$\psi(4360)$

$I^G(J^{PC}) = 0^-(1^{--})$

also known as $Y(4360)$; was $X(4360)$

See the reviews on the "Spectroscopy of Mesons Containing two Heavy Quarks' and on "Heavy Non-qqbar Mesons."

$\psi(4360)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4373 ± 7 OUR AVERAGE					Error includes scale factor of 2.3. See the ideogram below.
$4327.4^{+20.1}_{-18.8}{}^{+10.7}_{-9.3}$		[1] ABLIKIM	25B	BES3	$e^+e^- \to \pi^+\pi^- h_c(1P)$
4386 ±13 ±17		[2] ABLIKIM	24T	BES3	$e^+e^- \to \eta J/\psi$
4371.6± 2.5± 9.2		[3] ABLIKIM	22AL	BES3	$e^+e^- \to \pi^+\pi^- D^+D^-$
4298 ±12 ±26		[4] ABLIKIM	22AM	BES3	$e^+e^- \to \pi^+\pi^- J/\psi$
4390.3± 6.0± 0.7		[5] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^- \psi(2S)$
4371.7± 7.5± 1.8		[6] ABLIKIM	21AK	BES3	$e^+e^- \to \gamma\chi_{c2} \to \gamma\gamma J/\psi$
$4391.5^{+6.3}_{-6.8}$± 1.0		ABLIKIM	17G	BES3	$e^+e^- \to \pi^+\pi^- h_c$
4347 ± 6 ± 3	279	[7] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
4340 ±16 ± 9	37	[8] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4406.9±17.2± 4.5		[9] ABLIKIM	22R	BES3	$e^+e^- \to \pi^+\pi^-\chi_{c1}\gamma$
4382.0±13.3± 1.7		[10] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$
4320.0±10.4± 7.0		[11] ABLIKIM	17B	BES3	$e^+e^- \to \pi^+\pi^- J/\psi$
4383.8± 4.2± 0.8		[12] ABLIKIM	17V	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
4383.7± 2.9± 6.2		[13] ZHANG	17B	RVUE	$e^+e^- \to \pi^+\pi^-\psi(2S)$
4386.4± 2.1± 6.4		[14] ZHANG	17C	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$ or $\psi(2S)$
$4355\ ^{+9}_{-10}$ ± 9	74	[15] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
4324 ±24		[16] AUBERT	07S	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
4361 ± 9 ± 9	47	[8] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

[1] Using three coherent Breit-Wigner functions between 4.009 and 4.950 GeV.

[2] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 3.808–4.951 GeV. Supersedes ABLIKIM 20O.

[3] From a fit to the cross section for $e^+e^- \to D^+D^-\pi^+\pi^-$ in the range $\sqrt{s}$ = 4.190–4.946 GeV.

[4] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 3.7730–4.7008 GeV. Parameters depend on the existence or non-existence of a state near 4.5 GeV.

[5] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 4.008–4.698 GeV.

[6] From a five-resonance fit to the cross section for $e^+e^- \to \gamma\gamma J/\psi \to \gamma\gamma\ell^+\ell^-$.

[7] From a two-resonance fit. Supersedes WANG 07D.

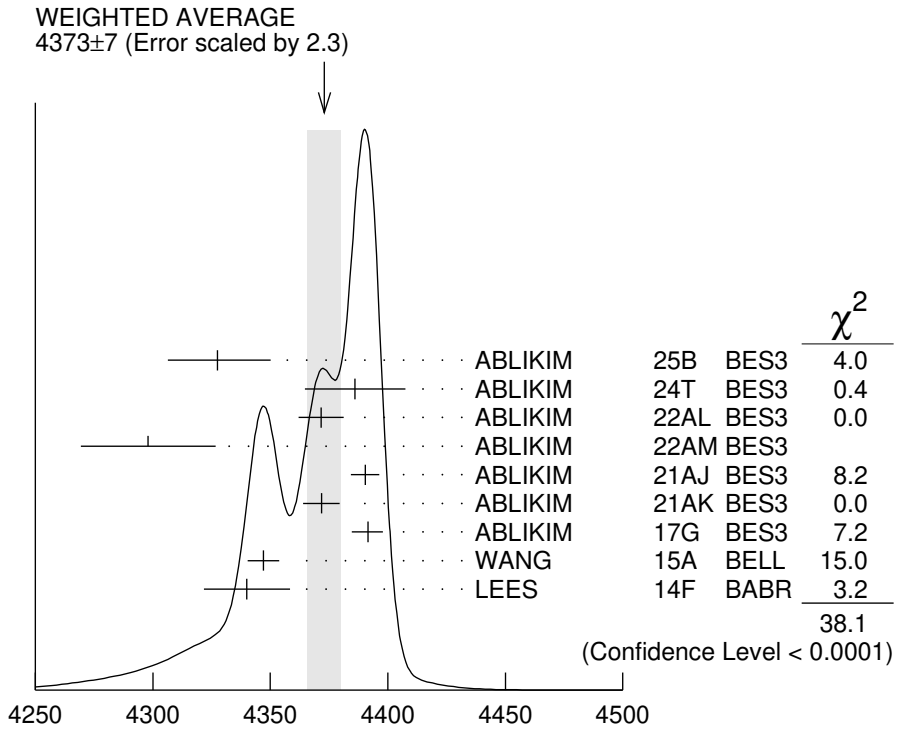
[8] From a two-resonance fit.

[9] From a fit to the $e^+e^- \to \pi^+\pi^-\psi(3823)$ cross section between 4.23 and 4.70 GeV with two coherent Breit-Wigner resonances. The data is also consistent with a single peak with mass 4417.5 ± 26.2 ± 3.5 MeV and width 245 ± 48 ± 13 MeV.

[10] From a fit of the measured cross section in the range $\sqrt{s}$ = 3.808–4.600 GeV.

[11] From a three-resonance fit. Superseded by ABLIKIM 22AM.

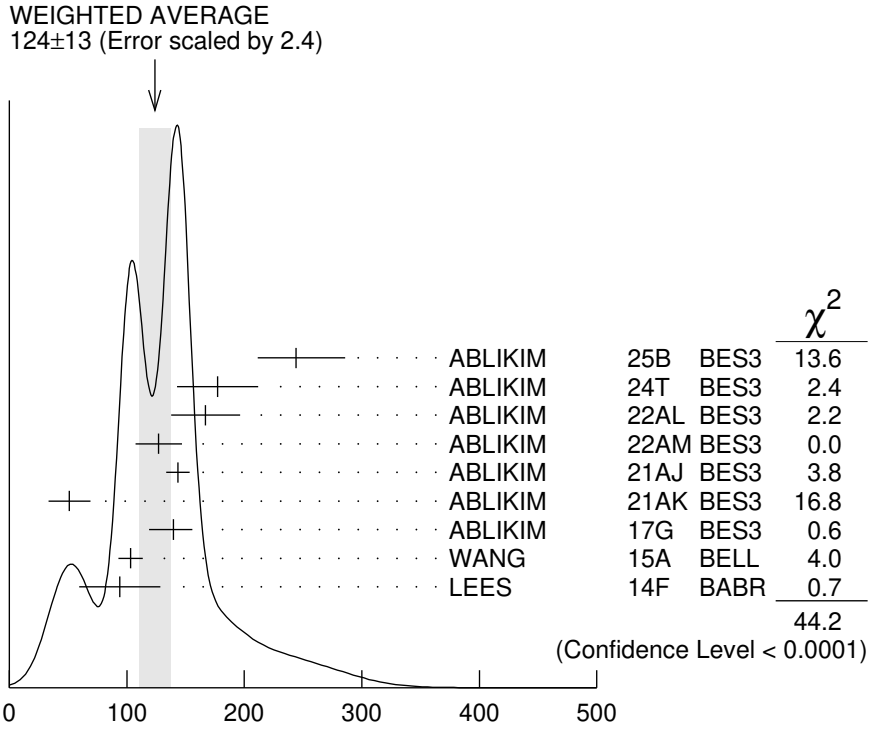
[12] From a fit to the cross section for $e^+e^- \to \pi^+\pi^-\psi(2S) \to 2(\pi^+\pi^-)\ell^+\ell^-$ obtained from 16 center-of-mass energies between 4.008 and 4.600 GeV and comprising 5.1 fb^{-1}. Superseded by ABLIKIM 21AJ.
[13] From a three-resonance fit.
[14] From a combined fit of BELLE, BABAR and BES3 $e^+e^- \to \pi^+\pi^- J/\psi$ and $e^+e^- \to \pi^+\pi^-\psi(2S)$ data.
[15] From a combined fit of AUBERT 07S and WANG 07D data with two resonances.
[16] From a single-resonance fit. Systematic errors not estimated.



$\psi(4360)$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
124 ±13 OUR AVERAGE		Error includes scale factor of 2.4. See the ideogram below.			
$244.1^{+34.0}_{-27.1}{}^{+24.2}_{-18.3}$		[1] ABLIKIM	25B	BES3	$e^+e^- \to \pi^+\pi^- h_c(1P)$
177 ±32 ±13		[2] ABLIKIM	24T	BES3	$e^+e^- \to \eta J/\psi$
167 ± 4 ±29		[3] ABLIKIM	22AL	BES3	$e^+e^- \to \pi^+\pi^- D^+D^-$
127 ±17 ±10		[4] ABLIKIM	22AM	BES3	$e^+e^- \to \pi^+\pi^- J/\psi$
143.3±10.0± 0.5		[5] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
51.1±17.6± 1.9		[6] ABLIKIM	21AK	BES3	$e^+e^- \to \gamma\chi_{c2} \to \gamma\gamma J/\psi$
$139.5^{+16.2}_{-20.6}$± 0.6		ABLIKIM	17G	BES3	$e^+e^- \to \pi^+\pi^- h_c$
103 ± 9 ± 5	279	[7] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
94 ±32 ±13	37	[8] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
128.1±37.2± 2.3		[9] ABLIKIM	22R	BES3	$e^+e^- \to \pi^+\pi^-\chi_{c1}\gamma$
135.8±60.8±22.5		[10] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$

$101.4^{+25.3}_{-19.7}\pm10.2$			[11] ABLIKIM	17B	BES3	$e^+e^- \to \pi^+\pi^- J/\psi$
$84.2\pm12.5\pm 2.1$			[12] ABLIKIM	17V	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
$94.2\pm 7.3\pm 2.0$			[13] ZHANG	17B	RVUE	$e^+e^- \to \pi^+\pi^-\psi(2S)$
$96.0\pm 6.7\pm 2.7$			[14] ZHANG	17C	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$ or $\psi(2S)$
$103\ ^{+17}_{-15}\ \pm11$		74	[15] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$172\ \pm33$			[16] AUBERT	07S	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$74\ \pm15\ \pm10$		47	[8] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$



$\psi(4360)$ WIDTH (MeV)

[1] Using three coherent Breit-Wigner functions between 4.009 and 4.950 GeV.

[2] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 3.808–4.951 GeV. Supersedes ABLIKIM 20O.

[3] From a fit to the cross section for $e^+e^- \to D^+D^-\pi^+\pi^-$ in the range $\sqrt{s}$ = 4.190–4.946 GeV.

[4] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 3.7730–4.7008 GeV. Parameters depend on the existence or non-existence of a state near 4.5 GeV.

[5] From a three-resonance fit to the Born cross section in the range $\sqrt{s}$ = 4.008–4.698 GeV.

[6] From a five-resonance fit to the cross section for $e^+e^- \to \gamma\gamma J/\psi \to \gamma\gamma\ell^+\ell^-$.

[7] From a two-resonance fit. Supersedes WANG 07D.

[8] From a two-resonance fit.

[9] From a fit to the $e^+e^- \to \pi^+\pi^-\psi(3823)$ cross section between 4.23 and 4.70 GeV with two coherent Breit-Wigner resonances. The data is also consistent with a single peak with mass 4417.5 ± 26.2 ± 3.5 MeV and width 245 ± 48 ± 13 MeV.

[10] From a fit of the measured cross section in the range $\sqrt{s}$ = 3.808–4.600 GeV.

[11] From a three-resonance fit. Superseded by ABLIKIM 22AM.

[12] From a fit to the cross section for $e^+e^- \to \pi^+\pi^-\psi(2S) \to 2(\pi^+\pi^-)\ell^+\ell^-$ obtained from 16 center-of-mass energies between 4.008 and 4.600 GeV and comprising 5.1 fb^{-1}. Superseded by ABLIKIM 21AJ.
[13] From a three-resonance fit.
[14] From a combined fit of BELLE, BABAR and BES3 $e^+e^- \to \pi^+\pi^- J/\psi$ and $e^+e^- \to \pi^+\pi^-\psi(2S)$ data.
[15] From a combined fit of AUBERT 07S and WANG 07D data with two resonances.
[16] From a single-resonance fit. Systematic errors not estimated.

$\psi(4360)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	e^+e^-	seen
Γ_2	$h_c\pi^+\pi^-$	seen
Γ_3	$J/\psi\pi^+\pi^-$	seen
Γ_4	$\psi(2S)\pi^+\pi^-$	seen
Γ_5	$\psi(3770)\pi^+\pi^-$	possibly seen
Γ_6	$\psi_2(3823)\pi^+\pi^-$	seen
Γ_7	$J/\psi\eta$	seen
Γ_8	$D^0D^{*-}\pi^+$	not seen
Γ_9	$D^+D^-\pi^+\pi^-$	seen
Γ_{10}	$D_1(2420)\overline{D}$ + c.c.	possibly seen
Γ_{11}	$\phi\eta$	not seen
Γ_{12}	$\omega\pi^0$	not seen
Γ_{13}	$\omega\eta$	not seen
Γ_{14}	$p\overline{p}\eta$	not seen
Γ_{15}	$p\overline{p}\omega$	not seen
Γ_{16}	$\chi_{c1}\gamma$	not seen
Γ_{17}	$\chi_{c2}\gamma$	not seen
Γ_{18}	$\Sigma^+\overline{\Sigma}^-$	not seen
Γ_{19}	$\Sigma^0\overline{\Sigma}^0$	
Γ_{20}	$\Xi^0\overline{\Xi}^0$	
Γ_{21}	$\Xi^-\overline{\Xi}^+$	not seen
Γ_{22}	$pK^-\overline{\Lambda}$ + c.c.	not seen
Γ_{23}	$\Lambda\overline{\Xi}^+K^-$ + c.c.	not seen
Γ_{24}	$\Sigma^0\overline{\Xi}^+K^-$ + c.c.	not seen
Γ_{25}	$pK^-K^-\overline{\Xi}^+$ + c.c.	

$\psi(4360)$ Γ(i) $\times$ $\Gamma(e^+e^-)/\Gamma$(total)

$\Gamma(h_c\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\quad \Gamma_2\Gamma_1/\Gamma$

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
21 $^{+10}_{-8}$ OUR AVERAGE	Error includes scale factor of 2.4.			
$29.1^{+\ 5.7+4.4}_{-\ 3.9-3.4}$	[1] ABLIKIM	25B	BES3	$e^+e^- \to \pi^+\pi^- h_c(1P)$
$11.6^{+\ 5.0}_{-\ 4.4}\pm 1.9$	ABLIKIM	17G	BES3	$e^+e^- \to \pi^+\pi^- h_c(1P)$

[1] Using three coherent Breit-Wigner functions between 4.009 and 4.950 GeV. Second solution: $10.8^{+3.1}_{-2.3}$ eV.

$\Gamma(\psi(2S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_4\Gamma_1/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10.7±4.1		[1] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
20.7±2.5		[2] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
9.9±4.1		[3] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
19.4±2.0		[4] ABLIKIM	21AJ	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
7.3±2.8		[5] ABLIKIM	19K	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
11.0±3.8		[6] ABLIKIM	19K	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$
9.2±0.6±0.6	279	[7] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
10.9±0.6±0.7	279	[8] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
6.0±1.0±0.5	37	[5] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
7.2±1.0±0.6	37	[6] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$11.1^{+1.3}_{-1.2}$	74	[9] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
12.3±1.2	74	[10] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
10.4±1.7±1.5	47	[5] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
11.8±1.8±1.4	47	[6] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

[1] Solution I of four equivalent solutions in a fit using three interfering resonances. Supersedes ABLIKIM 19K.
[2] Solution II of four equivalent solutions in a fit using three interfering resonances. Supersedes ABLIKIM 19K.
[3] Solution III of four equivalent solutions in a fit using three interfering resonances. Supersedes ABLIKIM 19K.
[4] Solution IV of four equivalent solutions in a fit using three interfering resonances. Supersedes ABLIKIM 19K.
[5] Solution I of two equivalent solutions in a fit using two interfering resonances.
[6] Solution II of two equivalent solutions in a fit using two interfering resonances.
[7] Solution I of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D.
[8] Solution II of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D.
[9] Solution I in a combined fit of AUBERT 07S and WANG 07D data with two resonances.
[10] Solution II in a combined fit of AUBERT 07S and WANG 07D data with two resonances.

$\Gamma(J/\psi\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_7\Gamma_1/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.8±0.6±0.3		[1] ABLIKIM	24T	BES3	$e^+e^- \to \eta J/\psi$
2.1±0.7±0.3		[2] ABLIKIM	24T	BES3	$e^+e^- \to \eta J/\psi$
4.3±1.3±0.5		[3] ABLIKIM	24T	BES3	$e^+e^- \to \eta J/\psi$
5.0±1.5±0.5		[4] ABLIKIM	24T	BES3	$e^+e^- \to \eta J/\psi$
3.4±2.2		[5] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$
1.5±1.0		[6] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$
1.7±1.1		[7] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$
<6.8	90	WANG	13B	BELL	$e^+e^- \to J/\psi\eta\gamma$

[1] Solution 1 of 4. Supersedes ABLIKIM 20O.

[2] Solution 2 of 4. Supersedes ABLIKIM 20O.
[3] Solution 3 of 4. Supersedes ABLIKIM 20O.
[4] Solution 4 of 4. Supersedes ABLIKIM 20O.
[5] Solution 1 of three equivalent fit solutions using three resonant structures.
[6] Solution 2 of three equivalent fit solutions using three resonant structures.
[7] Solution 3 of three equivalent fit solutions using three resonant structures.

$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{16}\Gamma_1/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.57	90	[1] HAN	15	BELL	10.58 $e^+e^- \to \chi_{c1}\gamma$

[1] Using B($\eta \to \gamma\gamma$) = (39.41 ± 0.21)%.

$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{17}\Gamma_1/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<1.9	90	[1] HAN	15	BELL	10.58 $e^+e^- \to \chi_{c2}\gamma$

[1] Using B($\eta \to \gamma\gamma$) = (39.41 ± 0.21)%.

$\Gamma(\Sigma^+\overline{\Sigma}^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{18}\Gamma_1/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<118.8 × 10^{-3}	90	[1] ABLIKIM	24AH	BES3	$e^+e^- \to \Sigma^+\overline{\Sigma}^-$

[1] Interference effect between resonance and continuum amplitudes is considered. Two solutions from the fit.

$\Gamma(\Sigma^0\overline{\Sigma}^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{19}\Gamma_1/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<29.3 × 10^{-3}	90	[1] ABLIKIM	25U	BES3	$e^+e^- \to \Sigma^0\overline{\Sigma}^0$

[1] Interference effect between resonance and continuum amplitudes is considered. Upper limit is for the larger of the two solutions from the fit.

$\Gamma(\Xi^0\overline{\Xi}^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{20}\Gamma_1/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<84.5 × 10^{-3}	90	[1] ABLIKIM	24CD	BES3	$e^+e^- \to \psi(4360)$

[1] From a fit to $e^+e^- \to \Xi^0\overline{\Xi}^0$ cross sections.

$\Gamma(\Xi^-\overline{\Xi}^+) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{21}\Gamma_1/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<44.8 × 10^{-3}	90	[1] ABLIKIM	23BK	BES3	$e^+e^- \to \psi(4360)$

[1] From a fit to $e^+e^- \to \Xi^-\overline{\Xi}^+$ cross sections.

$\Gamma(pK^-\overline{\Lambda}+\text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{22}\Gamma_1/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<4.7 × 10^{-3}	90	[1] ABLIKIM	23BL	BES3	$e^+e^- \to \psi(4360)$

[1] From a fit to $e^+e^- \to pK^-\overline{\Lambda}+$ c.c. cross sections.

$\Gamma(\Lambda\overline{\Xi}^+K^-+\text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{23}\Gamma_1/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<35.8 × 10^{-3}	90	[1] ABLIKIM	24AL	BES3	$e^+e^- \to \Lambda\overline{\Xi}^+K^-$ + c.c.

[1] A fit to the Born cross section of $e^+e^- \to \Lambda\overline{\Xi}^+K^-$ + c.c. including interference with the continuum. Two solutions from the fit.

$\Gamma(\Sigma^0\overline{\Xi}^+K^- + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{24}\Gamma_1/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
$<2.8 \times 10^{-3}$	90	[1] ABLIKIM	24AL	BES3	$e^+e^- \to \Sigma^0\overline{\Xi}^+K^-$ + c.c.

[1] A fit to the Born cross section of $e^+e^- \to \Sigma^0\overline{\Xi}^+K^-$ + c.c. including interference with the continuum. Two solutions from the fit.

$\Gamma(e^+e^-) \times \Gamma(pK^-K^-\overline{\Xi}^+ + \text{c.c.})/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_{25}/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
$<66.6 \times 10^{-3}$	90	ABLIKIM	25CF	BES3	$e^+e^- \to pK^-K^-\overline{\Xi}^+$ + c.c.

$\psi(4360)$ BRANCHING RATIOS

$\Gamma(h_c\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_2/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ABLIKIM	17G	BES3	$e^+e^- \to \pi^+\pi^- h_c$

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	17V	BES3	$e^+e^- \to \pi^+\pi^-\psi(2S)$

[1] From a fit to the cross section for $e^+e^- \to \pi^+\pi^-\psi(2S) \to 2(\pi^+\pi^-)\ell^+\ell^-$ obtained from 16 center-of-mass energies between 4.008 and 4.600 GeV and comprising 5.1 fb^{-1}.

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma(J/\psi\pi^+\pi^-)$ Γ_4/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$(0.81 \pm 0.12 \pm 0.13)$ to $(42 \pm 15 \pm 15)$	[1] ZHANG	17C	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$ or $\psi(2S)$

[1] From a combined fit of BELLE, BABAR and BES3 $e^+e^- \to \pi^+\pi^- J/\psi$ and $e^+e^- \to \pi^+\pi^-\psi(2S)$ data.

$\Gamma(\psi(3770)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	[1] ABLIKIM	19AR	BES3	$e^+e^- \to \pi^+\pi^- D\overline{D}$

[1] Observe $e^+e^- \to \pi^+\pi^-\psi(3770)$ at $\sqrt{s} = 4.26$, 4.36, and 4.42 GeV but cannot establish if continuum or resonant.

$\Gamma(\psi_2(3823)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_6/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen		[1] ABLIKIM	22R	BES3	$e^+e^- \to \pi^+\pi^-\chi_{c1}\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
possibly seen	19	[2] ABLIKIM	15S	BES3	$e^+e^- \to \pi^+\pi^-\chi_{c1}\gamma$

[1] From a fit to the $e^+e^- \to \pi^+\pi^-\psi(3823)$ cross section between 4.23 and 4.70 GeV with two coherent Breit-Wigner resonances.

[2] From a fit of $e^+e^- \to \pi^+\pi^-\psi_2(3823)$, $\psi_2(3823) \to \chi_{c1}\gamma$ cross sections taken at $\sqrt{s}$ values of 4.23, 4.26, 4.36, 4.42, and 4.60 GeV to the $\psi(4360)$ line shape.

$\Gamma(J/\psi\eta)/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	24T	BES3	$e^+e^- \to \eta J/\psi$

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

seen	[2] ABLIKIM	20O	BES3	$e^+e^- \to \eta J/\psi$	

[1] Supersedes ABLIKIM 20O.
[2] With a significance of 6.0 σ.

$\Gamma(D^0 D^{*-}\pi^+)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_8/\Gamma \times \Gamma_1/\Gamma$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.72 \times 10^{-6}$	90	[1] PAKHLOVA	09	BELL	$e^+e^- \to \psi(4360) \to D^0 D^{*-}\pi^+$

[1] Using $4355^{+9}_{-10} \pm 9$ MeV for the mass of $\psi(4360)$.

$\Gamma(D^0 D^{*-}\pi^+)/\Gamma(\psi(2S)\pi^+\pi^-)$ — Γ_8/Γ_4

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	PAKHLOVA	09	BELL	$e^+e^- \to \psi(4360) \to D^0 D^{*-}\pi^+$

$\Gamma(D^+ D^-\pi^+\pi^-)/\Gamma_{total}$ — Γ_9/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] ABLIKIM	22AL	BES3	$e^+e^- \to \pi^+\pi^- D^+ D^-$

[1] From a fit to the cross section for $e^+e^- \to D^+D^-\pi^+\pi^-$ in the range $\sqrt{s}$ = 4.190–4.946 GeV.

$\Gamma(D_1(2420)\overline{D} + \text{c.c.})/\Gamma_{total}$ — Γ_{10}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
possibly seen	[1] ABLIKIM	19AR	BES3	$e^+e^- \to \pi^+\pi^- D\overline{D}$

[1] Evidence for $e^+e^- \to D_1(2420)\overline{D}+$ c.c. between $\sqrt{s}$ = 4.3 and 4.6 GeV, not necessarily resonant.

$\Gamma(\phi\eta)/\Gamma_{total}$ — Γ_{11}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	23BT	BES3	$e^+e^- \to \phi\eta$

$\Gamma(\omega\pi^0)/\Gamma_{total}$ — Γ_{12}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	22K	BES3	$e^+e^- \to \omega\pi^0$

$\Gamma(\omega\eta)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	22K	BES3	$e^+e^- \to \omega\eta$

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ — Γ_{14}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	21AN	BES3	$e^+e^- \to p\overline{p}\eta$

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ — Γ_{15}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	ABLIKIM	21AN	BES3	$e^+e^- \to p\overline{p}\omega$

ψ(4360) REFERENCES

ABLIKIM	25B	PRL 135 071901	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	25CF	JHEP 2511 111	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	25U	PR D111 L051502	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	24AH	JHEP 2405 022	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	24AL	JHEP 2407 258	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	24CD	JHEP 2411 062	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	24T	PR D109 092012	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	23BK	JHEP 2311 228	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	23BL	JHEP 2312 027	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	23BT	PR D108 112011	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	22AL	PR D106 052012	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	22AM	PR D106 072001	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	22K	JHEP 2207 064	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	22R	PRL 129 102003	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	21AJ	PR D104 052012	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	21AK	PR D104 092001	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	21AN	PR D104 092008	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	20O	PR D102 031101	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19AR	PR D100 032005	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19K	PR D99 019903 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17B	PRL 118 092001	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17G	PRL 118 092002	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17V	PR D96 032004	M. Ablikim *et al.*	(BESIII Collab.)
Also		PR D99 019903 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)
ZHANG	17B	PR D96 054008	J. Zhang, J. Zhang	
ZHANG	17C	EPJ C77 727	J. Zhang, L. Yuan	
ABLIKIM	15S	PRL 115 011803	M. Ablikim *et al.*	(BESIII Collab.)
HAN	15	PR D92 012011	Y.L. Han *et al.*	(BELLE Collab.)
WANG	15A	PR D91 112007	X.L. Wang *et al.*	(BELLE Collab.)
LEES	14F	PR D89 111103	J.P. Lees *et al.*	(BABAR Collab.)
WANG	13B	PR D87 051101	X.L. Wang *et al.*	(BELLE Collab.)
PAKHLOVA	09	PR D80 091101	G. Pakhlova *et al.*	(BELLE Collab.)
LIU	08H	PR D78 014032	Z.Q. Liu, X.S. Qin, C.Z. Yuan	
AUBERT	07S	PRL 98 212001	B. Aubert *et al.*	(BABAR Collab.)
WANG	07D	PRL 99 142002	X.L. Wang *et al.*	(BELLE Collab.)