			
0.05±0.39±0.08	<sup>1</sup> KRONENBIT...12	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
0.41±0.49±0.08	AUBERT	09C BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
••• We do not use the following data for averages, fits, limits, etc. •••			
0.23±0.67±0.10	AUBERT	07BO BABR	Repl. by AUBERT 09C
-0.20±0.96±0.11	<sup>2</sup> AUBERT,BE	05A BABR	Repl. by AUBERT 07BO

<sup>1</sup> Belle Collab. quotes  $A_{D^{*+} D^{*-}}$  which is equal to  $-C_{D^{*+} D^{*-}}$ .

<sup>2</sup> AUBERT,BE 05A reports a  $CP$ -odd fraction  $R_\perp = 0.125 \pm 0.044 \pm 0.007$ .



### $S_-(B^0 \rightarrow D^{*+} D^{*-})$

See the note in the  $S_{\pi\pi}$  datablock, but for  $CP$  odd final state.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.1 ± 1.6 OUR AVERAGE</b>	Error includes scale factor of 3.5.		
1.52 ± 0.62 ± 0.12	KRONENBIT...12	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
-1.80 ± 0.70 ± 0.16	AUBERT	09C BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-1.83 ± 1.04 ± 0.23	AUBERT	07BO BABR	Repl. by AUBERT 09C
-1.75 ± 1.78 ± 0.22	<sup>1</sup> AUBERT, BE	05A BABR	Repl. by AUBERT 07BO
<sup>1</sup> AUBERT, BE 05A reports a $CP$ -odd fraction $R_{\perp} = 0.125 \pm 0.044 \pm 0.007$ .			

### $C(B^0 \rightarrow D^{*(2010)+} D^{*(2010)-} K_S^0)$

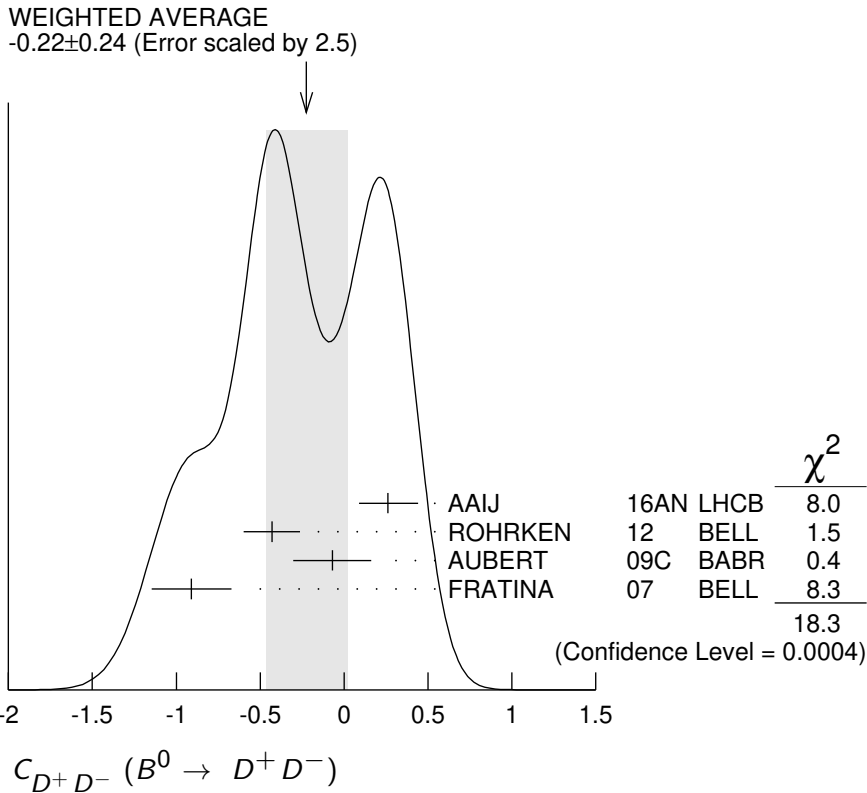
VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.01 ± 0.28 ± 0.09</b>	<sup>1</sup> DALSENO	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Reports value of $A$ which is equal to $-C$ .			

### $S(B^0 \rightarrow D^{*(2010)+} D^{*(2010)-} K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.06<sup>+0.45</sup><sub>-0.44</sub> ± 0.06</b>	<sup>1</sup> DALSENO	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> This value includes an unknown $CP$ dilution factor $D$ due to possible contributions from intermediate resonances and different partial waves.			

### $C_{D^+ D^-}(B^0 \rightarrow D^+ D^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.22 ± 0.24 OUR AVERAGE</b>	Error includes scale factor of 2.5. See the ideogram below.		
0.26 <sup>+0.18</sup> <sub>-0.17</sub> ± 0.02	AAIJ	16AN LHCB	$pp$ at 7, 8 TeV
-0.43 ± 0.16 ± 0.05	ROHRKEN	12 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
-0.07 ± 0.23 ± 0.03	AUBERT	09C BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
-0.91 ± 0.23 ± 0.06	<sup>1</sup> FRATINA	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.11 ± 0.22 ± 0.07	AUBERT	07AI BABR	Repl. by AUBERT 09C
0.11 ± 0.35 ± 0.06	AUBERT, B	05Z BABR	Repl. by AUBERT 07AI
<sup>1</sup> The paper reports $A$ , which is equal to $-C$ .			



### $S_{D^+D^-} (B^0 \rightarrow D^+D^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.76^{+0.15}_{-0.13}</math> OUR AVERAGE</b>			Error includes scale factor of 1.2.
$-0.54^{+0.17}_{-0.16} \pm 0.05$	AAIJ	16AN LHCB	$pp$ at 7, 8 TeV
$-1.06^{+0.21}_{-0.14} \pm 0.08$	ROHRKEN	12 BELL	$e^+e^- \rightarrow \gamma(4S)$
$-0.63 \pm 0.36 \pm 0.05$	AUBERT	09C BABR	$e^+e^- \rightarrow \gamma(4S)$
$-1.13 \pm 0.37 \pm 0.09$	FRATINA	07 BELL	$e^+e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.54 \pm 0.34 \pm 0.06$	AUBERT	07AI BABR	Repl. by AUBERT 09C
$-0.29 \pm 0.63 \pm 0.06$	AUBERT,B	05Z BABR	Repl. by AUBERT 07AI

### $C_{J/\psi(1S)\pi^0} (B^0 \rightarrow J/\psi(1S)\pi^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.03 \pm 0.17</math> OUR AVERAGE</b>			Error includes scale factor of 1.5.
$0.15 \pm 0.14^{+0.04}_{-0.03}$	<sup>1</sup> PAL	18 BELL	$e^+e^- \rightarrow \gamma(4S)$
$-0.20 \pm 0.19 \pm 0.03$	AUBERT	08AU BABR	$e^+e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.08 \pm 0.16 \pm 0.05$	<sup>1</sup> LEE	08A BELL	Repl. by PAL 18
$-0.21 \pm 0.26 \pm 0.06$	AUBERT,B	06B BABR	Repl. by AUBERT 08AU
$0.01 \pm 0.29 \pm 0.03$	<sup>1</sup> KATAOKA	04 BELL	Repl. by LEE 08A
$0.38 \pm 0.41 \pm 0.09$	AUBERT	03N BABR	Repl. by AUBERT,B 06B
<sup>1</sup> BELLE Collab. quotes $A_{J/\psi\pi^0}$ which is equal to $-C_{J/\psi\pi^0}$ .			

### $S_{J/\psi(1S)\pi^0} (B^0 \rightarrow J/\psi(1S)\pi^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.88 \pm 0.32</math> OUR AVERAGE</b>	Error includes scale factor of 2.2.		
$-0.59 \pm 0.19 \pm 0.03$	PAL	18	BELL $e^+e^- \rightarrow \Upsilon(4S)$
$-1.23 \pm 0.21 \pm 0.04$	AUBERT	08AU BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$-0.65 \pm 0.21 \pm 0.05$	LEE	08A	BELL Repl. by PAL 18
$-0.68 \pm 0.30 \pm 0.04$	AUBERT,B	06B BABR	Repl. by AUBERT 08AU
$-0.72 \pm 0.42 \pm 0.09$	KATAOKA	04	BELL Repl. by LEE 08A
$0.05 \pm 0.49 \pm 0.16$	AUBERT	03N BABR	Repl. by AUBERT,B 06B

### $C(B^0 \rightarrow J/\psi(1S)\rho^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.063 \pm 0.056^{+0.019}_{-0.014}</math></b>	<sup>1</sup> AAIJ	15J	LHCB $pp$ at 7, 8 TeV

<sup>1</sup> Time-dependent  $CP$  violation is measured in the  $B^0 \rightarrow J/\psi\rho^0$  and was used to limit the size of penguin amplitude contributions to  $\phi_s$  in  $B_S^0 \rightarrow J/\psi\phi$  decays to be between  $[-1.05^\circ, 1.18^\circ]$  at 95% confidence level.

### $S(B^0 \rightarrow J/\psi(1S)\rho^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.66^{+0.13+0.09}_{-0.12-0.03}</math></b>	<sup>1</sup> AAIJ	15J	LHCB $pp$ at 7, 8 TeV

<sup>1</sup> Time-dependent  $CP$  violation is measured in the  $B^0 \rightarrow J/\psi\rho^0$  and was used to limit the size of penguin amplitude contributions to  $\phi_s$  in  $B_S^0 \rightarrow J/\psi\phi$  decays to be between  $[-1.05^\circ, 1.18^\circ]$  at 95% confidence level.

### $C_{D_{CP}^{(*)}h^0} (B^0 \rightarrow D_{CP}^{(*)}h^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.02 \pm 0.07 \pm 0.03</math></b>	<sup>1</sup> ABDESSALAM 15		$e^+e^- \rightarrow \Upsilon(4S)$

● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●

$-0.23 \pm 0.16 \pm 0.04$  AUBERT 07AJ BABR Repl. by ABDESSALAM 15

<sup>1</sup> BABAR and BELLE combined analysis uses  $CP$ -eigenstate decay modes  $D^0 \rightarrow K^+K^-$ ,  $K_S^0\pi^0$ ,  $K_S^0\omega$ , and  $h^0 = \pi^0, \eta, \omega$ .

### $S_{D_{CP}^{(*)}h^0} (B^0 \rightarrow D_{CP}^{(*)}h^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.66 \pm 0.10 \pm 0.06</math></b>	<sup>1</sup> ABDESSALAM 15		$e^+e^- \rightarrow \Upsilon(4S)$

● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●

$-0.56 \pm 0.23 \pm 0.05$  AUBERT 07AJ BABR Repl. by ABDESSALAM 15

<sup>1</sup> BABAR and BELLE combined analysis uses  $CP$ -eigenstate decay modes  $D^0 \rightarrow K^+K^-$ ,  $K_S^0\pi^0$ ,  $K_S^0\omega$ , and  $h^0 = \pi^0, \eta, \omega$ .

### $C_{K^0\pi^0}(B^0 \rightarrow K^0\pi^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.00±0.08 OUR AVERAGE</b>			
-0.01±0.12±0.04	<sup>1</sup> ADACHI	24	BELL $e^+e^- \rightarrow \Upsilon(4S)$
-0.14±0.13±0.06	<sup>2</sup> FUJIKAWA	10A	BELL $e^+e^- \rightarrow \Upsilon(4S)$
0.13±0.13±0.03	AUBERT	09I	BABR $e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.06±0.15±0.04	<sup>3</sup> ADACHI	24	BELL $e^+e^- \rightarrow \Upsilon(4S)$
-0.04 <sup>+0.14</sup> <sub>-0.15</sub> ±0.05	<sup>4</sup> ADACHI	23E	BELL $e^+e^- \rightarrow \Upsilon(4S)$
0.24±0.15±0.03	AUBERT	08E	BABR Repl. by AUBERT 09I
0.05±0.14±0.05	<sup>2</sup> CHAO	07	BELL Repl. by FUJIKAWA 10A
0.06±0.18±0.03	AUBERT	05Y	BABR Repl. by AUBERT 08E
-0.16±0.29±0.05	<sup>2,5</sup> CHAO	05A	BELL Repl. by CHEN 05B
0.11±0.20±0.09	<sup>2</sup> CHEN	05B	BELL Repl. by CHAO 07
-0.03±0.36±0.11	<sup>2</sup> AUBERT	04M	BABR Repl. by AUBERT,B 04M
0.40 <sup>+0.27</sup> <sub>-0.28</sub> ±0.09	<sup>6</sup> AUBERT,B	04M	BABR Repl. by AUBERT 05Y

<sup>1</sup> This is the combined result of this analysis (ADACHI 24) and ADACHI 23E.

<sup>2</sup> Reports A which is equal to -C.

<sup>3</sup> The measurement is using BELL II data reported in ADACHI 24. The combination with ADACHI 23E is also reported.

<sup>4</sup> The result has been combined with ADACHI 24.

<sup>5</sup> Corresponds to a 90% CL interval of  $-0.33 < A_{CP} < 0.64$ .

<sup>6</sup> Based on a total signal yield of  $122 \pm 16$  events.

### $S_{K^0\pi^0}(B^0 \rightarrow K^0\pi^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.64±0.13 OUR AVERAGE</b>			
0.75 <sup>+0.20</sup> <sub>-0.23</sub> ±0.04	ADACHI	23E	BELL $e^+e^- \rightarrow \Upsilon(4S)$
0.67±0.31±0.08	FUJIKAWA	10A	BELL $e^+e^- \rightarrow \Upsilon(4S)$
0.55±0.20±0.03	AUBERT	09I	BABR $e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.40±0.23±0.03	AUBERT	08E	BABR Repl. by AUBERT 09I
0.33±0.35±0.08	CHAO	07	BELL Repl. by FUJIKAWA 10A
0.35 <sup>+0.30</sup> <sub>-0.33</sub> ±0.04	AUBERT	05Y	BABR Repl. by AUBERT 08E
0.32±0.61±0.13	CHEN	05B	BELL Repl. by CHAO 07
0.48 <sup>+0.38</sup> <sub>-0.47</sub> ±0.06	<sup>1</sup> AUBERT,B	04M	BABR Repl. by AUBERT 05Y

<sup>1</sup> Based on a total signal yield of  $122 \pm 16$  events.

### $C_{\eta(958)K_S^0}(B^0 \rightarrow \eta(958)K_S^0)$

See updated measurements in  $C_{\eta'K^0}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.04±0.20 OUR AVERAGE</b>			
-0.21±0.10±0.02	AUBERT	05M	BABR $e^+e^- \rightarrow \Upsilon(4S)$
0.19±0.11±0.05	<sup>1</sup> CHEN	05B	BELL $e^+e^- \rightarrow \Upsilon(4S)$

Error includes scale factor of 2.5.

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.26 \pm 0.22 \pm 0.03$	<sup>1</sup> ABE	03C	BELL	Repl. by ABE 03H
$0.01 \pm 0.16 \pm 0.04$	<sup>1</sup> ABE	03H	BELL	Repl. by CHEN 05B
$0.10 \pm 0.22 \pm 0.04$	AUBERT	03W	BABR	Repl. by AUBERT 05M
$-0.13 \pm 0.32^{+0.06}_{-0.09}$	<sup>1</sup> CHEN	02B	BELL	Repl. by ABE 03C

<sup>1</sup> BELLE Collab. quotes  $A_{\eta'(958)K_S^0}$  which is equal to  $-C_{\eta'(958)K_S^0}$ .

### $S_{\eta'(958)K_S^0} (B^0 \rightarrow \eta'(958)K_S^0)$

See updated measurements in  $S_{\eta'K^0}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.43 \pm 0.17</math> OUR AVERAGE</b>	Error includes scale factor of 1.5.		
$0.30 \pm 0.14 \pm 0.02$	AUBERT	05M	BABR $e^+e^- \rightarrow \Upsilon(4S)$
$0.65 \pm 0.18 \pm 0.04$	CHEN	05B	BELL $e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.71 \pm 0.37^{+0.05}_{-0.06}$	ABE	03C	BELL	Repl. by ABE 03H
$0.43 \pm 0.27 \pm 0.05$	ABE	03H	BELL	Repl. by CHEN 05B
$0.02 \pm 0.34 \pm 0.03$	AUBERT	03W	BABR	Repl. by AUBERT 05M
$0.28 \pm 0.55^{+0.07}_{-0.08}$	CHEN	02B	BELL	Repl. by ABE 03C

### $C_{\eta'K^0} (B^0 \rightarrow \eta'K^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.06 \pm 0.04</math> OUR AVERAGE</b>			
$-0.03 \pm 0.05 \pm 0.04$	<sup>1</sup> SANTELJ	14	BELL $e^+e^- \rightarrow \Upsilon(4S)$
$-0.08 \pm 0.06 \pm 0.02$	AUBERT	09i	BABR $e^+e^- \rightarrow \Upsilon(4S)$
$-0.16 \pm 0.07 \pm 0.03$	<sup>2</sup> AUBERT	07A	BABR Repl. by AUBERT 09i
$0.01 \pm 0.07 \pm 0.05$	<sup>1,2</sup> CHEN	07	BELL Repl. by SANTELJ 14

<sup>1</sup> The paper reports  $A$ , which is equal to  $-C$ .

<sup>2</sup> The mixing-induced  $CP$  violation is reported with a significance of more than 5 standard deviations in this  $b \rightarrow s$  penguin dominated mode.

### $S_{\eta'K^0} (B^0 \rightarrow \eta'K^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.63 \pm 0.06</math> OUR AVERAGE</b>			
$0.68 \pm 0.07 \pm 0.03$	SANTELJ	14	BELL $e^+e^- \rightarrow \Upsilon(4S)$
$0.57 \pm 0.08 \pm 0.02$	AUBERT	09i	BABR $e^+e^- \rightarrow \Upsilon(4S)$
$0.58 \pm 0.10 \pm 0.03$	<sup>1</sup> AUBERT	07A	BABR Repl. by AUBERT 09i
$0.64 \pm 0.10 \pm 0.04$	<sup>1</sup> CHEN	07	BELL Repl. by SANTELJ 14

<sup>1</sup> The mixing-induced  $CP$  violation is reported with a significance of more than 5 standard deviations in this  $b \rightarrow s$  penguin dominated mode.

### $C_{\omega K_S^0} (B^0 \rightarrow \omega K_S^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.0 ± 0.4 OUR AVERAGE</b>	Error includes scale factor of 3.0.		
0.36 ± 0.19 ± 0.05	<sup>1</sup> CHOBANOVA 14	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
-0.52 <sup>+0.22</sup> <sub>-0.20</sub> ± 0.03	AUBERT	09I BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.09 ± 0.29 ± 0.06	<sup>1</sup> CHAO	07 BELL	Repl. by CHOBANOVA 14
-0.55 <sup>+0.28</sup> <sub>-0.26</sub> ± 0.03	AUBERT,B	06E BABR	Repl. by AUBERT 09I
-0.27 ± 0.48 ± 0.15	<sup>1</sup> CHEN	05B BELL	Repl. by CHAO 07
<sup>1</sup> Belle Collab. quotes $A_{\omega K_S^0}$ which is equal to $-C_{\omega K_S^0}$ .			

### $S_{\omega K_S^0} (B^0 \rightarrow \omega K_S^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.70 ± 0.21 OUR AVERAGE</b>			
0.91 ± 0.32 ± 0.05	CHOBANOVA 14	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
0.55 <sup>+0.26</sup> <sub>-0.29</sub> ± 0.02	AUBERT	09I BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.11 ± 0.46 ± 0.07	CHAO	07 BELL	Repl. by CHOBANOVA 14
0.51 <sup>+0.35</sup> <sub>-0.39</sub> ± 0.02	AUBERT,B	06E BABR	Repl. by AUBERT 09I
0.76 ± 0.65 <sup>+0.13</sup> <sub>-0.16</sub>	CHEN	05B BELL	Repl. by CHAO 07

### $C (B^0 \rightarrow K_S^0 \pi^0 \pi^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.21 ± 0.20 OUR AVERAGE</b>			
-0.28 ± 0.21 ± 0.04	<sup>1</sup> YUSA	19 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
0.23 ± 0.52 ± 0.13	AUBERT	07AQ BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Reports value of $A$ which is equal to $-C$ .			

### $S (B^0 \rightarrow K_S^0 \pi^0 \pi^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.89<sup>+0.27</sup><sub>-0.30</sub> OUR AVERAGE</b>			
0.92 <sup>+0.27</sup> <sub>-0.31</sub> ± 0.11	YUSA	19 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
0.72 ± 0.71 ± 0.08	AUBERT	07AQ BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

### $C_{\rho^0 K_S^0} (B^0 \rightarrow \rho^0 K_S^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.04 ± 0.20 OUR AVERAGE</b>			
-0.05 ± 0.26 ± 0.10	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
-0.03 <sup>+0.24</sup> <sub>-0.23</sub> ± 0.15	<sup>2,3</sup> DALSENO	09 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.64 ± 0.41 ± 0.20	AUBERT	07F BABR	Repl. by AUBERT 09AU

- <sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.  
<sup>2</sup> Quotes  $A_{\rho^0(K_S)^0}$  which is equal to  $-C_{\rho^0 K_S^0}$ .  
<sup>3</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two consistent solutions that may be preferred.

### $S_{\rho^0 K_S^0} (B^0 \rightarrow \rho^0 K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
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#### **0.50<sup>+0.17</sup><sub>-0.21</sub> OUR AVERAGE**

$0.35^{+0.26}_{-0.31} \pm 0.07$	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.64^{+0.19}_{-0.25} \pm 0.13$	<sup>2</sup> DALSENO	09 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.20 \pm 0.52 \pm 0.24$	AUBERT	07F BABR	Repl. by AUBERT 09AU
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- <sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.  
<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two consistent solutions that may be preferred.

### $C_{f_0(980) K_S^0} (B^0 \rightarrow f_0(980) K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
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#### **0.29 ± 0.20 OUR AVERAGE**

$0.28 \pm 0.24 \pm 0.09$	<sup>1</sup> LEES	12O BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.30 \pm 0.29 \pm 0.14$	<sup>2,3</sup> NAKAHAMA	10 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.08 \pm 0.19 \pm 0.05$	<sup>4</sup> AUBERT	09AU BABR	Repl. by LEES 12O
$0.06 \pm 0.17 \pm 0.11$	<sup>2,5</sup> DALSENO	09 BELL	Repl. by NAKAHAMA 10
$-0.41 \pm 0.23 \pm 0.07$	<sup>2</sup> AUBERT	07AX BABR	Repl. by AUBERT 09AU
$0.15 \pm 0.15 \pm 0.07$	<sup>2</sup> CHAO	07 BELL	Repl. by DALSENO 09
$0.39 \pm 0.27 \pm 0.09$	<sup>2</sup> CHEN	05B BELL	Repl. by CHAO 07

- <sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K^+ K^-$  decay.  
<sup>2</sup> Quotes  $A_{f_0(980) K_S^0}$  which is equal to  $-C_{f_0(980) K_S^0}$ .  
<sup>3</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K_S^0 K^+ K^-$  decays and the first of four consistent solutions that may be preferred.  
<sup>4</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.  
<sup>5</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two consistent solutions that may be preferred.

### $S_{f_0(980) K_S^0} (B^0 \rightarrow f_0(980) K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
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#### **-0.50 ± 0.16 OUR AVERAGE**

$-0.55 \pm 0.18 \pm 0.12$	<sup>1</sup> LEES	12O BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$-0.43^{+0.22}_{-0.20} \pm 0.14$	<sup>2</sup> DALSENO	09 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.96^{+0.21}_{-0.04} \pm 0.04$	<sup>3</sup> AUBERT	09AU BABR	Repl. by LEES 120
$-0.25 \pm 0.26 \pm 0.10$	<sup>4</sup> AUBERT	07AX BABR	Repl. by AUBERT 09AU
$0.18 \pm 0.23 \pm 0.11$	CHAO	07 BELL	Repl. by DALSENO 09
$0.47 \pm 0.41 \pm 0.08$	CHEN	05B BELL	Repl. by CHAO 07

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K^+ K^-$  decay.

<sup>2</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two consistent solutions that may be preferred.

<sup>3</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

<sup>4</sup> Reports  $\beta_{eff}$ . We quote  $S$  obtained from epaps: E-PRLTAO-99-076741.

### $S_{f_2(1270)K_S^0} (B^0 \rightarrow f_2(1270)K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.48 \pm 0.52 \pm 0.12$	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

### $C_{f_2(1270)K_S^0} (B^0 \rightarrow f_2(1270)K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.28^{+0.35}_{-0.40} \pm 0.11$	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

### $S_{f_x(1300)K_S^0} (B^0 \rightarrow f_x(1300)K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.20 \pm 0.52 \pm 0.10$	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

### $C_{f_x(1300)K_S^0} (B^0 \rightarrow f_x(1300)K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.13^{+0.33}_{-0.35} \pm 0.10$	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

### $S_{K^0 \pi^+ \pi^-} (B^0 \rightarrow K^0 \pi^+ \pi^- \text{ nonresonant})$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.01 \pm 0.31 \pm 0.10$	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.



### $C_{K^0\pi^+\pi^-} (B^0 \rightarrow K^0\pi^+\pi^- \text{ nonresonant})$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.01 ± 0.25 ± 0.08</b>	<sup>1</sup> AUBERT	09AU BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0\pi^+\pi^-$  decays and the first of two equivalent solutions is used.

### $C_{K_S^0 K_S^0} (B^0 \rightarrow K_S^0 K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.0 ± 0.4 OUR AVERAGE</b>	Error includes scale factor of 1.4.		
0.38 ± 0.38 ± 0.05	<sup>1</sup> NAKAHAMA	08 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
-0.40 ± 0.41 ± 0.06	AUBERT, BE	06C BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Reports  $A_{K_S^0 K_S^0}$  which equals to  $-C_{K_S^0 K_S^0}$ .

### $S_{K_S^0 K_S^0} (B^0 \rightarrow K_S^0 K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.8 ± 0.5 OUR AVERAGE</b>			
-0.38 $^{+0.69}_{-0.77}$ ± 0.09	NAKAHAMA	08 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
-1.28 $^{+0.80}_{-0.73}$ $^{+0.11}_{-0.16}$	AUBERT, BE	06C BABR	$e^+e^- \rightarrow \Upsilon(4S)$

### $C_{K^+K^-K_S^0} (B^0 \rightarrow K^+K^-K_S^0 \text{ nonresonant})$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.06 ± 0.08 OUR AVERAGE</b>			
0.02 ± 0.09 ± 0.03	<sup>1,2</sup> LEES	12O BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.14 ± 0.11 ± 0.09	<sup>3,4</sup> NAKAHAMA	10 BELL	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.054 ± 0.102 ± 0.060	<sup>3,5</sup> AUBERT	07AX BABR	Repl. by LEES 12O
0.09 ± 0.10 ± 0.05	<sup>3,5</sup> CHAO	07 BELL	Repl. by NAKAHAMA 10
0.10 ± 0.14 ± 0.04	<sup>5</sup> AUBERT	05T BABR	Repl. by AUBERT 07AX
0.09 ± 0.12 ± 0.07	<sup>3</sup> CHEN	05B BELL	Repl. by CHAO 07
-0.10 ± 0.19 ± 0.10	<sup>5</sup> AUBERT, B	04V BABR	Repl. by AUBERT 05T
0.40 ± 0.33 $^{+0.28}_{-0.10}$	<sup>3</sup> ABE	03C BELL	Repl. by ABE 03H
0.17 ± 0.16 ± 0.04	<sup>3,5</sup> ABE	03H BELL	Repl. by CHEN 05B

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K^+ K^-$  decay.

<sup>2</sup> This measurement is performed on all the isobar components, excluding  $\phi K_S^0$  and  $f_0(980) K_S^0$ .

<sup>3</sup> Quotes  $A_{K^+K^-K_S^0}$  which is equal to  $-C_{K^+K^-K_S^0}$ .

<sup>4</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K_S^0 K^+ K^-$  decays and the first of four consistent solutions that may be preferred.

<sup>5</sup> Excludes the events from  $B^0 \rightarrow \phi K_S^0$  decay. The results are derived from a combined sample of  $K^+K^-K_S^0$  and  $K^+K^-K_L^0$  decays.

### $S_{K^+K^-K_S^0} (B^0 \rightarrow K^+K^-K_S^0 \text{ nonresonant})$

VALUE	DOCUMENT ID	TECN	COMMENT
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**-0.66 ± 0.11 OUR AVERAGE**

-0.65 ± 0.12 ± 0.03      1,2 LEES      120 BABR       $e^+e^- \rightarrow \gamma(4S)$

-0.68 ± 0.15  $\begin{smallmatrix} +0.21 \\ -0.13 \end{smallmatrix}$       3 CHAO      07 BELL       $e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

-0.764 ± 0.111  $\begin{smallmatrix} +0.071 \\ -0.040 \end{smallmatrix}$       3,4 AUBERT      07AX BABR      Repl. by LEES 120

-0.42 ± 0.17 ± 0.03      3,5 AUBERT      05T BABR      Repl. by AUBERT 07AX

-0.49 ± 0.18 ± 0.04      CHEN      05B BELL      Repl. by CHAO 07

-0.56 ± 0.25 ± 0.04      3,6 AUBERT,B      04V BABR      Repl. by AUBERT 05T

-0.49 ± 0.43 ± 0.11      ABE      03C BELL      Repl. by ABE 03H

-0.51 ± 0.26 ± 0.05      3,7 ABE      03H BELL      Repl. by CHEN 05B

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K^+ K^-$  decay.

<sup>2</sup> This measurement is performed on all the isobar components, excluding  $\phi K_S^0$  and  $f_0(980) K_S^0$ . Note that the nonresonant component is not a  $CP$  eigenstate.

<sup>3</sup> Excludes events from  $B^0 \rightarrow \phi K_S^0$  decay. The results are derived from a combined sample of  $K^+K^-K_S^0$  and  $K^+K^-K_L^0$  decays.

<sup>4</sup> Reports  $\beta_{eff}$ . We quote  $S$  obtained from epaps: E-PRLTAO-99-076741.

<sup>5</sup> The measured  $CP$ -even final states fraction is  $0.89 \pm 0.08 \pm 0.06$ .

<sup>6</sup> The measured  $CP$ -even final states fraction is  $0.98 \pm 0.15 \pm 0.04$ .

<sup>7</sup> The measured  $CP$ -even final states fraction is  $1.03 \pm 0.15 \pm 0.05$ .

### $C_{K^+K^-K_S^0} (B^0 \rightarrow K^+K^-K_S^0 \text{ inclusive})$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.015 ± 0.077 ± 0.053**      1,2 AUBERT      07AX BABR       $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Measured using full Dalitz plot fit including  $\phi$  component.

<sup>2</sup> The results are derived from a combined sample of  $K^+K^-K_S^0$  and  $K^+K^-K_L^0$  decays.

### $S_{K^+K^-K_S^0} (B^0 \rightarrow K^+K^-K_S^0 \text{ inclusive})$

VALUE	DOCUMENT ID	TECN	COMMENT
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**-0.647 ± 0.116 ± 0.040**      1 AUBERT      07AX BABR       $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Measured using full Dalitz plot fit including  $\phi$  component.

### $C_{\phi K_S^0} (B^0 \rightarrow \phi K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
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**-0.09 ± 0.12 OUR AVERAGE**

-0.31 ± 0.20 ± 0.05      ADACHI      23I BELL       $e^+e^- \rightarrow \gamma(4S)$

0.05 ± 0.18 ± 0.05      1 LEES      120 BABR       $e^+e^- \rightarrow \gamma(4S)$

-0.04 ± 0.20 ± 0.10      2,3 NAKAHAMA      10 BELL       $e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.08 ± 0.18 ± 0.04      2,4 AUBERT      07AX BABR      Repl. by LEES 120

-0.07 ± 0.15 ± 0.05      2,4 CHEN      07 BELL      Repl. by NAKAHAMA 10

0.00 ± 0.23 ± 0.05      4 AUBERT      05T BABR      Repl. by AUBERT 07AX

-0.08 ± 0.22 ± 0.09      2,4 CHEN      05B BELL      Repl. by CHEN 07

0.01 ± 0.33 ± 0.10      4 AUBERT,B      04G BABR      Repl. by AUBERT 05T

0.56 ± 0.41 ± 0.16      2 ABE      03C BELL      Repl. by ABE 03H

0.15 ± 0.29 ± 0.07      2 ABE      03H BELL      Repl. by CHEN 05B

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K^+ K^-$  decay.

<sup>2</sup> Quotes  $A_{\phi K_S^0}$  which is equal to  $-C_{\phi K_S^0}$ .

<sup>3</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K_S^0 K^+ K^-$  decays and the first of four consistent solutions that may be preferred.

<sup>4</sup> Result combines  $B$ -meson final states  $\phi K_S^0$  and  $\phi K_L^0$  by assuming  $S_{\phi K_S^0} = -S_{\phi K_L^0}$

### $S_{\phi K_S^0} (B^0 \rightarrow \phi K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.58 ± 0.12 OUR AVERAGE</b>			
$0.54 \pm 0.26^{+0.06}_{-0.08}$	ADACHI	23I BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.66 \pm 0.17 \pm 0.07$	<sup>1</sup> LEES	12O BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.50 \pm 0.21 \pm 0.06$	<sup>2</sup> CHEN	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$0.21 \pm 0.26 \pm 0.11$	<sup>2,3</sup> AUBERT	07AX BABR	Repl. by LEES 12O
$0.50 \pm 0.25^{+0.07}_{-0.04}$	<sup>2</sup> AUBERT	05T BABR	Repl. by AUBERT 07AX
$0.08 \pm 0.33 \pm 0.09$	<sup>2</sup> CHEN	05B BELL	Repl. by CHEN 07
$0.47 \pm 0.34^{+0.08}_{-0.06}$	<sup>2</sup> AUBERT,B	04G BABR	Repl. by AUBERT 05T
$-0.73 \pm 0.64 \pm 0.22$	ABE	03C BELL	Repl. by ABE 03H
$-0.96 \pm 0.50^{+0.09}_{-0.11}$	ABE	03H BELL	Repl. by CHEN 05B

<sup>1</sup> Uses Dalitz plot analysis of the  $B^0 \rightarrow K_S^0 K^+ K^-$  decay.

<sup>2</sup> Result combines  $B$ -meson final states  $\phi K_S^0$  and  $\phi K_L^0$  by assuming  $S_{\phi K_S^0} = -S_{\phi K_L^0}$

<sup>3</sup> Reports  $\beta_{eff}$ . We quote  $S$  obtained from epaps: E-PRLTAO-99-076741.

### $C_{K_S K_S K_S} (B^0 \rightarrow K_S K_S K_S)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.14 ± 0.12 OUR AVERAGE</b>			
$-0.12 \pm 0.16 \pm 0.05$	<sup>1</sup> KANG	21 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$-0.17 \pm 0.18 \pm 0.04$	LEES	12I BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$0.02 \pm 0.21 \pm 0.05$	AUBERT	07AT BABR	Repl. by LEES 12I
$-0.31 \pm 0.20 \pm 0.07$	<sup>1</sup> CHEN	07 BELL	Repl. by KANG 21
$-0.34^{+0.28}_{-0.25} \pm 0.05$	AUBERT,B	05 BABR	Repl. by AUBERT 07AT
$-0.54 \pm 0.34 \pm 0.09$	<sup>1</sup> SUMISAWA	05 BELL	Repl. by CHEN 07

<sup>1</sup> KANG 21 quotes  $A_{K_S^0 K_S^0 K_S^0}$  which is equal to  $-C_{K_S^0 K_S^0 K_S^0}$ .

### $S_{K_S K_S K_S} (B^0 \rightarrow K_S K_S K_S)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.82 ± 0.17 OUR AVERAGE</b>			
$-0.71 \pm 0.23 \pm 0.05$	KANG	21 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$-0.94^{+0.24}_{-0.21} \pm 0.06$	LEES	12I BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.71 \pm 0.24 \pm 0.04$	AUBERT	07AT BABR	Repl. by LEES 12I
$0.30 \pm 0.32 \pm 0.08$	CHEN	07 BELL	Repl. by KANG 21
$-0.71^{+0.38}_{-0.32} \pm 0.04$	AUBERT,B	05 BABR	Repl. by AUBERT 07AT
$1.26 \pm 0.68 \pm 0.20$	SUMISAWA	05 BELL	Repl. by CHEN 07.

### $C_{K_S^0 \pi^0 \gamma}(B^0 \rightarrow K_S^0 \pi^0 \gamma)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.36 \pm 0.33 \pm 0.04</math></b>	<sup>1</sup> AUBERT	08BA BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.20 \pm 0.20 \pm 0.06$	<sup>2,3</sup> USHIRODA	06 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$-1.0 \pm 0.5 \pm 0.2$	<sup>1</sup> AUBERT,B	05P BABR	Repl. by AUBERT 08BA
$-0.03 \pm 0.34 \pm 0.11$	<sup>3</sup> USHIRODA	05 BELL	Repl. by USHIRODA 06

<sup>1</sup> Requires  $1.1 < M_{K_S^0 \pi^0} < 1.8 \text{ GeV}/c^2$ .

<sup>2</sup> Requires  $M_{K_S^0 \pi^0} < 1.8 \text{ GeV}/c^2$ .

<sup>3</sup> Reports  $A_{K_S^0 \pi^0 \gamma}$ , which is  $-C_{K_S^0 \pi^0 \gamma}$ .

### $S_{K_S^0 \pi^0 \gamma}(B^0 \rightarrow K_S^0 \pi^0 \gamma)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.78 \pm 0.59 \pm 0.09</math></b>	<sup>1</sup> AUBERT	08BA BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.10 \pm 0.31 \pm 0.07$	<sup>2</sup> USHIRODA	06 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.9 \pm 1.0 \pm 0.2$	<sup>1</sup> AUBERT,B	05P BABR	Repl. by AUBERT 08BA
$-0.58^{+0.46}_{-0.38} \pm 0.11$	USHIRODA	05 BELL	Repl. by USHIRODA 06

<sup>1</sup> Requires  $1.1 < M_{K_S^0 \pi^0} < 1.8 \text{ GeV}/c^2$ .

<sup>2</sup> Requires  $M_{K_S^0 \pi^0} < 1.8 \text{ GeV}/c^2$ .

### $C_{K_S^0 \pi^+ \pi^- \gamma}(B^0 \rightarrow K_S^0 \pi^+ \pi^- \gamma)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.39 \pm 0.20^{+0.03}_{-0.02}</math></b>	<sup>1</sup> DEL-AMO-SA..16	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Requires  $M_{K \pi \pi} < 1.8 \text{ GeV}/c^2$ ,  $0.6 \text{ GeV}/c^2 < m_{\pi^+ \pi^-} < 0.9 \text{ GeV}/c^2$ ,  $m_{K \pi} < 0.845 \text{ GeV}/c^2$  or  $m_{K \pi} > 0.945 \text{ GeV}/c^2$ .

### $S_{K_S^0 \pi^+ \pi^- \gamma}(B^0 \rightarrow K_S^0 \pi^+ \pi^- \gamma)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.14 \pm 0.25 \pm 0.03</math></b>	<sup>1</sup> DEL-AMO-SA..16	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Requires  $M_{K \pi \pi} < 1.8 \text{ GeV}/c^2$ ,  $0.6 \text{ GeV}/c^2 < m_{\pi^+ \pi^-} < 0.9 \text{ GeV}/c^2$ ,  $m_{K \pi} < 0.845 \text{ GeV}/c^2$  or  $m_{K \pi} > 0.945 \text{ GeV}/c^2$ .

### $C_{K^*(892)^0\gamma} (B^0 \rightarrow K^*(892)^0\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.04 ± 0.16 OUR AVERAGE</b>	Error includes scale factor of 1.2.		
-0.14 ± 0.16 ± 0.03	<sup>1</sup> AUBERT	08BA BABR	$e^+e^- \rightarrow \Upsilon(4S)$
0.20 ± 0.24 ± 0.05	<sup>1,2</sup> USHIRODA	06 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.40 ± 0.23 ± 0.03	AUBERT,B	05P BABR	Repl. by AUBERT 08BA
-0.57 ± 0.32 ± 0.09	<sup>3</sup> AUBERT,B	04Z BABR	Repl. by AUBERT,B 05P
<sup>1</sup> Requires $0.8 < M_{K_S^0\pi^0} < 1.0$ GeV/c <sup>2</sup> .			
<sup>2</sup> Reports value of A which is equal to -C.			
<sup>3</sup> Based on a total signal of $105 \pm 14$ events with $K^*(892)^0 \rightarrow K_S^0\pi^0$ only.			

### $S_{K^*(892)^0\gamma} (B^0 \rightarrow K^*(892)^0\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.15 ± 0.22 OUR AVERAGE</b>			
-0.03 ± 0.29 ± 0.03	<sup>1</sup> AUBERT	08BA BABR	$e^+e^- \rightarrow \Upsilon(4S)$
-0.32 $^{+0.36}_{-0.33}$ ± 0.05	<sup>1</sup> USHIRODA	06 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.21 ± 0.40 ± 0.05	AUBERT,B	05P BABR	Repl. by AUBERT 08BA
-0.79 $^{+0.63}_{-0.50}$ ± 0.10	<sup>2</sup> USHIRODA	05 BELL	Repl. by USHIRODA 06
0.25 ± 0.63 ± 0.14	<sup>3</sup> AUBERT,B	04Z BABR	Repl. by AUBERT,B 05P
<sup>1</sup> Requires $0.8 < M_{K_S^0\pi^0} < 1.0$ GeV/c <sup>2</sup> .			
<sup>2</sup> Assumes $C(B^0 \rightarrow K^*(892)^0\gamma) = 0$ .			
<sup>3</sup> Based on a total signal of $105 \pm 14$ events with $K^*(892)^0 \rightarrow K_S^0\pi^0$ only.			

### $C_{\eta K^0\gamma} (B^0 \rightarrow \eta K^0\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.1 ± 0.4 OUR AVERAGE</b>	Error includes scale factor of 1.4.		
0.48 ± 0.41 ± 0.07	<sup>1,2</sup> NAKANO	18 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
-0.32 $^{+0.40}_{-0.39}$ ± 0.07	<sup>3</sup> AUBERT	09 BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assuming $m_{\eta K_S^0} < 2.1$ GeV.			
<sup>2</sup> Reversed the sign for C=-A.			
<sup>3</sup> Assuming $m_{\eta K} < 3.25$ GeV.			

### $S_{\eta K^0\gamma} (B^0 \rightarrow \eta K^0\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.5 ± 0.5 OUR AVERAGE</b>	Error includes scale factor of 1.2.		
-1.32 ± 0.77 ± 0.36	<sup>1</sup> NAKANO	18 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
-0.18 $^{+0.49}_{-0.46}$ ± 0.12	<sup>2</sup> AUBERT	09 BABR	$e^+e^- \rightarrow \Upsilon(4S)$
<sup>1</sup> Assuming $m_{\eta K_S^0} < 2.1$ GeV.			
<sup>2</sup> Assuming $m_{\eta K} < 3.25$ GeV.			

### $C_{K^0\phi\gamma} (B^0 \rightarrow K^0\phi\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.35 \pm 0.58^{+0.10}_{-0.23}$	<sup>1</sup> SAHOO	11A	BELL $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Reports value of  $A$ , which is equal to  $-C$ .

### $S_{K^0\phi\gamma} (B^0 \rightarrow K^0\phi\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.74^{+0.72+0.10}_{-1.05-0.24}$	SAHOO	11A	BELL $e^+e^- \rightarrow \gamma(4S)$

### $C(B^0 \rightarrow K_S^0\rho^0\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.05 \pm 0.18 \pm 0.06$	<sup>1,2</sup> LI	08F	BELL $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Requires  $M_{K_S^0\pi^+\pi^-} < 1.8 \text{ GeV}/c^2$  and  $0.6 < M_{\pi^+\pi^-} < 0.9 \text{ GeV}/c^2$ .

<sup>2</sup> Reports value of  $A_{\text{eff}}$  which is equal to  $-C$ , and includes the non-resonant  $\pi^+\pi^-$  contribution in the  $\rho^0$  region.

### $S(B^0 \rightarrow K_S^0\rho^0\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.04 \pm 0.23$ OUR AVERAGE			

$-0.18 \pm 0.32^{+0.06}_{-0.05}$	<sup>1</sup> DEL-AMO-SA..16	BABR	$e^+e^- \rightarrow \gamma(4S)$
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$0.11 \pm 0.33^{+0.05}_{-0.09}$	<sup>2</sup> LI	08F	BELL $e^+e^- \rightarrow \gamma(4S)$
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<sup>1</sup> Requires  $M_{K\pi\pi} < 1.8 \text{ GeV}/c^2$ ,  $0.6 \text{ GeV}/c^2 < m_{\pi^+\pi^-} < 0.9 \text{ GeV}/c^2$ ,  $m_{K\pi} < 0.845 \text{ GeV}/c^2$  or  $m_{K\pi} > 0.945 \text{ GeV}/c^2$ .

<sup>2</sup> Requires  $M_{K\pi\pi} < 1.8 \text{ GeV}/c^2$ .

### $C(B^0 \rightarrow \rho^0\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.44 \pm 0.49 \pm 0.14$	<sup>1</sup> USHIRODA	08	BELL $e^+e^- \rightarrow \gamma(4S)$

<sup>1</sup> Reports value of  $A$  which is equal to  $-C$ .

### $S(B^0 \rightarrow \rho^0\gamma)$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.83 \pm 0.65 \pm 0.18$	USHIRODA	08	BELL $e^+e^- \rightarrow \gamma(4S)$

### $C_{\pi\pi} (B^0 \rightarrow \pi^+\pi^-)$

$C_{\pi\pi}$  is defined as  $(1-|\lambda|^2)/(1+|\lambda|^2)$ , where the quantity  $\lambda=q/p \bar{A}_f/A_f$  is a phase convention independent observable quantity for the final state  $f$ . For details, see the review on "CP Violation" in the Reviews section.

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.314 \pm 0.030$ OUR AVERAGE			
$-0.311 \pm 0.045 \pm 0.015$	AAIJ	210	LHCB $pp$ at 13 TeV
$-0.34 \pm 0.06 \pm 0.01$	AAIJ	180	LHCB $pp$ at 7, 8 TeV
$-0.33 \pm 0.06 \pm 0.03$	<sup>1</sup> DALSENO	13	BELL $e^+e^- \rightarrow \gamma(4S)$
$-0.25 \pm 0.08 \pm 0.02$	LEES	13D	BABR $e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.38 \pm 0.15 \pm 0.02$	AAIJ	13BO LHC	Repl. by AAIJ 180
$-0.21 \pm 0.09 \pm 0.02$	AUBERT	07AF BABR	Repl. by LEES 13D
$-0.55 \pm 0.08 \pm 0.05$	<sup>1</sup> ISHINO	07 BELL	Repl. by DALSENO 13
$-0.56 \pm 0.12 \pm 0.06$	<sup>1</sup> ABE	05D BELL	Repl. by ISHINO 07
$-0.09 \pm 0.15 \pm 0.04$	AUBERT, BE	05 BABR	Repl. by AUBERT 07AF
$-0.58 \pm 0.15 \pm 0.07$	<sup>1</sup> ABE	04E BELL	Repl. by ABE 05D
$-0.77 \pm 0.27 \pm 0.08$	<sup>1</sup> ABE	03G BELL	Repl. by ABE 04E.
$-0.94 \begin{smallmatrix} +0.31 \\ -0.25 \end{smallmatrix} \pm 0.09$	<sup>1</sup> ABE	02M BELL	Repl. by ABE 03G
$-0.25 \begin{smallmatrix} +0.45 \\ -0.47 \end{smallmatrix} \pm 0.14$	<sup>2</sup> AUBERT	02D BABR	Repl. by AUBERT 02Q
$-0.30 \pm 0.25 \pm 0.04$	<sup>3</sup> AUBERT	02Q BABR	Repl. by AUBERT, BE 05

<sup>1</sup> Paper reports  $A_{\pi\pi}$  which equals to  $-C_{\pi\pi}$ .

<sup>2</sup> Corresponds to 90% confidence range  $-1.0 < C_{\pi\pi} < 0.47$ .

<sup>3</sup> Corresponds to 90% confidence range  $-0.72 < C_{\pi\pi} < 0.12$ .

### $S_{\pi\pi} (B^0 \rightarrow \pi^+ \pi^-)$

$S_{\pi\pi} = 2\text{Im}\lambda/(1+|\lambda|^2)$ , see the note in the  $C_{\pi\pi}$  datablock above.

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.670 \pm 0.030</math> OUR AVERAGE</b>			
$-0.706 \pm 0.042 \pm 0.013$	AAIJ	210 LHC	$pp$ at 13 TeV
$-0.63 \pm 0.05 \pm 0.01$	AAIJ	180 LHC	$pp$ at 7, 8 TeV
$-0.64 \pm 0.08 \pm 0.03$	<sup>1</sup> DALSENO	13 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$-0.68 \pm 0.10 \pm 0.03$	LEES	13D BABR	$e^+e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.71 \pm 0.13 \pm 0.02$	AAIJ	13BO LHC	Repl. by AAIJ 180
$-0.60 \pm 0.11 \pm 0.03$	AUBERT	07AF BABR	Repl. by LEES 13D
$-0.61 \pm 0.10 \pm 0.04$	ISHINO	07 BELL	Repl. by DALSENO 13
$-0.67 \pm 0.16 \pm 0.06$	<sup>2</sup> ABE	05D BELL	Repl. by ISHINO 07
$-0.30 \pm 0.17 \pm 0.03$	AUBERT, BE	05 BABR	Repl. by AUBERT 07AF
$-1.00 \pm 0.21 \pm 0.07$	<sup>3</sup> ABE	04E BELL	Repl. by ABE 05D
$-1.23 \pm 0.41 \begin{smallmatrix} +0.08 \\ -0.07 \end{smallmatrix}$	ABE	03G BELL	Repl. by ABE 04E.
$-1.21 \begin{smallmatrix} +0.38 \\ -0.27 \\ -0.13 \end{smallmatrix}$	ABE	02M BELL	Repl. by ABE 03G
$0.03 \begin{smallmatrix} +0.52 \\ -0.56 \end{smallmatrix} \pm 0.11$	<sup>4</sup> AUBERT	02D BABR	Repl. by AUBERT 02Q
$0.02 \pm 0.34 \pm 0.05$	<sup>5</sup> AUBERT	02Q BABR	Repl. by AUBERT, BE 05

<sup>1</sup> An isospin analysis using other BELLE measurements, disfavors the region of  $23.8^\circ < \phi_2 < 66.8^\circ$  at 68% CL.

<sup>2</sup> Rule out the  $CP$ -conserving case,  $C_{\pi\pi} = S_{\pi\pi} = 0$ , at the 5.4 sigma level.

<sup>3</sup> Rule out the  $CP$ -conserving case,  $C_{\pi\pi} = S_{\pi\pi} = 0$ , at the 5.2 sigma level.

<sup>4</sup> Corresponds to 90% confidence range  $-0.89 < S_{\pi\pi} < 0.85$ .

<sup>5</sup> Corresponds to 90% confidence range  $-0.54 < S_{\pi\pi} < 0.58$ .

### $C_{\pi^0\pi^0}(B^0 \rightarrow \pi^0\pi^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.30 \pm 0.20</math> OUR AVERAGE</b>			
$-0.14 \pm 0.46 \pm 0.07$	<sup>1</sup> ABUDINEN	23E BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$-0.14 \pm 0.36 \pm 0.10$	<sup>1</sup> JULIUS	17 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$-0.43 \pm 0.26 \pm 0.05$	LEES	13D BABR	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.49 \pm 0.35 \pm 0.05$	AUBERT	07BC BABR	Repl. by LEES 13D
$-0.12 \pm 0.56 \pm 0.06$	<sup>2</sup> AUBERT	05L BABR	Repl. by AUBERT 07BC
$-0.44^{+0.52}_{-0.53} \pm 0.17$	<sup>1</sup> CHAO	05 BELL	Repl. by JULIUS 17

<sup>1</sup> Quotes  $A_{\pi^0\pi^0}$  which is equal to  $-C_{\pi^0\pi^0}$ .

<sup>2</sup> Corresponds to a 90% CL interval of  $-0.88 < A_{CP} < 0.64$ .

### $C_{\rho\pi}(B^0 \rightarrow \rho^+\pi^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.03 \pm 0.07</math> OUR AVERAGE</b>	Error includes scale factor of 1.2.		
$0.016 \pm 0.059 \pm 0.036$	<sup>1</sup> LEES	13J BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$-0.13 \pm 0.09 \pm 0.05$	<sup>1</sup> KUSAKA	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.15 \pm 0.09 \pm 0.05$	AUBERT	07AA BABR	Repl. by LEES 13J
$0.25 \pm 0.17^{+0.02}_{-0.06}$	WANG	05 BELL	Repl. by KUSAKA 07
$0.36 \pm 0.18 \pm 0.04$	AUBERT	03T BABR	Repl. by AUBERT 07AA

<sup>1</sup> Uses time-dependent Dalitz plot analysis of  $B^0 \rightarrow \pi^+\pi^-\pi^0$  decays.

### $S_{\rho\pi}(B^0 \rightarrow \rho^+\pi^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.05 \pm 0.07</math> OUR AVERAGE</b>			
$0.053 \pm 0.081 \pm 0.034$	<sup>1</sup> LEES	13J BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$0.06 \pm 0.13 \pm 0.05$	<sup>1</sup> KUSAKA	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.03 \pm 0.11 \pm 0.04$	AUBERT	07AA BABR	Repl. by LEES 13J
$-0.28 \pm 0.23^{+0.10}_{-0.08}$	WANG	05 BELL	Repl. by KUSAKA 07
$0.19 \pm 0.24 \pm 0.03$	AUBERT	03T BABR	Repl. by AUBERT 07AA

<sup>1</sup> Uses time-dependent Dalitz plot analysis of  $B^0 \rightarrow \pi^+\pi^-\pi^0$  decays.

### $\Delta C_{\rho\pi}(B^0 \rightarrow \rho^+\pi^-)$

$\Delta C_{\rho\pi}$  describes the asymmetry between the rates  $\Gamma(B^0 \rightarrow \rho^+\pi^-) + \Gamma(\bar{B}^0 \rightarrow \rho^-\pi^+)$  and  $\Gamma(B^0 \rightarrow \rho^-\pi^+) + \Gamma(\bar{B}^0 \rightarrow \rho^+\pi^-)$ .

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.27 \pm 0.06</math> OUR AVERAGE</b>			
$0.234 \pm 0.061 \pm 0.048$	<sup>1</sup> LEES	13J BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$0.36 \pm 0.10 \pm 0.05$	<sup>1</sup> KUSAKA	07 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.39 \pm 0.09 \pm 0.09$	AUBERT	07AA BABR	Repl. by LEES 13J
$0.38 \pm 0.18^{+0.02}_{-0.04}$	WANG	05 BELL	Repl. by KUSAKA 07
$0.28^{+0.18}_{-0.19} \pm 0.04$	AUBERT	03T BABR	Repl. by AUBERT 07AA



<sup>1</sup> Uses time-dependent Dalitz plot analysis of  $B^0 \rightarrow \pi^+ \pi^- \pi^0$  decays.

### $\Delta S_{\rho\pi} (B^0 \rightarrow \rho^+ \pi^-)$

$\Delta S_{\rho\pi}$  is related to the strong phase difference between the amplitudes contributing to  $B^0 \rightarrow \rho^+ \pi^-$ .

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.01 ± 0.08 OUR AVERAGE</b>			
0.054 ± 0.082 ± 0.039	<sup>1</sup> LEES	13J BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
-0.08 ± 0.13 ± 0.05	<sup>1</sup> KUSAKA	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.01 ± 0.14 ± 0.06	AUBERT	07AA BABR	Repl. by LEES 13J
-0.30 ± 0.24 ± 0.09	WANG	05 BELL	Repl. by KUSAKA 07
0.15 ± 0.25 ± 0.03	AUBERT	03T BABR	Repl. by AUBERT 07AA

<sup>1</sup> Uses time-dependent Dalitz plot analysis of  $B^0 \rightarrow \pi^+ \pi^- \pi^0$  decays.

### $C_{\rho^0\pi^0} (B^0 \rightarrow \rho^0 \pi^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.27 ± 0.24 OUR AVERAGE</b>			
0.19 ± 0.23 ± 0.15	<sup>1</sup> LEES	13J BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
0.49 ± 0.36 ± 0.28	<sup>1,2</sup> KUSAKA	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.10 ± 0.40 ± 0.53	AUBERT	07AA BABR	Repl. by LEES 13J
0.53 <sup>+0.67+0.10</sup> -0.84-0.15	<sup>2</sup> DRAGIC	06 BELL	Repl. by KUSAKA 07

<sup>1</sup> Uses time-dependent Dalitz plot analysis of  $B^0 \rightarrow \pi^+ \pi^- \pi^0$  decays.

<sup>2</sup> Quotes  $A_{\rho^0\pi^0}$  which is equal to  $-C_{\rho^0\pi^0}$ .

### $S_{\rho^0\pi^0} (B^0 \rightarrow \rho^0 \pi^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.23 ± 0.34 OUR AVERAGE</b>			
-0.37 ± 0.34 ± 0.20	<sup>1</sup> LEES	13J BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
0.17 ± 0.57 ± 0.35	<sup>1</sup> KUSAKA	07 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.04 ± 0.44 ± 0.18	AUBERT	07AA BABR	Repl. by LEES 13J

<sup>1</sup> Uses time-dependent Dalitz plot analysis of  $B^0 \rightarrow \pi^+ \pi^- \pi^0$  decays.

### $C_{a_1\pi} (B^0 \rightarrow a_1(1260)^+ \pi^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.05 ± 0.11 OUR AVERAGE</b>			
-0.01 ± 0.11 ± 0.09	DALSENO	12 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
-0.10 ± 0.15 ± 0.09	AUBERT	07o BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

### $S_{a_1\pi} (B^0 \rightarrow a_1(1260)^+ \pi^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.2 ± 0.4 OUR AVERAGE</b>	Error includes scale factor of 3.2.		
-0.51 ± 0.14 ± 0.08	DALSENO	12 BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
0.37 ± 0.21 ± 0.07	AUBERT	07o BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

### $\Delta C_{a_1\pi} (B^0 \rightarrow a_1(1260)^+ \pi^-)$

$\Delta C_{a_1\pi}$  describes the asymmetry between the rates  $\Gamma(B^0 \rightarrow a_1^+ \pi^-) + \Gamma(\bar{B}^0 \rightarrow a_1^- \pi^+)$  and  $\Gamma(B^0 \rightarrow a_1^- \pi^+) + \Gamma(\bar{B}^0 \rightarrow a_1^+ \pi^-)$ .

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.43±0.14 OUR AVERAGE</b>	Error includes scale factor of 1.3.		
0.54±0.11±0.07	DALSENO	12	BELL $e^+e^- \rightarrow \gamma(4S)$
0.26±0.15±0.07	AUBERT	07O	BABR $e^+e^- \rightarrow \gamma(4S)$

### $\Delta S_{a_1\pi} (B^0 \rightarrow a_1(1260)^+ \pi^-)$

$\Delta S_{a_1\pi}$  is related to the strong phase difference between the amplitudes contributing to  $B^0 \rightarrow a_1\pi$  decays.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.11±0.12 OUR AVERAGE</b>			
-0.09±0.14±0.06	DALSENO	12	BELL $e^+e^- \rightarrow \gamma(4S)$
-0.14±0.21±0.06	AUBERT	07O	BABR $e^+e^- \rightarrow \gamma(4S)$

### $C(B^0 \rightarrow b_1^- K^+)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.22±0.23±0.05</b>	AUBERT	07BI	BABR $e^+e^- \rightarrow \gamma(4S)$

### $\Delta C(B^0 \rightarrow b_1^- \pi^+)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-1.04±0.23±0.08</b>	AUBERT	07BI	BABR $e^+e^- \rightarrow \gamma(4S)$

### $C_{\rho\rho\rho} (B^0 \rightarrow \rho^0 \rho^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.2±0.8±0.3</b>	AUBERT	08BB	BABR $e^+e^- \rightarrow \gamma(4S)$

### $S_{\rho\rho\rho} (B^0 \rightarrow \rho^0 \rho^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.3±0.7±0.2</b>	AUBERT	08BB	BABR $e^+e^- \rightarrow \gamma(4S)$

### $C_{\rho\rho} (B^0 \rightarrow \rho^+ \rho^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.00±0.09 OUR AVERAGE</b>			
0.00±0.10±0.06	<sup>1</sup> VANHOEFER	16	BELL $e^+e^- \rightarrow \gamma(4S)$
0.01±0.15±0.06	AUBERT	07BF	BABR $e^+e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

-0.16±0.21±0.08	<sup>1</sup> SOMOV	07	BELL	Repl. by VANHOEFER 16
-0.00±0.30±0.09	<sup>1</sup> SOMOV	06	BELL	Repl. by SOMOV 07
-0.03±0.18±0.09	AUBERT,B	05C	BABR	Repl. by AUBERT 07BF
-0.17±0.27±0.14	AUBERT,B	04R	BABR	Repl. by AUBERT,B 05C

<sup>1</sup> BELLE Collab. quotes  $A_{CP}$  which is equal to  $-C$ .

### $S_{\rho\rho} (B^0 \rightarrow \rho^+ \rho^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.14 \pm 0.13</math> OUR AVERAGE</b>			
$-0.13 \pm 0.15 \pm 0.05$	VANHOEFER 16	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$-0.17 \pm 0.20^{+0.05}_{-0.06}$	AUBERT 07BF	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.19 \pm 0.30 \pm 0.08$	SOMOV 07	BELL	Repl. by VANHOEFER 16
$0.08 \pm 0.41 \pm 0.09$	SOMOV 06	BELL	Repl. by SOMOV 07
$-0.33 \pm 0.24^{+0.08}_{-0.14}$	AUBERT,B 05C	BABR	Repl. by AUBERT 07BF
$-0.42 \pm 0.42 \pm 0.14$	AUBERT,B 04R	BABR	Repl. by AUBERT,B 05C

### $|\lambda| (B^0 \rightarrow J/\psi K^*(892)^0)$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt;0.25</math></b>	95	<sup>1</sup> AUBERT,B 04H	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses the measured cosine coefficients  $C$  and  $\bar{C}$  and assumes  $|q/p| = 1$ .

### $\cos 2\beta (B^0 \rightarrow J/\psi K^*(892)^0)$

$\beta$  ( $\phi_1$ ) is one of the angles of CKM unitarity triangle, see the review on "CP" Violation in the Reviews section.

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>1.7^{+0.7}_{-0.9}</math> OUR AVERAGE</b>			Error includes scale factor of 1.6.

$2.72^{+0.50}_{-0.79} \pm 0.27$	<sup>1</sup> AUBERT 05P	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.87 \pm 0.74 \pm 0.12$	<sup>2</sup> ITOH 05	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> The measurement is obtained when  $\sin 2\beta$  is fixed to 0.726 and the sign of  $\cos 2\beta$  is positive with 86% confidence level.

<sup>2</sup> The measurement is obtained with  $\sin 2\beta$  fixed to 0.731.

### $\cos 2\beta (B^0 \rightarrow [K_S^0 \pi^+ \pi^-]_{D^{(*)}} h^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.91 \pm 0.22 \pm 0.11</math></b>	<sup>1</sup> ADACHI 18		$e^+ e^- \rightarrow \Upsilon(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.06 \pm 0.33^{+0.21}_{-0.15}$	<sup>2</sup> VOROBYEV 16	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.42 \pm 0.49 \pm 0.16$	<sup>3</sup> AUBERT 07BH	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$1.87^{+0.40+0.22}_{-0.53-0.32}$	<sup>4</sup> KROKOVNY 06	BELL	Repl. by VOROBYEV 16

<sup>1</sup> Analyzes joint data sample of Belle and BaBar using Dalitz plot analysis of  $D \rightarrow K_S^0 \pi^+ \pi^-$ ; the second error combines experimental systematic uncertainty and the Dalitz plot model uncertainty.

<sup>2</sup> A model-independent measurement uses the binned Dalitz plot technique.

<sup>3</sup> AUBERT 07BH evaluates the likelihoods for the positive and negative solutions assuming  $\sin(2\beta_{eff}) = 0.678$ . It quotes  $L_+ / (L_+ + L_-) = 0.86$  corresponding to a likelihood ratio of  $L_+ / L_- = 6.14$  in favor of the positive solution.

<sup>4</sup> KROKOVNY 06 evaluates the likelihoods for the positive and negative solutions assuming  $\sin(2\beta_{eff}) = 0.689$ . It quotes  $L_+ / (L_+ + L_-) = 0.983$  corresponding to a likelihood ratio of  $L_+ / L_- = 57.8$  in favor of the positive solution.

**$(S_+ + S_-)/2 (B^0 \rightarrow D^{*-} \pi^+)$**

$S_{\pm} = -\frac{2Im(\lambda_{\pm})}{1+|\lambda_{\pm}|^2}$  where  $\lambda_+$  and  $\lambda_-$  are defined in the  $C_{\pi\pi}$  datablock above for

$B^0 \rightarrow D^{*-} \pi^+$  and  $\bar{B}^0 \rightarrow D^{*+} \pi^-$ .

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.039±0.011 OUR AVERAGE</b>			

-0.046±0.013±0.015	1 BAHINIPATI	11 BELL	$e^+e^- \rightarrow \gamma(4S)$
-0.040±0.023±0.010	2 AUBERT	06Y BABR	$e^+e^- \rightarrow \gamma(4S)$
-0.034±0.014±0.009	1 AUBERT	05Z BABR	$e^+e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.039±0.020±0.013	3 RONGA	06 BELL	Repl. by BAHINIPATI 11
-0.030±0.028±0.018	1 GERSHON	05 BELL	Repl. by RONGA 06
-0.068±0.038±0.020	2 AUBERT	04V BABR	Repl. by AUBERT 06Y
-0.063±0.024±0.014	1 AUBERT	04W BABR	Repl. by AUBERT 05Z
0.060±0.040±0.019	2 SARANGI	04 BELL	Repl. by RONGA 06

<sup>1</sup> Uses partially reconstructed  $B^0 \rightarrow D^{*\pm} \pi^{\mp}$  decays.

<sup>2</sup> Uses fully reconstructed  $B^0 \rightarrow D^{*\pm} \pi^{\mp}$  decays.

<sup>3</sup> Combines the results from fully reconstructed and partially reconstructed  $D^* \pi$  events by taking weighted averages. Assumes that systematic errors from physics parameters and fit biases in the two measurements are 100% correlated.

**$(S_- - S_+)/2 (B^0 \rightarrow D^{*-} \pi^+)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.009±0.015 OUR AVERAGE</b>			

-0.015±0.013±0.015	1 BAHINIPATI	11 BELL	$e^+e^- \rightarrow \gamma(4S)$
0.049±0.042±0.015	2 AUBERT	06Y BABR	$e^+e^- \rightarrow \gamma(4S)$
-0.019±0.022±0.013	1 AUBERT	05Z BABR	$e^+e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.011±0.020±0.013	3 RONGA	06 BELL	Repl. by BAHINIPATI 11
-0.005±0.028±0.018	1 GERSHON	05 BELL	Repl. by RONGA 06
0.031±0.070±0.033	2 AUBERT	04V BABR	Repl. by AUBERT 06Y
-0.004±0.037±0.014	1 AUBERT	04W BABR	Repl. by AUBERT 05Z
0.049±0.040±0.019	2 SARANGI	04 BELL	Repl. by RONGA 06

<sup>1</sup> Uses partially reconstructed  $B^0 \rightarrow D^{*\pm} \pi^{\mp}$  decays.

<sup>2</sup> Uses fully reconstructed  $B^0 \rightarrow D^{*\pm} \pi^{\mp}$  decays.

<sup>3</sup> Combines the results from fully reconstructed and partially reconstructed  $D^* \pi$  events by taking weighted averages. Assumes that systematic errors from physics parameters and fit biases in the two measurements are 100% correlated.

**$(S_+ + S_-)/2 (B^0 \rightarrow D^- \pi^+)$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-0.046±0.023 OUR AVERAGE</b>			

-0.010±0.023±0.07	1 AUBERT	06Y BABR	$e^+e^- \rightarrow \gamma(4S)$
-0.050±0.021±0.012	2 RONGA	06 BELL	$e^+e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.022±0.038±0.020	1 AUBERT	04V BABR	Repl. by AUBERT 06Y
-0.062±0.037±0.018	1 SARANGI	04 BELL	Repl. by RONGA 06

<sup>1</sup> Uses fully reconstructed  $B^0 \rightarrow D^{\pm} \pi^{\mp}$  decays.

<sup>2</sup> Combines the results from fully reconstructed and partially reconstructed  $D\pi$  events by taking weighted averages. Assumes that systematic errors from physics parameters and fit biases in the two measurements are 100% correlated.

$(S_- - S_+)/2 (B^0 \rightarrow D^- \pi^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.022 \pm 0.021</math> OUR AVERAGE</b>			
$-0.033 \pm 0.042 \pm 0.012$	<sup>1</sup> AUBERT	06Y	BABR $e^+ e^- \rightarrow \Upsilon(4S)$
$-0.019 \pm 0.021 \pm 0.012$	<sup>2</sup> RONGA	06	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.025 \pm 0.068 \pm 0.033$	<sup>1</sup> AUBERT	04V	BABR Repl. by AUBERT 06Y
$-0.025 \pm 0.037 \pm 0.018$	<sup>1</sup> SARANGI	04	BELL Repl. by RONGA 06

<sup>1</sup> Uses fully reconstructed  $B^0 \rightarrow D^\pm \pi^\mp$  decays.

<sup>2</sup> Combines the results from fully reconstructed and partially reconstructed  $D\pi$  events by taking weighted averages. Assumes that systematic errors from physics parameters and fit biases in the two measurements are 100% correlated.

$S_+ (B^0 \rightarrow D^- \pi^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.058 \pm 0.020 \pm 0.011</math></b>	<sup>1</sup> AAIJ	18Z	LHCB $pp$ at 7, 8 TeV

<sup>1</sup> Measured in the simultaneous analysis of  $B^0 \rightarrow D^\mp \pi^\pm$  decays. AAIJ 18Z reports a statistical (systematic) correlation of 0.6 (−0.41) with the measured value of  $S_-(B^0 \rightarrow D^+ \pi^-)$ .

$S_- (B^0 \rightarrow D^+ \pi^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.038 \pm 0.020 \pm 0.007</math></b>	<sup>1</sup> AAIJ	18Z	LHCB $pp$ at 7, 8 TeV

<sup>1</sup> Measured in the simultaneous analysis of  $B^0 \rightarrow D^\mp \pi^\pm$  decays. AAIJ 18Z reports a statistical (systematic) correlation of 0.6 (−0.41) with the measured value of  $S_+(B^0 \rightarrow D^- \pi^+)$ .

$(S_+ + S_-)/2 (B^0 \rightarrow D^- \rho^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.024 \pm 0.031 \pm 0.009</math></b>	<sup>1</sup> AUBERT	06Y	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses fully reconstructed  $B^0 \rightarrow D^- \rho^+$  decays.

$(S_- - S_+)/2 (B^0 \rightarrow D^- \rho^+)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>-0.098 \pm 0.055 \pm 0.018</math></b>	<sup>1</sup> AUBERT	06Y	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses fully reconstructed  $B^0 \rightarrow D^- \rho^+$  decays.

$C_{\eta_c K_S^0} (B^0 \rightarrow \eta_c K_S^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.080 \pm 0.124 \pm 0.029</math></b>	AUBERT	09K	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

$S_{\eta_c K_S^0} (B^0 \rightarrow \eta_c K_S^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.925 \pm 0.160 \pm 0.057</math></b>	AUBERT	09K	BABR $e^+ e^- \rightarrow \Upsilon(4S)$

### $C_{c\bar{c}K^{(*)0}} (B^0 \rightarrow c\bar{c}K^{(*)0})$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>-0.5 \pm 1.5</math> OUR EVALUATION</b>	(Produced by HFLAV)		
<b><math>0.4 \pm 1.0</math> OUR AVERAGE</b>			
$0.4 \pm 1.2$	<sup>1</sup> AAIJ	24 LHCb	$pp$ at 7, 8 and 13 TeV
$-0.6 \pm 1.6 \pm 1.2$	<sup>2</sup> ADACHI	12A BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$-29 \begin{smallmatrix} +53 \\ -44 \end{smallmatrix} \pm 6$	<sup>3</sup> AUBERT	09AU BABR	$e^+e^- \rightarrow \Upsilon(4S)$
$2.4 \pm 2.0 \pm 1.6$	<sup>4</sup> AUBERT	09K BABR	$e^+e^- \rightarrow \Upsilon(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$0.8 \pm 1.2 \pm 0.3$	<sup>5,6</sup> AAIJ	24 LHCb	$pp$ at 13 TeV
$-1.7 \pm 2.9$	<sup>5,7</sup> AAIJ	17BN LHCb	$pp$ at 7, 8 TeV
$-4 \pm 7 \pm 5$	<sup>8</sup> SAHOO	08 BELL	Repl. by ADACHI 12A
$4.9 \pm 2.3 \pm 1.8$	<sup>4</sup> AUBERT	07AY BABR	Repl. by AUBERT 09K
$-1.8 \pm 2.1 \pm 1.4$	<sup>9</sup> CHEN	07 BELL	Repl. by ADACHI 12A
$-0.7 \pm 4.1 \pm 3.3$	<sup>10</sup> ABE	05B BELL	Repl. by CHEN 07
$5.1 \pm 3.2 \pm 1.4$	<sup>11</sup> AUBERT	05F BABR	Repl. by AUBERT 07AY
$5.1 \pm 5.1 \pm 2.6$	<sup>12</sup> ABE	02Z BELL	Repl. by ABE 05B
$5.3 \pm 5.4 \pm 3.2$	<sup>13</sup> AUBERT	02P BABR	Repl. by AUBERT 05F

<sup>1</sup> A combination of this Run 2 result with the Run 1 result from AAIJ 17BN is reported with a correlation coefficient of 0.40.

<sup>2</sup> Measurement based on  $B^0 \rightarrow J/\psi K_S^0$ ,  $B^0 \rightarrow \psi(2S) K_S^0$ ,  $B^0 \rightarrow J/\psi K_L^0$ , and  $B^0 \rightarrow \chi_{c1}(1P) K_S^0$  decays.

<sup>3</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

<sup>4</sup> Measurement based on  $B^0 \rightarrow c\bar{c}K^{(*)0}$  decays.

<sup>5</sup> Measurement based on  $B^0 \rightarrow J/\psi K_S^0$ ,  $B^0 \rightarrow \psi(2S) K_S^0$  with  $J/\psi \rightarrow \mu^+ \mu^-$ ,  $J/\psi \rightarrow e^+ e^-$  and  $\psi(2S) \rightarrow \mu^+ \mu^-$ .

<sup>6</sup> AAIJ 24 provides the correlation coefficient  $\rho=0.441$  between the uncertainties of  $\sin(2\beta)$  and  $C_{c\bar{c}K^{(*)0}} (B^0 \rightarrow c\bar{c}K^{(*)0})$  measurements.

<sup>7</sup> AAIJ 17BN provides the correlation coefficient  $\rho=0.42$  between the uncertainties of  $S_{B^0 \rightarrow c\bar{c}K^{(*)0}} (B^0 \rightarrow c\bar{c}K^{(*)0})$  and  $C_{c\bar{c}K^{(*)0}} (B^0 \rightarrow c\bar{c}K^{(*)0})$  measurements.

<sup>8</sup> Reports value of  $A$  of  $B^0 \rightarrow \psi(2S) K^0$  which is equal to  $-C$ .

<sup>9</sup> Reports value of  $A$  of  $B^0 \rightarrow J/\psi K^0$  which is equal to  $-C$ .

<sup>10</sup> Measurement based on  $152 \times 10^6 B\bar{B}$  pairs.

<sup>11</sup> Measurement based on  $227 \times 10^6 B\bar{B}$  pairs.

<sup>12</sup> Measured with both  $\eta_f = \pm 1$  samples.

<sup>13</sup> Measured with the high purity of  $\eta_f = -1$  samples.

### $\sin(2\beta)$

For a discussion of  $CP$  violation, see the review on “ $CP$  Violation” in the Reviews section.  $\sin(2\beta)$  is a measure of the  $CP$ -violating amplitude in the  $B_d^0 \rightarrow J/\psi(1S) K_S^0$ .

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.709 \pm 0.011</math> OUR EVALUATION</b>	(Produced by HFLAV)		
<b><math>0.708 \pm 0.017</math> OUR AVERAGE</b>	Error includes scale factor of 1.5. See the ideogram below.		
$0.724 \pm 0.014$	<sup>1</sup> AAIJ	24 LHCb	$pp$ at 7, 8 and 13 TeV
$0.667 \pm 0.023 \pm 0.012$	<sup>2</sup> ADACHI	12A BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.57 \pm 0.58 \pm 0.06$	<sup>3</sup> SATO	12 BELL	$e^+e^- \rightarrow \Upsilon(5S)$
$0.69 \pm 0.52 \pm 0.08$	<sup>4</sup> AUBERT	09AU BABR	$e^+e^- \rightarrow \Upsilon(4S)$

$0.687 \pm 0.028 \pm 0.012$	<sup>5</sup> AUBERT	09K BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$1.56 \pm 0.42 \pm 0.21$	<sup>6</sup> AUBERT	04R BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.79 \begin{smallmatrix} +0.41 \\ -0.44 \end{smallmatrix}$	<sup>7</sup> AFFOLDER	00C CDF	$p\bar{p}$ at 1.8 TeV
$0.84 \begin{smallmatrix} +0.82 \\ -1.04 \end{smallmatrix} \pm 0.16$	<sup>8</sup> BARATE	00Q ALEP	$e^+ e^- \rightarrow Z$
$3.2 \begin{smallmatrix} +1.8 \\ -2.0 \end{smallmatrix} \pm 0.5$	<sup>9</sup> ACKERSTAFF	98Z OPAL	$e^+ e^- \rightarrow Z$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.717 \pm 0.013 \pm 0.008$	<sup>10,11</sup> AAIJ	24 LHCb	$pp$ at 13 TeV
$0.760 \pm 0.034$	<sup>10,12</sup> AAIJ	17BN LHCb	$pp$ at 7, 8 TeV
$0.72 \pm 0.09 \pm 0.03$	<sup>13</sup> SAHOO	08 BELL	Repl. by ADACHI 12A
$0.714 \pm 0.032 \pm 0.018$	<sup>5</sup> AUBERT	07AY BABR	Repl. by AUBERT 09K
$0.642 \pm 0.031 \pm 0.017$	CHEN	07 BELL	Repl. by ADACHI 12A
$0.728 \pm 0.056 \pm 0.023$	<sup>14</sup> ABE	05B BELL	Repl. by CHEN 07
$0.722 \pm 0.040 \pm 0.023$	<sup>15</sup> AUBERT	05F BABR	Repl. by AUBERT 07AY
$0.99 \pm 0.14 \pm 0.06$	<sup>16</sup> ABE	02U BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.719 \pm 0.074 \pm 0.035$	<sup>17</sup> ABE	02Z BELL	Repl. by ABE 05B
$0.59 \pm 0.14 \pm 0.05$	<sup>18</sup> AUBERT	02N BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
$0.741 \pm 0.067 \pm 0.034$	<sup>19</sup> AUBERT	02P BABR	Repl. by AUBERT 05F
$0.58 \begin{smallmatrix} +0.32 & +0.09 \\ -0.34 & -0.10 \end{smallmatrix}$	ABASHIAN	01 BELL	Repl. by ABE 01G
$0.99 \pm 0.14 \pm 0.06$	<sup>20</sup> ABE	01G BELL	Repl. by ABE 02Z
$0.34 \pm 0.20 \pm 0.05$	AUBERT	01 BABR	Repl. by AUBERT 01B
$0.59 \pm 0.14 \pm 0.05$	<sup>20</sup> AUBERT	01B BABR	Repl. by AUBERT 02P
$1.8 \pm 1.1 \pm 0.3$	<sup>21</sup> ABE	98U CDF	Repl. by AFFOLDER 00C

<sup>1</sup> A combination of this Run 2 result with the Run 1 result from AAIJ 17BN is reported with a correlation coefficient of 0.40.

<sup>2</sup> Measurement based on  $B^0 \rightarrow J/\psi K_S^0$ ,  $B^0 \rightarrow \psi(2S) K_S^0$ ,  $B^0 \rightarrow J/\psi K_L^0$ , and  $B^0 \rightarrow \chi_{c1}(1P) K_S^0$  decays.

<sup>3</sup> SATO 12 uses 121 fb<sup>-1</sup> data collected on  $Y(5S)$  resonance. Uses the "B -  $\pi$  tagging" where  $B\pi^+$  and  $B\pi^-$  tagged  $J/\psi K_S^0$  events are compared.

<sup>4</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions.

<sup>5</sup> Measurement based on  $B^0 \rightarrow c\bar{c}K^{(*)0}$  decays.

<sup>6</sup> Measurement in which the  $J/\psi$  decays to hadrons or to muons that do not satisfy the standard identification criteria.

<sup>7</sup> AFFOLDER 00C uses about 400  $B^0 \rightarrow J/\psi(1S) K_S^0$  events. The production flavor of  $B^0$  was determined using three tagging algorithms: a same-side tag, a jet-charge tag, and a soft-lepton tag.

<sup>8</sup> BARATE 00Q uses 23 candidates for  $B^0 \rightarrow J/\psi(1S) K_S^0$  decays. A combination of jet-charge, vertex-charge, and same-side tagging techniques were used to determine the  $B^0$  production flavor.

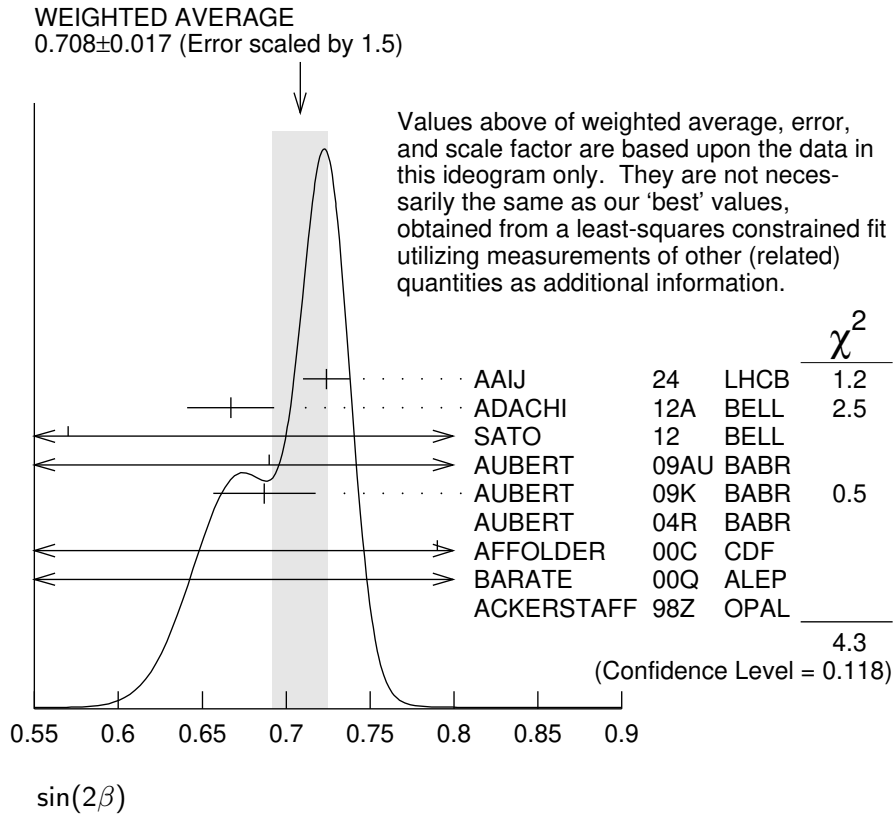
<sup>9</sup> ACKERSTAFF 98Z uses 24 candidates for  $B_d^0 \rightarrow J/\psi(1S) K_S^0$  decay. A combination of jet-charge and vertex-charge techniques were used to tag the  $B_d^0$  production flavor.

<sup>10</sup> Measurement based on  $B^0 \rightarrow J/\psi K_S^0$ ,  $B^0 \rightarrow \psi(2S) K_S^0$  with  $J/\psi \rightarrow \mu^+ \mu^-$ ,  $J/\psi \rightarrow e^+ e^-$  and  $\psi(2S) \rightarrow \mu^+ \mu^-$ .

<sup>11</sup> AAIJ 24 provides the correlation coefficient  $\rho = 0.441$  between the uncertainties of  $\sin(2\beta)$  and  $C_{c\bar{c}K^{(*)0}}$  ( $B^0 \rightarrow c\bar{c}K^{(*)0}$ ) measurements.

<sup>12</sup> AAIJ 17BN provides the correlation coefficient  $\rho = 0.42$  between the uncertainties of  $\sin(2\beta)$  and  $\cos(2\beta)$  measurements.

- 13 Based on  $B^0 \rightarrow \psi(2S)K_S^0$  decays.
- 14 Measurement based on  $152 \times 10^6 B\bar{B}$  pairs.
- 15 Measurement based on  $227 \times 10^6 B\bar{B}$  pairs.
- 16 ABE 02U result is based on the same analysis and data sample reported in ABE 01G.
- 17 ABE 02Z result is based on  $85 \times 10^6 B\bar{B}$  pairs.
- 18 AUBERT 02N result based on the same analysis and data sample reported in AUBERT 01B.
- 19 AUBERT 02P result is based on  $88 \times 10^6 B\bar{B}$  pairs.
- 20 First observation of  $CP$  violation in  $B^0$  meson system.
- 21 ABE 98U uses  $198 \pm 17 B_d^0 \rightarrow J/\psi(1S)K^0$  events. The production flavor of  $B^0$  was determined using the same side tagging technique.



**$C_{J/\psi(nS)K^0} (B^0 \rightarrow J/\psi(nS)K^0)$**

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>- 0.8 ± 1.7 OUR EVALUATION</b>	(Produced by HFLAV)		
<b>0.3 ± 1.0 OUR AVERAGE</b>			
0.4 ± 1.2	1 AAIJ	24 LHCB	$pp$ at 7, 8 and 13 TeV
1.5 ± 2.1 <sup>+2.3</sup> <sub>-4.5</sub>	2,3 ADACHI	12A BELL	$e^+e^- \rightarrow \gamma(4S)$
-10.4 ± 5.5 <sup>+2.7</sup> <sub>-4.7</sub>	3,4 ADACHI	12A BELL	$e^+e^- \rightarrow \gamma(4S)$
- 1.9 ± 2.6 <sup>+4.1</sup> <sub>-1.7</sub>	3,5 ADACHI	12A BELL	$e^+e^- \rightarrow \gamma(4S)$
8.9 ± 7.6 ± 2.0	4 AUBERT	09K BABR	$e^+e^- \rightarrow \gamma(4S)$
1.6 ± 2.3 ± 1.8	AUBERT	09K BABR	$e^+e^- \rightarrow \gamma(4S)$



• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.8 \pm 1.2 \pm 0.3$	<sup>6,7</sup> AAIJ	24	LHCB	$pp$ at 13 TeV
– $8.7 \pm 4.8 \pm 0.5$	<sup>8</sup> AAIJ	24	LHCB	$pp$ at 13 TeV
$1.5 \pm 1.3 \pm 0.3$	<sup>9</sup> AAIJ	24	LHCB	$pp$ at 13 TeV
– $1.7 \pm 2.9$	<sup>6,10</sup> AAIJ	17BN	LHCB	$pp$ at 7, 8 TeV
– $1.4 \pm 3.0$	<sup>9</sup> AAIJ	17BN	LHCB	$pp$ at 7, 8 TeV
– $5 \pm 10 \pm 1$	<sup>8</sup> AAIJ	17BN	LHCB	$pp$ at 7, 8 TeV
– $3.8 \pm 3.2 \pm 0.5$	<sup>11</sup> AAIJ	15N	LHCB	Repl. by AAIJ 17BN
$3 \pm 9 \pm 1$	<sup>12</sup> AAIJ	13K	LHCB	Repl. by AAIJ 15N
– $4 \pm 7 \pm 5$	<sup>3,4</sup> SAHOO	08	BELL	Repl. by ADACHI 12A
– $1.8 \pm 2.1 \pm 1.4$	<sup>3</sup> CHEN	07	BELL	Repl. by ADACHI 12A

<sup>1</sup> A combination of this Run 2 result with the Run 1 result from AAIJ 17BN is reported with a correlation coefficient of 0.40.

<sup>2</sup> Uses  $B^0 \rightarrow J/\psi K_S^0$  decays.

<sup>3</sup> The paper reports  $A$ , which is equal to  $-C$ .

<sup>4</sup> Uses  $B^0 \rightarrow \psi(2S) K_S^0$  decays.

<sup>5</sup> Uses  $B^0 \rightarrow J/\psi K_L^0$  decays.

<sup>6</sup> Measurement based on  $B^0 \rightarrow J/\psi K_S^0$ ,  $B^0 \rightarrow \psi(2S) K_S^0$  with  $J/\psi \rightarrow \mu^+ \mu^-$ ,  $J/\psi \rightarrow e^+ e^-$  and  $\psi(2S) \rightarrow \mu^+ \mu^-$ .

<sup>7</sup> AAIJ 24 provides the correlation coefficient  $\rho = 0.441$  between the uncertainties of  $C_{J/\psi(nS)K^0} (B^0 \rightarrow J/\psi(nS)K^0)$  and  $S_{J/\psi(nS)K^0} (B^0 \rightarrow J/\psi(nS)K^0)$  measurements.

<sup>8</sup> Measurement based on  $B^0 \rightarrow \psi(2S) K_S^0$  with  $\psi(2S) \rightarrow \mu^+ \mu^-$ .

<sup>9</sup> Measurement based on  $B^0 \rightarrow J/\psi K_S^0$  with  $J/\psi \rightarrow \mu^+ \mu^-$  and  $J/\psi \rightarrow e^+ e^-$ .

<sup>10</sup> AAIJ 17BN provides the correlation coefficient  $\rho = 0.42$  between the uncertainties of  $S_{J/\psi(nS)K^0} (B^0 \rightarrow J/\psi(nS)K^0)$  and  $C_{J/\psi(nS)K^0} (B^0 \rightarrow J/\psi(nS)K^0)$  measurements.

<sup>11</sup> AAIJ 15N uses 41,560 flavor-tagged  $B_d \rightarrow J/\psi K_S^0$  events from  $3 \text{ fb}^{-1}$  of integrated luminosity. Provides the correlation coefficient  $\rho = 0.483$  between the statistical uncertainties of and measurements.

<sup>12</sup> AAIJ 13K uses 8200 flavor-tagged  $B_d \rightarrow J/\psi K_S^0$  events from  $1 \text{ fb}^{-1}$  of integrated luminosity. Provides the correlation coefficient  $\rho = 0.42$  between the statistical uncertainties of  $S_{J/\psi(nS)K^0} (B^0 \rightarrow J/\psi(nS)K^0)$  and  $C_{J/\psi(nS)K^0} (B^0 \rightarrow J/\psi(nS)K^0)$  measurements.

### $S_{J/\psi(nS)K^0} (B^0 \rightarrow J/\psi(nS)K^0)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.701 \pm 0.017</math> OUR EVALUATION</b>	(Produced by HFLAV)		
<b><math>0.708 \pm 0.016</math> OUR AVERAGE</b>	Error includes scale factor of 1.4. See the ideogram below.		
$0.724 \pm 0.014$	<sup>1</sup> AAIJ	24	LHCB $pp$ at 7, 8 and 13 TeV
$0.670 \pm 0.029 \pm 0.013$	<sup>2</sup> ADACHI	12A	BELL $e^+ e^- \rightarrow \gamma(4S)$
$0.738 \pm 0.079 \pm 0.036$	<sup>3</sup> ADACHI	12A	BELL $e^+ e^- \rightarrow \gamma(4S)$
$0.642 \pm 0.047 \pm 0.021$	<sup>4</sup> ADACHI	12A	BELL $e^+ e^- \rightarrow \gamma(4S)$
$0.57 \pm 0.58 \pm 0.06$	<sup>5</sup> SATO	12	BELL $e^+ e^- \rightarrow \gamma(5S)$
$0.897 \pm 0.100 \pm 0.036$	<sup>3</sup> AUBERT	09K	BABR $e^+ e^- \rightarrow \gamma(4S)$
$0.666 \pm 0.031 \pm 0.013$	AUBERT	09K	BABR $e^+ e^- \rightarrow \gamma(4S)$
$0.79 \begin{smallmatrix} +0.41 \\ -0.44 \end{smallmatrix}$	<sup>6</sup> AFFOLDER	00C	CDF $p\bar{p}$ at 1.8 TeV
$0.84 \begin{smallmatrix} +0.82 \\ -1.04 \end{smallmatrix} \pm 0.16$	<sup>7</sup> BARATE	00Q	ALEP $e^+ e^- \rightarrow Z$
$3.2 \begin{smallmatrix} +1.8 \\ -2.0 \end{smallmatrix} \pm 0.5$	<sup>8</sup> ACKERSTAFF	98Z	OPAL $e^+ e^- \rightarrow Z$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.717 \pm 0.013 \pm 0.008$	<sup>9,10</sup> AAIJ	24	LHCB	$pp$	at 13 TeV
$0.649 \pm 0.053 \pm 0.018$	<sup>11</sup> AAIJ	24	LHCB	$pp$	at 13 TeV
$0.722 \pm 0.014 \pm 0.007$	<sup>12</sup> AAIJ	24	LHCB	$pp$	at 13 TeV
$0.760 \pm 0.034$	<sup>9,13</sup> AAIJ	17BN	LHCB	$pp$	at 7, 8 TeV
$0.75 \pm 0.04$	<sup>12</sup> AAIJ	17BN	LHCB	$pp$	at 7, 8 TeV
$0.84 \pm 0.10 \pm 0.01$	<sup>11</sup> AAIJ	17BN	LHCB	$pp$	at 7, 8 TeV
$0.731 \pm 0.035 \pm 0.020$	<sup>14</sup> AAIJ	15N	LHCB	Repl. by AAIJ	17BN
$0.73 \pm 0.07 \pm 0.04$	<sup>15</sup> AAIJ	13K	LHCB	Repl. by AAIJ	15N
$0.650 \pm 0.029 \pm 0.018$	<sup>16</sup> SAHOO	08	BELL	Repl. by ADACHI	12A
$0.72 \pm 0.09 \pm 0.03$	<sup>3</sup> SAHOO	08	BELL	Repl. by ADACHI	12A
$0.642 \pm 0.031 \pm 0.017$	CHEN	07	BELL	Repl. by ADACHI	12A

<sup>1</sup> A combination of this Run 2 result with the Run 1 result from AAIJ 17BN is reported with a correlation coefficient of 0.40.

<sup>2</sup> Uses  $B^0 \rightarrow J/\psi K_S^0$  decays.

<sup>3</sup> Based on  $B^0 \rightarrow \psi(2S) K_S^0$  decays.

<sup>4</sup> Uses  $B^0 \rightarrow J/\psi K_L^0$  decays.

<sup>5</sup> SATO 12 uses  $121 \text{ fb}^{-1}$  data collected at  $\Upsilon(5S)$  resonance. Uses the " $B - \pi$  tagging" where  $B\pi^+$  and  $B\pi^-$  tagged  $J/\psi K_S^0$  events are compared.

<sup>6</sup> AFFOLDER 00C uses about 400  $B^0 \rightarrow J/\psi(1S) K_S^0$  events. The production flavor of  $B^0$  was determined using three tagging algorithms: a same-side tag, a jet-charge tag, and a soft-lepton tag.

<sup>7</sup> BARATE 00Q uses 23 candidates for  $B^0 \rightarrow J/\psi(1S) K_S^0$  decays. A combination of jet-charge, vertex-charge, and same-side tagging techniques were used to determine the  $B^0$  production flavor.

<sup>8</sup> ACKERSTAFF 98Z uses 24 candidates for  $B_d^0 \rightarrow J/\psi(1S) K_S^0$  decay. A combination of jet-charge and vertex-charge techniques were used to tag the  $B_d^0$  production flavor.

<sup>9</sup> Measurement based on  $B^0 \rightarrow J/\psi K_S^0$ ,  $B^0 \rightarrow \psi(2S) K_S^0$  with  $J/\psi \rightarrow \mu^+ \mu^-$ ,  $J/\psi \rightarrow e^+ e^-$  and  $\psi(2S) \rightarrow \mu^+ \mu^-$ .

<sup>10</sup> AAIJ 24 provides the correlation coefficient  $\rho = 0.441$  between the uncertainties of  $C_{J/\psi(nS)K^0}$  ( $B^0 \rightarrow J/\psi(nS)K^0$ ) and  $S_{J/\psi(nS)K^0}$  ( $B^0 \rightarrow J/\psi(nS)K^0$ ) measurements.

<sup>11</sup> Measurement based on  $B^0 \rightarrow \psi(2S) K_S^0$  with  $\psi(2S) \rightarrow \mu^+ \mu^-$ .

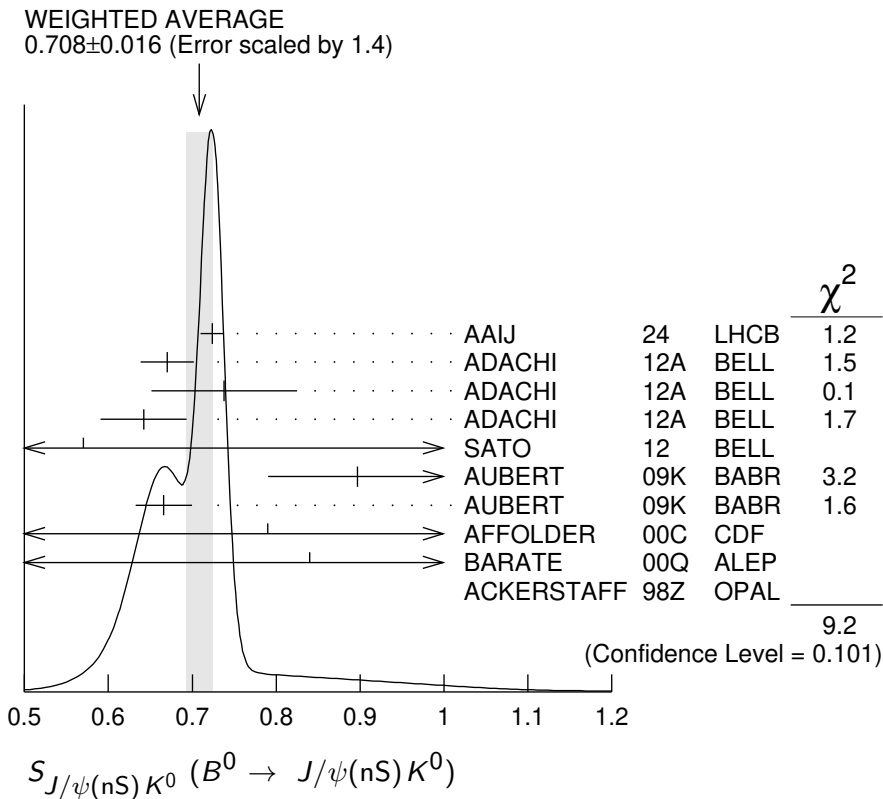
<sup>12</sup> Measurement based on  $B^0 \rightarrow J/\psi K_S^0$  with  $J/\psi \rightarrow \mu^+ \mu^-$  and  $J/\psi \rightarrow e^+ e^-$ .

<sup>13</sup> AAIJ 17BN provides the correlation coefficient  $\rho = 0.42$  between the uncertainties of  $S_{J/\psi(nS)K^0}$  ( $B^0 \rightarrow J/\psi(nS)K^0$ ) and  $C_{J/\psi(nS)K^0}$  ( $B^0 \rightarrow J/\psi(nS)K^0$ ) measurements.

<sup>14</sup> AAIJ 15N uses 41,560 flavor-tagged  $B_d \rightarrow J/\psi K_S^0$  events from  $3 \text{ fb}^{-1}$  of integrated luminosity. Provides the correlation coefficient  $\rho = 0.483$  between the statistical uncertainties of and measurements.

<sup>15</sup> AAIJ 13K uses 8200 flavor-tagged  $B_d \rightarrow J/\psi K_S^0$  events from  $1 \text{ fb}^{-1}$  of integrated luminosity. Provides the correlation coefficient  $\rho = 0.42$  between the statistical uncertainties of  $S_{J/\psi(nS)K^0}$  ( $B^0 \rightarrow J/\psi(nS)K^0$ ) and  $C_{J/\psi(nS)K^0}$  ( $B^0 \rightarrow J/\psi(nS)K^0$ ) measurements.

<sup>16</sup> Combined result of CHEN 07 and SAHOO 08.



### $C_{J/\psi K^{*0}} (B^0 \rightarrow J/\psi K^{*0})$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.025 \pm 0.083 \pm 0.054$	<sup>1</sup> AUBERT	09K BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Based on  $B^0 \rightarrow J/\psi K^{*0}$ ,  $K^{*0} \rightarrow K_S^0 \pi^0$ .

### $S_{J/\psi K^{*0}} (B^0 \rightarrow J/\psi K^{*0})$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.601 \pm 0.239 \pm 0.087$	<sup>1,2</sup> AUBERT	09K BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Based on  $B^0 \rightarrow J/\psi K^{*0}$ ,  $K^{*0} \rightarrow K_S^0 \pi^0$ .  
<sup>2</sup> This  $S_{J/\psi K^{*0}}$  value has been corrected for the dilution of the  $\sin(\Delta M \Delta t)$  coefficient of the  $CP$  asymmetry by a factor of  $1 - R_{\perp}$ , which arises from the mixture of  $CP$ -even and  $CP$ -odd  $B$  decay amplitudes.

### $C_{\chi_{c0} K_S^0} (B^0 \rightarrow \chi_{c0} K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.29^{+0.53}_{-0.44} \pm 0.06$	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

### $S_{\chi_{c0} K_S^0} (B^0 \rightarrow \chi_{c0} K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.69 \pm 0.52 \pm 0.08</math></b>	<sup>1</sup> AUBERT	09AU BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Uses Dalitz plot analysis of  $B^0 \rightarrow K^0 \pi^+ \pi^-$  decays and the first of two equivalent solutions is used.

### $C_{\chi_{c1} K_S^0} (B^0 \rightarrow \chi_{c1} K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.06 \pm 0.07</math> OUR AVERAGE</b>			

$0.017 \pm 0.083^{+0.026}_{-0.046}$  ADACHI 12A BELL  $e^+ e^- \rightarrow \gamma(4S)$

$0.129 \pm 0.109 \pm 0.025$  AUBERT 09K BABR  $e^+ e^- \rightarrow \gamma(4S)$

### $S_{\chi_{c1} K_S^0} (B^0 \rightarrow \chi_{c1} K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.63 \pm 0.10</math> OUR AVERAGE</b>			

$0.640 \pm 0.117 \pm 0.040$  ADACHI 12A BELL  $e^+ e^- \rightarrow \gamma(4S)$

$0.614 \pm 0.160 \pm 0.040$  AUBERT 09K BABR  $e^+ e^- \rightarrow \gamma(4S)$

### $\sin(2\beta_{\text{eff}})(B^0 \rightarrow \phi K^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.22 \pm 0.27 \pm 0.12</math></b>	AUBERT	07AX BABR	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.50 \pm 0.25^{+0.07}_{-0.04}$  <sup>1</sup> AUBERT 05T BABR Repl. by AUBERT 07AX

<sup>1</sup> Obtained by constraining  $C = 0$ .

### $\sin(2\beta_{\text{eff}})(B^0 \rightarrow \phi K_0^*(1430)^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.97^{+0.03}_{-0.52}</math></b>	<sup>1</sup> AUBERT	08BG BABR	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Measured using the  $CP$ -violation phase difference  $\Delta\phi_{00}$  between the  $B$  and  $\bar{B}$  decay amplitude.

### $\sin(2\beta_{\text{eff}})(B^0 \rightarrow K^+ K^- K_S^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.77 \pm 0.11^{+0.07}_{-0.04}</math></b>	AUBERT	07AX BABR	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.55 \pm 0.22 \pm 0.12$  <sup>1</sup> AUBERT 05T BABR Repl. by AUBERT 07AX

<sup>1</sup> Obtained by constraining  $C = 0$ .

### $\sin(2\beta_{\text{eff}})(B^0 \rightarrow [K_S^0 \pi^+ \pi^-]_{D^{(*)}} h^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.80 \pm 0.14 \pm 0.07</math></b>	<sup>1</sup> ADACHI	18	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.43 \pm 0.27 \pm 0.08$  <sup>2</sup> VOROBYEV 16 BELL  $e^+ e^- \rightarrow \gamma(4S)$

$0.29 \pm 0.34 \pm 0.06$  AUBERT 07BH BABR  $e^+ e^- \rightarrow \gamma(4S)$

$0.78 \pm 0.44 \pm 0.22$  KROKOVNY 06 BELL Repl. by VOROBYEV 16

<sup>1</sup> Analyzes joint data sample of Belle and BaBar using Dalitz plot analysis of  $D \rightarrow K_S^0 \pi^+ \pi^-$ ; the second error combines experimental systematic uncertainty and the Dalitz plot model uncertainty.

<sup>2</sup> A model-independent measurement uses the binned Dalitz plot technique.

### $\beta_{\text{eff}}(B^0 \rightarrow [K_S^0 \pi^+ \pi^-]_{D^{(*)}} h^0)$

VALUE (°)	DOCUMENT ID	TECN	COMMENT
<b>22.5 ± 4.4 ± 1.3</b>	<sup>1</sup> ADACHI 18		$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
11.7 ± 7.8 ± 2.1	<sup>2</sup> VOROBYEV 16	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Analyzes joint data sample of Belle and BaBar using Dalitz plot analysis of  $D \rightarrow K_S^0 \pi^+ \pi^-$ ; the second error combines experimental systematic uncertainty and the Dalitz plot model uncertainty.

<sup>2</sup> A model-independent measurement uses the binned Dalitz plot technique.

### $2\beta_{\text{eff}}(B^0 \rightarrow J/\psi \rho^0)$

VALUE (°)	DOCUMENT ID	TECN	COMMENT
<b>41.7 ± 9.6<sup>+2.8</sup><sub>-6.3</sub></b>	AAIJ 15J	LHCB	$pp$ at 7, 8 TeV

### $|\lambda| (B^0 \rightarrow [K_S^0 \pi^+ \pi^-]_{D^{(*)}} h^0)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.01 ± 0.08 ± 0.02</b>	AUBERT 07BH	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

### $|\sin(2\beta + \gamma)|$

$\beta$  ( $\phi_1$ ) and  $\gamma$  ( $\phi_3$ ) are angles of CKM unitarity triangle, see the review on “CP Violation” in the Reviews section.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&gt;0.40</b>	90	<sup>1</sup> AUBERT 06Y	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
>0.77	68	<sup>2</sup> AAIJ 18Z	LHCB	$pp$ at 7, 8 TeV
>0.13	95	<sup>3</sup> RONGA 06	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
>0.07	95	<sup>3</sup> RONGA 06	BELL	$e^+ e^- \rightarrow \Upsilon(4S)$
>0.35	90	<sup>4</sup> AUBERT 05Z	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
>0.69	68	<sup>5</sup> AUBERT 04V	BABR	$e^+ e^- \rightarrow \Upsilon(4S)$
>0.58	95	<sup>6</sup> AUBERT 04W	BABR	Repl. by AUBERT 05Z

<sup>1</sup> Uses fully reconstructed  $B^0 \rightarrow D^{(*)\pm} \pi^\mp$  and  $D^\pm \rho^\mp$  decays and some theoretical assumptions.

<sup>2</sup> Uses a time dependent CP violation measurement in  $B^0 \rightarrow D^\mp \pi^\pm$  decays with external input and some theoretical assumptions.

<sup>3</sup> Combines the results from fully reconstructed and partially reconstructed  $D^{(*)} \pi$  events by taking weighted averages. Assumes that systematic errors from physics parameters and fit biases in the two measurements are 100% correlated.

<sup>4</sup> Uses partially reconstructed  $B^0 \rightarrow D^{*\pm} \pi^\mp$  decays and some theoretical assumptions.

<sup>5</sup> Uses fully reconstructed  $B^0 \rightarrow D^{(*)\pm} \pi^\mp$  decays and some theoretical assumptions, such as the SU(3) symmetry relation.

<sup>6</sup> Combining this measurement with the results from AUBERT 04V for fully reconstructed  $B^0 \rightarrow D^{(*)\pm} \pi^\mp$  and some theoretical assumptions, such as the SU(3) symmetry relation.

## 2 $\beta + \gamma$

VALUE (°)	DOCUMENT ID	TECN	COMMENT
<b>83±53±20</b>	<sup>1</sup> AUBERT	08AC BABR	$e^+e^- \rightarrow \Upsilon(4S)$

<sup>1</sup> Used a time-dependent Dalitz-plot analysis of  $B^0 \rightarrow D^\mp K^0 \pi^\pm$  assuming the ratio of the  $b \rightarrow u$  and  $b \rightarrow c$  decay amplitudes to be 0.3.

## $\alpha$

For angle  $\alpha(\phi_2)$  of the CKM unitarity triangle, see the review on "CP violation" in the reviews section.

VALUE (°)	DOCUMENT ID	TECN	COMMENT
<b>84.1<sup>+</sup><sub>-</sub> 4.5 3.8</b> OUR EVALUATION	(Produced by HFLAV)		

• • • We do not use the following data for averages, fits, limits, etc. • • •

93.7±10.6	<sup>1</sup> VANHOEFER	16 BELL	$e^+e^- \rightarrow \Upsilon(4S)$
84.9±13.5	<sup>1</sup> VANHOEFER	14 BELL	Repl. by VANHOEFER 16
79 ± 7 ± 11	<sup>2</sup> AUBERT	10D BABR	$e^+e^- \rightarrow \Upsilon(4S)$
92.4 <sup>+</sup> <sub>-</sub> 6.0 6.5	<sup>1</sup> AUBERT	09G BABR	$e^+e^- \rightarrow \Upsilon(4S)$
78.6± 7.3	<sup>3</sup> AUBERT	07O BABR	$e^+e^- \rightarrow \Upsilon(4S)$
88 ± 17	<sup>4</sup> SOMOV	06 BELL	Repl. by VANHOEFER 14
100 ± 13	<sup>5</sup> AUBERT,B	05C BABR	Repl. by AUBERT 09G
102 <sup>+16</sup> <sub>-12</sub> ± 14	<sup>6</sup> AUBERT,B	04R BABR	Repl. by AUBERT,B 05C

<sup>1</sup> Based on an isospin analysis of the  $B \rightarrow \rho\rho$  system.

<sup>2</sup> Obtained using the time dependent analysis of  $B^0 \rightarrow a_1(1260)^\pm \pi^\mp$  and branching fraction measurements of  $B \rightarrow a_1(1260)K$  and  $B \rightarrow K_1\pi$ . Uses SU(3) flavor relations.

<sup>3</sup> The angle  $\alpha_{\text{eff}}$  is obtained using the measured CP parameters of  $B^0 \rightarrow a_1(1260)^\pm \pi^\mp$  and choosing one of the four solutions that is compatible with the result of SM-based fits.

<sup>4</sup> Obtained using isospin relation and selecting a solution closest to the CKM best fit average; the 90% CL allowed interval is  $59^\circ < \phi_2 (\equiv \alpha) < 115^\circ$ .

<sup>5</sup> Obtained using isospin relation and selecting a solution closest to the CKM best fit average; 90% CL allowed interval is  $79^\circ < \alpha < 123^\circ$ .

<sup>6</sup> Obtained from the measured CP parameters of the longitudinal polarization by selecting the solution closest to the CKM best fit central value of  $\alpha = 95^\circ - 98^\circ$ .

## CP VIOLATION PARAMETERS IN $B^0 \rightarrow D^0 K^{*0}$ DECAY

The parameters  $r_{B^0}$  and  $\delta_{B^0}$  are the magnitude ratio and strong phase difference between the amplitudes of  $A(B^0 \rightarrow D^0 K^{*0})$  and  $A(B^0 \rightarrow \bar{D}^0 K^{*0})$ . The measured observables are defined as  $x_\pm = r_{B^0} \cos(\delta_{B^0} \pm \gamma)$  and  $y_\pm = r_{B^0} \sin(\delta_{B^0} \pm \gamma)$  where  $\gamma$  is the CKM angle  $\gamma$ .

"OUR EVALUATION" is provided by the Heavy Flavor Averaging Group (HFLAV). The CKM angle  $\gamma$  is listed in the  $B^+$  section for "CP VIOLATION PARAMETERS IN  $B^+ \rightarrow DK^+$  AND SIMILAR DECAYS."

### $x_+(B^0 \rightarrow DK^{*0})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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#### **$0.04 \pm 0.17$ OUR AVERAGE**

$0.04 \pm 0.16 \pm 0.11$	<sup>1</sup> AAIJ	16S	LHCB $pp$ at 7, 8 TeV
$0.05 \pm 0.35 \pm 0.02$	AAIJ	16Z	LHCB $pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.05 \pm 0.24 \pm 0.04$	<sup>2</sup> AAIJ	16AA	LHCB Repl. by AAIJ 16Z
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<sup>1</sup> Uses Dalitz plot of  $B^0 \rightarrow DK^+ \pi^-$  with  $D \rightarrow K^+ K^-, \pi^+ \pi^-,$  or  $K^+ \pi^-$ .

<sup>2</sup> Uses Dalitz plot analysis of  $D \rightarrow K_S^0 \pi^+ \pi^-$  decays coming from  $B^0 \rightarrow DK^*(892)^0$  modes.

### $x_-(B^0 \rightarrow DK^{*0})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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#### **$-0.16 \pm 0.14$ OUR AVERAGE**

$-0.02 \pm 0.13 \pm 0.14$	<sup>1</sup> AAIJ	16S	LHCB $pp$ at 7, 8 TeV
$-0.31 \pm 0.20 \pm 0.04$	AAIJ	16Z	LHCB $pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.15 \pm 0.14 \pm 0.03$	<sup>2</sup> AAIJ	16AA	LHCB Repl. by AAIJ 16Z
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<sup>1</sup> Uses Dalitz plot of  $B^0 \rightarrow DK^+ \pi^-$  with  $D \rightarrow K^+ K^-, \pi^+ \pi^-,$  or  $K^+ \pi^-$ .

<sup>2</sup> Uses Dalitz plot analysis of  $D \rightarrow K_S^0 \pi^+ \pi^-$  decays coming from  $B^0 \rightarrow DK^*(892)^0$  modes.

### $y_+(B^0 \rightarrow DK^{*0})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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#### **$-0.68 \pm 0.22$ OUR AVERAGE**

$-0.47 \pm 0.28 \pm 0.22$	<sup>1</sup> AAIJ	16S	LHCB $pp$ at 7, 8 TeV
$-0.81 \pm 0.28 \pm 0.06$	AAIJ	16Z	LHCB $pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$-0.65^{+0.24}_{-0.23} \pm 0.08$	<sup>2</sup> AAIJ	16AA	LHCB Repl. by AAIJ 16Z
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<sup>1</sup> Uses Dalitz plot of  $B^0 \rightarrow DK^+ \pi^-$  with  $D \rightarrow K^+ K^-, \pi^+ \pi^-,$  or  $K^+ \pi^-$ .

<sup>2</sup> Uses Dalitz plot analysis of  $D \rightarrow K_S^0 \pi^+ \pi^-$  decays coming from  $B^0 \rightarrow DK^*(892)^0$  modes.

### $y_-(B^0 \rightarrow DK^{*0})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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#### **$0.20 \pm 0.25$ OUR AVERAGE** Error includes scale factor of 1.2.

$-0.35 \pm 0.26 \pm 0.41$	<sup>1</sup> AAIJ	16S	LHCB $pp$ at 7, 8 TeV
$0.31 \pm 0.21 \pm 0.05$	AAIJ	16Z	LHCB $pp$ at 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.25 \pm 0.15 \pm 0.06$	<sup>2</sup> AAIJ	16AA	LHCB Repl. by AAIJ 16Z
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<sup>1</sup> Uses Dalitz plot of  $B^0 \rightarrow DK^+ \pi^-$  with  $D \rightarrow K^+ K^-, \pi^+ \pi^-,$  or  $K^+ \pi^-$ .

<sup>2</sup> Uses Dalitz plot analysis of  $D \rightarrow K_S^0 \pi^+ \pi^-$  decays coming from  $B^0 \rightarrow DK^*(892)^0$  modes.

### $r_{B^0}(B^0 \rightarrow DK^{*0})$

VALUE	DOCUMENT ID	TECN	COMMENT
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**0.257<sup>+0.021</sup><sub>-0.023</sub>** OUR EVALUATION (Produced by HFLAV)

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.39 ± 0.13	<sup>1</sup> AAIJ	16AA LHCB	Repl. by AAIJ 16Z
0.56 ± 0.17	<sup>2</sup> AAIJ	16Z LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses Dalitz plot analysis of  $D \rightarrow K_S^0 \pi^+ \pi^-$  decays coming from  $B^0 \rightarrow DK^*(892)^0$  modes.

<sup>2</sup> Measurement is performed with  $K^+ \pi^-$  masses within 50 MeV of the  $K^{*0}$  mass and an absolute value of the cosine of the  $K^{*0}$  helicity angle greater than 0.4. Angle  $\gamma$  is required to satisfy  $0 < \gamma < 180$  degrees.

### $\delta_{B^0}(B^0 \rightarrow DK^{*0})$

VALUE (°)	DOCUMENT ID	TECN	COMMENT
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**194.1<sup>+9.6</sup><sub>-8.8</sub>** OUR EVALUATION (Produced by HFLAV)

• • • We do not use the following data for averages, fits, limits, etc. • • •

197 <sup>+24</sup> <sub>-20</sub>	<sup>1</sup> AAIJ	16AA LHCB	Repl. by AAIJ 16Z
204 <sup>+21</sup> <sub>-20</sub>	<sup>2</sup> AAIJ	16Z LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses Dalitz plot analysis of  $D \rightarrow K_S^0 \pi^+ \pi^-$  decays coming from  $B^0 \rightarrow DK^*(892)^0$  modes.

<sup>2</sup> Measurement is performed with  $K^+ \pi^-$  masses within 50 MeV of the  $K^{*0}$  mass and an absolute value of the cosine of the  $K^{*0}$  helicity angle greater than 0.4. Angle  $\gamma$  is required to satisfy  $0 < \gamma < 180$  degrees.

### $a_{CP}(B^0 \rightarrow p\bar{p}K^+\pi^-)$

Observable  $a_{CP}(B^0 \rightarrow p\bar{p}K^+\pi^-)$  calculated as half of the difference between triple products for  $B^0$  and  $\bar{B}^0$ , which is sensitive to  $CP$  violation.

VALUE (%)	DOCUMENT ID	TECN	COMMENT
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**0.51 ± 0.85 ± 0.08** <sup>1</sup> AAIJ 23AG LHCB  $pp$  at 7, 8 and 13 TeV

<sup>1</sup> Phase-space integrated asymmetry.

### $a_P(B^0 \rightarrow p\bar{p}K^+\pi^-)$

Observable  $a_P(B^0 \rightarrow p\bar{p}K^+\pi^-)$  calculated as the average of the triple products for  $B^0$  and  $\bar{B}^0$ , which is sensitive to parity violation.

VALUE (%)	DOCUMENT ID	TECN	COMMENT
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**1.49 ± 0.85 ± 0.08** <sup>1</sup> AAIJ 23AG LHCB  $pp$  at 7, 8 and 13 TeV

<sup>1</sup> Phase-space integrated asymmetry.



## T and CPT VIOLATION PARAMETERS

Measured values of the  $T$ -,  $CP$ -, and  $CPT$ -asymmetry parameters, defined as the differences in  $S_{\alpha,\beta}^{\pm}$  and  $C_{\alpha,\beta}^{\pm}$  between symmetry-transformed transitions. The indices  $\alpha = \ell^+, \ell^-$  and  $\beta = K_S^0, K_L^0$  stand for reconstructed the flavor final state and the  $CP$  final states from  $\Upsilon(4S)$  decay. The sign  $\pm$  indicates whether the decay to the flavor final state  $\alpha$  occurs before or after the decay to the  $CP$  final state.

Alternatively, violations of  $CPT$  symmetry and Lorentz invariance are searched for by studying interference effects in  $B^0$  mixing. Results are expressed in terms of the standard model extension parameter  $\Delta a$ , which describes the difference between the couplings of the valence quarks within  $B^0$  meson with the Lorentz-violating fields.

$$\Delta S_T^+ (S_{\ell^-, K_S^0}^- - S_{\ell^+, K_S^0}^+)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-1.37 \pm 0.14 \pm 0.06</math></b>	LEES	12W BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$$\Delta S_T^- (S_{\ell^-, K_S^0}^+ - S_{\ell^+, K_S^0}^-)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>1.17 \pm 0.18 \pm 0.11</math></b>	LEES	12W BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$$\Delta C_T^+ (C_{\ell^-, K_S^0}^- - C_{\ell^+, K_S^0}^+)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.10 \pm 0.14 \pm 0.08</math></b>	LEES	12W BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$$\Delta C_T^- (C_{\ell^-, K_S^0}^+ - C_{\ell^+, K_S^0}^-)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.04 \pm 0.14 \pm 0.08</math></b>	LEES	12W BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$$\Delta S_{CP}^+ (S_{\ell^-, K_S^0}^+ - S_{\ell^+, K_S^0}^+)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-1.30 \pm 0.11 \pm 0.07</math></b>	LEES	12W BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$$\Delta S_{CP}^- (S_{\ell^-, K_S^0}^- - S_{\ell^+, K_S^0}^-)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>1.33 \pm 0.12 \pm 0.06</math></b>	LEES	12W BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$$\Delta C_{CP}^+ (C_{\ell^-, K_S^0}^+ - C_{\ell^+, K_S^0}^+)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.07 \pm 0.09 \pm 0.03</math></b>	LEES	12W BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$$\Delta C_{CP}^- (C_{\ell^-, K_S^0}^- - C_{\ell^+, K_S^0}^-)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.08 \pm 0.10 \pm 0.04</math></b>	LEES	12W BABR	$e^+ e^- \rightarrow \Upsilon(4S)$

$$\Delta S_{CPT}^+ (S_{\ell^+, K_S^0}^- - S_{\ell^+, K_S^0}^+)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.16 ± 0.21 ± 0.09</b>	LEES	12W BABR	$e^+ e^- \rightarrow \gamma(4S)$

$$\Delta S_{CPT}^- (S_{\ell^+, K_S^0}^+ - S_{\ell^+, K_S^0}^-)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.03 ± 0.13 ± 0.06</b>	LEES	12W BABR	$e^+ e^- \rightarrow \gamma(4S)$

$$\Delta C_{CPT}^+ (C_{\ell^+, K_S^0}^- - C_{\ell^+, K_S^0}^+)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.14 ± 0.15 ± 0.07</b>	LEES	12W BABR	$e^+ e^- \rightarrow \gamma(4S)$

$$\Delta C_{CPT}^- (C_{\ell^+, K_S^0}^+ - C_{\ell^+, K_S^0}^-)$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.03 ± 0.12 ± 0.08</b>	LEES	12W BABR	$e^+ e^- \rightarrow \gamma(4S)$

### $\Delta a_{\parallel}$ CPT parameter in $B^0$ mixing

VALUE ( $10^{-15}$ GeV)	DOCUMENT ID	TECN	COMMENT
<b>-0.10 ± 0.82 ± 0.54</b>	<sup>1</sup> AAIJ	16E LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses  $B^0 \rightarrow J/\psi K_S^0$  decays.

### $\Delta a_{\perp}$ CPT parameter in $B^0$ mixing

VALUE ( $10^{-13}$ GeV)	DOCUMENT ID	TECN	COMMENT
<b>-0.20 ± 0.22 ± 0.04</b>	<sup>1</sup> AAIJ	16E LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses  $B^0 \rightarrow J/\psi K_S^0$  decays.

### $\Delta a_{\chi}$ CPT parameter in $B^0$ mixing

VALUE ( $10^{-15}$ GeV)	DOCUMENT ID	TECN	COMMENT
<b>+1.97 ± 1.30 ± 0.29</b>	<sup>1</sup> AAIJ	16E LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses  $B^0 \rightarrow J/\psi K_S^0$  decays.

### $\Delta a_{\gamma}$ CPT parameter in $B^0$ mixing

VALUE ( $10^{-15}$ GeV)	DOCUMENT ID	TECN	COMMENT
<b>+0.44 ± 1.26 ± 0.29</b>	<sup>1</sup> AAIJ	16E LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Uses  $B^0 \rightarrow J/\psi K_S^0$  decays.

## $B^0 \rightarrow D^{*-} \ell^+ \nu_{\ell}$ FORM FACTORS

$R_1$  (form factor ratio  $\sim V/A_1$ )

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.239 ± 0.029 OUR AVERAGE</b>			
1.229 ± 0.028 ± 0.009	<sup>1</sup> WAHEED	19 BELL	$e^+ e^- \rightarrow \gamma(4S)$
1.56 ± 0.07 ± 0.15	AUBERT	09A BABR	$e^+ e^- \rightarrow \gamma(4S)$
1.18 ± 0.30 ± 0.12	DUBOSCQ	96 CLE2	$e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.401 \pm 0.034 \pm 0.018$	<sup>1</sup> DUNGEL	10	BELL	Repl. by WAHEED 19
$1.429 \pm 0.061 \pm 0.044$	AUBERT	08R	BABR	Repl. by AUBERT 09A
$1.396 \pm 0.060 \pm 0.044$	AUBERT,B	06Z	BABR	Repl. by AUBERT 08R

<sup>1</sup> Uses fully reconstructed  $D^{*-} \ell^+ \nu$  events ( $\ell = e$  or  $\mu$ ).

$R_2$  (form factor ratio  $\sim A_2/A_1$ )

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.84 \pm 0.04</math> OUR AVERAGE</b>	Error includes scale factor of 1.8.		
$0.852 \pm 0.021 \pm 0.006$	<sup>1</sup> WAHEED	19	BELL $e^+ e^- \rightarrow \gamma(4S)$
$0.66 \pm 0.05 \pm 0.09$	AUBERT	09A	BABR $e^+ e^- \rightarrow \gamma(4S)$
$0.71 \pm 0.22 \pm 0.07$	DUBOSCQ	96	CLE2 $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.864 \pm 0.024 \pm 0.008$	<sup>1</sup> DUNGEL	10	BELL	Repl. by WAHEED 19
$0.827 \pm 0.038 \pm 0.022$	AUBERT	08R	BABR	Repl. by AUBERT 09A
$0.885 \pm 0.040 \pm 0.026$	AUBERT,B	06Z	BABR	Repl. by AUBERT 08R

<sup>1</sup> Uses fully reconstructed  $D^{*-} \ell^+ \nu$  events ( $\ell = e$  or  $\mu$ ).

$\rho_{A_1}^2$  (form factor slope)

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>1.12 \pm 0.04</math> OUR AVERAGE</b>	Error includes scale factor of 1.5.		
$1.106 \pm 0.031 \pm 0.007$	<sup>1</sup> WAHEED	19	BELL $e^+ e^- \rightarrow \gamma(4S)$
$1.22 \pm 0.02 \pm 0.07$	AUBERT	09A	BABR $e^+ e^- \rightarrow \gamma(4S)$
$0.91 \pm 0.15 \pm 0.06$	DUBOSCQ	96	CLE2 $e^+ e^- \rightarrow \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.214 \pm 0.034 \pm 0.009$	<sup>1</sup> DUNGEL	10	BELL	Repl. by WAHEED 19
$1.191 \pm 0.048 \pm 0.028$	AUBERT	08R	BABR	Repl. by AUBERT 09A
$1.145 \pm 0.059 \pm 0.046$	AUBERT,B	06Z	BABR	Repl. by AUBERT 08R

<sup>1</sup> Uses fully reconstructed  $D^{*-} \ell^+ \nu$  events ( $\ell = e$  or  $\mu$ ).

### PARTIAL BRANCHING FRACTIONS IN $B^0 \rightarrow K^{(*)0} \ell^+ \ell^-$

#### $B(B^0 \rightarrow K^{*0} e^+ e^-) (0.0009 < q^2 < 1.0 \text{ GeV}^2/c^4)$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>3.1^{+0.9+0.2}_{-0.8-0.3} \pm 0.2</math></b>	<sup>1</sup> AAIJ	13U	LHCB $pp$ at 7 TeV

<sup>1</sup> The last uncertainty is due to uncertainties of  $B(B^0 \rightarrow J/\psi K^{*0})$  and  $B(J/\psi \rightarrow e^+ e^-)$  branching fraction measurements.

#### $B(B^0 \rightarrow K^{*0} \ell^+ \ell^-) (0.1 < q^2 < 2.0 \text{ GeV}^2/c^4)$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>1.24^{+0.23}_{-0.27}</math> OUR AVERAGE</b>	Error includes scale factor of 1.6.		

$1.14 \pm 0.11^{+0.11}_{-0.15}$	AAIJ	13Y	LHCB $pp$ at 7 TeV, $K^{*0} \mu^+ \mu^-$
$1.80 \pm 0.36 \pm 0.11$	AALTONEN	11A1	CDF $p\bar{p}$ at 1.96 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.48^{+0.14}_{-0.12} \pm 0.04$	<sup>1</sup> CHATRCHYAN	13BL	CMS $pp$ at 7 TeV
$1.16 \pm 0.23 \pm 0.11$	AAIJ	12U	LHCB Repl. by AAIJ 13Y

<sup>1</sup> CHATRCHYAN 13BL uses, for this bin,  $1.0 < q^2 < 2.0 \text{ GeV}^2/c^4$ .

**$B(B^0 \rightarrow K^{*0} \ell^+ \ell^-)$  ( $2.0 < q^2 < 4.3 \text{ GeV}^2/c^4$ )**

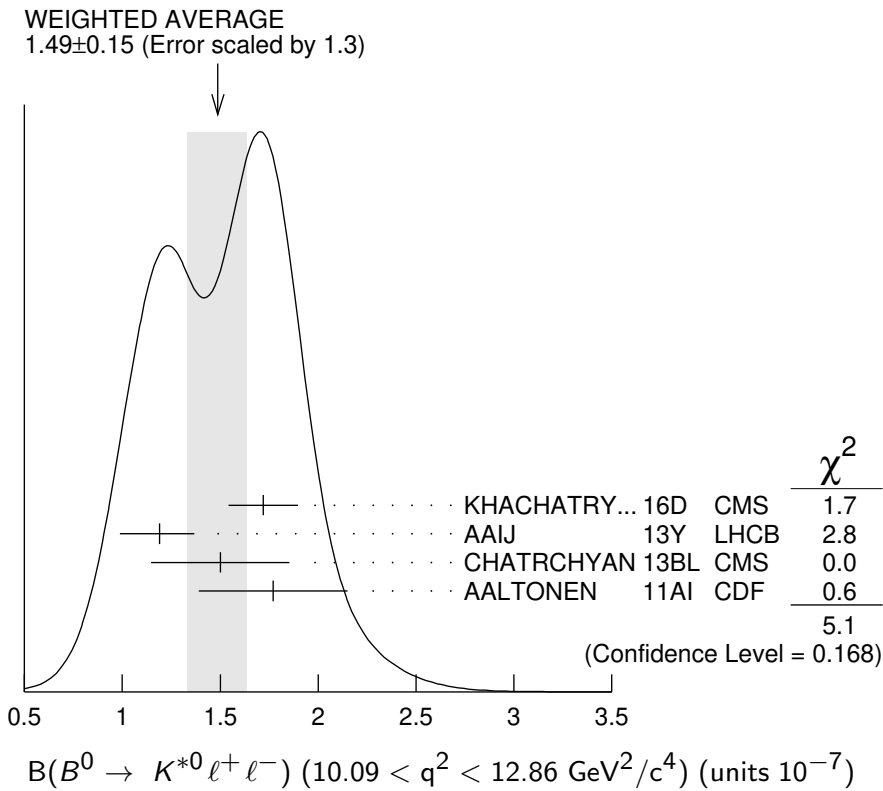
<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.76 ± 0.07 OUR AVERAGE</b>			
0.759 ± 0.115 ± 0.046	KHACHATRY...16D	CMS	$p\bar{p}$ at 8 TeV
0.69 ± 0.07 ± 0.09	AAIJ	13Y LHCb	$p\bar{p}$ at 7 TeV, $K^{*0} \mu^+ \mu^-$
0.87 ± 0.16 ± 0.07	CHATRCHYAN 13BL	CMS	$p\bar{p}$ at 7 TeV
0.84 ± 0.28 ± 0.06	AALTONEN	11A1 CDF	$p\bar{p}$ at 1.96 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.78 ± 0.21 ± 0.05	AAIJ	12U LHCb	Repl. by AAIJ 13Y

**$B(B^0 \rightarrow K^{*0} \ell^+ \ell^-)$  ( $4.3 < q^2 < 8.68 \text{ GeV}^2/c^4$ )**

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.87 ± 0.21 OUR AVERAGE</b>			
2.15 ± 0.18 $^{+0.22}_{-0.28}$	AAIJ	13Y LHCb	$p\bar{p}$ at 7 TeV, $K^{*0} \mu^+ \mu^-$
1.62 ± 0.31 ± 0.18	CHATRCHYAN 13BL	CMS	$p\bar{p}$ at 7 TeV
1.73 ± 0.43 ± 0.15	AALTONEN	11A1 CDF	$p\bar{p}$ at 1.96 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
3.02 ± 0.35 ± 0.22	AAIJ	12U LHCb	Repl. by AAIJ 13Y

**$B(B^0 \rightarrow K^{*0} \ell^+ \ell^-)$  ( $10.09 < q^2 < 12.86 \text{ GeV}^2/c^4$ )**

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.49 ± 0.15 OUR AVERAGE</b>	Error includes scale factor of 1.3.		See the ideogram below.
1.72 ± 0.11 ± 0.14	KHACHATRY...16D	CMS	$p\bar{p}$ at 8 TeV
1.19 ± 0.11 $^{+0.14}_{-0.17}$	AAIJ	13Y LHCb	$p\bar{p}$ at 7 TeV, $K^{*0} \mu^+ \mu^-$
1.50 ± 0.25 ± 0.25	CHATRCHYAN 13BL	CMS	$p\bar{p}$ at 7 TeV
1.77 ± 0.36 ± 0.12	AALTONEN	11A1 CDF	$p\bar{p}$ at 1.96 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1.52 ± 0.25 ± 0.19	AAIJ	12U LHCb	Repl. by AAIJ 13Y



**$B(B^0 \rightarrow K^{*0} \ell^+ \ell^-)$  ( $14.18 < q^2 < 16.0 \text{ GeV}^2/c^4$ )**

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>1.09 \pm 0.10</math> OUR AVERAGE</b>	Error includes scale factor of 1.1.		
$1.22 \pm 0.11 \pm 0.09$	KHACHATRY...16D	CMS	$pp$ at 8 TeV
$1.02 \pm 0.11^{+0.11}_{-0.15}$	AAIJ	13Y LHCb	$pp$ at 7 TeV, $K^{*0} \mu^+ \mu^-$
$0.84^{+0.16}_{-0.15} \pm 0.09$	CHATRCHYAN 13BL	CMS	$pp$ at 7 TeV
$1.34 \pm 0.26 \pm 0.08$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$1.15 \pm 0.20 \pm 0.09$	AAIJ	12U LHCb	Repl. by AAIJ 13Y

**$B(B^0 \rightarrow K^{*0} \ell^+ \ell^-)$  ( $16.0 < q^2 < 19.0 \text{ GeV}^2/c^4$ )**

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>1.27 \pm 0.09</math> OUR AVERAGE</b>			
$1.26 \pm 0.09 \pm 0.09$	KHACHATRY...16D	CMS	$pp$ at 8 TeV
$1.23 \pm 0.12^{+0.15}_{-0.18}$	AAIJ	13Y LHCb	$pp$ at 7 TeV, $K^{*0} \mu^+ \mu^-$
$1.56 \pm 0.18 \pm 0.15$	CHATRCHYAN 13BL	CMS	$pp$ at 7 TeV
$0.97 \pm 0.26 \pm 0.07$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$1.50 \pm 0.24 \pm 0.15$	AAIJ	12U LHCb	Repl. by AAIJ 13Y

### $B(B^0 \rightarrow K^{*0} \ell^+ \ell^-) (15.0 < q^2 < 19.0 \text{ GeV}^2/c^4)$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.80 ± 0.13 OUR AVERAGE</b>			
2.2 $^{+0.5}_{-0.4} \pm 0.2$	<sup>1</sup> WEHLE	21 BELL	$e^+ e^- \rightarrow \gamma(4S)$
2.0 $^{+0.6}_{-0.5} \pm 0.2$	<sup>2</sup> WEHLE	21 BELL	$e^+ e^- \rightarrow \gamma(4S)$
1.744 $^{+0.072}_{-0.076} \pm 0.123$	<sup>1</sup> AAIJ	17Q LHCB	$pp$ at 7, 8 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1.95 $^{+0.08}_{-0.09} \pm 0.13$	<sup>1</sup> AAIJ	16AO LHCB	Repl. by AAIJ 17Q

<sup>1</sup> Measured with  $\mu^+ \mu^-$  as lepton pair.

<sup>2</sup> Measured with  $e^+ e^-$  as lepton pair.

### $B(B^0 \rightarrow K^{*0} \ell^+ \ell^-) (1.0 < q^2 < 6.0 \text{ GeV}^2/c^4)$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.74 ± 0.11 OUR AVERAGE</b>			
1.9 $^{+0.6}_{-0.5} \pm 0.3$	<sup>1,2</sup> WEHLE	21 BELL	$e^+ e^- \rightarrow \gamma(4S)$
1.8 $^{+0.6}_{-0.6} \pm 0.2$	<sup>1,3</sup> WEHLE	21 BELL	$e^+ e^- \rightarrow \gamma(4S)$
1.68 ± 0.083 ± 0.12	<sup>1,2</sup> AAIJ	17Q LHCB	$pp$ at 7, 8 TeV
1.90 ± 0.20	<sup>2</sup> KHACHATRY...16D	CMS	$pp$ at 7, 8 TeV
1.42 ± 0.41 ± 0.12	<sup>2</sup> AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1.92 $^{+0.10}_{-0.09} \pm 0.14$	AAIJ	16AO LHCB	Repl. by AAIJ 17Q
1.70 ± 0.15 $^{+0.20}_{-0.25}$	AAIJ	13Y LHCB	Repl. by AAIJ 16AO
2.20 ± 0.30 ± 0.20	CHATRCHYAN 13BL	CMS	Repl. by KHACHA-TRYAN 16D
2.10 ± 0.30 ± 0.15	AAIJ	12U LHCB	Repl. by AAIJ 13Y

● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●

1.92 $^{+0.10}_{-0.09} \pm 0.14$	AAIJ	16AO LHCB	Repl. by AAIJ 17Q
1.70 ± 0.15 $^{+0.20}_{-0.25}$	AAIJ	13Y LHCB	Repl. by AAIJ 16AO
2.20 ± 0.30 ± 0.20	CHATRCHYAN 13BL	CMS	Repl. by KHACHA-TRYAN 16D
2.10 ± 0.30 ± 0.15	AAIJ	12U LHCB	Repl. by AAIJ 13Y

<sup>1</sup> Result is determined for the range  $1.1 < q^2 < 6.0 \text{ GeV}^4/c^2$ .

<sup>2</sup> Measured with  $\mu^+ \mu^-$  as lepton pair.

<sup>3</sup> Measured with  $e^+ e^-$  as lepton pair.

### $B(B^0 \rightarrow K^{*0} \ell^+ \ell^-) (0.0 < q^2 < 4.3 \text{ GeV}^2/c^4)$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2.60 ± 0.45 ± 0.17</b>	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV

### $B(B^0 \rightarrow K^{*0} \mu^+ \mu^-) / B(B^0 \rightarrow K^{*0} e^+ e^-) (0.045 < q^2 < 1.1 \text{ GeV}^2/c^4)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.91 ± 0.09 OUR AVERAGE</b>			
0.927 $^{+0.093}_{-0.087} \pm 0.036$	<sup>1</sup> AAIJ	23AB LHCB	$pp$ at 7, 8, 13 TeV
0.46 $^{+0.55}_{-0.27} \pm 0.13$	WEHLE	21 BELL	$e^+ e^- \rightarrow \gamma(4S)$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.66 $^{+0.11}_{-0.07} \pm 0.03$	<sup>2</sup> AAIJ	17W LHCB	$pp$ at 7, 8 TeV

<sup>1</sup> Measured for the region  $0.1 < q^2 < 1.1 \text{ GeV}^2/c^4$ .

<sup>2</sup> Superseded by AAIJ 23AB.

**$B(B^0 \rightarrow K^{*0} \mu^+ \mu^-)/B(B^0 \rightarrow K^{*0} e^+ e^-)$  ( $1.1 < q^2 < 6.0 \text{ GeV}^2/c^4$ )**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>1.03 \pm 0.07</math> OUR AVERAGE</b>			
$1.027^{+0.072+0.027}_{-0.068-0.026}$	AAIJ	23AB	LHCB $pp$ at 7, 8, 13 TeV
$1.06^{+0.63}_{-0.38} \pm 0.13$	WEHLE	21	BELL $e^+ e^- \rightarrow \Upsilon(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.69^{+0.11}_{-0.07} \pm 0.05$	<sup>1</sup> AAIJ	17W	LHCB $pp$ at 7, 8 TeV

<sup>1</sup>Superseded by AAIJ 23AB.

**$B(B^0 \rightarrow K^{*0} \mu^+ \mu^-)/B(B^0 \rightarrow K^{*0} e^+ e^-)$  ( $15.0 < q^2 < 19.0 \text{ GeV}^2/c^4$ )**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>1.12^{+0.61}_{-0.36} \pm 0.10</math></b>	WEHLE	21	BELL $e^+ e^- \rightarrow \Upsilon(4S)$

**$B(B^0 \rightarrow K^0 \ell^+ \ell^-)$  ( $q^2 < 2.0 \text{ GeV}^2/c^4$ )**

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.24^{+0.22}_{-0.20}</math> OUR AVERAGE</b>			
$0.21^{+0.27}_{-0.23}$	AAIJ	12AH	LHCB $pp$ at 7 TeV
$0.31 \pm 0.37 \pm 0.02$	AALTONEN	11A1	CDF $p\bar{p}$ at 1.96 TeV

**$B(B^0 \rightarrow K^0 \ell^+ \ell^-)$  ( $2.0 < q^2 < 4.3 \text{ GeV}^2/c^4$ )**

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.24^{+0.35}_{-0.30}</math> OUR AVERAGE</b> Error includes scale factor of 1.6.			
$0.07^{+0.25}_{-0.21}$	AAIJ	12AH	LHCB $pp$ at 7 TeV
$0.93 \pm 0.49 \pm 0.07$	AALTONEN	11A1	CDF $p\bar{p}$ at 1.96 TeV

**$B(B^0 \rightarrow K^0 \ell^+ \ell^-)$  ( $4.3 < q^2 < 8.68 \text{ GeV}^2/c^4$ )**

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>1.08 \pm 0.27</math> OUR AVERAGE</b>			
$1.23 \pm 0.31$	AAIJ	12AH	LHCB $pp$ at 7 TeV
$0.66 \pm 0.51 \pm 0.05$	AALTONEN	11A1	CDF $p\bar{p}$ at 1.96 TeV

**$B(B^0 \rightarrow K^0 \ell^+ \ell^-)$  ( $10.09 < q^2 < 12.86 \text{ GeV}^2/c^4$ )**

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.27 \pm 0.27</math> OUR AVERAGE</b> Error includes scale factor of 1.8.			
$0.50^{+0.22}_{-0.19}$	AAIJ	12AH	LHCB $pp$ at 7 TeV
$-0.03 \pm 0.22 \pm 0.01$	AALTONEN	11A1	CDF $p\bar{p}$ at 1.96 TeV

**$B(B^0 \rightarrow K^0 \ell^+ \ell^-)$  ( $14.18 < q^2 < 16.0 \text{ GeV}^2/c^4$ )**

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.29^{+0.21}_{-0.15}</math> OUR AVERAGE</b> Error includes scale factor of 1.8.			
$0.20^{+0.13}_{-0.09}$	AAIJ	12AH	LHCB $pp$ at 7 TeV
$0.73 \pm 0.26 \pm 0.06$	AALTONEN	11A1	CDF $p\bar{p}$ at 1.96 TeV

### $B(B^0 \rightarrow K^0 \ell^+ \ell^-) (q^2 > 16.0 \text{ GeV}^2/c^4)$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**0.31<sup>+0.16</sup><sub>-0.12</sub> OUR AVERAGE**

0.35 <sup>+0.21</sup> <sub>-0.14</sub>	AAIJ	12AH	LHCB $pp$ at 7 TeV
0.21 $\pm$ 0.18 $\pm$ 0.16	AALTONEN	11AI	CDF $p\bar{p}$ at 1.96 TeV

### $B(B^0 \rightarrow K^0 \ell^+ \ell^-) (1.0 < q^2 < 6.0 \text{ GeV}^2/c^4)$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**0.91<sup>+0.15</sup><sub>-0.13</sub> OUR AVERAGE**

0.62 <sup>+0.44</sup> <sub>-0.32</sub> $\pm$ 0.02	<sup>1</sup> CHOUDHURY 21	BELL	$e^+ e^- \rightarrow \gamma(4S)$
1.12 <sup>+0.50</sup> <sub>-0.40</sub> $\pm$ 0.04	<sup>2</sup> CHOUDHURY 21	BELL	$e^+ e^- \rightarrow \gamma(4S)$
0.916 <sup>+0.172</sup> <sub>-0.157</sub> $\pm$ 0.004	<sup>3</sup> AAIJ	14M	LHCB $pp$ at 7, 8 TeV
0.98 $\pm$ 0.61 $\pm$ 0.08	AALTONEN	11AI	CDF $p\bar{p}$ at 1.96 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.65 <sup>+0.45</sup> <sub>-0.35</sub>	AAIJ	12AH	LHCB Repl. by AAIJ 14M
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<sup>1</sup> Measured for  $B^0 \rightarrow K_S^0 \mu^+ \mu^-$  decays. Measurements in other  $q^2$  bins are also reported.

<sup>2</sup> Measured for  $B^0 \rightarrow K_S^0 e^+ e^-$  decays. Measurements in other  $q^2$  bins are also reported.

<sup>3</sup> Uses  $B(B^0 \rightarrow J/\psi(1S) K^0) = (0.928 \pm 0.013 \pm 0.037) \times 10^{-3}$  for normalisation and  $\mu^+ \mu^-$  as a lepton pair. Measured in  $1.1 < q^2 < 6.0 \text{ GeV}^2/c^4$ .

### $B(B^0 \rightarrow K^0 \mu^+ \mu^-) / B(B^0 \rightarrow K^0 e^+ e^-) (1.0 < q^2 < 6.0 \text{ GeV}^2/c^4)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**0.64<sup>+0.18</sup><sub>-0.13</sub> OUR AVERAGE**

0.66 <sup>+0.20</sup> <sub>-0.14</sub> <sup>+0.02</sup> <sub>-0.04</sub>	<sup>1</sup> AAIJ	22J	LHCB $pp$ at 7, 8, 13 TeV
0.55 <sup>+0.46</sup> <sub>-0.34</sub> $\pm$ 0.01	<sup>2</sup> CHOUDHURY 21	BELL	$e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> Measured in the range  $1.1 < q^2 < 6.0 \text{ GeV}^2/c^4$ .

<sup>2</sup> Measured from the ratio of  $K_S^0 \mu^+ \mu^-$  and  $K_S^0 e^+ e^-$ . Measurements in other  $q^2$  bins are also reported.

### $B(B^0 \rightarrow K^0 \ell^+ \ell^-) (0.0 < q^2 < 4.3 \text{ GeV}^2/c^4)$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>1.27<math>\pm</math>0.62<math>\pm</math>0.10</b>	AALTONEN	11AI	CDF $p\bar{p}$ at 1.96 TeV
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### $B(B^0 \rightarrow K^0 \ell^+ \ell^-) (15.0 < q^2 < 22.0 \text{ GeV}^2/c^4)$

<u>VALUE (units <math>10^{-7}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>0.67<sup>+0.11</sup><sub>-0.11</sub> <math>\pm</math>0.04</b>	<sup>1</sup> AAIJ	14M	LHCB $pp$ at 7, 8 TeV
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<sup>1</sup> Uses  $B(B^0 \rightarrow J/\psi(1S) K^0) = (0.928 \pm 0.013 \pm 0.037) \times 10^{-3}$  for normalisation and  $\mu^+ \mu^-$  as a lepton pair.



### $B(B^0 \rightarrow K^0 e^+ e^-) (1.1 < q^2 < 6.0 \text{ GeV}^2/c^4)$

VALUE (units $10^{-8}$ )	DOCUMENT ID	TECN	COMMENT
<b>13±3±1</b>	<sup>1</sup> AAIJ	22J LHCb	$pp$ at 7, 8, 13 TeV

<sup>1</sup> The reported value is converted from the measured  $dB/dq^2 = (2.6 \pm 0.6 \pm 0.1) \times 10^{-8} (\text{GeV}^2/c^4)^{-1}$  by multiplying by the  $\Delta q^2 = 4.9 \text{ GeV}^2/c^4$  range.

### $B(B^0 \rightarrow K_{0,2}^*(1430)^0 \mu^+ \mu^-) (1.10 < q^2 < 6.00 \text{ GeV}^2/c^4)$

VALUE (units $10^{-8}$ )	DOCUMENT ID	TECN	COMMENT
<b>4.02±0.44±0.31</b>	<sup>1,2</sup> AAIJ	16AP LHCb	$pp$ at 7, 8 TeV

<sup>1</sup> Measured the differential branching fraction and angular moments of the decay  $B^0 \rightarrow K^+ \pi^- \mu^+ \mu^-$  in the  $K^+ \pi^-$  invariant mass range  $1330 < m(K^+ \pi^-) < 1530 \text{ MeV}/c^2$ .

<sup>2</sup> The reported value is converted from the measured  $dB/dq^2 = (0.82 \pm 0.09 \pm 0.063) \times 10^{-8} (\text{GeV}^2/c^4)^{-1}$  by multiplying by the  $\Delta q^2 = 4.9 \text{ GeV}^2/c^4$  range.

### $F_H(B^0 \rightarrow K^0 \mu^+ \mu^-) (1.1 < q^2 < 6.0 \text{ GeV}^2/c^4)$

$F_H$  is a fractional contribution of (pseudo) scalar and tensor amplitudes to the decay width in the massless muon approximation.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.78±0.46±0.09</b>	<sup>1</sup> AAIJ	140 LHCb	$pp$ at 7, 8 TeV

<sup>1</sup> AAIJ 140 reports 68% C.L. interval, which we encode as midpoint with uncertainty as half of the width of interval.

### $F_H(B^0 \rightarrow K^0 \mu^+ \mu^-) (15.0 < q^2 < 22.0 \text{ GeV}^2/c^4)$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.34±0.25±0.03</b>	<sup>1</sup> AAIJ	140 LHCb	$pp$ at 7, 8 TeV

<sup>1</sup> AAIJ 140 reports 68% C.L. interval, which we encode as midpoint with uncertainty as half of the width of interval.

## PRODUCTION ASYMMETRIES

### $A_P(B^0)$

$$A_P(B^0) = [\sigma(\bar{B}^0) - \sigma(B^0)] / [\sigma(\bar{B}^0) + \sigma(B^0)]$$

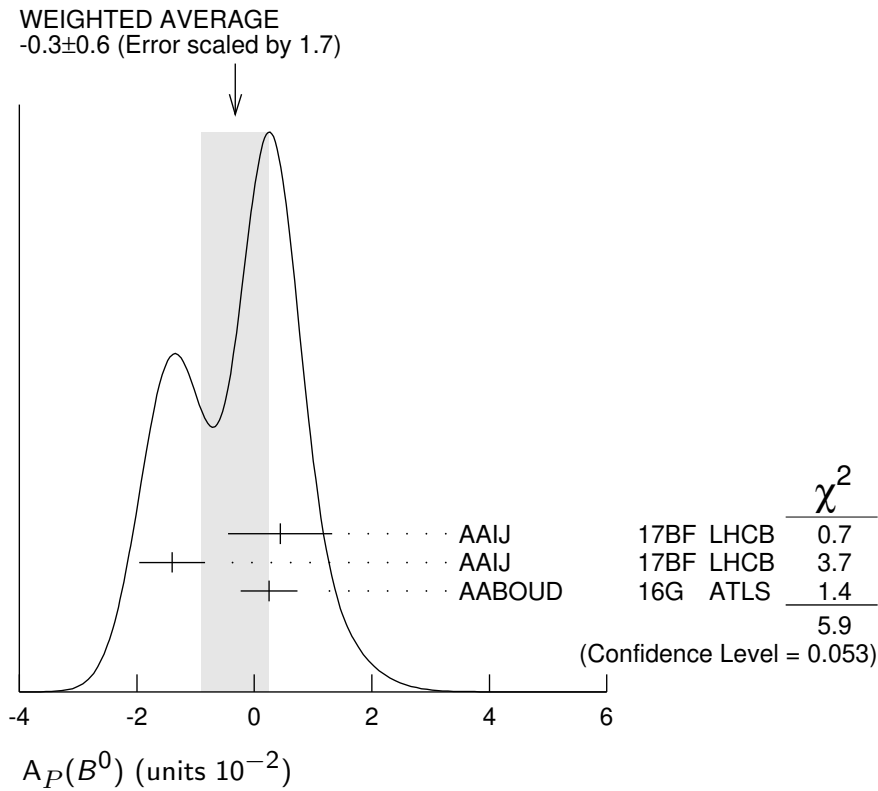
VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b>-0.3 ± 0.6 OUR AVERAGE</b>	Error includes scale factor of 1.7.		See the ideogram below.

0.44±0.88±0.11	<sup>1</sup> AAIJ	17BF LHCb	$pp$ at 7 TeV
-1.40±0.55±0.10	<sup>1</sup> AAIJ	17BF LHCb	$pp$ at 8 TeV
0.25±0.48±0.05	<sup>2</sup> AABOUD	16G ATLS	$pp$ at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.35±0.76±0.28	<sup>3</sup> AAIJ	14BP LHCb	Repl. by AAIJ 17BF, $pp$ at 7 TeV

<sup>1</sup> AAIJ 17BF uses  $B^0 \rightarrow J/\psi K^{*0}$  decays with  $B^0$  transverse momenta  $p_T$  and rapidities  $y$  in the region of  $0 < p_T < 30 \text{ GeV}/c$  and  $2.1 < y < 4.5$ .

<sup>2</sup> Based on time-dependent analysis of  $B^0 \rightarrow J/\psi K^{*0}$  decay in kinematic range  $p_T > 10 \text{ GeV}/c$  and  $|\eta| < 2.5$ .

<sup>3</sup> Based on time-dependent analysis of  $B^0 \rightarrow J/\psi K^{*0}$  and  $B^0 \rightarrow D^- \pi^+$  in kinematic range  $4 < p_T < 30 \text{ GeV}/c$  and  $2.5 < \eta < 4.5$ .



**$A(B^0 + \bar{B}^0)$  in  $K_S^0 K^\mp \pi^\pm$**

$$A(B^0 + \bar{B}^0) = [n(K_S^0 K^- \pi^+) - n(K_S^0 K^+ \pi^-)] / [n(K_S^0 K^- \pi^+) + n(K_S^0 K^+ \pi^-)]$$

VALUE (units $10^{-2}$ )	DOCUMENT ID	TECN	COMMENT
<b><math>-8.5 \pm 8.9 \pm 0.2</math></b>	LAI	19	BELL $e^+ e^- \rightarrow \gamma(4S)$

**FORWARD-BACKWARD ASYMMETRIES**

**$A_{FB}$  in  $B^0 \rightarrow D^{*-} e^+ \nu_e$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.225 \pm 0.018</math> OUR AVERAGE</b>			
$0.228 \pm 0.012 \pm 0.018$	ADACHI	23J	BELL $e^+ e^- \rightarrow \gamma(4S)$
$0.218 \pm 0.030 \pm 0.009$	PRIM	23	BELL $e^+ e^- \rightarrow \gamma(4S)$

**$A_{FB}$  in  $B^0 \rightarrow D^{*-} \mu^+ \nu_\mu$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>0.235 \pm 0.033</math> OUR AVERAGE</b>			Error includes scale factor of 1.7.
$0.211 \pm 0.011 \pm 0.021$	ADACHI	23J	BELL $e^+ e^- \rightarrow \gamma(4S)$
$0.281 \pm 0.032 \pm 0.007$	PRIM	23	BELL $e^+ e^- \rightarrow \gamma(4S)$

**$\Delta(A_{FB}) = (A_{FB}^\mu - A_{FB}^e)$  in  $B^0 \rightarrow D^{*-} \ell^+ \nu_\ell$**

VALUE	DOCUMENT ID	TECN	COMMENT
<b><math>-0.018 \pm 0.020</math> OUR AVERAGE</b>			
$-0.024 \pm 0.043 \pm 0.016$	<sup>1</sup> ADACHI	23H	BELL $e^+ e^- \rightarrow \gamma(4S)$
$-0.017 \pm 0.016 \pm 0.016$	ADACHI	23J	BELL $e^+ e^- \rightarrow \gamma(4S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.063 \pm 0.044 \pm 0.012$	PRIM	23	BELL $e^+ e^- \rightarrow \gamma(4S)$

<sup>1</sup> ADACHI 23H measurement is based on the angular asymmetries of  $B^0 \rightarrow D^{*-} \ell^+ \nu_\ell$  decays using explicit reconstruction of the  $B$  tag. Other asymmetries from  $\Delta(S_3)$ ,  $\Delta(S_5)$ ,  $\Delta(S_7)$ , and  $\Delta(S_9)$  are also reported.

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AAIJ	23AB	PRL 131 051803	R. Aaij <i>et al.</i>	(LHCb Collab.)
Also		PR D108 032002	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23AD	PRL 131 091901	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23AG	PR D108 032007	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23AR	PRL 131 111802	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23AY	JHEP 2310 106	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23AZ	JHEP 2310 123	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23B	PR D108 012017	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23F	JHEP 2306 143	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23G	JHEP 2306 073	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23T	PR D108 012007	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	23W	PR D108 012018	R. Aaij <i>et al.</i>	(LHCb Collab.)
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GLATTAUER	16	PR D93 032006	R. Glattauer <i>et al.</i>	(BELLE Collab.)
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PAL	15	PR D92 011101	B. Pal <i>et al.</i>	(BELLE Collab.)
WIEHCZYN...	15	PR D91 032008	J. Wiechczynski <i>et al.</i>	(BELLE Collab.)
AAIJ	14AA	PRL 112 202001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14AM	JHEP 1405 069	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14AN	JHEP 1409 177	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14BM	NJP 16 123001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14BN	PR D90 112002	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14BP	PL B739 218	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14E	JHEP 1404 114	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14L	JHEP 1407 140	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14M	JHEP 1406 133	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14O	JHEP 1405 082	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14R	PL B736 446	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14X	PR D90 012003	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14Y	PRL 112 091802	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALTONEN	14P	PRL 113 242001	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ABAZOV	14	PR D89 012002	V.M. Abazov <i>et al.</i>	(D0 Collab.)
CHILIKIN	14	PR D90 112009	K. Chilikin <i>et al.</i>	(BELLE Collab.)
CHOBANOVA	14	PR D90 012002	V. Chobanova <i>et al.</i>	(BELLE Collab.)
IWASHITA	14	PTEP 2014 043C01	T. Iwashita <i>et al.</i>	(BELLE Collab.)
LAI	14	PR D89 051103	Y.-T. Lai <i>et al.</i>	(BELLE Collab.)
LEES	14	PR D89 051101	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	14B	PR D89 112002	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	14C	PR D89 071102	J.P. Lees <i>et al.</i>	(BABAR Collab.)
PDG	14	CP C38 070001	K. Olive <i>et al.</i>	(PDG Collab.)
SANTELJ	14	JHEP 1410 165	L. Santelj <i>et al.</i>	(BELLE Collab.)
SATO	14	PR D90 072009	S. Sato <i>et al.</i>	(BELLE Collab.)
VANHOEFER	14	PR D89 072008	P. Vanhoefer <i>et al.</i>	(BELLE Collab.)
AAD	13U	PR D87 032002	G. Aad <i>et al.</i>	(ATLAS Collab.)
AAIJ	13	NP B867 1	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13A	NP B867 547	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AA	NP B871 403	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AC	NP B874 663	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AO	PR D87 092001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AP	PR D87 092007	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AQ	PR D87 112009	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AT	PR D88 052002	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AW	PRL 110 211801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AX	PRL 110 221601	R. Aaij <i>et al.</i>	(LHCb Collab.)

AAIJ	13B	PRL 110 021801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13BA	PRL 111 101805	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13BM	PRL 111 141801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13BO	JHEP 1310 183	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13BP	JHEP 1310 143	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13BQ	JHEP 1310 005	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13BT	PR D88 072005	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13CF	EPJ C73 2655	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13E	PRL 110 031801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13F	PL B719 318	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13K	PL B721 24	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13L	JHEP 1303 067	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13M	PR D87 052001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13P	JHEP 1304 001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13U	JHEP 1305 159	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13Y	JHEP 1308 131	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13Z	JHEP 1309 006	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALTONEN	13F	PR D87 072003	T. Aaltonen <i>et al.</i>	(CDF Collab.)
CHATRCHYAN	13AW	PRL 111 101804	S. Chatrchyan <i>et al.</i>	(CMS Collab.)
CHATRCHYAN	13BL	PL B727 77	S. Chatrchyan <i>et al.</i>	(CMS Collab.)
CHILIKIN	13	PR D88 074026	K.P. Chilikin <i>et al.</i>	(BELLE Collab.)
DALSENO	13	PR D88 092003	J. Dalseno <i>et al.</i>	(BELLE Collab.)
DUH	13	PR D87 031103	Y. T. Duh <i>et al.</i>	(BELLE Collab.)
GAUR	13	PR D87 091101	V. Gaur <i>et al.</i>	(BELLE Collab.)
LEES	13D	PR D87 052009	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	13H	PR D87 092004	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	13I	PR D87 112005	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	13J	PR D88 012003	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	13M	PR D88 032012	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	13N	PRL 111 101802	J.P. Lees <i>et al.</i>	(BABAR Collab.)
Also		PRL 111 159901(errat.)	J.P. Lees <i>et al.</i>	(BABAR Collab.)
Also		PR D93 032001	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LUTZ	13	PR D87 111103	O. Lutz <i>et al.</i>	(BELLE Collab.)
PRIM	13	PR D88 072004	M. Prim <i>et al.</i>	(BELLE Collab.)
SIBIDANOV	13	PR D88 032005	A. Sibidanov <i>et al.</i>	(BELLE Collab.)
AAIJ	12A	PL B708 55	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12AH	JHEP 1207 133	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12AM	PRL 109 131801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12AR	JHEP 1210 037	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12AX	PR D86 112005	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12E	PL B708 241	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12I	PL B709 177	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12L	EPJ C72 2118	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12T	PRL 108 161801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12U	PRL 108 181806	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12V	PRL 108 201601	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	12W	PRL 108 231801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALTONEN	12L	PRL 108 211803	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ABAZOV	12AC	PR D86 072009	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABAZOV	12U	PR D85 112003	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ADACHI	12A	PRL 108 171802	I. Adachi <i>et al.</i>	(BELLE Collab.)
CHANG	12	PR D85 091102	M.-C. Chang <i>et al.</i>	(BELLE Collab.)
CHATRCHYAN	12A	JHEP 1204 033	S. Chatrchyan <i>et al.</i>	(CMS Collab.)
DALSENO	12	PR D86 092012	J. Dalseno <i>et al.</i>	(BELLE Collab.)
DEL-AMO-SA...	12	PR D85 092017	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
HIGUCHI	12	PR D85 071105	T. Higuchi <i>et al.</i>	(BELLE Collab.)
HOI	12	PRL 108 031801	C.-T. Hoi <i>et al.</i>	(BELLE Collab.)
HSU	12	PR D86 032002	C.-L. Hsu <i>et al.</i>	(BELLE Collab.)
KIM	12A	PR D86 031101	J.H. Kim <i>et al.</i>	(BELLE Collab.)
KRONENBIT...	12	PR D86 071103	B. Kronenbitter <i>et al.</i>	(BELLE Collab.)
LEES	12AA	PR D86 092004	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	12AF	PR D86 112006	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	12B	PR D85 052003	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	12D	PRL 109 101802	J.P. Lees <i>et al.</i>	(BABAR Collab.)
Also		PR D88 072012	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	12I	PR D85 054023	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	12K	PR D85 072005	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	12O	PR D85 112010	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	12T	PR D86 051105	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	12W	PRL 109 211801	J.P. Lees <i>et al.</i>	(BABAR Collab.)
NEGISHI	12	PR D86 011101	K. Negishi <i>et al.</i>	(BELLE Collab.)

PDG	12	PR D86 010001	J. Beringer <i>et al.</i>	(PDG Collab.)
ROHRKEN	12	PR D85 091106	M. Rohrken <i>et al.</i>	(BELLE Collab.)
SATO	12	PRL 108 171801	Y. Sato <i>et al.</i>	(BELLE Collab.)
AAIJ	11B	PL B699 330	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	11E	PR D84 092001	R. Aaij <i>et al.</i>	(LHCb Collab.)
Also		PR D85 039904 (errata.)	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALTONEN	11	PRL 106 121804	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	11AG	PRL 107 191801	T. Aaltonen <i>et al.</i>	(CDF Collab.)
Also		PRL 107 239903 (errata.)	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	11AI	PRL 107 201802	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	11L	PRL 106 161801	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	11N	PRL 106 181802	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ABAZOV	11U	PR D84 052007	V.M. Abazov <i>et al.</i>	(D0 Collab.)
AUSHEV	11	PR D83 051102	T. Aushev <i>et al.</i>	(BELLE Collab.)
BAHINIPATI	11	PR D84 021101	S. Bahinipati <i>et al.</i>	(BELLE Collab.)
BHARDWAJ	11	PRL 107 091803	V. Bhardwaj <i>et al.</i>	(BELLE Collab.)
CHATRCHYAN	11T	PRL 107 191802	S. Chatrchyan <i>et al.</i>	(CMS Collab.)
CHOI	11	PR D84 052004	S.-K. Choi <i>et al.</i>	(BELLE Collab.)
DEL-AMO-SA...	11A	PR D83 032006	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
DEL-AMO-SA...	11B	PR D83 032004	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
DEL-AMO-SA...	11C	PR D83 032007	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
DEL-AMO-SA...	11F	PR D83 052011	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
DEL-AMO-SA...	11K	PR D83 091101	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
HA	11	PR D83 071101	H. Ha <i>et al.</i>	(BELLE Collab.)
LEES	11	PR D83 112010	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	11A	PR D84 012001	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	11F	PR D84 071102	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	11M	PR D84 112007	J.P. Lees <i>et al.</i>	(BABAR Collab.)
Also		PR D87 039901 (errata.)	J.P. Lees <i>et al.</i>	(BABAR Collab.)
SAHOO	11A	PR D84 071101	H. Sahoo <i>et al.</i>	(BELLE Collab.)
AUBERT	10	PRL 104 011802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	10D	PR D81 052009	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	10H	PR D82 031102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUSHEV	10	PR D81 031103	T. Aushev <i>et al.</i>	(BELLE Collab.)
CHIANG	10	PR D81 071101	C.-C. Chiang <i>et al.</i>	(BELLE Collab.)
DAS	10	PR D82 051103	A. Das <i>et al.</i>	(BELLE Collab.)
DEL-AMO-SA...	10A	PR D82 011502	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
DEL-AMO-SA...	10B	PR D82 011101	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
DEL-AMO-SA...	10E	PR D82 031101	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
DEL-AMO-SA...	10Q	PR D82 112002	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
DUNGEL	10	PR D82 112007	W. Dungenl <i>et al.</i>	(BELLE Collab.)
FUJIKAWA	10A	PR D81 011101	M. Fujikawa <i>et al.</i>	(BELLE Collab.)
HYUN	10	PRL 105 091801	H.J. Hyun <i>et al.</i>	(BELLE Collab.)
JOSHI	10	PR D81 031101	N.J. Joshi <i>et al.</i>	(BELLE Collab.)
NAKAHAMA	10	PR D82 073011	Y. Nakahama <i>et al.</i>	(BELLE Collab.)
WEDD	10	PR D81 111104	R. Wedd <i>et al.</i>	(BELLE Collab.)
AALTONEN	09B	PR D79 011104	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	09C	PRL 103 031801	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	09E	PR D79 032001	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	09P	PRL 102 201801	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ABAZOV	09E	PRL 102 032001	V.M. Abazov <i>et al.</i>	(D0 Collab.)
AUBERT	09	PR D79 011102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09A	PR D79 012002	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AA	PR D79 112001	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AC	PR D79 112009	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AD	PR D80 011101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AE	PR D80 031102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AF	PR D80 051101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AG	PR D80 051105	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AL	PR D80 092007	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AO	PRL 103 211802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AU	PR D80 112001	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09AV	PR D80 112002	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09B	PRL 102 132001	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09C	PR D79 032002	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09G	PRL 102 141802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09H	PR D79 052005	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09I	PR D79 052003	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09K	PR D79 072009	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	09S	PR D79 092002	B. Aubert <i>et al.</i>	(BABAR Collab.)

AUBERT	09T	PRL 102 091803	B. Aubert <i>et al.</i>	(BABAR Collab.)
Also		EPAPS Document No.	E-PRLTAO-102-060910	(BABAR Collab.)
AUBERT	09Y	PRL 103 051803	B. Aubert <i>et al.</i>	(BABAR Collab.)
CHANG	09	PR D79 052006	Y.-W. Chang <i>et al.</i>	(BELLE Collab.)
DALSENO	09	PR D79 072004	J. Dalseno <i>et al.</i>	(BELLE Collab.)
KYEONG	09	PR D80 051103	S.-H. Kyeong <i>et al.</i>	(BELLE Collab.)
MIZUK	09	PR D80 031104	R. Mizuk <i>et al.</i>	(BELLE Collab.)
VERVINK	09	PR D80 111104	K. Vervink <i>et al.</i>	(BELLE Collab.)
WEI	09A	PRL 103 171801	J.-T. Wei <i>et al.</i>	(BELLE Collab.)
Also		EPAPS Supplement	J.-T. Wei <i>et al.</i>	(BELLE Collab.)
ADACHI	08	PR D77 091101	I. Adachi <i>et al.</i>	(BELLE Collab.)
AUBERT	08AB	PR D78 012006	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AC	PR D77 071102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AD	PR D77 091104	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AF	PR D78 011103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AG	PR D78 011104	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AH	PR D78 011107	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AJ	PR D78 032005	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AP	PR D78 051103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AQ	PR D78 052005	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AU	PRL 101 021801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08AV	PRL 101 081801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08B	PR D77 011102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08BA	PR D78 071102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08BB	PR D78 071104	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08BC	PR D78 072007	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08BD	PR D78 091101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08BG	PR D78 092008	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08BH	PR D78 112001	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08BK	PRL 101 201801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08BL	PRL 101 261802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08BN	PR D78 112003	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08C	PR D77 011104	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08E	PR D77 012003	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08F	PRL 100 051803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08G	PRL 100 171803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08H	PR D77 031101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08I	PRL 100 081801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08N	PRL 100 021801	B. Aubert <i>et al.</i>	(BABAR Collab.)
Also		PR D79 092002	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08P	PR D77 032007	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08Q	PRL 100 151802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08R	PR D77 032002	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08W	PRL 101 082001	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	08Y	PR D77 111101	B. Aubert <i>et al.</i>	(BABAR Collab.)
CHEN	08C	PRL 100 251801	J.-H. Chen <i>et al.</i>	(BELLE Collab.)
CHIANG	08	PR D78 111102	C.C. Chiang <i>et al.</i>	(BELLE Collab.)
CHOI	08	PRL 100 142001	S.-K. Choi <i>et al.</i>	(BELLE Collab.)
GOLDENZWE...	08	PRL 101 231801	P. Goldenzweig <i>et al.</i>	(BELLE Collab.)
KIM	08	PL B669 287	H.O. Kim <i>et al.</i>	(BELLE Collab.)
KUMAR	08	PR D78 091104	R. Kumar <i>et al.</i>	(BELLE Collab.)
KUSAKA	08	PR D77 072001	A. Kusaka <i>et al.</i>	(BELLE Collab.)
LEE	08A	PR D77 071101	S.E. Lee <i>et al.</i>	(BELLE Collab.)
LI	08F	PRL 101 251601	J. Li <i>et al.</i>	(BELLE Collab.)
LIN	08	NAT 452 332	S.-W. Lin <i>et al.</i>	(BELLE Collab.)
LIU	08I	PR D78 011106	Y. Liu <i>et al.</i>	(BELLE Collab.)
LIVENTSEV	08	PR D77 091503	D. Liventsev <i>et al.</i>	(BELLE Collab.)
MIZUK	08	PR D78 072004	R. Mizuk <i>et al.</i>	(BELLE Collab.)
NAKAHAMA	08	PRL 100 121601	Y. Nakahama <i>et al.</i>	(BELLE Collab.)
PDG	08	PL B667 1	C. Amsler <i>et al.</i>	(PDG Collab.)
SAHOO	08	PR D77 091103	H. Sahoo <i>et al.</i>	(BELLE Collab.)
TANIGUCHI	08	PRL 101 111801	N. Taniguchi <i>et al.</i>	(BELLE Collab.)
UCHIDA	08	PR D77 051101	Y. Uchida <i>et al.</i>	(BELLE Collab.)
USHIRODA	08	PRL 100 021602	Y. Ushiroda <i>et al.</i>	(BELLE Collab.)
WEI	08A	PR D78 011101	J.-T. Wei <i>et al.</i>	(BELLE Collab.)
ABAZOV	07S	PRL 99 142001	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABULENCIA	07A	PRL 98 122001	A. Abulencia <i>et al.</i>	(FNAL CDF Collab.)
ADAM	07	PRL 99 041802	N.E. Adam <i>et al.</i>	(CLEO Collab.)
Also		PR D76 012007	D.M. Asner <i>et al.</i>	(CLEO Collab.)
AUBERT	07A	PRL 98 031801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AA	PR D76 012004	B. Aubert <i>et al.</i>	(BABAR Collab.)



AUBERT	07AC	PR D76 031101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AD	PR D76 031102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AE	PR D76 031103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AF	PRL 99 021603	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AG	PRL 99 051801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AI	PRL 99 071801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AJ	PRL 99 081801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AN	PR D76 051101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AO	PR D76 051103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AQ	PR D76 071101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AS	PR D76 071104	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AT	PR D76 091101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AV	PR D76 092004	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AX	PRL 99 161802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07AY	PRL 99 171803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07B	PR D75 012008	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07BC	PR D76 091102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07BF	PR D76 052007	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07BH	PRL 99 231802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07BI	PRL 99 241803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07BO	PR D76 111102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07D	PRL 98 051801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07E	PRL 98 051802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07F	PRL 98 051803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07G	PRL 98 111801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07H	PR D75 031101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07J	PRL 98 091801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07K	PRL 98 081801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07L	PRL 98 151802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07N	PR D75 072002	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07O	PRL 98 181803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07Q	PR D75 051102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07R	PRL 98 211804	B. Aubert <i>et al.</i>	(BABAR Collab.)
Also		PRL 100 189903E	B. Aubert <i>et al.</i>	(BABAR Collab.)
Also		PRL 100 199905E	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07Y	PR D75 111102	B. Aubert <i>et al.</i>	(BABAR Collab.)
CHANG	07A	PRL 98 131803	M.-C. Chang <i>et al.</i>	(BELLE Collab.)
CHANG	07B	PR D75 071104	P. Chang <i>et al.</i>	(BELLE Collab.)
CHAO	07	PR D76 091103	Y. Chao <i>et al.</i>	(BELLE Collab.)
CHEN	07	PRL 98 031802	K.-F. Chen <i>et al.</i>	(BELLE Collab.)
CHEN	07D	PRL 99 221802	K.-F. Chen <i>et al.</i>	(BELLE Collab.)
DALSENO	07	PR D76 072004	J. Dalseno <i>et al.</i>	(BELLE Collab.)
FRATINA	07	PRL 98 221802	S. Fratina <i>et al.</i>	(BELLE Collab.)
GARMASH	07	PR D75 012006	A. Garmash <i>et al.</i>	(BELLE Collab.)
HOKUUE	07	PL B648 139	T. Hokuue <i>et al.</i>	(BELLE Collab.)
ISHINO	07	PRL 98 211801	H. Ishino <i>et al.</i>	(BELLE Collab.)
KUSAKA	07	PRL 98 221602	A. Kusaka <i>et al.</i>	(BELLE Collab.)
Also		PR D77 072001	A. Kusaka <i>et al.</i>	(BELLE Collab.)
KUZMIN	07	PR D76 012006	A. Kuzmin <i>et al.</i>	(BELLE Collab.)
LIN	07	PRL 98 181804	S.-W. Lin <i>et al.</i>	(BELLE Collab.)
LIN	07A	PRL 99 121601	S.-W. Lin <i>et al.</i>	(BELLE Collab.)
MATYJA	07	PRL 99 191807	A. Matyja <i>et al.</i>	(BELLE Collab.)
MEDVEDEVA	07	PR D76 051102	T. Medvedeva <i>et al.</i>	(BELLE Collab.)
PARK	07	PR D75 011101	K.S. Park <i>et al.</i>	(BELLE Collab.)
SCHUEMANN	07	PR D75 092002	J. Schuemann <i>et al.</i>	(BELLE Collab.)
SOMOV	07	PR D76 011104	A. Somov <i>et al.</i>	(BELLE Collab.)
TSAI	07	PR D75 111101	Y.-T. Tsai <i>et al.</i>	(BELLE Collab.)
URQUIJO	07	PR D75 032001	P. Urquijo <i>et al.</i>	(BELLE Collab.)
WANG	07B	PR D75 092005	C.H. Wang <i>et al.</i>	(BELLE Collab.)
WANG	07C	PR D76 052004	M.-Z. Wang <i>et al.</i>	(BELLE Collab.)
XIE	07	PR D75 017101	Q.L. Xie <i>et al.</i>	(BELLE Collab.)
ZUPANC	07	PR D75 091102	A. Zupanc <i>et al.</i>	(BELLE Collab.)
ABAZOV	06S	PR D74 092001	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABAZOV	06W	PR D74 112002	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABULENCIA,A	06D	PRL 97 211802	A. Abulencia <i>et al.</i>	(CDF Collab.)
ACOSTA	06	PRL 96 202001	D. Acosta <i>et al.</i>	(CDF Collab.)
AUBERT	06	PR D73 011101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06A	PRL 96 011803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06E	PRL 96 052002	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06G	PR D73 012004	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06I	PR D73 031101	B. Aubert <i>et al.</i>	(BABAR Collab.)

AUBERT	06L	PR D74 012001	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06N	PR D74 031103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06S	PRL 96 241802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06T	PRL 96 251802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06V	PRL 97 051802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06W	PR D73 071102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06X	PR D73 071103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06Y	PR D73 111101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06A	PR D73 112004	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06B	PR D74 011101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06C	PR D74 011102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06E	PR D74 011106	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06G	PRL 97 201801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06H	PRL 97 201802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06J	PR D73 092001	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06K	PRL 97 211801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06L	PR D74 031101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06M	PR D74 031102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06O	PR D74 031104	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06P	PR D74 031105	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06Q	PR D74 091101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06R	PR D74 032005	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06S	PR D74 051101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06T	PR D74 051102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06V	PR D74 051106	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06Y	PR D74 091105	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	06Z	PR D74 092004	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	06C	PRL 97 171805	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	06H	PRL 97 261803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	06J	PR D74 111102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	06N	PR D74 072008	S. Aubert <i>et al.</i>	(BABAR Collab.)
BLYTH	06	PR D74 092002	S. Blyth <i>et al.</i>	(BELLE Collab.)
CHISTOV	06A	PR D74 111105	R. Chistov <i>et al.</i>	(BELLE Collab.)
DRAGIC	06	PR D73 111105	J. Dragic <i>et al.</i>	(BELLE Collab.)
GABYSHEV	06	PRL 97 202003	N. Gabyshev <i>et al.</i>	(BELLE Collab.)
GOKHROO	06	PRL 97 162002	G. Gokhroo <i>et al.</i>	(BELLE Collab.)
JEN	06	PR D74 111101	C.-M. Jen <i>et al.</i>	(BELLE Collab.)
KROKOVNY	06	PRL 97 081801	P. Krokovny <i>et al.</i>	(BELLE Collab.)
MOHAPATRA	06	PRL 96 221601	D. Mohapatra <i>et al.</i>	(BELLE Collab.)
NAKANO	06	PR D73 112002	E. Nakano <i>et al.</i>	(BELLE Collab.)
RONGA	06	PR D73 092003	F.J. Ronga <i>et al.</i>	(BELLE Collab.)
SCHUEMANN	06	PRL 97 061802	J. Schuemann <i>et al.</i>	(BELLE Collab.)
SOMOV	06	PRL 96 171801	A. Somov <i>et al.</i>	(BELLE Collab.)
SONI	06	PL B634 155	N. Soni <i>et al.</i>	(BELLE Collab.)
USHIRODA	06	PR D74 111104	Y. Ushiroda <i>et al.</i>	(BELLE Collab.)
VILLA	06	PR D73 051107	S. Villa <i>et al.</i>	(BELLE Collab.)
ABAZOV	05B	PRL 94 042001	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABAZOV	05C	PRL 94 102001	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABAZOV	05D	PRL 94 182001	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABAZOV	05W	PRL 95 171801	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABE	05A	PRL 94 221805	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	05B	PR D71 072003	K. Abe <i>et al.</i>	(BELLE Collab.)
Also		PR D71 079903 (errata.)	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	05D	PRL 95 101801	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	05G	PRL 95 231802	K. Abe <i>et al.</i>	(BELLE Collab.)
ACOSTA	05	PRL 94 101803	D. Acosta <i>et al.</i>	(CDF Collab.)
AUBERT	05	PRL 94 011801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05B	PR D71 031501	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05E	PR D71 051502	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05F	PRL 94 161803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05I	PRL 94 131801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05J	PRL 94 141801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05K	PRL 94 171801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05L	PRL 94 181802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05M	PRL 94 191802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05O	PR D71 031103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05P	PR D71 032005	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05T	PR D71 091102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05U	PR D71 091103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05V	PR D71 091104	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05W	PRL 94 221803	B. Aubert <i>et al.</i>	(BABAR Collab.)

AUBERT	05Y	PR D71 111102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	05Z	PR D71 112003	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	05	PRL 95 011801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	05C	PRL 95 041805	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	05K	PRL 95 131803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	05O	PR D72 051102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	05P	PR D72 051103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	05Q	PR D72 051106	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	05Z	PRL 95 131802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	05	PRL 95 151803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	05A	PRL 95 151804	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	05B	PRL 95 171802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	05C	PR D72 091103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	05E	PRL 95 221801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	05F	PR D72 111101	B. Aubert <i>et al.</i>	(BABAR Collab.)
CHANG	05	PR D71 072007	M.-C. Chang <i>et al.</i>	(BELLE Collab.)
CHANG	05A	PR D71 091106	P. Chang <i>et al.</i>	(BELLE Collab.)
CHAO	05	PRL 94 181803	Y. Chao <i>et al.</i>	(BELLE Collab.)
CHAO	05A	PR D71 031502	Y. Chao <i>et al.</i>	(BELLE Collab.)
CHEN	05A	PRL 94 221804	K.-F. Chen <i>et al.</i>	(BELLE Collab.)
CHEN	05B	PR D72 012004	K.-F. Chen <i>et al.</i>	(BELLE Collab.)
DRUTSKOY	05	PRL 94 061802	A. Drutskoy <i>et al.</i>	(BELLE Collab.)
GERSHON	05	PL B624 11	T. Gershon <i>et al.</i>	(BELLE Collab.)
ITOH	05	PRL 95 091601	R. Itoh <i>et al.</i>	(BELLE Collab.)
LIVENTSEV	05	PR D72 051109	D. Liventsev <i>et al.</i>	(BELLE Collab.)
MAJUMDER	05	PRL 95 041803	G. Majumder <i>et al.</i>	(BELLE Collab.)
MIYAKE	05	PL B618 34	H. Miyake <i>et al.</i>	(BELLE Collab.)
MOHAPATRA	05	PR D72 011101	D. Mohapatra <i>et al.</i>	(BELLE Collab.)
NISHIDA	05	PL B610 23	S. Nishida <i>et al.</i>	(BELLE Collab.)
OKABE	05	PL B614 27	T. Okabe <i>et al.</i>	(BELLE Collab.)
PARK	05	PRL 94 021801	H.K. Park <i>et al.</i>	(FNAL HyperCP Collab.)
SCHUMANN	05	PR D72 011103	J. Schumann <i>et al.</i>	(BELLE Collab.)
SUMISAWA	05	PRL 95 061801	K. Sumisawa <i>et al.</i>	(BELLE Collab.)
USHIRODA	05	PRL 94 231601	Y. Ushiroda <i>et al.</i>	(BELLE Collab.)
WANG	05	PRL 94 121801	C.C. Wang <i>et al.</i>	(BELLE Collab.)
WANG	05A	PL B617 141	M.-Z. Wang <i>et al.</i>	(BELLE Collab.)
XIE	05	PR D72 051105	Q.L. Xie <i>et al.</i>	(BELLE Collab.)
YANG	05	PRL 94 111802	H. Yang <i>et al.</i>	(BELLE Collab.)
ZHANG	05B	PR D71 091107	L.M. Zhang <i>et al.</i>	(BELLE Collab.)
ABDALLAH	04D	EPJ C33 213	J. Abdallah <i>et al.</i>	(DELPHI Collab.)
ABDALLAH	04E	EPJ C33 307	J. Abdallah <i>et al.</i>	(DELPHI Collab.)
ABE	04E	PRL 93 021601	K. Abe <i>et al.</i>	(BELLE Collab.)
AUBERT	04A	PR D69 011102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04B	PR D69 032004	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04C	PRL 92 111801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04G	PR D69 031102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04H	PRL 92 061801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04M	PRL 92 201802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04R	PR D69 052001	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04U	PR D69 091503	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04V	PRL 92 251801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04W	PRL 92 251802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04Y	PRL 93 041801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	04Z	PRL 93 051802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04B	PR D70 011101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04C	PR D70 012007	B. Aubert <i>et al.</i>	(BABAR Collab.)
Also		PRL 92 181801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04D	PR D70 032006	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04G	PRL 93 071801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04H	PRL 93 081801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04J	PRL 93 091802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04K	PRL 93 131801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04M	PRL 93 131805	B. Aubert	(BABAR Collab.)
AUBERT,B	04O	PR D70 091103	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04R	PRL 93 231801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04S	PRL 93 181801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04T	PR D70 091104	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04U	PR D70 091105	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04V	PRL 93 181805	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04W	PRL 93 231804	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,B	04X	PRL 93 181806	B. Aubert <i>et al.</i>	(BABAR Collab.)

AUBERT,B	04Z	PRL 93 201801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	04	PR D70 111102	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	04A	PR D70 112006	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	04B	PR D70 091106	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUSHEV	04	PRL 93 201802	T. Aushev <i>et al.</i>	(BELLE Collab.)
BORNHEIM	04	PRL 93 241802	A. Bornheim <i>et al.</i>	(CLEO Collab.)
CHANG	04	PL B599 148	P. Chang <i>et al.</i>	(BELLE Collab.)
CHAO	04	PR D69 111102	Y. Chao <i>et al.</i>	(BELLE Collab.)
CHAO	04B	PRL 93 191802	Y. Chao <i>et al.</i>	(BELLE Collab.)
DRAGIC	04	PRL 93 131802	J. Dragic	(BELLE Collab.)
DRUTSKOY	04	PRL 92 051801	A. Drutskoy <i>et al.</i>	(BELLE Collab.)
GARMASH	04	PR D69 012001	A. Garmash <i>et al.</i>	(BELLE Collab.)
KATAOKA	04	PRL 93 261801	S.U. Kataoka <i>et al.</i>	(BELLE Collab.)
MAJUMDER	04	PR D70 111103	G. Majumder <i>et al.</i>	(BELLE Collab.)
NAKAO	04	PR D69 112001	M. Nakao <i>et al.</i>	(BELLE Collab.)
SARANGI	04	PRL 93 031802	T.R. Sarangi <i>et al.</i>	(BELLE Collab.)
WANG	04	PRL 92 131801	M.Z. Wang <i>et al.</i>	(BELLE Collab.)
WANG	04A	PR D70 012001	C.H. Wang <i>et al.</i>	(BELLE Collab.)
ABDALLAH	03B	EPJ C28 155	J. Abdallah <i>et al.</i>	(DELPHI Collab.)
ABE	03B	PR D67 032003	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	03C	PR D67 031102	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	03G	PR D68 012001	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	03H	PRL 91 261602	K. Abe <i>et al.</i>	(BELLE Collab.)
ADAM	03	PR D67 032001	N.E. Adam <i>et al.</i>	(CLEO Collab.)
ATHAR	03	PR D68 072003	S.B. Athar <i>et al.</i>	(CLEO Collab.)
AUBERT	03B	PRL 90 091801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03C	PR D67 072002	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03D	PRL 90 181803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03E	PRL 90 181801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03H	PR D67 091101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03I	PR D67 092003	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03J	PRL 90 221801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03K	PRL 90 231801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03L	PRL 91 021801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03N	PRL 91 061802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03O	PRL 91 071801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03Q	PRL 91 131801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03S	PRL 91 241801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03T	PRL 91 201802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03U	PRL 91 221802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03V	PRL 91 171802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03W	PRL 91 161801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	03X	PR D68 092001	B. Aubert <i>et al.</i>	(BABAR Collab.)
BORNHEIM	03	PR D68 052002	A. Bornheim <i>et al.</i>	(CLEO Collab.)
CHANG	03	PR D68 111101	M.-C. Chang <i>et al.</i>	(BELLE Collab.)
CHEN	03B	PRL 91 201801	K.-F. Chen <i>et al.</i>	(BELLE Collab.)
CSORNA	03	PR D67 112002	S.E. Csorna <i>et al.</i>	(CLEO Collab.)
EISENSTEIN	03	PR D68 017101	B.I. Eisenstein <i>et al.</i>	(CLEO Collab.)
FANG	03	PRL 90 071801	F. Fang <i>et al.</i>	(BELLE Collab.)
GABYSHEV	03	PRL 90 121802	N. Gabyshev <i>et al.</i>	(BELLE Collab.)
HASTINGS	03	PR D67 052004	N.C. Hastings <i>et al.</i>	(BELLE Collab.)
ISHIKAWA	03	PRL 91 261601	A. Ishikawa <i>et al.</i>	(BELLE Collab.)
KROKOVNY	03	PRL 90 141802	P. Krokovny <i>et al.</i>	(BELLE Collab.)
KROKOVNY	03B	PRL 91 262002	P. Krokovny <i>et al.</i>	(BELLE Collab.)
LEE	03	PRL 91 261801	S.H. Lee <i>et al.</i>	(BELLE Collab.)
SATPATHY	03	PL B553 159	A. Satpathy <i>et al.</i>	(BELLE Collab.)
WANG	03	PRL 90 201802	M.-Z. Wang <i>et al.</i>	(BELLE Collab.)
ZHENG	03	PR D67 092004	Y. Zheng <i>et al.</i>	(BELLE Collab.)
ABE	02	PRL 88 021801	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02E	PL B526 258	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02F	PL B526 247	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02H	PRL 88 171801	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02J	PRL 88 052002	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02K	PRL 88 181803	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02M	PRL 89 071801	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02N	PL B538 11	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02O	PR D65 091103	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02Q	PRL 89 122001	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02U	PR D66 032007	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02W	PRL 89 151802	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	02Z	PR D66 071102	K. Abe <i>et al.</i>	(BELLE Collab.)

ACOSTA	02C	PR D65 092009	D. Acosta <i>et al.</i>	(CDF Collab.)
ACOSTA	02G	PR D66 112002	D. Acosta <i>et al.</i>	(CDF Collab.)
AFFOLDER	02B	PRL 88 071801	T. Affolder <i>et al.</i>	(CDF Collab.)
AHMED	02B	PR D66 031101	S. Ahmed <i>et al.</i>	(CLEO Collab.)
ASNER	02	PR D65 031103	D.M. Asner <i>et al.</i>	(CLEO Collab.)
AUBERT	02	PR D65 032001	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02C	PRL 88 101805	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02D	PR D65 051502	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02E	PR D65 051101	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02H	PRL 89 011802	B. Aubert <i>et al.</i>	(BABAR Collab.)
Also		PRL 89 169903 (errat.)	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02I	PRL 88 221802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02J	PRL 88 221803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02K	PRL 88 231801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02L	PRL 88 241801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02M	PRL 89 061801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02N	PR D66 032003	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02P	PRL 89 201802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	02Q	PRL 89 281802	B. Aubert <i>et al.</i>	(BABAR Collab.)
BRIERE	02	PRL 89 081803	R. Briere <i>et al.</i>	(CLEO Collab.)
CASEY	02	PR D66 092002	B.C.K. Casey <i>et al.</i>	(BELLE Collab.)
CHEN	02B	PL B546 196	K.-F. Chen <i>et al.</i>	(BELLE Collab.)
COAN	02	PRL 88 062001	T.E. Coan <i>et al.</i>	(CLEO Collab.)
Also		PRL 88 069902 (errat.)	T.E. Coan <i>et al.</i>	(CLEO Collab.)
DRUTSKOY	02	PL B542 171	A. Drutskoy <i>et al.</i>	(BELLE Collab.)
DYTMAN	02	PR D66 091101	S.A. Dytman <i>et al.</i>	(CLEO Collab.)
ECKHART	02	PRL 89 251801	E. Eckhart <i>et al.</i>	(CLEO Collab.)
EDWARDS	02	PR D65 012002	K.W. Edwards <i>et al.</i>	(CLEO Collab.)
GABYSHEV	02	PR D66 091102	N. Gabyshev <i>et al.</i>	(BELLE Collab.)
GODANG	02	PRL 88 021802	R. Godang <i>et al.</i>	(CLEO Collab.)
GORDON	02	PL B542 183	A. Gordon <i>et al.</i>	(BELLE Collab.)
HARA	02	PRL 89 251803	K. Hara <i>et al.</i>	(BELLE Collab.)
KROKOVNY	02	PRL 89 231804	P. Korkovny <i>et al.</i>	(BELLE Collab.)
MAHAPATRA	02	PRL 88 101803	R. Mahapatra <i>et al.</i>	(CLEO Collab.)
NISHIDA	02	PRL 89 231801	S. Nishida <i>et al.</i>	(BELLE Collab.)
TOMURA	02	PL B542 207	T. Tomura <i>et al.</i>	(BELLE Collab.)
ABASHIAN	01	PRL 86 2509	A. Abashian <i>et al.</i>	(BELLE Collab.)
ABE	01D	PRL 86 3228	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	01G	PRL 87 091802	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	01H	PRL 87 101801	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	01I	PRL 87 111801	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	01K	PR D64 071101	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	01L	PRL 87 161601	K. Abe <i>et al.</i>	(BELLE Collab.)
ABE	01M	PL B517 309	K. Abe <i>et al.</i>	(BELLE Collab.)
ABREU	01H	PL B510 55	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ALEXANDER	01B	PR D64 092001	J.P. Alexander <i>et al.</i>	(CLEO Collab.)
AMMAR	01B	PRL 87 271801	R. Ammar <i>et al.</i>	(CLEO Collab.)
ANDERSON	01	PRL 86 2732	S. Anderson <i>et al.</i>	(CLEO Collab.)
ANDERSON	01B	PRL 87 181803	S. Anderson <i>et al.</i>	(CLEO Collab.)
AUBERT	01	PRL 86 2515	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	01B	PRL 87 091801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	01D	PRL 87 151801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	01E	PRL 87 151802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	01F	PRL 87 201803	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	01G	PRL 87 221802	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	01H	PRL 87 241801	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	01I	PRL 87 241803	B. Aubert <i>et al.</i>	(BABAR Collab.)
BARATE	01D	EPJ C20 431	R. Barate <i>et al.</i>	(ALEPH Collab.)
BRIERE	01	PRL 86 3718	R.A. Biere <i>et al.</i>	(CLEO Collab.)
EDWARDS	01	PRL 86 30	K.W. Edwards <i>et al.</i>	(CLEO Collab.)
JAFFE	01	PRL 86 5000	D. Jaffe <i>et al.</i>	(CLEO Collab.)
RICHICHI	01	PR D63 031103	S.J. Richichi <i>et al.</i>	(CLEO Collab.)
ABBIENDI	00Q	PL B482 15	G. Abbiendi <i>et al.</i>	(OPAL Collab.)
ABBIENDI,G	00B	PL B493 266	G. Abbiendi <i>et al.</i>	(OPAL Collab.)
ABE	00C	PR D62 071101	K. Abe <i>et al.</i>	(SLD Collab.)
AFFOLDER	00C	PR D61 072005	T. Affolder <i>et al.</i>	(CDF Collab.)
AFFOLDER	00N	PRL 85 4668	T. Affolder <i>et al.</i>	(CDF Collab.)
AHMED	00B	PR D62 112003	S. Ahmed <i>et al.</i>	(CLEO Collab.)
ANASTASSOV	00	PRL 84 1393	A. Anastassov <i>et al.</i>	(CLEO Collab.)
ARTUSO	00	PRL 84 4292	M. Artuso <i>et al.</i>	(CLEO Collab.)
AVERY	00	PR D62 051101	P. Avery <i>et al.</i>	(CLEO Collab.)

BARATE	00Q	PL B492 259	R. Barate <i>et al.</i>	(ALEPH Collab.)
BARATE	00R	PL B492 275	R. Barate <i>et al.</i>	(ALEPH Collab.)
BEHRENS	00	PR D61 052001	B.H. Behrens <i>et al.</i>	(CLEO Collab.)
BEHRENS	00B	PL B490 36	B.H. Behrens <i>et al.</i>	(CLEO Collab.)
BERGFELD	00B	PR D62 091102	T. Bergfeld <i>et al.</i>	(CLEO Collab.)
CHEN	00	PRL 85 525	S. Chen <i>et al.</i>	(CLEO Collab.)
COAN	00	PRL 84 5283	T.E. Coan <i>et al.</i>	(CLEO Collab.)
CRONIN-HEN...	00	PRL 85 515	D. Cronin-Hennessy <i>et al.</i>	(CLEO Collab.)
CSORNA	00	PR D61 111101	S.E. Csorna <i>et al.</i>	(CLEO Collab.)
JESSOP	00	PRL 85 2881	C.P. Jessop <i>et al.</i>	(CLEO Collab.)
LIPELES	00	PR D62 032005	E. Lipeles <i>et al.</i>	(CLEO Collab.)
RICHICHI	00	PRL 85 520	S.J. Richichi <i>et al.</i>	(CLEO Collab.)
ABBIENDI	99J	EPJ C12 609	G. Abbiendi <i>et al.</i>	(OPAL Collab.)
ABE	99K	PR D60 051101	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	99Q	PR D60 072003	F. Abe <i>et al.</i>	(CDF Collab.)
AFFOLDER	99B	PRL 83 3378	T. Affolder <i>et al.</i>	(CDF Collab.)
AFFOLDER	99C	PR D60 112004	T. Affolder <i>et al.</i>	(CDF Collab.)
ARTUSO	99	PRL 82 3020	M. Artuso <i>et al.</i>	(CLEO Collab.)
BARTELT	99	PRL 82 3746	J. Bartelt <i>et al.</i>	(CLEO Collab.)
COAN	99	PR D59 111101	T.E. Coan <i>et al.</i>	(CLEO Collab.)
ABE	98B	PR D57 5382	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	98C	PRL 80 2057	F. Abe <i>et al.</i>	(CDF Collab.)
Also		PR D59 032001	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	98O	PR D58 072001	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	98Q	PR D58 092002	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	98U	PRL 81 5513	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	98V	PRL 81 5742	F. Abe <i>et al.</i>	(CDF Collab.)
ACCIARRI	98D	EPJ C5 195	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACCIARRI	98S	PL B438 417	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACKERSTAFF	98Z	EPJ C5 379	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
BARATE	98Q	EPJ C4 387	R. Barate <i>et al.</i>	(ALEPH Collab.)
BEHRENS	98	PRL 80 3710	B.H. Behrens <i>et al.</i>	(CLEO Collab.)
BERGFELD	98	PRL 81 272	T. Bergfeld <i>et al.</i>	(CLEO Collab.)
BRANDENB...	98	PRL 80 2762	G. Brandenbrug <i>et al.</i>	(CLEO Collab.)
GODANG	98	PRL 80 3456	R. Godang <i>et al.</i>	(CLEO Collab.)
NEMATI	98	PR D57 5363	B. Nemati <i>et al.</i>	(CLEO Collab.)
ABE	97J	PRL 79 590	K. Abe <i>et al.</i>	(SLD Collab.)
ABREU	97F	ZPHY C74 19	P. Abreu <i>et al.</i>	(DELPHI Collab.)
Also		ZPHY C75 579 (errat.)	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ABREU	97N	ZPHY C76 579	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ACCIARRI	97B	PL B391 474	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACCIARRI	97C	PL B391 481	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACKERSTAFF	97G	PL B395 128	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
ACKERSTAFF	97U	ZPHY C76 401	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
ACKERSTAFF	97V	ZPHY C76 417	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
ARTUSO	97	PL B399 321	M. Artuso <i>et al.</i>	(CLEO Collab.)
ASNER	97	PRL 79 799	D. Asner <i>et al.</i>	(CLEO Collab.)
ATHANAS	97	PRL 79 2208	M. Athanas <i>et al.</i>	(CLEO Collab.)
BUSKULIC	97	PL B395 373	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	97D	ZPHY C75 397	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
FU	97	PRL 79 3125	X. Fu <i>et al.</i>	(CLEO Collab.)
JESSOP	97	PRL 79 4533	C.P. Jessop <i>et al.</i>	(CLEO Collab.)
ABE	96B	PR D53 3496	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	96C	PRL 76 4462	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	96H	PRL 76 2015	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	96Q	PR D54 6596	F. Abe <i>et al.</i>	(CDF Collab.)
ABREU	96P	ZPHY C71 539	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ABREU	96Q	ZPHY C72 17	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ACCIARRI	96E	PL B383 487	M. Acciarri <i>et al.</i>	(L3 Collab.)
ADAM	96D	ZPHY C72 207	W. Adam <i>et al.</i>	(DELPHI Collab.)
ALBRECHT	96D	PL B374 256	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALEXANDER	96T	PRL 77 5000	J.P. Alexander <i>et al.</i>	(CLEO Collab.)
ALEXANDER	96V	ZPHY C72 377	G. Alexander <i>et al.</i>	(OPAL Collab.)
ASNER	96	PR D53 1039	D.M. Asner <i>et al.</i>	(CLEO Collab.)
BARISH	96B	PRL 76 1570	B.C. Barish <i>et al.</i>	(CLEO Collab.)
BISHAI	96	PL B369 186	M. Bishai <i>et al.</i>	(CLEO Collab.)
BUSKULIC	96J	ZPHY C71 31	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	96V	PL B384 471	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
DUBOSCQ	96	PRL 76 3898	J.E. Duboscq <i>et al.</i>	(CLEO Collab.)
GIBAUT	96	PR D53 4734	D. Gibaut <i>et al.</i>	(CLEO Collab.)
PDG	96	PR D54 1	R. M. Barnett <i>et al.</i>	(PDG Collab.)

ABE	95Z	PRL 75 3068	F. Abe <i>et al.</i>	(CDF Collab.)
ABREU	95N	PL B357 255	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ABREU	95Q	ZPHY C68 13	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ACCIARRI	95H	PL B363 127	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACCIARRI	95I	PL B363 137	M. Acciarri <i>et al.</i>	(L3 Collab.)
ADAM	95	ZPHY C68 363	W. Adam <i>et al.</i>	(DELPHI Collab.)
AKERS	95J	ZPHY C66 555	R. Akers <i>et al.</i>	(OPAL Collab.)
AKERS	95T	ZPHY C67 379	R. Akers <i>et al.</i>	(OPAL Collab.)
ALEXANDER	95	PL B341 435	J. Alexander <i>et al.</i>	(CLEO Collab.)
Also		PL B347 469 (errat.)	J. Alexander <i>et al.</i>	(CLEO Collab.)
BARISH	95	PR D51 1014	B.C. Barish <i>et al.</i>	(CLEO Collab.)
BUSKULIC	95N	PL B359 236	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
ABE	94D	PRL 72 3456	F. Abe <i>et al.</i>	(CDF Collab.)
ABREU	94M	PL B338 409	P. Abreu <i>et al.</i>	(DELPHI Collab.)
AKERS	94C	PL B327 411	R. Akers <i>et al.</i>	(OPAL Collab.)
AKERS	94H	PL B336 585	R. Akers <i>et al.</i>	(OPAL Collab.)
AKERS	94J	PL B337 196	R. Akers <i>et al.</i>	(OPAL Collab.)
AKERS	94L	PL B337 393	R. Akers <i>et al.</i>	(OPAL Collab.)
ALAM	94	PR D50 43	M.S. Alam <i>et al.</i>	(CLEO Collab.)
ALBRECHT	94	PL B324 249	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	94G	PL B340 217	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
AMMAR	94	PR D49 5701	R. Ammar <i>et al.</i>	(CLEO Collab.)
ATHANAS	94	PRL 73 3503	M. Athanas <i>et al.</i>	(CLEO Collab.)
Also		PRL 74 3090 (errat.)	M. Athanas <i>et al.</i>	(CLEO Collab.)
BUSKULIC	94B	PL B322 441	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
PDG	94	PR D50 1173	L. Montanet <i>et al.</i>	(CERN, LBL, BOST+)
PROCARIO	94	PRL 73 1472	M. Procaro <i>et al.</i>	(CLEO Collab.)
STONE	94	HEPSY 93-11	S. Stone	
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ABREU	93D	ZPHY C57 181	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ABREU	93G	PL B312 253	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ACTON	93C	PL B307 247	P.D. Acton <i>et al.</i>	(OPAL Collab.)
ALBRECHT	93	ZPHY C57 533	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	93E	ZPHY C60 11	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALEXANDER	93B	PL B319 365	J. Alexander <i>et al.</i>	(CLEO Collab.)
AMMAR	93	PRL 71 674	R. Ammar <i>et al.</i>	(CLEO Collab.)
BARTELT	93	PRL 71 1680	J.E. Bartelt <i>et al.</i>	(CLEO Collab.)
BATTLE	93	PRL 71 3922	M. Battle <i>et al.</i>	(CLEO Collab.)
BEAN	93B	PRL 70 2681	A. Bean <i>et al.</i>	(CLEO Collab.)
BUSKULIC	93D	PL B307 194	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
Also		PL B325 537 (errat.)	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	93K	PL B313 498	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
SANGHERA	93	PR D47 791	S. Sanghera <i>et al.</i>	(CLEO Collab.)
ALBRECHT	92C	PL B275 195	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	92G	ZPHY C54 1	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	92L	ZPHY C55 357	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
BORTOLETTO	92	PR D45 21	D. Bortoletto <i>et al.</i>	(CLEO Collab.)
HENDERSON	92	PR D45 2212	S. Henderson <i>et al.</i>	(CLEO Collab.)
KRAMER	92	PL B279 181	G. Kramer, W.F. Palmer	(HAMB, OSU)
ALBAJAR	91E	PL B273 540	C. Albajar <i>et al.</i>	(UA1 Collab.)
ALBRECHT	91B	PL B254 288	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	91C	PL B255 297	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	91E	PL B262 148	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
BERKELMAN	91	ARNPS 41 1	K. Berkelman, S. Stone	(CORN, SYRA)
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FULTON	91	PR D43 651	R. Fulton <i>et al.</i>	(CLEO Collab.)
ALBRECHT	90B	PL B241 278	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	90J	ZPHY C48 543	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ANTREASYAN	90B	ZPHY C48 553	D. Antreasyan <i>et al.</i>	(Crystal Ball Collab.)
BORTOLETTO	90	PRL 64 2117	D. Bortoletto <i>et al.</i>	(CLEO Collab.)
ELSEN	90	ZPHY C46 349	E. Elsen <i>et al.</i>	(JADE Collab.)
ROSNER	90	PR D42 3732	J.L. Rosner	
WAGNER	90	PRL 64 1095	S.R. Wagner <i>et al.</i>	(Mark II Collab.)
ALBRECHT	89C	PL B219 121	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	89G	PL B229 304	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	89J	PL B229 175	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT	89L	PL B232 554	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ARTUSO	89	PRL 62 2233	M. Artuso <i>et al.</i>	(CLEO Collab.)
AVERILL	89	PR D39 123	D.A. Averill <i>et al.</i>	(HRS Collab.)
AVERY	89B	PL B223 470	P. Avery <i>et al.</i>	(CLEO Collab.)
BEBEK	89	PRL 62 8	C. Bebek <i>et al.</i>	(CLEO Collab.)

BORTOLETTO 89	PRL 62 2436	D. Bortoletto <i>et al.</i>	(CLEO Collab.)
BORTOLETTO 89B	PRL 63 1667	D. Bortoletto <i>et al.</i>	(CLEO Collab.)
ALBRECHT 88F	PL B209 119	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT 88K	PL B215 424	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT 87C	PL B185 218	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT 87D	PL B199 451	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT 87I	PL B192 245	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALBRECHT 87J	PL B197 452	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
AVERY 87	PL B183 429	P. Avery <i>et al.</i>	(CLEO Collab.)
BEAN 87B	PRL 58 183	A. Bean <i>et al.</i>	(CLEO Collab.)
BEBEK 87	PR D36 1289	C. Bebek <i>et al.</i>	(CLEO Collab.)
ALAM 86	PR D34 3279	M.S. Alam <i>et al.</i>	(CLEO Collab.)
ALBRECHT 86F	PL B182 95	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
PDG 86	PL 170B 1	M. Aguilar-Benitez <i>et al.</i>	(CERN, CIT+)
CHEN 85	PR D31 2386	A. Chen <i>et al.</i>	(CLEO Collab.)
HAAS 85	PRL 55 1248	J. Haas <i>et al.</i>	(CLEO Collab.)
AVERY 84	PRL 53 1309	P. Avery <i>et al.</i>	(CLEO Collab.)
GILES 84	PR D30 2279	R. Giles <i>et al.</i>	(CLEO Collab.)
BEHRENDTS 83	PRL 50 881	S. Behrends <i>et al.</i>	(CLEO Collab.)

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