$\psi(2S)$

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

See the Review on "$\psi(2S)$ and χ_c branching ratios" before the $\chi_{c0}(1P)$ Listings.

$\psi(2S)$ MASS

OUR FIT includes measurements of $m_{\psi(2S)}$, $m_{\psi(3770)}$, and $m_{\psi(3770)} - m_{\psi(2S)}$.

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$3686.109^{+0.012}_{-0.014}$ OUR FIT					
$3686.108^{+0.011}_{-0.014}$ OUR AVERAGE					
$3686.12 \pm 0.06 \pm 0.10$	4k	AAIJ	12H	LHCB	$pp \to J/\psi \pi^+ \pi^- X$
$3686.114 \pm 0.007 ^{+0.011}_{-0.016}$		[1] ANASHIN	12	KEDR	$e^+ e^- \to$ hadrons
$3686.111 \pm 0.025 \pm 0.009$		AULCHENKO	03	KEDR	$e^+ e^- \to$ hadrons
3685.95 ± 0.10	413	[2] ARTAMONOV	00	OLYA	$e^+ e^- \to$ hadrons
$3685.98 \pm 0.09 \pm 0.04$		[3] ARMSTRONG	93B	E760	$\overline{p} p \to e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3686.00 ± 0.10	413	[4] ZHOLENTZ	80	OLYA	$e^+ e^-$

[1] From the scans in 2004 and 2006. ANASHIN 12 reports the value $3686.114 \pm 0.007 \pm 0.011 ^{+0.002}_{-0.012}$ MeV, where the third uncertainty is due to assumptions on the interference between the resonance and hadronic continuum. We combined the two systematic uncertainties.

[2] Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85).

[3] Mass central value and systematic error recalculated by us according to Eq. (16) in ARMSTRONG 93B, using the value for the $J/\psi(1S)$ mass from AULCHENKO 03.

[4] Superseded by ARTAMONOV 00.

$m_{\psi(2S)} - m_{J/\psi(1S)}$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
589.188 ± 0.028 OUR AVERAGE				
$589.194 \pm 0.027 \pm 0.011$	[1] AULCHENKO	03	KEDR	$e^+ e^- \to$ hadrons
589.7 ± 1.2	LEMOIGNE	82	GOLI	$185\ \pi^- \text{Be} \to \gamma \mu^+ \mu^- \text{A}$
589.07 ± 0.13	[1] ZHOLENTZ	80	OLYA	$e^+ e^-$
588.7 ± 0.8	LUTH	75	MRK1	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
588 ± 1	[2] BAI	98E	BES	$e^+ e^-$

[1] Redundant with data in mass above.

[2] Systematic errors not evaluated.

$\psi(2S)$ WIDTH

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
299± 8 OUR FIT					
286±16 OUR AVERAGE					
358±88± 4		ABLIKIM	08B	BES2	$e^+e^- \to$ hadrons
290±25± 4	2.7k	ANDREOTTI	07	E835	$p\overline{p} \to e^+e^-$, $J/\psi X$
331±58± 2		ABLIKIM	06L	BES2	$e^+e^- \to$ hadrons
264±27		[1] BAI	02B	BES2	e^+e^-
287±37±16		[2] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$

[1] From a simultaneous fit to the hadronic and $\mu^+\mu^-$ cross section, assuming $\Gamma = \Gamma_h + \Gamma_e + \Gamma_\mu + \Gamma_\tau$ and lepton universality. Does not include vacuum polarization correction.

[2] The initial-state radiation correction reevaluated by ANDREOTTI 07 in its Ref. [4].

$\psi(2S)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	hadrons	(97.85 ±0.13) %	
Γ_2	virtual $\gamma \to$ hadrons	(1.73 ±0.14) %	S=1.5
Γ_3	ggg	(10.6 ±1.6) %	
Γ_4	γgg	(1.03 ±0.29) %	
Γ_5	light hadrons	(15.4 ±1.5) %	
Γ_6	e^+e^-	(7.89 ±0.17) $\times 10^{-3}$	
Γ_7	$\mu^+\mu^-$	(7.9 ±0.9) $\times 10^{-3}$	
Γ_8	$\tau^+\tau^-$	(3.1 ±0.4) $\times 10^{-3}$	
	Decays into $J/\psi(1S)$ and anything		
Γ_9	$J/\psi(1S)$ anything	(60.9 ±0.6) %	
Γ_{10}	$J/\psi(1S)$ neutrals	(25.10 ±0.33) %	
Γ_{11}	$J/\psi(1S)\pi^+\pi^-$	(34.45 ±0.30) %	
Γ_{12}	$J/\psi(1S)\pi^0\pi^0$	(18.13 ±0.31) %	
Γ_{13}	$J/\psi(1S)\eta$	(3.36 ±0.05) %	
Γ_{14}	$J/\psi(1S)\pi^0$	(1.268±0.032) $\times 10^{-3}$	
	Hadronic decays		
Γ_{15}	$\pi^0 h_c(1P)$	(8.6 ±1.3) $\times 10^{-4}$	
Γ_{16}	$3(\pi^+\pi^-)\pi^0$	(3.5 ±1.6) $\times 10^{-3}$	
Γ_{17}	$2(\pi^+\pi^-)\pi^0$	(2.9 ±1.0) $\times 10^{-3}$	S=4.7
Γ_{18}	$\rho a_2(1320)$	(2.6 ±0.9) $\times 10^{-4}$	
Γ_{19}	$p\overline{p}$	(2.80 ±0.11) $\times 10^{-4}$	
Γ_{20}	$\Delta^{++}\overline{\Delta}^{--}$	(1.28 ±0.35) $\times 10^{-4}$	
Γ_{21}	$\Lambda\overline{\Lambda}\pi^0$	$<$ 2.9 $\times 10^{-6}$	CL=90%
Γ_{22}	$\Lambda\overline{\Lambda}\eta$	(2.5 ±0.4) $\times 10^{-5}$	
Γ_{23}	$\Lambda\overline{p}K^+$	(1.00 ±0.14) $\times 10^{-4}$	
Γ_{24}	$\Lambda\overline{p}K^+\pi^+\pi^-$	(1.8 ±0.4) $\times 10^{-4}$	
Γ_{25}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	(2.8 ±0.6) $\times 10^{-4}$	

Γ_{26}	$\Lambda\overline{\Lambda}$	$(2.8 \pm 0.5) \times 10^{-4}$	S=2.6
Γ_{27}	$\Lambda\overline{\Sigma}^{+}\pi^{-}$ + c.c.	$(1.40 \pm 0.13) \times 10^{-4}$	
Γ_{28}	$\Lambda\overline{\Sigma}^{-}\pi^{+}$ + c.c.	$(1.54 \pm 0.14) \times 10^{-4}$	
Γ_{29}	$\Sigma^{0}\overline{p}K^{+}$ + c.c.	$(1.67 \pm 0.18) \times 10^{-5}$	
Γ_{30}	$\Sigma^{+}\overline{\Sigma}^{-}$	$(2.6 \pm 0.8) \times 10^{-4}$	
Γ_{31}	$\Sigma^{0}\overline{\Sigma}^{0}$	$(2.2 \pm 0.4) \times 10^{-4}$	S=1.5
Γ_{32}	$\Sigma(1385)^{+}\overline{\Sigma}(1385)^{-}$	$(1.1 \pm 0.4) \times 10^{-4}$	
Γ_{33}	$\Xi^{-}\overline{\Xi}^{+}$	$(1.8 \pm 0.6) \times 10^{-4}$	S=2.8
Γ_{34}	$\Xi^{0}\overline{\Xi}^{0}$	$(2.8 \pm 0.9) \times 10^{-4}$	
Γ_{35}	$\Xi(1530)^{0}\overline{\Xi}(1530)^{0}$	$(5.2 {}^{+3.2}_{-1.2}) \times 10^{-5}$	
Γ_{36}	$\Omega^{-}\overline{\Omega}^{+}$	$< 7.3 \times 10^{-5}$	CL=90%
Γ_{37}	$\pi^{0}p\overline{p}$	$(1.53 \pm 0.07) \times 10^{-4}$	
Γ_{38}	$N(940)\overline{p}$+ c.c. $\rightarrow \pi^{0}p\overline{p}$	$(6.4 {}^{+1.8}_{-1.3}) \times 10^{-5}$	
Γ_{39}	$N(1440)\overline{p}$+ c.c. $\rightarrow \pi^{0}p\overline{p}$	$(7.3 {}^{+1.7}_{-1.5}) \times 10^{-5}$	S=2.5
Γ_{40}	$N(1520)\overline{p}$+ c.c. $\rightarrow \pi^{0}p\overline{p}$	$(6.4 {}^{+2.3}_{-1.8}) \times 10^{-6}$	
Γ_{41}	$N(1535)\overline{p}$+ c.c. $\rightarrow \pi^{0}p\overline{p}$	$(2.5 \pm 1.0) \times 10^{-5}$	
Γ_{42}	$N(1650)\overline{p}$+ c.c. $\rightarrow \pi^{0}p\overline{p}$	$(3.8 {}^{+1.4}_{-1.7}) \times 10^{-5}$	
Γ_{43}	$N(1720)\overline{p}$+ c.c. $\rightarrow \pi^{0}p\overline{p}$	$(1.79 {}^{+0.26}_{-0.70}) \times 10^{-5}$	
Γ_{44}	$N(2300)\overline{p}$+ c.c. $\rightarrow \pi^{0}p\overline{p}$	$(2.6 {}^{+1.2}_{-0.7}) \times 10^{-5}$	
Γ_{45}	$N(2570)\overline{p}$+ c.c. $\rightarrow \pi^{0}p\overline{p}$	$(2.13 {}^{+0.40}_{-0.31}) \times 10^{-5}$	
Γ_{46}	$\pi^{0}f_{0}(2100) \rightarrow \pi^{0}p\overline{p}$	$(1.1 \pm 0.4) \times 10^{-5}$	
Γ_{47}	$\eta p\overline{p}$	$(6.0 \pm 0.4) \times 10^{-5}$	
Γ_{48}	$\eta f_{0}(2100) \rightarrow \eta p\overline{p}$	$(1.2 \pm 0.4) \times 10^{-5}$	
Γ_{49}	$N(1535)\overline{p} \rightarrow \eta p\overline{p}$	$(4.4 \pm 0.7) \times 10^{-5}$	
Γ_{50}	$\omega p\overline{p}$	$(6.9 \pm 2.1) \times 10^{-5}$	
Γ_{51}	$\phi p\overline{p}$	$< 2.4 \times 10^{-5}$	CL=90%
Γ_{52}	$\pi^{+}\pi^{-}p\overline{p}$	$(6.0 \pm 0.4) \times 10^{-4}$	
Γ_{53}	$p\overline{n}\pi^{-}$ or c.c.	$(2.48 \pm 0.17) \times 10^{-4}$	
Γ_{54}	$p\overline{n}\pi^{-}\pi^{0}$	$(3.2 \pm 0.7) \times 10^{-4}$	
Γ_{55}	$2(\pi^{+}\pi^{-}\pi^{0})$	$(4.7 \pm 1.5) \times 10^{-3}$	
Γ_{56}	$\eta\pi^{+}\pi^{-}$	$< 1.6 \times 10^{-4}$	CL=90%
Γ_{57}	$\eta\pi^{+}\pi^{-}\pi^{0}$	$(9.5 \pm 1.7) \times 10^{-4}$	
Γ_{58}	$2(\pi^{+}\pi^{-})\eta$	$(1.2 \pm 0.6) \times 10^{-3}$	
Γ_{59}	$\eta'\pi^{+}\pi^{-}\pi^{0}$	$(4.5 \pm 2.1) \times 10^{-4}$	
Γ_{60}	$\omega\pi^{+}\pi^{-}$	$(7.3 \pm 1.2) \times 10^{-4}$	S=2.1
Γ_{61}	$b_{1}^{\pm}\pi^{\mp}$	$(4.0 \pm 0.6) \times 10^{-4}$	S=1.1
Γ_{62}	$b_{1}^{0}\pi^{0}$	$(2.4 \pm 0.6) \times 10^{-4}$	
Γ_{63}	$\omega f_{2}(1270)$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{64}	$\pi^{+}\pi^{-}K^{+}K^{-}$	$(7.5 \pm 0.9) \times 10^{-4}$	S=1.9

Γ_{65}	$\rho^0 K^+ K^-$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{66}	$K^*(892)^0 \overline{K}^*_2(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$	
Γ_{67}	$K^+ K^- \pi^+ \pi^- \eta$	$(1.3 \pm 0.7) \times 10^{-3}$	
Γ_{68}	$K^+ K^- 2(\pi^+ \pi^-) \pi^0$	$(1.00 \pm 0.31) \times 10^{-3}$	
Γ_{69}	$K^+ K^- 2(\pi^+ \pi^-)$	$(1.9 \pm 0.9) \times 10^{-3}$	
Γ_{70}	$K_1(1270)^{\pm} K^{\mp}$	$(1.00 \pm 0.28) \times 10^{-3}$	
Γ_{71}	$K^0_S K^0_S \pi^+ \pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{72}	$\rho^0 p \overline{p}$	$(5.0 \pm 2.2) \times 10^{-5}$	
Γ_{73}	$K^+ \overline{K}^*(892)^0 \pi^- +$ c.c.	$(6.7 \pm 2.5) \times 10^{-4}$	
Γ_{74}	$2(\pi^+ \pi^-)$	$(2.4 \pm 0.6) \times 10^{-4}$	S=2.2
Γ_{75}	$\rho^0 \pi^+ \pi^-$	$(2.2 \pm 0.6) \times 10^{-4}$	S=1.4
Γ_{76}	$K^+ K^- \pi^+ \pi^- \pi^0$	$(1.26 \pm 0.09) \times 10^{-3}$	
Γ_{77}	$\omega f_0(1710) \to \omega K^+ K^-$	$(5.9 \pm 2.2) \times 10^{-5}$	
Γ_{78}	$K^*(892)^0 K^- \pi^+ \pi^0 +$ c.c.	$(8.6 \pm 2.2) \times 10^{-4}$	
Γ_{79}	$K^*(892)^+ K^- \pi^+ \pi^- +$ c.c.	$(9.6 \pm 2.8) \times 10^{-4}$	
Γ_{80}	$K^*(892)^+ K^- \rho^0 +$ c.c.	$(7.3 \pm 2.6) \times 10^{-4}$	
Γ_{81}	$K^*(892)^0 K^- \rho^+ +$ c.c.	$(6.1 \pm 1.8) \times 10^{-4}$	
Γ_{82}	$\eta K^+ K^-$, no $\eta \phi$	$(3.1 \pm 0.4) \times 10^{-5}$	
Γ_{83}	$\omega K^+ K^-$	$(1.85 \pm 0.25) \times 10^{-4}$	S=1.1
Γ_{84}	$\omega K^*(892)^+ K^- +$ c.c.	$(2.07 \pm 0.26) \times 10^{-4}$	
Γ_{85}	$\omega K^*_2(1430)^+ K^- +$ c.c.	$(6.1 \pm 1.2) \times 10^{-5}$	
Γ_{86}	$\omega \overline{K}^*(892)^0 K^0$	$(1.68 \pm 0.30) \times 10^{-4}$	
Γ_{87}	$\omega \overline{K}^*_2(1430)^0 K^0$	$(5.8 \pm 2.2) \times 10^{-5}$	
Γ_{88}	$\omega X(1440) \to \omega K^0_S K^- \pi^+ +$ c.c.	$(1.6 \pm 0.4) \times 10^{-5}$	
Γ_{89}	$\omega X(1440) \to \omega K^+ K^- \pi^0$	$(1.09 \pm 0.26) \times 10^{-5}$	
Γ_{90}	$\omega f_1(1285) \to \omega K^0_S K^- \pi^+ +$ c.c.	$(3.0 \pm 1.0) \times 10^{-6}$	
Γ_{91}	$\omega f_1(1285) \to \omega K^+ K^- \pi^0$	$(1.2 \pm 0.7) \times 10^{-6}$	
Γ_{92}	$3(\pi^+ \pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8
Γ_{93}	$p \overline{p} \pi^+ \pi^- \pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$	
Γ_{94}	$K^+ K^-$	$(7.1 \pm 0.5) \times 10^{-5}$	S=1.5
Γ_{95}	$K^0_S K^0_L$	$(5.34 \pm 0.33) \times 10^{-5}$	
Γ_{96}	$\pi^+ \pi^- \pi^0$	$(2.01 \pm 0.17) \times 10^{-4}$	S=1.7
Γ_{97}	$\rho(2150) \pi \to \pi^+ \pi^- \pi^0$	$(1.9 {}^{+1.2}_{-0.4}) \times 10^{-4}$	
Γ_{98}	$\rho(770) \pi \to \pi^+ \pi^- \pi^0$	$(3.2 \pm 1.2) \times 10^{-5}$	S=1.8
Γ_{99}	$\pi^+ \pi^-$	$(7.8 \pm 2.6) \times 10^{-6}$	
Γ_{100}	$K_1(1400)^{\pm} K^{\mp}$	$< 3.1 \times 10^{-4}$	CL=90%
Γ_{101}	$K^*_2(1430)^{\pm} K^{\mp}$	$(7.1 {}^{+1.3}_{-0.9}) \times 10^{-5}$	
Γ_{102}	$K^+ K^- \pi^0$	$(4.07 \pm 0.31) \times 10^{-5}$	
Γ_{103}	$K^+ K^*(892)^- +$ c.c.	$(2.9 \pm 0.4) \times 10^{-5}$	S=1.2
Γ_{104}	$K^*(892)^0 \overline{K}^0 +$ c.c.	$(1.09 \pm 0.20) \times 10^{-4}$	
Γ_{105}	$\phi \pi^+ \pi^-$	$(1.17 \pm 0.29) \times 10^{-4}$	S=1.7

Γ_{106}	$\quad \phi f_0(980) \to \pi^+\pi^-$	$(6.8 \pm 2.4) \times 10^{-5}$	S=1.1
Γ_{107}	$2(K^+K^-)$	$(6.0 \pm 1.4) \times 10^{-5}$	
Γ_{108}	ϕK^+K^-	$(7.0 \pm 1.6) \times 10^{-5}$	
Γ_{109}	$2(K^+K^-)\pi^0$	$(1.10 \pm 0.28) \times 10^{-4}$	
Γ_{110}	$\phi\eta$	$(3.10 \pm 0.31) \times 10^{-5}$	
Γ_{111}	$\phi\eta'$	$(3.1 \pm 1.6) \times 10^{-5}$	
Γ_{112}	$\omega\eta'$	$(3.2 {}^{+2.5}_{-2.1}) \times 10^{-5}$	
Γ_{113}	$\omega\pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$	
Γ_{114}	$\rho\eta'$	$(1.9 {}^{+1.7}_{-1.2}) \times 10^{-5}$	
Γ_{115}	$\rho\eta$	$(2.2 \pm 0.6) \times 10^{-5}$	S=1.1
Γ_{116}	$\omega\eta$	$< 1.1 \times 10^{-5}$	CL=90%
Γ_{117}	$\phi\pi^0$	$< 4 \times 10^{-7}$	CL=90%
Γ_{118}	$\eta_c\pi^+\pi^-\pi^0$	$< 1.0 \times 10^{-3}$	CL=90%
Γ_{119}	$p\overline{p}K^+K^-$	$(2.7 \pm 0.7) \times 10^{-5}$	
Γ_{120}	$\overline{\Lambda} n K^0_S +$ c.c.	$(8.1 \pm 1.8) \times 10^{-5}$	
Γ_{121}	$\phi f'_2(1525)$	$(4.4 \pm 1.6) \times 10^{-5}$	
Γ_{122}	$\Theta(1540)\overline{\Theta}(1540) \to K^0_S p K^- \overline{n} +$ c.c.	$< 8.8 \times 10^{-6}$	CL=90%
Γ_{123}	$\Theta(1540) K^- \overline{n} \to K^0_S p K^- \overline{n}$	$< 1.0 \times 10^{-5}$	CL=90%
Γ_{124}	$\Theta(1540) K^0_S \overline{p} \to K^0_S \overline{p} K^+ n$	$< 7.0 \times 10^{-6}$	CL=90%
Γ_{125}	$\overline{\Theta}(1540) K^+ n \to K^0_S \overline{p} K^+ n$	$< 2.6 \times 10^{-5}$	CL=90%
Γ_{126}	$\overline{\Theta}(1540) K^0_S p \to K^0_S p K^- \overline{n}$	$< 6.0 \times 10^{-6}$	CL=90%
Γ_{127}	$K^0_S K^0_S$	$< 4.6 \times 10^{-6}$	

Radiative decays

Γ_{128}	$\gamma\chi_{c0}(1P)$	(9.99 ± 0.27) %	
Γ_{129}	$\gamma\chi_{c1}(1P)$	(9.55 ± 0.31) %	
Γ_{130}	$\gamma\chi_{c2}(1P)$	(9.11 ± 0.31) %	
Γ_{131}	$\gamma\eta_c(1S)$	$(3.4 \pm 0.5) \times 10^{-3}$	S=1.3
Γ_{132}	$\gamma\eta_c(2S)$	$(7 \pm 5) \times 10^{-4}$	
Γ_{133}	$\gamma\pi^0$	$(1.6 \pm 0.4) \times 10^{-6}$	
Γ_{134}	$\gamma\eta'(958)$	$(1.23 \pm 0.06) \times 10^{-4}$	
Γ_{135}	$\gamma f_2(1270)$	$(2.1 \pm 0.4) \times 10^{-4}$	
Γ_{136}	$\gamma f_0(1710)$		
Γ_{137}	$\quad \gamma f_0(1710) \to \gamma\pi\pi$	$(3.0 \pm 1.3) \times 10^{-5}$	
Γ_{138}	$\quad \gamma f_0(1710) \to \gamma K\overline{K}$	$(6.0 \pm 1.6) \times 10^{-5}$	
Γ_{139}	$\gamma\gamma$	$< 1.4 \times 10^{-4}$	CL=90%
Γ_{140}	$\gamma\eta$	$(1.4 \pm 0.5) \times 10^{-6}$	
Γ_{141}	$\gamma\eta\pi^+\pi^-$	$(8.7 \pm 2.1) \times 10^{-4}$	
Γ_{142}	$\gamma\eta(1405)$		
Γ_{143}	$\quad \gamma\eta(1405) \to \gamma K\overline{K}\pi$	$< 9 \times 10^{-5}$	CL=90%
Γ_{144}	$\quad \gamma\eta(1405) \to \eta\pi^+\pi^-$	$(3.6 \pm 2.5) \times 10^{-5}$	

Γ_{145}	$\gamma\eta(1475)$			
Γ_{146}	$\gamma\eta(1475) \to K\overline{K}\pi$	< 1.4	$\times 10^{-4}$	CL=90%
Γ_{147}	$\gamma\eta(1475) \to \eta\pi^+\pi^-$	< 8.8	$\times 10^{-5}$	CL=90%
Γ_{148}	$\gamma 2(\pi^+\pi^-)$	(4.0 ± 0.6)	$\times 10^{-4}$	
Γ_{149}	$\gamma K^{*0} K^+\pi^- +$ c.c.	(3.7 ± 0.9)	$\times 10^{-4}$	
Γ_{150}	$\gamma K^{*0}\overline{K}^{*0}$	(2.4 ± 0.7)	$\times 10^{-4}$	
Γ_{151}	$\gamma K^0_S K^+\pi^- +$ c.c.	(2.6 ± 0.5)	$\times 10^{-4}$	
Γ_{152}	$\gamma K^+ K^-\pi^+\pi^-$	(1.9 ± 0.5)	$\times 10^{-4}$	
Γ_{153}	$\gamma p\overline{p}$	(3.9 ± 0.5)	$\times 10^{-5}$	S=2.0
Γ_{154}	$\gamma f_2(1950) \to \gamma p\overline{p}$	(1.20 ± 0.22)	$\times 10^{-5}$	
Γ_{155}	$\gamma f_2(2150) \to \gamma p\overline{p}$	(7.2 ± 1.8)	$\times 10^{-6}$	
Γ_{156}	$\gamma X(1835) \to \gamma p\overline{p}$	$(4.6 {}^{+1.8}_{-4.0})$	$\times 10^{-6}$	
Γ_{157}	$\gamma X \to \gamma p\overline{p}$	[a] < 2	$\times 10^{-6}$	CL=90%
Γ_{158}	$\gamma\pi^+\pi^- p\overline{p}$	(2.8 ± 1.4)	$\times 10^{-5}$	
Γ_{159}	$\gamma 2(\pi^+\pi^-) K^+ K^-$	< 2.2	$\times 10^{-4}$	CL=90%
Γ_{160}	$\gamma 3(\pi^+\pi^-)$	< 1.7	$\times 10^{-4}$	CL=90%
Γ_{161}	$\gamma K^+ K^- K^+ K^-$	< 4	$\times 10^{-5}$	CL=90%
Γ_{162}	$\gamma\gamma J/\psi$	$(3.1 {}^{+1.0}_{-1.2})$	$\times 10^{-4}$	
	Other decays			
Γ_{163}	invisible	< 1.6	%	CL=90%

[a] For a narrow resonance in the range $2.2 < M(X) < 2.8$ GeV.

CONSTRAINED FIT INFORMATION

A multiparticle fit to $\chi_{c1}(1P)$, $\chi_{c0}(1P)$, $\chi_{c2}(1P)$, and $\psi(2S)$ with 4 total widths, a partial width, 25 combinations of partial widths obtained from integrated cross section, and 84 branching ratios uses 238 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 339.7$ for 189 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta p_i \delta p_j\right\rangle/(\delta p_i{\cdot}\delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$.

x_7	3									
x_8	1	0								
x_{11}	30	8	2							
x_{12}	29	5	1	49						
x_{13}	13	3	1	37	16					
x_{19}	0	1	0	6	4	3				
x_{128}	1	0	0	3	1	1	0			
x_{129}	2	0	0	4	1	1	0	0		
x_{130}	1	0	0	4	2	1	0	0	0	
Γ	−79	−3	−1	−40	−35	−17	−11	−1	−2	−2
	x_6	x_7	x_8	x_{11}	x_{12}	x_{13}	x_{19}	x_{128}	x_{129}	x_{130}

$\psi(2S)$ PARTIAL WIDTHS

Γ(hadrons) Γ_1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
258±26	BAI	02B	BES2	e^+e^-
224±56	LUTH	75	MRK1	e^+e^-

$\Gamma(e^+e^-)$ Γ_6

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
2.36 ±0.04 OUR FIT				
2.33 ±0.07 OUR AVERAGE				
2.338±0.037±0.096	ABLIKIM	08B	BES2	$e^+e^- \rightarrow$ hadrons
2.330±0.036±0.110	ABLIKIM	06L	BES2	$e^+e^- \rightarrow$ hadrons
2.44 ±0.21	[1] BAI	02B	BES2	e^+e^-
2.14 ±0.21	ALEXANDER	89	RVUE	See Υ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.0 ±0.3	BRANDELIK	79C	DASP	e^+e^-
2.1 ±0.3	[2] LUTH	75	MRK1	e^+e^-

[1] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$, and hadronic channel, assuming $\Gamma_e = \Gamma_\mu = \Gamma_\tau/0.38847$.

[2] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$, and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$.

$\Gamma(\gamma\gamma)$ Γ_{139}

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<43	90	BRANDELIK	79C	DASP	e^+e^-

$\psi(2S)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

This combination of a partial width with the partial width into e^+e^- and with the total width is obtained from the integrated cross section into channel(i) in the e^+e^- annihilation. We list only data that have not been used to determine the partial width $\Gamma(i)$ or the branching ratio $\Gamma(i)$/total.

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_6/\Gamma$

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
2.233±0.015±0.042	[1] ANASHIN	12	KEDR	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.2 ±0.4	ABRAMS	75	MRK1	e^+e^-

[1] ANASHIN 12 reports the value 2.233 ± 0.015 ± 0.037 ± 0.020 keV, where the third uncertainty is due to assumptions on the interference between the resonance and hadronic continuum. We combined the two systematic uncertainties.

$\Gamma(\tau^+\tau^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_8\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9.0±2.6	79	[1] ANASHIN	07	KEDR	$e^+e^- \to \psi(2S) \to \tau^+\tau^-$

[1] Using $\psi(2S)$ total width of 337 ± 13 keV. Systematic errors not evaluated.

$\Gamma(J/\psi(1S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{11}\Gamma_6/\Gamma$

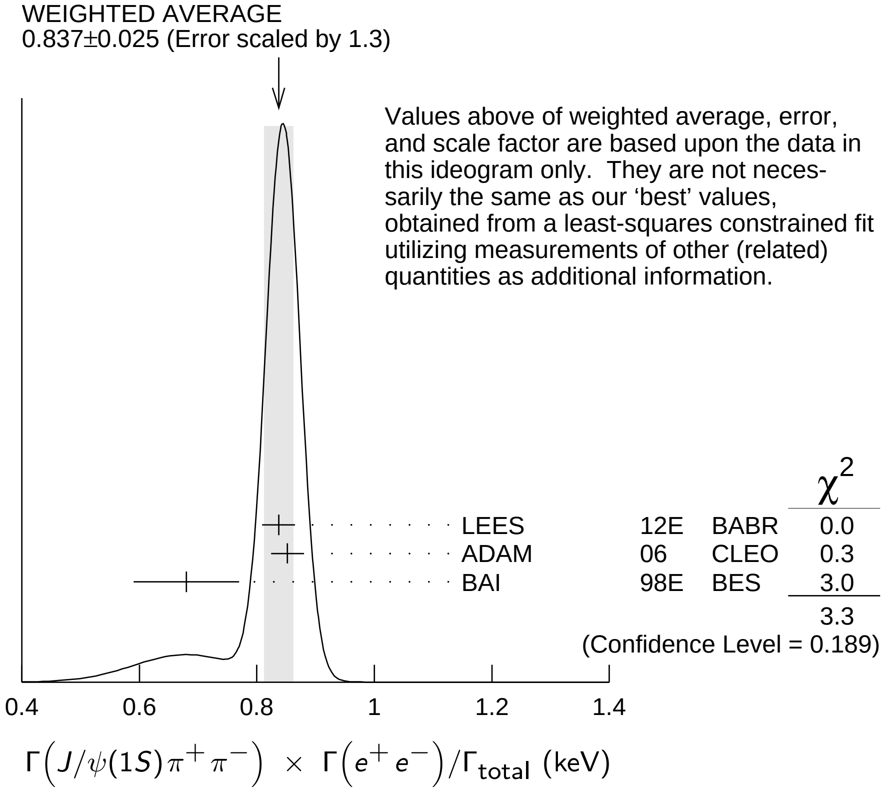
VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.813±0.013 OUR FIT					
0.837±0.025 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
0.837±0.028±0.005		[1] LEES	12E	BABR	10.6 $e^+e^- \to 2\pi^+2\pi^-\gamma$
0.852±0.010±0.026	19.5k	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$
0.68 ±0.09		[2] BAI	98E	BES	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.88 ±0.08 ±0.03	256	[3] AUBERT	07AU	BABR	10.6 $e^+e^- \to J/\psi\pi^+\pi^-\gamma$
0.755±0.048±0.004	544	[4] AUBERT	05D	BABR	10.6 $e^+e^- \to \pi^+\pi^-\mu^+\mu^-\gamma$

[1] LEES 12E reports $[\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \mu^+\mu^-)] = (49.9 \pm 1.3 \pm 1.0) \times 10^{-3}$ keV which we divide by our best value $B(J/\psi(1S) \to \mu^+\mu^-) = (5.961 \pm 0.033) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] The value of $\Gamma(e^+e^-)$ quoted in BAI 98E is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6) \times 10^{-2}$ and $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1203 \pm 0.0038$. Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$.

[3] AUBERT 07AU reports $[\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \pi^+\pi^-\pi^0)] = 0.0186 \pm 0.0012 \pm 0.0011$ keV which we divide by our best value $B(J/\psi(1S) \to \pi^+\pi^-\pi^0) = (2.11 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[4] AUBERT 05D reports $[\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \mu^+\mu^-)] = 0.0450 \pm 0.0018 \pm 0.0022$ keV which we divide by our best value $B(J/\psi(1S) \to \mu^+\mu^-) = (5.961 \pm 0.033) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Superseded by LEES 12E.



$\Gamma(J/\psi(1S)\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{12}\Gamma_6/\Gamma$

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.428±0.009 OUR FIT					
0.411±0.008±0.018	3.6k±96	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

$\Gamma(J/\psi(1S)\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{13}\Gamma_6/\Gamma$

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
79.2± 1.7 OUR FIT					
87 ± 9 OUR AVERAGE					
83 ±25 ±5	14	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to J/\psi\pi^+\pi^-\pi^0\gamma$
88 ± 6 ±7	291 ± 24	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

[1] AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot B(\psi(2S) \to J/\psi\eta) \cdot B(J/\psi \to \mu^+\mu^-) \cdot B(\eta \to \pi^+\pi^-\pi^0) = 1.11 \pm 0.33 \pm 0.07$ eV.

$\Gamma(J/\psi(1S)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{14}\Gamma_6/\Gamma$

VALUE (eV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
<8	90	<37	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

$\Gamma(p\overline{p}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{19}\Gamma_6/\Gamma$

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.661±0.026 OUR FIT					
0.64 ±0.04 OUR AVERAGE					
0.67 ±0.12 ±0.02	43	LEES	13O	BABR	$e^+e^- \to p\overline{p}\gamma$
0.74 ±0.07 ±0.04	142	LEES	13Y	BABR	$e^+e^- \to p\overline{p}\gamma$
0.579±0.038±0.036	2.7k	ANDREOTTI	07	E835	$p\overline{p} \to e^+e^-$, $J/\psi X$
0.70 ±0.17 ±0.03	22	AUBERT	06B		$e^+e^- \to p\overline{p}\gamma$

$\Gamma(\Lambda\overline{\Lambda}) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{26}\Gamma_6/\Gamma$

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
1.5±0.4±0.1	AUBERT	07BD	BABR	10.6 $e^+e^- \rightarrow \Lambda\overline{\Lambda}\gamma$

$\Gamma(2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{55}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
11.2±3.3±1.3	43	AUBERT	06D	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-\pi^0)\gamma$

$\Gamma(K^+K^-2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{69}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±2.1±0.3	26	AUBERT	06D	BABR	10.6 $e^+e^- \rightarrow K^+K^-2(\pi^+\pi^-)\gamma$

$\Gamma(\pi^+\pi^-K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{64}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.56±0.42±0.16	85	AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$

$\Gamma(\phi f_0(980) \rightarrow \pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{106}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.347±0.169±0.003	6 ± 3	[1] AUBERT	07AK	BABR	10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$

[1] AUBERT 07AK reports $[\Gamma(\psi(2S) \rightarrow \phi f_0(980) \rightarrow \pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \rightarrow K^+K^-)] = 0.17 \pm 0.08 \pm 0.02$ eV which we divide by our best value $B(\phi(1020) \rightarrow K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{105}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.57±0.23±0.01	10	[1] AUBERT,BE	06D	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

[1] AUBERT,BE 06D reports $[\Gamma(\psi(2S) \rightarrow \phi\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\phi(1020) \rightarrow K^+K^-)] = 0.28 \pm 0.11 \pm 0.02$ eV which we divide by our best value $B(\phi(1020) \rightarrow K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(2(\pi^+\pi^-)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{17}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
29.7±2.2±1.8	410	AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\pi^0\gamma$

$\Gamma(\omega\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{60}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.01±0.84±0.02	37	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$

[1] AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow \omega\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\omega(782) \rightarrow \pi^+\pi^-\pi^0)] = 2.69 \pm 0.73 \pm 0.16$ eV which we divide by our best value $B(\omega(782) \rightarrow \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(2(\pi^+\pi^-)\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{58}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.87±1.41±0.01	16	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\eta\gamma$

[1] AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow 2(\pi^+\pi^-)\eta) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\eta \rightarrow 2\gamma)] = 1.13 \pm 0.55 \pm 0.08$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = (39.41 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{76}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±1.3±0.3	32	AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\pi^0\gamma$

$\Gamma(K^+K^-\pi^+\pi^-\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{67}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.04±1.79±0.02	7	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\eta\gamma$

[1] AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow K^+K^-\pi^+\pi^-\eta) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{total}] \times [B(\eta \rightarrow 2\gamma)] = 1.2 \pm 0.7 \pm 0.1$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = (39.41 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{94}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.35±0.14±0.03	11	LEES	13Q	BABR	$e^+e^- \rightarrow K^+K^-\gamma$

$\psi(2S)$ BRANCHING RATIOS

$\Gamma(\text{hadrons})/\Gamma_{total}$ — Γ_1/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.9785±0.0013 OUR AVERAGE				
0.9779±0.0015	[1] BAI	02B	BES2	e^+e^-
0.981 ±0.003	[1] LUTH	75	MRK1	e^+e^-

[1] Includes cascade decay into $J/\psi(1S)$.

$\Gamma(\text{virtual}\gamma \rightarrow \text{hadrons})/\Gamma_{total}$ — Γ_2/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0173±0.0014 OUR AVERAGE	Error includes scale factor of 1.5.			
0.0166±0.0010	[1,2] SETH	04	RVUE	e^+e^-
0.0199±0.0019	[1] BAI	02B	BES2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.029 ±0.004	[1] LUTH	75	MRK1	e^+e^-

[1] Included in $\Gamma(\text{hadrons})/\Gamma_{total}$.

[2] Using $B(\psi(2S) \rightarrow \ell^+\ell^-) = (0.73 \pm 0.04)\%$ from RPP-2002 and $R = 2.28 \pm 0.04$ determined by a fit to data from BAI 00 and BAI 02C.

$\Gamma(ggg)/\Gamma_{total}$ Γ_3/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
10.58±1.62	2.9 M	[1] LIBBY	09	CLEO	$\psi(2S) \to$ hadrons

[1] Calculated using $\Gamma(\gamma gg)/\Gamma(ggg) = 0.097 \pm 0.026 \pm 0.016$ from LIBBY 09, B($\psi(2S) \to X J/\psi$) relative and absolute branching fractions from MENDEZ 08, B($\psi(2S) \to \gamma\eta_c$) from MITCHELL 09, and B($\psi(2S) \to$ virtual $\gamma \to$ hadrons), B($\psi(2S) \to \gamma\chi_{cJ}$), and B($\psi(2S) \to \ell^+\ell^-$) from PDG 08. The statistical error is negligible and the systematic error is largely uncorrelated with that of $\Gamma(\gamma gg)/\Gamma_{total}$ LIBBY 09 measurement.

$\Gamma(\gamma gg)/\Gamma_{total}$ Γ_4/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.025±0.288	200 k	[1] LIBBY	09	CLEO	$\psi(2S) \to \gamma +$ hadrons

[1] Calculated using $\Gamma(\gamma gg)/\Gamma(ggg) = 0.097 \pm 0.026 \pm 0.016$ from LIBBY 09. The statistical error is negligible and the systematic error is largely uncorrelated with that of $\Gamma(ggg)/\Gamma_{total}$ LIBBY 09 measurement.

$\Gamma(\gamma gg)/\Gamma(ggg)$ Γ_4/Γ_3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.7±2.6±1.6	2.9 M	LIBBY	09	CLEO	$\psi(2S) \to (\gamma +)$ hadrons

$\Gamma(\text{light hadrons})/\Gamma_{total}$ Γ_5/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.154±0.015	[1] MENDEZ	08	CLEO	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.169±0.026	[2] ADAM	05A	CLEO	$e^+e^- \to \psi(2S)$

[1] Uses B($\psi(2S) \to J/\psi X$) from MENDEZ 08 and other branching fractions from PDG 07.

[2] Uses B($J/\psi X$) from ADAM 05A, B($\chi_{cJ}\gamma$), B($\eta_c\gamma$) from ATHAR 04 and B($\ell^+\ell^-$) from PDG 04. Superseded by MENDEZ 08.

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_6/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
78.9± 1.7 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
88 ±13	[1] FELDMAN	77	RVUE	e^+e^-

[1] From an overall fit assuming equal partial widths for e^+e^- and $\mu^+\mu^-$. For a measurement of the ratio see the entry $\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ below. Includes LUTH 75, HILGER 75, BURMESTER 77.

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_7/Γ

VALUE (units 10^{-4})	DOCUMENT ID
79±9 OUR FIT	

$\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ Γ_7/Γ_6

VALUE	DOCUMENT ID		TECN	COMMENT
1.00±0.11 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.89±0.16	BOYARSKI	75C	MRK1	e^+e^-

$\Gamma(\tau^+\tau^-)/\Gamma_{total}$ — Γ_8/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
31 ±4 OUR FIT			
30.8±2.1±3.8	[1] ABLIKIM 06W	BES	$e^+e^- \to \psi(2S)$

[1] Computed using PDG 02 value of B($\psi(2S) \to$ hadrons) = 0.9810 ± 0.0030 to estimate the total number of $\psi(2S)$ events.

DECAYS INTO $J/\psi(1S)$ AND ANYTHING

$\Gamma(J/\psi(1S)\,\text{anything})/\Gamma_{total}$ — Γ_9/Γ

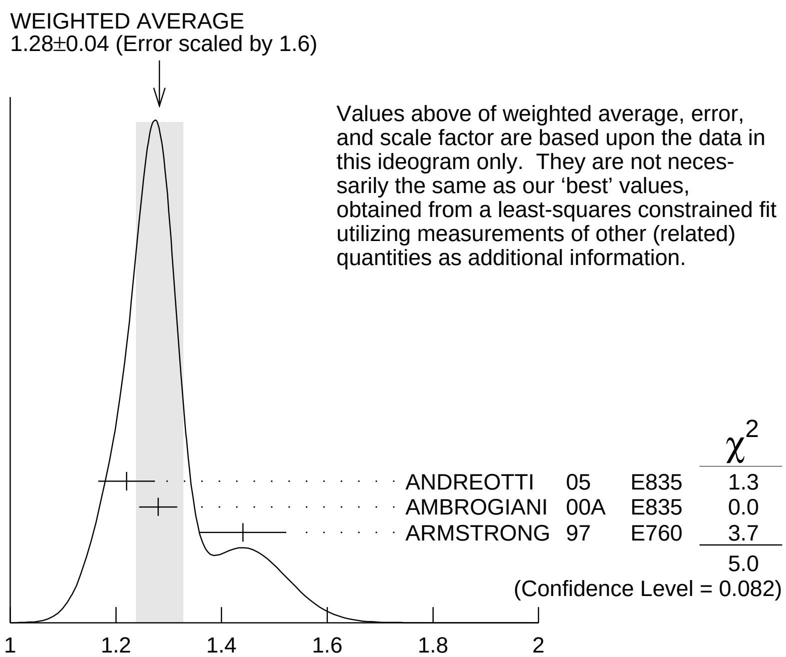
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.609 ±0.006 OUR FIT				
0.55 ±0.07 OUR AVERAGE				
0.51 ±0.12		BRANDELIK 79C	DASP	$e^+e^- \to \mu^+\mu^- X$
0.57 ±0.08		ABRAMS 75B	MRK1	$e^+e^- \to \mu^+\mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.6254±0.0016±0.0155	1.1M	[1] MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^- X$
0.5950±0.0015±0.0190	151k	ADAM 05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other measurements of MENDEZ 08.

$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\,\text{anything})$

$$\Gamma_6/\Gamma_9 = \Gamma_6/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13}+0.339\Gamma_{129}+0.192\Gamma_{130})$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.295±0.026 OUR FIT				
1.28 ±0.04 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.				
1.22 ±0.02 ±0.05	5097 ± 73	[1] ANDREOTTI 05	E835	$p\overline{p} \to \psi(2S) \to e^+e^-$
1.28 ±0.03 ±0.02		[1] AMBROGIANI 00A	E835	$p\overline{p} \to \psi(2S)$
1.44 ±0.08 ±0.02		[1] ARMSTRONG 97	E760	$\overline{p}p \to \psi(2S)$



$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\,\text{anything})$ (units 10^{-2})

[1] Using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010.

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\text{anything})$ $\Gamma_7/\Gamma_9 = \Gamma_7/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13}+0.339\Gamma_{129}+0.192\Gamma_{130})$

VALUE	DOCUMENT ID		TECN	COMMENT
0.0130±0.0014 OUR FIT				
0.014 ±0.003	HILGER	75	SPEC	e^+e^-

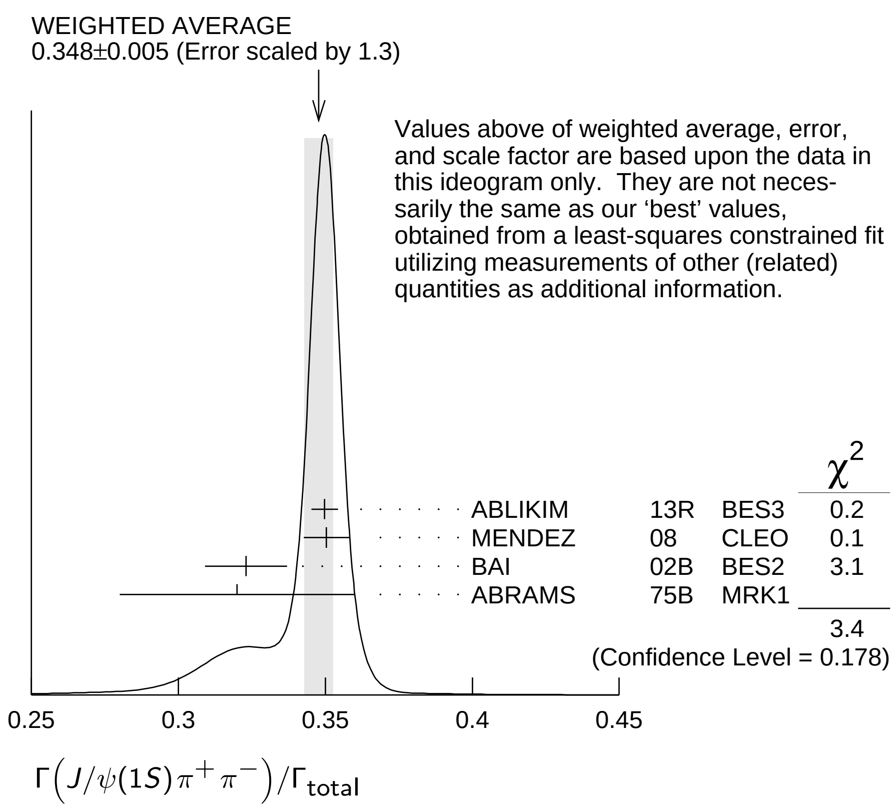
$\Gamma(J/\psi(1S)\text{neutrals})/\Gamma_{total}$ Γ_{10}/Γ

VALUE	DOCUMENT ID
0.2510±0.0033 OUR FIT	

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{total}$ Γ_{11}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.3445±0.0030 OUR FIT					
0.348 ±0.005 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
0.3498±0.0002±0.0045	20M	ABLIKIM	13R	BES3	$\psi(2S) \to J/\psi\pi^+\pi^-$
0.3504±0.0007±0.0077	565k	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\pi^+\pi^-$
0.323 ±0.014		BAI	02B	BES2	e^+e^-
0.32 ±0.04		ABRAMS	75B	MRK1	$e^+e^- \to J/\psi\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.3354±0.0014±0.0110	60k	[1] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other values reported by ADAM 05A.



$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_6/Γ_{11}

VALUE	DOCUMENT ID		TECN	COMMENT
0.0229±0.0005 OUR FIT				
0.0252±0.0028±0.0011	[1] AUBERT	02B	BABR	e^+e^-

[1] Using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010.

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_7/Γ_{11}

VALUE	DOCUMENT ID		TECN	COMMENT
0.0229±0.0025 OUR FIT				
0.0224±0.0029 OUR AVERAGE				
0.0216±0.0026±0.0014	[1] AUBERT	02B	BABR	e^+e^-
0.0327±0.0077±0.0072	[1] GRIBUSHIN	96	FMPS	515 π^- Be $\to 2\mu X$

[1] Using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010.

$\Gamma(\tau^+\tau^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_8/Γ_{11}

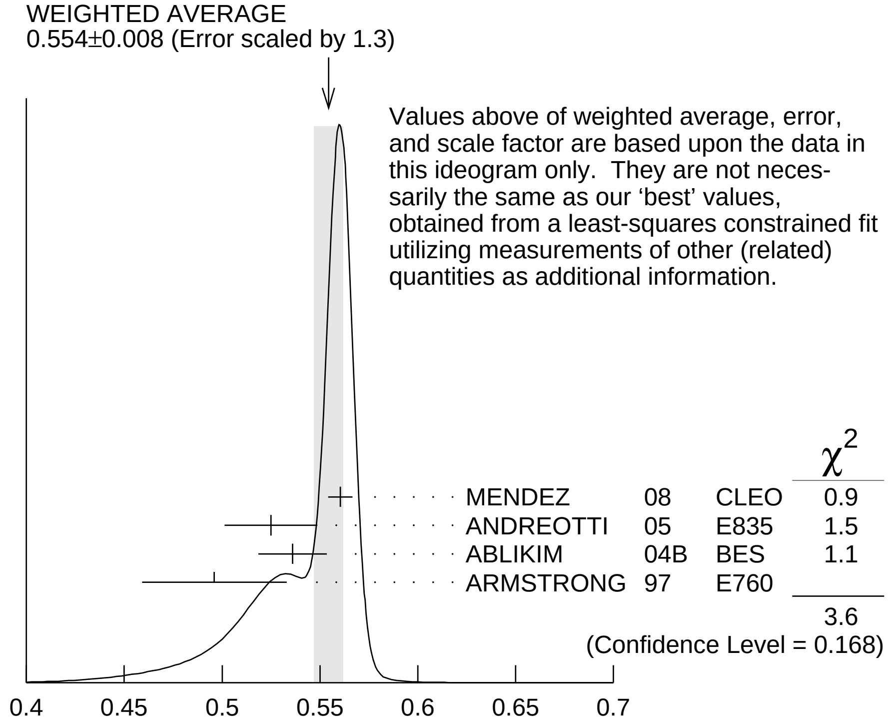
VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.9 ±1.1 OUR FIT				
8.73±1.39±1.57	BAI	02	BES	e^+e^-

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\text{anything})$ — Γ_{11}/Γ_9

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.5654±0.0026 OUR FIT					
0.554 ±0.008 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.					
0.5604±0.0009±0.0062	565k	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\pi^+\pi^-$
0.525 ±0.009 ±0.022	4k	ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$
0.536 ±0.007 ±0.016	20k	[1,2] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
0.496 ±0.037		ARMSTRONG	97	E760	$\overline{p}p \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.5637±0.0027±0.0046	60k	ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] From a fit to the J/ψ recoil mass spectra.

[2] ABLIKIM 04B quotes B($\psi(2S) \to J/\psi X$) / B($\psi(2S) \to J/\psi\pi^+\pi^-$).



$\Gamma\big(J/\psi(1S)\pi^+\pi^-\big)/\Gamma\big(J/\psi(1S)\,\text{anything}\big)$ $\qquad\Gamma_{11}/\Gamma_9$

$\Gamma\big(J/\psi(1S)\,\text{neutrals}\big)/\Gamma\big(J/\psi(1S)\pi^+\pi^-\big)$
$\Gamma_{10}/\Gamma_{11} = (0.9761\Gamma_{12}+0.719\Gamma_{13}+0.339\Gamma_{129}+0.192\Gamma_{130})/\Gamma_{11}$

VALUE	DOCUMENT ID	TECN	COMMENT
0.729±0.008 OUR FIT			
0.73 ±0.09	TANENBAUM 76	MRK1	e^+e^-

$\Gamma\big(J/\psi(1S)\pi^0\pi^0\big)/\Gamma_{\text{total}}$ $\qquad\Gamma_{12}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.1813±0.0031 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.1769±0.0008±0.0053	61k	[1] MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^- 2\pi^0$
0.1652±0.0014±0.0058	13.4k	[2] ADAM 05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other measurements of MENDEZ 08.
[2] Not independent from other values reported by ADAM 05A.

$\Gamma\big(J/\psi(1S)\pi^0\pi^0\big)/\Gamma\big(J/\psi(1S)\,\text{anything}\big)$ $\qquad\Gamma_{12}/\Gamma_9$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.2976±0.0031 OUR FIT				
0.320 ±0.012 OUR AVERAGE				
0.300 ±0.008 ±0.022	1655 ± 44	ANDREOTTI 05	E835	$\psi(2S) \to J/\psi X$
0.328 ±0.013 ±0.008		AMBROGIANI 00A	E835	$p\overline{p} \to \psi(2S)$
0.323 ±0.033		ARMSTRONG 97	E760	$\overline{p}p \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.2829±0.0012±0.0056	61k	MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^- 2\pi^0$
0.2776±0.0025±0.0043	13.4k	ADAM 05A	CLEO	Repl. by MENDEZ 08

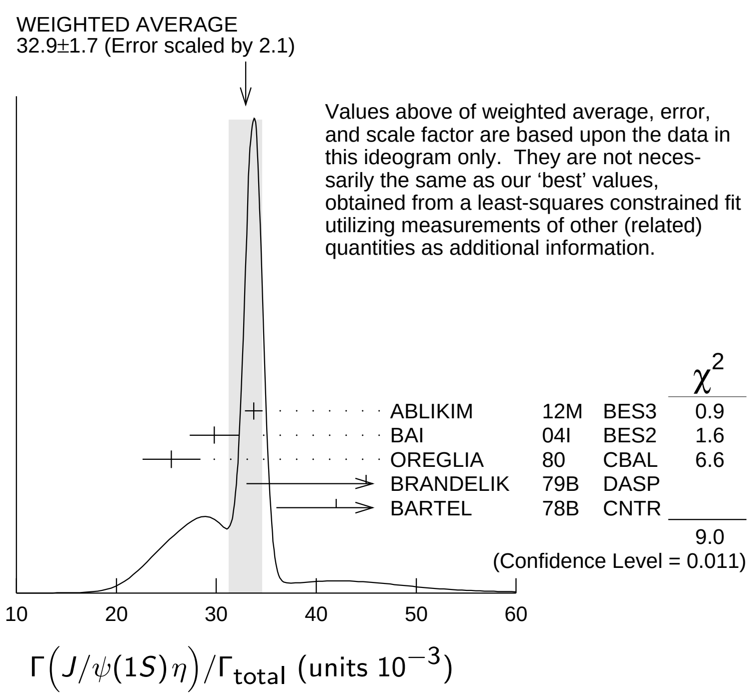
$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{12}/Γ_{11}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.526 ±0.008 OUR FIT				
0.513 ±0.022 OUR AVERAGE Error includes scale factor of 2.2.				
0.5047±0.0022±0.0102	61k	MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^- 2\pi^0$
0.570 ±0.009 ±0.026	14k	[1] ABLIKIM 04B	BES	$\psi(2S) \to J/\psi X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.4924±0.0047±0.0086	73k	[2,3] ADAM 05A	CLEO	Repl. by MENDEZ 08
0.571 ±0.018 ±0.044		[4] ANDREOTTI 05	E835	$\psi(2S) \to J/\psi X$
0.53 ±0.06		TANENBAUM 76	MRK1	e^+e^-
0.64 ±0.15		[5] HILGER 75	SPEC	e^+e^-

[1] From a fit to the J/ψ recoil mass spectra.
[2] Not independent from other values reported by ADAM 05A.
[3] Using 13,217 $J/\psi\pi^0\pi^0$ and 60,010 $J/\psi\pi^+\pi^-$ events.
[4] Not independent from other values reported by ANDREOTTI 05.
[5] Ignoring the $J/\psi(1S)\eta$ and $J/\psi(1S)\gamma\gamma$ decays.

$\Gamma(J/\psi(1S)\eta)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
33.6 ± 0.5 OUR FIT				
32.9 ± 1.7 OUR AVERAGE Error includes scale factor of 2.1. See the ideogram below.				
33.75± 0.17±0.86	68.2k	ABLIKIM 12M	BES3	$e^+e^- \to \ell^+\ell^- 2\gamma$
29.8 ± 0.9 ±2.3	5.7k	BAI 04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
25.5 ± 2.9	386	[1] OREGLIA 80	CBAL	$e^+e^- \to J/\psi 2\gamma$
45 ±12	17	[2] BRANDELIK 79B	DASP	$e^+e^- \to J/\psi 2\gamma$
42 ± 6	164	[2] BARTEL 78B	CNTR	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
34.3 ± 0.4 ±0.9	18.4k	[3] MENDEZ 08	CLEO	$\psi(2S) \to \ell^+\ell^-\eta$
32.5 ± 0.6 ±1.1	2.8k	[4] ADAM 05A	CLEO	Repl. by MENDEZ 08
43 ± 8	44	TANENBAUM 76	MRK1	e^+e^-

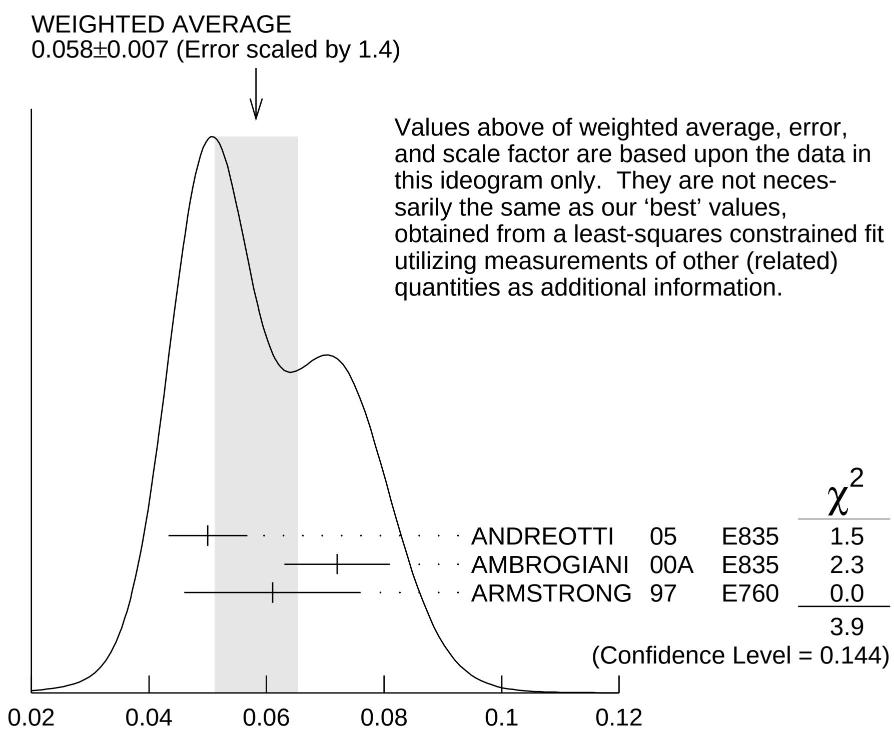


[1] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020.
[2] Recalculated by us using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010.
[3] Not independent from other measurements of MENDEZ 08.
[4] Not independent from other values reported by ADAM 05A.

$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\text{anything})$ — Γ_{13}/Γ_9

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0551±0.0008 OUR FIT					
0.058 ±0.007 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
0.050 ±0.006 ±0.003	298 ± 20	ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$
0.072 ±0.009		AMBROGIANI	00A	E835	$p\overline{p} \to \psi(2S)$
0.061 ±0.015		ARMSTRONG	97	E760	$\overline{p}p \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0549±0.0006±0.0009	18.4k	[1] MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\eta$
0.0546±0.0010±0.0007	2.8k	ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Not independent from other measurements of MENDEZ 08.



$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\text{anything})$ Γ_{13}/Γ_9

$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{13}/Γ_{11}

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0975±0.0014 OUR FIT					
0.0979±0.0018 OUR AVERAGE					
0.0979±0.0010±0.0015	18.4k	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\eta$
0.098 ±0.005 ±0.010	2k	[1] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
0.091 ±0.021		[2] HIMEL	80	MRK2	$e^+e^- \to \psi(2S)X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					

$0.0968\pm0.0019\pm0.0013$	2.8k	[3] ADAM	05A	CLEO	Repl. by MENDEZ 08
$0.095\ \pm0.007\ \pm0.007$		[4] ANDREOTTI	05	E835	$\psi(2S)\to J/\psi X$

[1] From a fit to the J/ψ recoil mass spectra.
[2] The value for B($\psi(2S)\to J/\psi(1s)\eta$) reported in HIMEL 80 is derived using B($\psi(2S))\to J/\psi(1S)\pi^+\pi^-) = (33\pm3))$% and B($J/\psi(1S)\to \ell^+\ell^-) = 0.138\pm0.018$. Calculated by us using B($J/\psi(1S)\to \ell^+\ell^-) = (0.1181\pm0.0020)$.
[3] Not independent from other values reported by ADAM 05A.
[4] Not independent from other values reported by ANDREOTTI 05.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{total}$ — Γ_{14}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12.68±0.32 OUR AVERAGE					
$12.6\ \pm0.2\ \pm0.3$	4.1k	ABLIKIM	12M	BES3	$e^+e^-\to \ell^+\ell^-2\gamma$
$13.3\ \pm0.8\ \pm0.3$	530	MENDEZ	08	CLEO	$\psi(2S)\to \ell^+\ell^-2\gamma$
$14.3\ \pm1.4\ \pm1.2$	280	BAI	04I	BES2	$\psi(2S)\to J/\psi\gamma\gamma$
$14\ \pm6$	7	HIMEL	80	MRK2	e^+e^-
$9\ \pm2\ \pm1$	23	[1] OREGLIA	80	CBAL	$\psi(2S)\to J/\psi 2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$13\ \pm1\ \pm1$	88	ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Recalculated by us using B($J/\psi(1S)\to \ell^+\ell^-) = 0.1181\pm0.0020$.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma(J/\psi(1S)\text{anything})$
$\Gamma_{14}/\Gamma_9 = \Gamma_{14}/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13}+0.339\Gamma_{129}+0.192\Gamma_{130})$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.213\pm0.012\pm0.003$	527	[1] MENDEZ	08	CLEO	$e^+e^-\to J/\psi\gamma\gamma$
$0.22\ \pm0.02\ \pm0.01$		[2] ADAM	05A	CLEO	$e^+e^-\to \psi(2S)\to J/\psi\gamma\gamma$

[1] Not independent from other values reported by MENDEZ 08. Supersedes ADAM 05A.
[2] Not independent from other values reported by ADAM 05A.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{14}/Γ_{11}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.380\pm0.022\pm0.005$	527	[1] MENDEZ	08	CLEO	$e^+e^-\to J/\psi\gamma\gamma$
$0.39\ \pm0.04\ \pm0.01$		[2] ADAM	05A	CLEO	$e^+e^-\to \psi(2S)\to J/\psi\gamma\gamma$

[1] Not independent from other values reported by MENDEZ 08. Supersedes ADAM 05A.
[2] Not independent from other values reported by ADAM 05A.

HADRONIC DECAYS

$\Gamma(\pi^0 h_c(1P))/\Gamma_{total}$ — Γ_{15}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.6±1.3 OUR AVERAGE					
$9.0\pm1.5\pm1.3$	3k	[1] GE	11	CLEO	$\psi(2S)\to \pi^0$ anything
$8.4\pm1.3\pm1.0$	11k	ABLIKIM	10B	BES3	$\psi(2S)\to \pi^0 h_c$

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

seen	92^{+23}_{-22}	ADAMS	09	CLEO	$\psi(2S) \to 2\pi^+ 2\pi^- 2\pi^0$
seen	1282	DOBBS	08A	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$
seen	168 ± 40	ROSNER	05	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$

[1] Assuming a width $\Gamma(h_c(1P)) = 0.86$ MeV $\equiv \Gamma_0$, a measured dependence of the central value of $B = (7.6 + 1.4 \times \Gamma(h_c(1P)/\Gamma_0) \times 10^{-4}$, and with a systematic error that accounts for the width variation range 0.43–1.29 MeV.

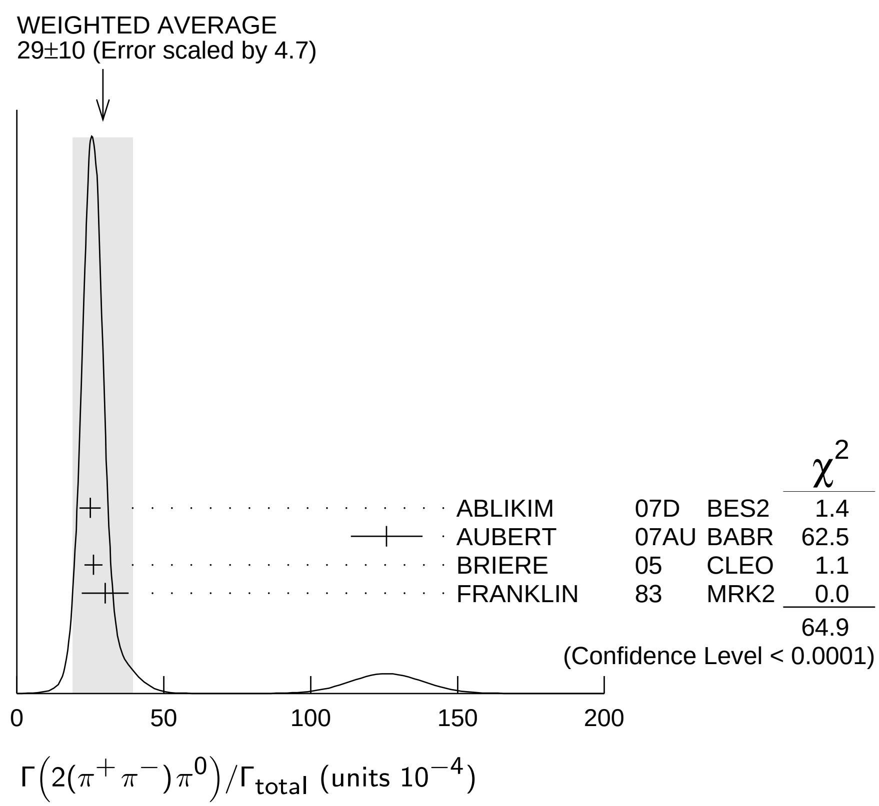
$\Gamma\big(3(\pi^+\pi^-)\pi^0\big)/\Gamma_{total}$ Γ_{16}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
35±16	6	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

$\Gamma\big(2(\pi^+\pi^-)\pi^0\big)/\Gamma_{total}$ Γ_{17}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
29 ±10 OUR AVERAGE		Error includes scale factor of 4.7. See the ideogram below.			
$24.9 \pm 0.7 \pm 3.6$	2173	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$
$126 \pm 12 \pm 2$	410	[1] AUBERT	07AU	BABR	$10.6\ e^+e^- \to 2(\pi^+\pi^-)\pi^0\gamma$
$26.1 \pm 0.7 \pm 3.0$	1703	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)\pi^0$
30 ± 8	42	FRANKLIN	83	MRK2	e^+e^-

[1] AUBERT 07AU reports $[\Gamma\big(\psi(2S) \to 2(\pi^+\pi^-)\pi^0\big)/\Gamma_{total}] \times [\Gamma\big(\psi(2S) \to e^+e^-\big)] = (297 \pm 22 \pm 18) \times 10^{-4}$ keV which we divide by our best value $\Gamma\big(\psi(2S) \to e^+e^-\big) = 2.36 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

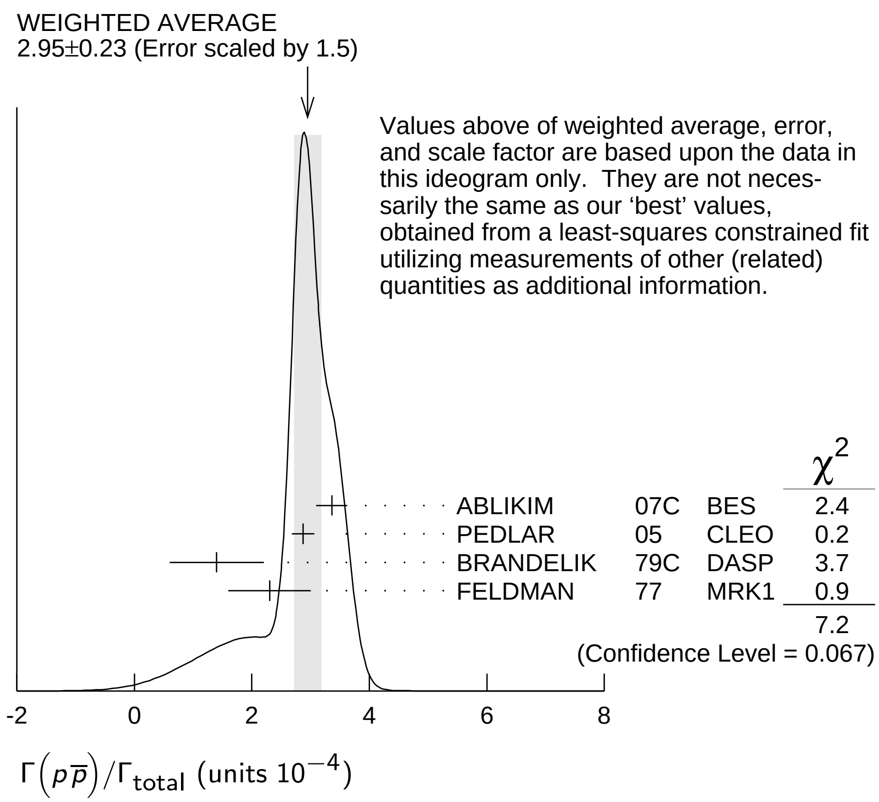


$\Gamma(\rho a_2(1320))/\Gamma_{total}$ — Γ_{18}/Γ

VALUE (units 10^{-4})	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.55±0.73±0.47		112 ± 31	BAI	04C	BES2	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.3	90		BAI	98J	BES	e^+e^-

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{19}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.80±0.11 OUR FIT					
2.95±0.23 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.				
3.36±0.09±0.25	1618	ABLIKIM	07C	BES	$e^+e^- \to \psi(2S) \to p\overline{p}$
2.87±0.12±0.15	557	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}$
1.4 ±0.8	4	BRANDELIK	79C	DASP	$e^+e^- \to \psi(2S) \to p\overline{p}$
2.3 ±0.7		FELDMAN	77	MRK1	$e^+e^- \to \psi(2S) \to p\overline{p}$



$\Gamma(p\overline{p})/\Gamma(J/\psi(1S)\pi^+\pi^-)$ — Γ_{19}/Γ_{11}

VALUE (units 10^{-4})	*DOCUMENT ID*		*TECN*	*COMMENT*
8.13±0.32 OUR FIT				
6.98±0.49±0.97	BAI	01	BES	$e^+e^- \to \psi(2S) \to p\overline{p}$

$\Gamma(\Delta^{++}\overline{\Delta}^{--})/\Gamma_{total}$ — Γ_{20}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
12.8±1.0±3.4	157	[1] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

[1] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ — Γ_{21}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 0.29	90	[1] ABLIKIM	13F	BES3	$\psi(2S) \to p\overline{p}\pi^+\pi^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<12	90	[2] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

[1] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\pi^0 \to \gamma\gamma$) = 98.8%.
[2] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\eta \to \gamma\gamma$) = 39.4%.

$\Gamma(\Lambda\overline{\Lambda}\eta)/\Gamma_{total}$ — Γ_{22}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.48±0.34±0.19		60	[1] ABLIKIM	13F	BES3	$\psi(2S) \to p\overline{p}\pi^+\pi^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<4.9	90		[2] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

[1] Using B($\Lambda \to \pi^- p$) = 63.9% and B($\eta \to \gamma\gamma$) = 39.31%.
[2] Using B($\Lambda \to \pi^- p$) = 63.9%.

$\Gamma(\Lambda\overline{p}K^+)/\Gamma_{total}$ — Γ_{23}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.0±0.1±0.1	74.0	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+\pi^-$

$\Gamma(\Lambda\overline{p}K^+\pi^+\pi^-)/\Gamma_{total}$ — Γ_{24}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±0.3±0.3	45.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+\pi^+\pi^-\pi^-$

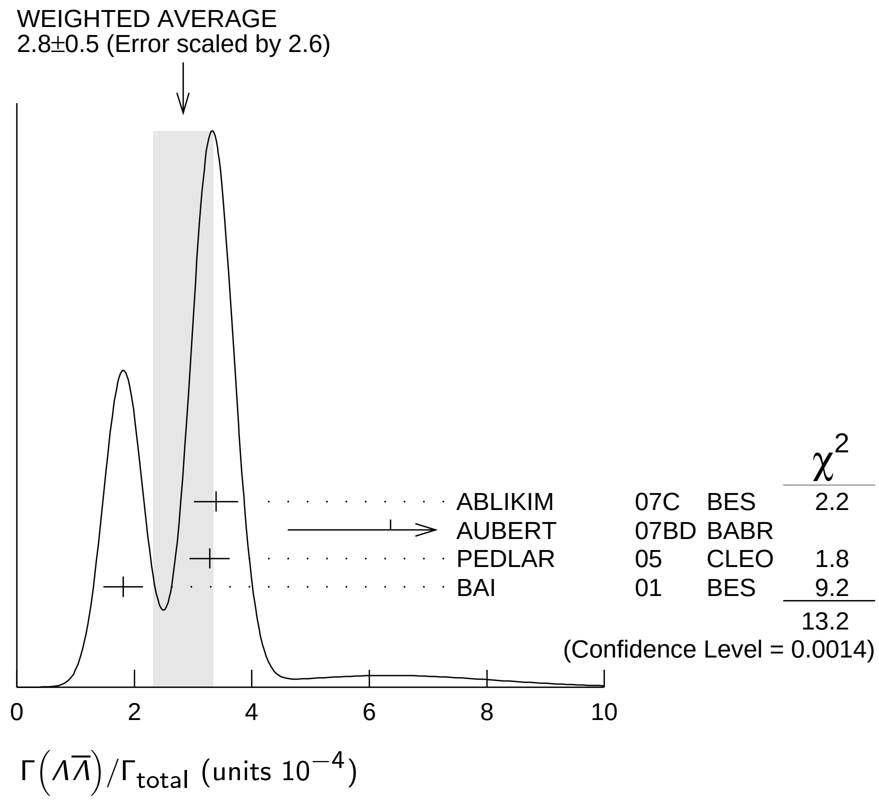
$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{25}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.4±0.5	73.4	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}2(\pi^+\pi^-)$

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{26}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.8 ±0.5 OUR AVERAGE			Error includes scale factor of 2.6. See the ideogram below.			
3.39±0.20±0.32		337	ABLIKIM	07C	BES	$e^+e^- \to \psi(2S) \to$ hadrons
6.4 ±1.7 ±0.1			[1] AUBERT	07BD	BABR	10.6 $e^+e^- \to \Lambda\overline{\Lambda}\gamma$
3.28±0.23±0.25		208	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
1.81±0.20±0.27		80	[2] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 4	90		FELDMAN	77	MRK1	$e^+e^- \to \psi(2S) \to$ hadrons

[1] AUBERT 07BD reports [$\Gamma(\psi(2S) \to \Lambda\overline{\Lambda})/\Gamma_{total}$] × [$\Gamma(\psi(2S) \to e^+e^-)$] = (15 ± 4 ± 1) × 10^{-4} keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-)$ = 2.36 ± 0.04 keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[2] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.



$\Gamma(\Lambda\overline{\Sigma}^+\pi^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{27}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.40±0.03±0.13	2.8k	ABLIKIM	13W	BES3	$\psi(2S) \to$ hadrons

$\Gamma(\Lambda\overline{\Sigma}^-\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{28}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.54±0.04±0.13	2.8k	ABLIKIM	13W	BES3	$\psi(2S) \to$ hadrons

$\Gamma(\Sigma^0\overline{p}K^+ + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{29}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.67±0.13±0.12	276	[1] ABLIKIM	13D	BES3	$\psi(2S) \to \gamma\Lambda\overline{p}K^+$

[1] Using B($\Lambda \to p\pi^-$) = 63.9%, and B($\Sigma^0 \to \Lambda\gamma$) = 100%.

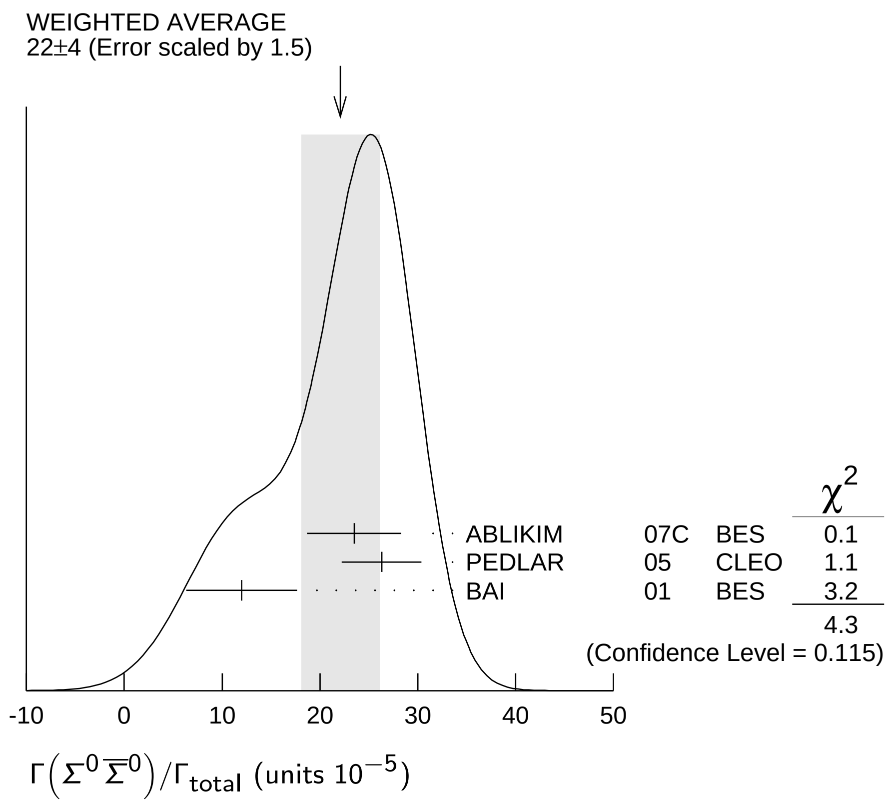
$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{\text{total}}$ — Γ_{30}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
25.7±4.4±6.8	35	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{\text{total}}$ — Γ_{31}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
22 ±4 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.				
23.5±3.6±3.2	59	ABLIKIM	07C	BES	$e^+e^- \to \psi(2S) \to$ hadrons
26.3±3.5±2.1	58	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
12 ±4 ±4	8	[1] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

[1] Estimated using B($\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$)= 0.310 ± 0.028.



$\Gamma\left(\Sigma(1385)^+\overline{\Sigma}(1385)^-\right)/\Gamma_{total}$ — Γ_{32}/Γ

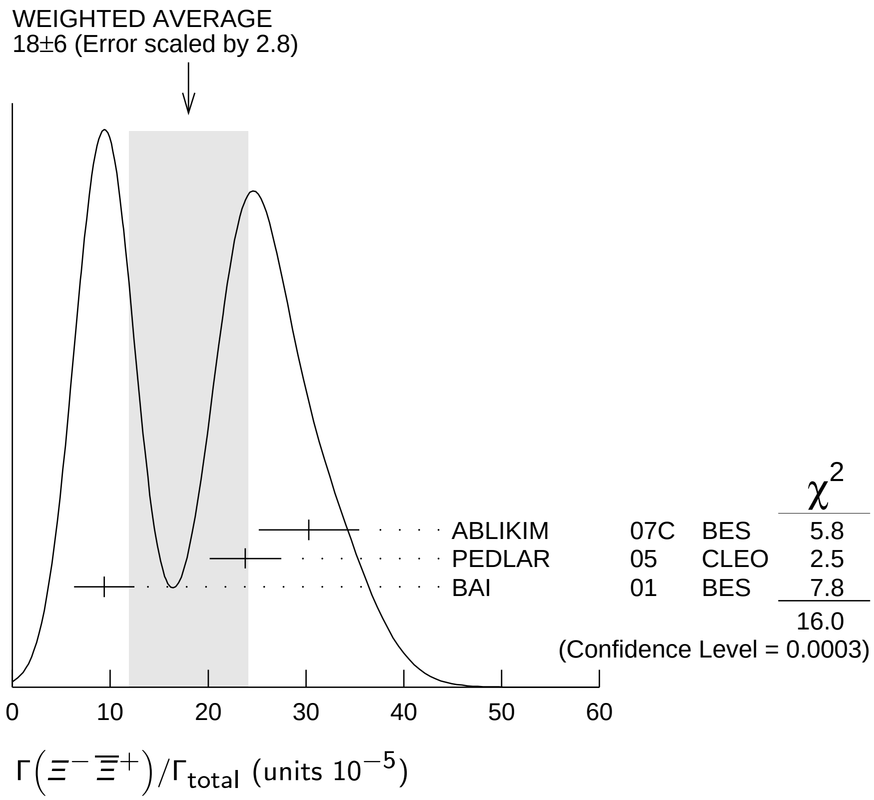
VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
11±3±3	14	[1] BAI	01	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[1] Estimated using B($\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$)= 0.310 ± 0.028.

$\Gamma\left(\Xi^-\overline{\Xi}^+\right)/\Gamma_{total}$ — Γ_{33}/Γ

VALUE (units 10^{-5})	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
18 ±6 OUR AVERAGE			Error includes scale factor of 2.8. See the ideogram below.			
30.3±4.0±3.2		67	ABLIKIM	07C	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
23.8±3.0±2.1		63	PEDLAR	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
9.4±2.7±1.5		12	[1] BAI	01	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<20	90		FELDMAN	77	MRK1	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[1] Estimated using B($\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$)= 0.310 ± 0.028.



$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{total}$ — Γ_{34}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
27.5±6.4±6.1	19	PEDLAR	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

$\Gamma(\Xi(1530)^0\overline{\Xi}(1530)^0)/\Gamma_{total}$ — Γ_{35}/Γ

VALUE (units 10^{-5})	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$5.2\pm0.3^{+3.2}_{-1.2}$		527	[1] ABLIKIM	13S	BES3	$\psi(2S) \rightarrow \eta p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<32	90		PEDLAR	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
< 8.1	90		[2] BAI	01	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[1] With $N(1535)$ decaying to $p\eta$.
[2] Estimated using B($\psi(2S) \rightarrow J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

$\Gamma(\Omega^-\overline{\Omega}^+)/\Gamma_{total}$ — Γ_{36}/Γ

VALUE (units 10^{-5})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
< 7.3	90	[1] BAI	01	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<15	90	ABLIKIM	12Q	BES2	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
<16	90	PEDLAR	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

[1] Estimated using B($\psi(2S) \rightarrow J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.

$\Gamma(\pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{37}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.53±0.07 OUR AVERAGE					
1.65±0.03±0.15	4.5k	ABLIKIM	13A	BES3	$\psi(2S) \to p\overline{p}\pi^0$
1.54±0.06±0.06	948	ALEXANDER	10	CLEO	$\psi(2S) \to \pi^0 p\overline{p}$
1.32±0.10±0.15	256 ± 18	[1] ABLIKIM	05E	BES2	$e^+e^- \to \psi(2S) \to p\overline{p}\gamma\gamma$
1.4 ±0.5	9	FRANKLIN	83	MRK2	e^+e^-

[1] Computed using B($\pi^0 \to \gamma\gamma$) = (98.80 ± 0.03)%.

$\Gamma(N(940)\overline{p}+ \text{c.c.} \to \pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{38}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{6.42\pm0.20^{+1.78}_{-1.28}}$	1.9k	[1] ABLIKIM	13A	BES3	$\psi(2S) \to p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

$\Gamma(N(1440)\overline{p}+ \text{c.c.} \to \pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{39}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{7.3\ ^{+1.7}_{-1.5}}$ **OUR AVERAGE** Error includes scale factor of 2.5.					
$3.58\pm0.25^{+1.59}_{-0.84}$	1.1k	[1] ABLIKIM	13A	BES3	$\psi(2S) \to p\overline{p}\pi^0$
8.1 ±0.7 ±0.3	474	[2] ALEXANDER	10	CLEO	$\psi(2S) \to \pi^0 p\overline{p}$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.
[2] From a fit of the $p\overline{p}$ and $p\pi^0$ mass distributions to a combination of $N(1440)\overline{p}$, $\pi^0 f_0(2100)$, and two other broad, unestablished resonances.

$\Gamma(N(1520)\overline{p}+ \text{c.c.} \to \pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{40}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.64\pm0.05^{+0.22}_{-0.17}}$	0.2k	[1] ABLIKIM	13A	BES3	$\psi(2S) \to p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

$\Gamma(N(1535)\overline{p}+ \text{c.c.} \to \pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{41}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.47\pm0.28^{+0.99}_{-0.97}}$	0.7k	[1] ABLIKIM	13A	BES3	$\psi(2S) \to p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

$\Gamma(N(1650)\overline{p}+ \text{c.c.} \to \pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{42}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{3.76\pm0.28^{+1.37}_{-1.66}}$	1.1k	[1] ABLIKIM	13A	BES3	$\psi(2S) \to p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

$\Gamma(N(1720)\overline{p} + c.c. \rightarrow \pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{43}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.79\pm0.10^{+0.24}_{-0.71}$	0.5k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

$\Gamma(N(2300)\overline{p} + c.c. \rightarrow \pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{44}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.62\pm0.28^{+1.12}_{-0.64}$	0.9k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

$\Gamma(N(2570)\overline{p} + c.c. \rightarrow \pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{45}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.13\pm0.08^{+0.40}_{-0.30}$	0.8k	[1] ABLIKIM	13A	BES3	$\psi(2S) \rightarrow p\overline{p}\pi^0$

[1] From a fit of $\pi^0 p\overline{p}$ data to eight distinct intermediate $N\overline{p}$ resonant states.

$\Gamma(\pi^0 f_0(2100) \rightarrow \pi^0 p\overline{p})/\Gamma_{total}$ — Γ_{46}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.4±0.1	76	[1] ALEXANDER	10	CLEO	$\psi(2S) \rightarrow \pi^0 p\overline{p}$

[1] From a fit of the $p\overline{p}$ and $p\pi^0$ mass distributions to a combination of $N_1^*(1440)\overline{p}$, $\pi^0 f_0(2100)$, and two other broad, unestablished resonances.

$\Gamma(\eta p\overline{p})/\Gamma_{total}$ — Γ_{47}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.0±0.4 OUR AVERAGE					
6.4±0.2±0.6	679	[1] ABLIKIM	13S	BES3	$\psi(2S) \rightarrow \eta p\overline{p}$
5.6±0.6±0.3	154	[1] ALEXANDER	10	CLEO	$\psi(2S) \rightarrow \eta p\overline{p}$
5.8±1.1±0.7	44.8 ± 8.5	[2] ABLIKIM	05E	BES2	$e^+e^- \rightarrow \psi(2S) \rightarrow p\overline{p}\gamma\gamma$
8 ±3 ±3	9.8	BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow p\overline{p}\pi^+\pi^-\pi^0$

[1] With $N(1535)$ decaying to $p\eta$.
[2] Computed using B($\eta \rightarrow \gamma\gamma$) = (39.43 ± 0.26)%.

$\Gamma(\eta f_0(2100) \rightarrow \eta p\overline{p})/\Gamma_{total}$ — Γ_{48}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.4±0.1	31	[1] ALEXANDER	10	CLEO	$\psi(2S) \rightarrow \eta p\overline{p}$

[1] From a fit of the $p\overline{p}$ and $p\eta$ distributions to a combination of $N^*(1535)\overline{p}$ and $\eta f_0(2100)$.

$\Gamma(N(1535)\overline{p} \rightarrow \eta p\overline{p})/\Gamma_{total}$ — Γ_{49}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±0.6±0.3	123	[1] ALEXANDER	10	CLEO	$\psi(2S) \rightarrow \eta p\overline{p}$

[1] From a fit of the $p\overline{p}$ and $p\eta$ distributions to a combination of $N^*(1535)\overline{p}$ and $\eta f_0(2100)$.

$\Gamma(\omega p\overline{p})/\Gamma_{total}$ Γ_{50}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.69±0.21 OUR AVERAGE					
0.6 ±0.2 ±0.2	21.2	BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow p\overline{p}\pi^+\pi^-\pi^0$
0.8 ±0.3 ±0.1	14.9 ± 0.1	[1] BAI	03B	BES	$\psi(2S) \rightarrow p\overline{p}\pi^+\pi^-\pi^0$

[1] Normalized to B($\psi(2S) \rightarrow J/\psi\pi^+\pi^-$) = 0.305 ± 0.016.

$\Gamma(\phi p\overline{p})/\Gamma_{total}$ Γ_{51}/Γ

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.24	90	BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow p\overline{p}K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.26	90	[1] BAI	03B	BES	$\psi(2S) \rightarrow K^+K^-p\overline{p}$

[1] Normalized to B($\psi(2S) \rightarrow J/\psi\pi^+\pi^-$) = 0.305 ± 0.016.

$\Gamma(\pi^+\pi^-p\overline{p})/\Gamma_{total}$ Γ_{52}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
6.0±0.4 OUR AVERAGE					
5.9±0.2±0.4	904.5	BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow p\overline{p}\pi^+\pi^-$
8 ±2		[1] TANENBAUM	78	MRK1	e^+e^-

[1] Assuming entirely strong decay.

$\Gamma(p\overline{n}\pi^-$ or c.c.$)/\Gamma_{total}$ Γ_{53}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.48±0.17 OUR AVERAGE					
2.45±0.11±0.21	851	ABLIKIM	06I	BES2	$e^+e^- \rightarrow p\pi^-X$
2.52±0.12±0.22	849	ABLIKIM	06I	BES2	$e^+e^- \rightarrow \overline{p}\pi^+X$

$\Gamma(p\overline{n}\pi^-\pi^0)/\Gamma_{total}$ Γ_{54}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3.18±0.50±0.50	135 ± 21	ABLIKIM	06I	BES2	$e^+e^- \rightarrow p\pi^-\pi^0X$

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{56}/Γ

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<1.6	90	BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$

$\Gamma(\eta\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{57}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
9.5±0.7±1.5		[1] BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadr
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10.3±0.8±1.4	201.7	[2] BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow \eta 3\pi(\eta \rightarrow \gamma\gamma)$
8.1±1.4±1.6	50.0	[2] BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow \eta 3\pi(\eta \rightarrow 3\pi)$

[1] Average of $\eta \to \gamma\gamma$ and $\eta \to 3\pi$.
[2] Not independent from other values reported by BRIERE 05.

$\Gamma(2(\pi^+\pi^-)\eta)/\Gamma_{total}$ — Γ_{58}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.6±0.1	16	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)\eta\gamma$

[1] AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot B(\psi(2S) \to 2(\pi^+\pi)\eta) \cdot B(\eta \to \gamma\gamma) = 1.2 \pm 0.7 \pm 0.1$ eV.

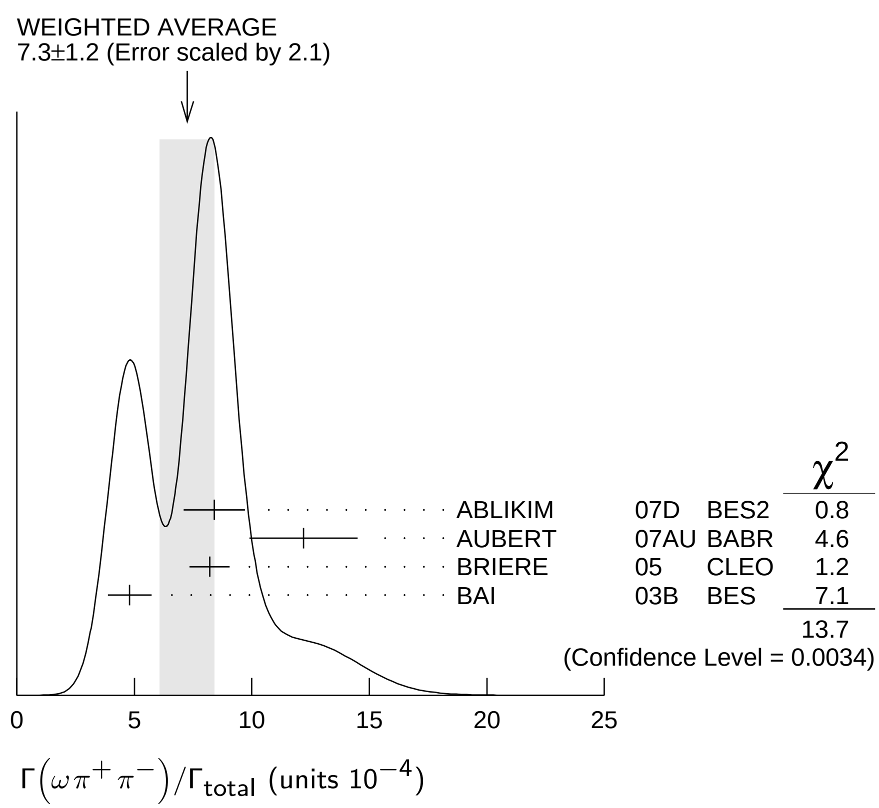
$\Gamma(\eta'\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{59}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.5±1.6±1.3	12.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadr

$\Gamma(\omega\pi^+\pi^-)/\Gamma_{total}$ — Γ_{60}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.3±1.2 OUR AVERAGE	Error includes scale factor of 2.1. See the ideogram below.				
8.4±0.5±1.2	386	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$
12.2±2.2±0.7	37	[1] AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
8.2±0.5±0.7	391	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)\pi^0$
4.8±0.6±0.7	100 ± 22	[2] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$

[1] AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot B(\psi(2S) \to \omega\pi^+\pi^-) \cdot B(\omega \to 3\pi) = 2.69 \pm 0.73 \pm 0.16$ eV.
[2] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.



$\Gamma(b_1^{\pm}\pi^{\mp})/\Gamma_{total}$ Γ_{61}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.0 ±0.6 OUR AVERAGE	Error includes scale factor of 1.1.				
5.1 ±0.6 ±0.8	202	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$
$4.18^{+0.43}_{-0.42}\pm0.92$	170	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
3.2 ±0.6 ±0.5	61 ± 11	[1,2] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.2 ±0.8 ±1.0		[1] BAI	99C	BES	Repl. by BAI 03B

[1] Assuming B($b_1 \to \omega\pi$)=1.
[2] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016.

$\Gamma(b_1^0\pi^0)/\Gamma_{total}$ Γ_{62}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{2.35^{+0.47}_{-0.42}\pm0.40}$	45	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$

$\Gamma(\omega f_2(1270))/\Gamma_{total}$ Γ_{63}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.2 ±0.4 OUR AVERAGE						
2.3 ±0.5 ±0.4		57	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$
2.05±0.41±0.38		62±12	BAI	04C	BES2	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.5	90		[1] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
<1.7	90		BAI	98J	BES	Repl. by BAI 03B

[1] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016.

$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{total}$ Γ_{64}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.5±0.9 OUR AVERAGE	Error includes scale factor of 1.9.				
10.9±1.9±0.2	85	[1] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
7.1±0.3±0.4	817.2	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$
16 ±4		[2] TANENBAUM	78	MRK1	e^+e^-

[1] AUBERT 07AK reports $[\Gamma(\psi(2S) \to \pi^+\pi^-K^+K^-)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (2.56 \pm 0.42 \pm 0.16) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.36 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[2] Assuming entirely strong decay.

$\Gamma(\rho^0K^+K^-)/\Gamma_{total}$ Γ_{65}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.2±0.4	223.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$

$\Gamma\big(K^*(892)^0 \overline{K}{}^*_2(1430)^0\big)/\Gamma_{total}$ — Γ_{66}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.86±0.32±0.43		93 ± 16	BAI	04C		$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.2	90		BAI	98J	BES	$e^+ e^-$

$\Gamma\big(K^+ K^- \pi^+ \pi^- \eta\big)/\Gamma_{total}$ — Γ_{67}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.3±0.7±0.1	7	[1] AUBERT	07AU	BABR	10.6 $e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \eta \gamma$

[1] AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot B(\psi(2S) \rightarrow 2(\pi^+ \pi) \eta) \cdot B(\eta \rightarrow \gamma\gamma) = 1.2 \pm 0.7 \pm 0.1$ eV.

$\Gamma\big(K^+ K^- 2(\pi^+ \pi^-) \pi^0\big)/\Gamma_{total}$ — Γ_{68}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
10.0±2.5±1.8	65	ABLIKIM	07D	BES2	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma\big(K_1(1270)^{\pm} K^{\mp}\big)/\Gamma_{total}$ — Γ_{70}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
10.0±1.8±2.1	[1] BAI	99C	BES	$e^+ e^-$

[1] Assuming $B(K_1(1270) \rightarrow K \rho) = 0.42 \pm 0.06$

$\Gamma\big(K^0_S K^0_S \pi^+ \pi^-\big)/\Gamma_{total}$ — Γ_{71}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.20±0.25±0.37	83 ± 9	ABLIKIM	05O	BES2	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma\big(\rho^0 p \overline{p}\big)/\Gamma_{total}$ — Γ_{72}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.5±0.1±0.2	61.1	BRIERE	05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow p \overline{p} \pi^+ \pi^-$

$\Gamma\big(K^+ \overline{K}{}^*(892)^0 \pi^- + \text{c.c.}\big)/\Gamma_{total}$ — Γ_{73}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.7±2.5	TANENBAUM	78	MRK1	$e^+ e^-$

$\Gamma\big(2(\pi^+ \pi^-)\big)/\Gamma_{total}$ — Γ_{74}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.4±0.6 OUR AVERAGE Error includes scale factor of 2.2.					
2.2±0.2±0.2	308	BRIERE	05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow 2(\pi^+ \pi^-)$
4.5±1.0		TANENBAUM	78	MRK1	$e^+ e^-$

$\Gamma\big(\rho^0 \pi^+ \pi^-\big)/\Gamma_{total}$ — Γ_{75}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2±0.6 OUR AVERAGE Error includes scale factor of 1.4.					
2.0±0.2±0.4	285.5	BRIERE	05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow 2(\pi^+ \pi^-)$
4.2±1.5		TANENBAUM	78	MRK1	$e^+ e^-$

$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{total}$ — Γ_{76}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12.6±0.9 OUR AVERAGE					
18.6±5.7±0.3	32	[1] AUBERT	07AU	BABR	10.6 $e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \pi^0 \gamma$
11.7±1.0±1.5	597	ABLIKIM	06G	BES2	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
12.7±0.5±1.0	711.6	BRIERE	05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

[1] AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{total}] \times [\Gamma(\psi(2S) \rightarrow e^+ e^-)] = (44 \pm 13 \pm 3) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \rightarrow e^+ e^-) = 2.36 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\omega f_0(1710) \rightarrow \omega K^+ K^-)/\Gamma_{total}$ — Γ_{77}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.9±2.0±0.9	19	ABLIKIM	06G	BES2	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(K^*(892)^0 K^- \pi^+ \pi^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{78}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.6±1.3±1.8	238	ABLIKIM	06G	BES2	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(K^*(892)^+ K^- \pi^+ \pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{79}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.6±2.2±1.7	133	ABLIKIM	06G	BES2	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(K^*(892)^+ K^- \rho^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{80}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.3±2.2±1.4	78	ABLIKIM	06G	BES2	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(K^*(892)^0 K^- \rho^+ + \text{c.c.})/\Gamma_{total}$ — Γ_{81}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.1±1.3±1.2	125	ABLIKIM	06G	BES2	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(\eta K^+ K^-, \text{no } \eta\phi)/\Gamma_{total}$ — Γ_{82}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.08±0.29±0.25		0.3k	[1] ABLIKIM	12L	BES3	$\psi(2S) \rightarrow K^+ K^- \gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<13	90		BRIERE	05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

[1] Excluding $\eta\phi$.

$\Gamma(\omega K^+ K^-)/\Gamma_{total}$ — Γ_{83}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.85±0.25 OUR AVERAGE	Error includes scale factor of 1.1.				
2.38±0.37±0.29	78	ABLIKIM	06G	BES2	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
1.9 ±0.3 ±0.3	76.8	BRIERE	05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
1.5 ±0.3 ±0.2	23.0 ± 5.2	[1] BAI	03B	BES	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

[1] Normalized to B($\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$) = 0.305 ± 0.016.

$\Gamma(\omega K^*(892)^+ K^- + c.c.)/\Gamma_{total}$ — Γ_{84}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
20.7±2.6 OUR AVERAGE					
18.9±2.9±2.2	396	ABLIKIM	13M	BES3	$\psi(2S) \rightarrow \omega K^0_S K^- \pi^+$
22.6±3.0±2.4	535	ABLIKIM	13M	BES3	$\psi(2S) \rightarrow \omega K^+ K^- \pi^0$

$\Gamma(\omega K_2^*(1430)^+ K^- + c.c.)/\Gamma_{total}$ — Γ_{85}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
6.1 ±1.2 OUR AVERAGE					
6.39±1.50±0.78	128	ABLIKIM	13M	BES3	$\psi(2S) \rightarrow \omega K^0_S K^- \pi^+$
5.86±1.61±0.83	143	ABLIKIM	13M	BES3	$\psi(2S) \rightarrow \omega K^+ K^- \pi^0$

$\Gamma(\omega \overline{K}^*(892)^0 K^0)/\Gamma_{total}$ — Γ_{86}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
16.8±2.5±1.6	356	ABLIKIM	13M	BES3	$\psi(2S) \rightarrow \omega K^0_S K^- \pi^+$

$\Gamma(\omega \overline{K}_2^*(1430)^0 K^0)/\Gamma_{total}$ — Γ_{87}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.82±2.08±0.72	116	ABLIKIM	13M	BES3	$\psi(2S) \rightarrow \omega K^0_S K^- \pi^+$

$\Gamma(\omega X(1440) \rightarrow \omega K^0_S K^- \pi^+ + c.c.)/\Gamma_{total}$ — Γ_{88}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.60±0.27±0.24	109	[1] ABLIKIM	13M	BES3	$\psi(2S) \rightarrow \omega K^0_S K^- \pi^+$

[1] $X(1440)$ compatible with $\eta(1405)$ and $\eta(1475)$. A $f_1(1420)$ is also possible.

$\Gamma(\omega X(1440) \rightarrow \omega K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_{89}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.09±0.20±0.16	82	[1] ABLIKIM	13M	BES3	$\psi(2S) \rightarrow \omega K^+ K^- \pi^0$

[1] $X(1440)$ compatible with $\eta(1405)$ and $\eta(1475)$. A $f_1(1420)$ is also possible.

$\Gamma(\omega f_1(1285) \rightarrow \omega K^0_S K^- \pi^+ + c.c.)/\Gamma_{total}$ — Γ_{90}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.302±0.098±0.027	22	[1] ABLIKIM	13M	BES3	$\psi(2S) \rightarrow \omega K^0_S K^- \pi^+$

[1] Statistical signficance 4.5 σ. This measurement is equivalent to a limit of $< 0.478 \times 10^{-5}$ at 90% C.L.

$\Gamma(\omega f_1(1285) \to \omega K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_{91}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.125±0.070±0.013	10	[1] ABLIKIM	13M	BES3	$\psi(2S) \to \omega K^+ K^- \pi^0$

[1] Statistical signficance 3.2 σ. This measurement is equivalent to a limit of $< 0.221 \times 10^{-5}$ at 90% C.L.

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{92}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.5 ±2.0 OUR AVERAGE	Error includes scale factor of 2.8.				
5.45±0.42±0.87	671	ABLIKIM	05H	BES2	$e^+e^- \to \psi(2S) \to 3(\pi^+\pi^-)$
1.5 ±1.0		[1] TANENBAUM	78	MRK1	e^+e^-

[1] Assuming entirely strong decay.

$\Gamma(p\overline{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{93}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.3±0.4±0.6	434.9	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_{94}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
7.1 ±0.5 OUR AVERAGE	Error includes scale factor of 1.5.					
7.48±0.23±0.39		1.3k	[1] METREVELI	12		$\psi(2S) \to K^+K^-$
6.3 ±0.6 ±0.3			DOBBS	06A	CLEO	e^+e^-
10 ±7			BRANDELIK	79C	DASP	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$ 5	90		FELDMAN	77	MRK1	e^+e^-

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ — Γ_{95}/Γ

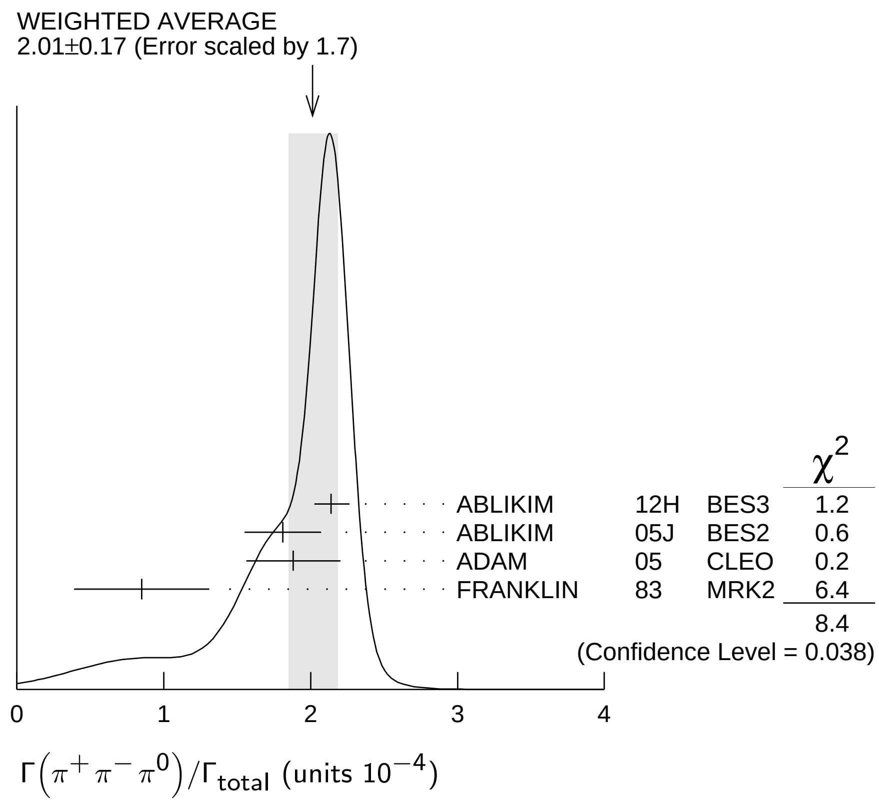
VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.34±0.33 OUR AVERAGE					
5.28±0.25±0.34	478 ± 23	[1] METREVELI	12		$\psi(2S) \to K^0_S K^0_L$
5.8 ±0.8 ±0.4		DOBBS	06A	CLEO	e^+e^-
5.24±0.47±0.48	156 ± 14	[2] BAI	04B	BES2	$\psi(2S) \to K^0_S K^0_L \to \pi^+\pi^- X$

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.
[2] Using $B(K^0_S \to \pi^+\pi^-) = 0.6860 \pm 0.0027$.

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{96}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.01±0.17 OUR AVERAGE	Error includes scale factor of 1.7. See the ideogram below.				
$2.14\pm0.03^{+0.12}_{-0.11}$	7k	[1] ABLIKIM	12H	BES3	$e^+e^- \to \psi(2S)$
1.81±0.18±0.19	260 ± 19	[2] ABLIKIM	05J	BES2	$e^+e^- \to \psi(2S)$
$1.88^{+0.16}_{-0.15}\pm0.28$	194	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
0.85±0.46	4	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

[1] From $\psi(2S) \rightarrow \pi^+\pi^-\pi^0$ events directly. The quoted systematic error includes a contribution of 4% (added in quadrature) from the uncertainty on the number of $\psi(2S)$ events.
[2] From a PW analysis of $\psi(2S) \rightarrow \pi^+\pi^-\pi^0$.



$\Gamma\big(\rho(2150)\pi \rightarrow \pi^+\pi^-\pi^0\big)/\Gamma_{total}$ $\quad\Gamma_{97}/\Gamma$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$1.94 \pm 0.25 ^{+1.15}_{-0.34}$	[1] ABLIKIM	05J	BES2	$\psi(2S) \rightarrow \rho(2150)\pi \rightarrow \pi^+\pi^-\pi^0$

[1] From a PW analysis of $\psi(2S) \rightarrow \pi^+\pi^-\pi^0$.

$\Gamma\big(\rho(770)\pi \rightarrow \pi^+\pi^-\pi^0\big)/\Gamma_{total}$ $\quad\Gamma_{98}/\Gamma$

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.32±0.12 OUR AVERAGE			Error includes scale factor of 1.8.			
$0.51 \pm 0.07 \pm 0.11$			[1] ABLIKIM	05J	BES2	$\psi(2S) \rightarrow \rho(770)\pi \rightarrow \pi^+\pi^-\pi^0$
$0.24 ^{+0.08}_{-0.07} \pm 0.02$		22	ADAM	05	CLEO	$e^+e^- \rightarrow \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.83	90	1	FRANKLIN	83	MRK2	e^+e^-
<10	90		BARTEL	76	CNTR	e^+e^-
<10	90		[2] ABRAMS	75	MRK1	e^+e^-

[1] From a PW analysis of $\psi(2S) \rightarrow \pi^+\pi^-\pi^0$.
[2] Final state $\rho^0\pi^0$.

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{99}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.78±0.26 OUR AVERAGE						
0.76±0.25±0.06		30	[1] METREVELI	12		$\psi(2S) \to \pi^+\pi^-$
8 ±5			BRANDELIK	79C	DASP	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.1	90		DOBBS	06A	CLEO	$e^+e^- \to \psi(2S)$
<5	90		FELDMAN	77	MRK1	e^+e^-

[1] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration. Using $\psi(3770) \to \pi^+\pi^-$ for continuum subtraction.

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{total}$ — Γ_{100}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.1	90	[1] BAI	99C	BES	e^+e^-

[1] Assuming B($K_1(1400) \to K^*\pi$)=0.94 ± 0.06

$\Gamma(K_2^*(1430)^\pm K^\mp)/\Gamma_{total}$ — Γ_{101}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$7.12\pm0.62^{+1.13}_{-0.61}$	251 ± 22	ABLIKIM	12L	BES3	$e^+e^- \to \psi(2S)$

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ — Γ_{102}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.07±0.16±0.26		0.9k	ABLIKIM	12L	BES3	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8.9	90	1	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

$\Gamma(K^+K^*(892)^- + \text{c.c.})/\Gamma_{total}$ — Γ_{103}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.9 ±0.4 OUR AVERAGE Error includes scale factor of 1.2.						
$3.18\pm0.30^{+0.26}_{-0.31}$		0.2k	ABLIKIM	12L	BES3	$e^+e^- \to \psi(2S)$
$2.9\ ^{+1.3}_{-1.7}\pm0.4$		9.6 ± 4.2	ABLIKIM	05I	BES2	$e^+e^- \to \psi(2S)$
$1.3\ ^{+1.0}_{-0.7}\pm0.3$		7	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<5.4	90		FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

$\Gamma(K^*(892)^0\overline{K}^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{104}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
10.9±2.0 OUR AVERAGE					
$13.3^{+2.4}_{-2.8}\pm1.7$	65.6 ± 9.0	ABLIKIM	05I	BES2	$e^+e^- \to \psi(2S)$
$9.2^{+2.7}_{-2.2}\pm0.9$	25	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$

$\Gamma\big(K^+ K^*(892)^- + \text{c.c.}\big)/\Gamma\big(K^*(892)^0 \overline{K}^0 + \text{c.c.}\big)$ — $\Gamma_{103}/\Gamma_{104}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.16±0.06 OUR AVERAGE				
$0.22^{+0.10}_{-0.14}$	ABLIKIM	05I	BES2	$e^+e^- \to \psi(2S)$
$0.14^{+0.08}_{-0.06}$	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$

$\Gamma\big(\phi\pi^+\pi^-\big)/\Gamma_{\text{total}}$ — Γ_{105}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.17±0.29 OUR AVERAGE	Error includes scale factor of 1.7.				
2.42±0.95±0.04	10 ± 4	[1,2] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
0.9 ±0.2 ±0.1	47.6	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$
1.5 ±0.2 ±0.2	51.5±8.3	[3] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

[1] AUBERT 07AK reports $[\Gamma\big(\psi(2S) \to \phi\pi^+\pi^-\big)/\Gamma_{\text{total}}] \times [\Gamma\big(\psi(2S) \to e^+e^-\big)] = (0.57 \pm 0.22 \pm 0.04) \times 10^{-3}$ keV which we divide by our best value $\Gamma\big(\psi(2S) \to e^+e^-\big) = 2.36 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Using $B(\phi \to K^+K^-) = (49.3 \pm 0.6)\%$.

[3] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

$\Gamma\big(\phi f_0(980) \to \pi^+\pi^-\big)/\Gamma_{\text{total}}$ — Γ_{106}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.68±0.24 OUR AVERAGE	Error includes scale factor of 1.1.				
1.44±0.70±0.02	6 ± 3	[1,2] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
0.6 ±0.2 ±0.1	18.4±6.4	[3] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

[1] AUBERT 07AK reports $[\Gamma\big(\psi(2S) \to \phi f_0(980) \to \pi^+\pi^-\big)/\Gamma_{\text{total}}] \times [\Gamma\big(\psi(2S) \to e^+e^-\big)] = (0.34 \pm 0.16 \pm 0.04) \times 10^{-3}$ keV which we divide by our best value $\Gamma\big(\psi(2S) \to e^+e^-\big) = 2.36 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Using $B(\phi \to K^+K^-) = (49.3 \pm 0.6)\%$.

[3] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

$\Gamma\big(2(K^+K^-)\big)/\Gamma_{\text{total}}$ — Γ_{107}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.6±0.1±0.1	59.2	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(K^+K^-)$

$\Gamma\big(\phi K^+K^-\big)/\Gamma_{\text{total}}$ — Γ_{108}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.70±0.16 OUR AVERAGE					
0.8 ±0.2 ±0.1	36.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(K^+K^-)$
0.6 ±0.2 ±0.1	16.1 ± 5.0	[1] BAI	03B	BES	$\psi(2S) \to 2(K^+K^-)$

[1] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

$\Gamma(2(K^+K^-)\pi^0)/\Gamma_{total}$ — Γ_{109}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.1±0.2±0.2	44.7	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(K^+K^-)\pi^0$

$\Gamma(\phi\eta)/\Gamma_{total}$ — Γ_{110}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.10±0.31 OUR AVERAGE					
3.14±0.23±0.23	0.2k	ABLIKIM	12L	BES3	$e^+e^- \to \psi(2S)$
$2.0\ ^{+1.5}_{-1.1}\ \pm0.4$	6	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
3.3 ±1.1 ±0.5	17	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\eta')/\Gamma_{total}$ — Γ_{111}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.1±1.4±0.7	8	[1] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

[1] Calculated combining $\eta' \to \gamma\rho$ and $\eta\pi^+\pi^-$ channels.

$\Gamma(\omega\eta')/\Gamma_{total}$ — Γ_{112}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{3.2^{+2.4}_{-2.0}\pm0.7}$	4	[1] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

[1] Calculated combining $\eta' \to \gamma\rho$ and $\eta\pi^+\pi^-$ channels.

$\Gamma(\omega\pi^0)/\Gamma_{total}$ — Γ_{113}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.1 ±0.6 OUR AVERAGE					
$2.5\ ^{+1.2}_{-1.0}\ \pm0.2$	14	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
$1.87^{+0.68}_{-0.62}\pm0.28$	14	ABLIKIM	04L	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\rho\eta')/\Gamma_{total}$ — Γ_{114}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.87^{+1.64}_{-1.11}\pm0.33}$	2	ABLIKIM	04L	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\rho\eta)/\Gamma_{total}$ — Γ_{115}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.2 ±0.6 OUR AVERAGE Error includes scale factor of 1.1.					
$3.0\ ^{+1.1}_{-0.9}\ \pm0.2$	18	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
$1.78^{+0.67}_{-0.62}\pm0.17$	13	ABLIKIM	04L	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\omega\eta)/\Gamma_{total}$ — Γ_{116}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.1	90	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\pi^0)/\Gamma_{total}$ — Γ_{117}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	90	ABLIKIM	12L	BES3	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.7	90	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
<0.4	90	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\eta_c\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{118}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	PEDLAR	07	CLEO	$e^+e^- \to \psi(2S)$

$\Gamma(p\overline{p}K^+K^-)/\Gamma_{total}$ — Γ_{119}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.7±0.6±0.4	30.1	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+K^-$

$\Gamma(\overline{\Lambda}nK^0_S+\text{c.c.})/\Gamma_{total}$ — Γ_{120}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.81±0.11±0.14	50	[1] ABLIKIM	08C	BES2	$e^+e^- \to J/\psi$

[1] Using B($\overline{\Lambda} \to \overline{p}\pi^+$) = 63.9% and B($K^0_S \to \pi^+\pi^-$) = 69.2%.

$\Gamma(\phi f_2'(1525))/\Gamma_{total}$ — Γ_{121}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.44±0.12±0.11		20 ± 6	BAI	04C		$\psi(2S) \to 2(K^+K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.45	90		BAI	98J	BES	$e^+e^- \to 2(K^+K^-)$

$\Gamma(\Theta(1540)\overline{\Theta}(1540) \to K^0_S pK^-\overline{n}+\text{c.c.})/\Gamma_{total}$ — Γ_{122}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.88	90	BAI	04G	BES2	e^+e^-

$\Gamma(\Theta(1540)K^-\overline{n} \to K^0_S pK^-\overline{n})/\Gamma_{total}$ — Γ_{123}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	BAI	04G	BES2	e^+e^-

$\Gamma(\Theta(1540)K^0_S\overline{p} \to K^0_S\overline{p}K^+n)/\Gamma_{total}$ — Γ_{124}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.70	90	BAI	04G	BES2	e^+e^-

$\Gamma(\overline{\Theta}(1540)K^+n \to K^0_S\overline{p}K^+n)/\Gamma_{total}$ — Γ_{125}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	BAI	04G	BES2	e^+e^-

$\Gamma(\overline{\Theta}(1540)K^0_S p \to K^0_S pK^-\overline{n})/\Gamma_{total}$ — Γ_{126}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<0.60	90	BAI	04G	BES2	e^+e^-

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ — Γ_{127}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
<0.046	[1] BAI	04D	BES	e^+e^-

[1] Forbidden by *CP*.

RADIATIVE DECAYS

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma_{total}$ — Γ_{128}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.99±0.27 OUR FIT					
9.2 ±0.4 OUR AVERAGE					
9.22±0.11±0.46	72600	ATHAR	04	CLEO	$e^+e^- \to \gamma X$
9.9 ±0.5 ±0.8		[1] GAISER	86	CBAL	$e^+e^- \to \gamma X$
7.2 ±2.3		[1] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
7.5 ±2.6		[1] WHITAKER	76	MRK1	e^+e^-

[1] Angular distribution ($1+\cos^2\theta$) assumed.

$\Gamma(\gamma\chi_{c1}(1P))/\Gamma_{total}$ — Γ_{129}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.55±0.31 OUR FIT					
8.9 ±0.5 OUR AVERAGE					
9.07±0.11±0.54	76700	ATHAR	04	CLEO	$e^+e^- \to \gamma X$
9.0 ±0.5 ±0.7		[1] GAISER	86	CBAL	$e^+e^- \to \gamma X$
7.1 ±1.9		[2] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$

[1] Angular distribution ($1-0.189\cos^2\theta$) assumed.
[2] Valid for isotropic distribution of the photon.

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma_{total}$ — Γ_{130}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.11±0.31 OUR FIT					
8.8 ±0.5 OUR AVERAGE Error includes scale factor of 1.1.					
9.33±0.14±0.61	79300	ATHAR	04	CLEO	$e^+e^- \to \gamma X$
8.0 ±0.5 ±0.7		[1] GAISER	86	CBAL	$e^+e^- \to \gamma X$
7.0 ±2.0		[2] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$

[1] Angular distribution ($1-0.052\cos^2\theta$) assumed.
[2] Valid for isotropic distribution of the photon.

$[\Gamma(\gamma\chi_{c0}(1P))+\Gamma(\gamma\chi_{c1}(1P))+\Gamma(\gamma\chi_{c2}(1P))]/\Gamma_{total}$ — $(\Gamma_{128}+\Gamma_{129}+\Gamma_{130})/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
27.6±0.3±2.0	[1] ATHAR	04	CLEO	$e^+e^- \to \gamma X$

[1] Not independent from ATHAR 04 measurements of B($\gamma\chi_{cJ}$).

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ — $\Gamma_{128}/\Gamma_{129}$

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.02±0.01±0.07	[1] ATHAR	04	CLEO	$e^+e^- \to \gamma X$

[1] Not independent from ATHAR 04 measurements of B($\gamma\chi_{cJ}$).

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ — $\Gamma_{130}/\Gamma_{129}$

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.03\pm0.02\pm0.03$	[1] ATHAR	04	CLEO	$e^+e^-\to\gamma X$

[1] Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c2}(1P))$ — $\Gamma_{128}/\Gamma_{130}$

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.99\pm0.02\pm0.08$	[1] ATHAR	04	CLEO	$e^+e^-\to\gamma X$

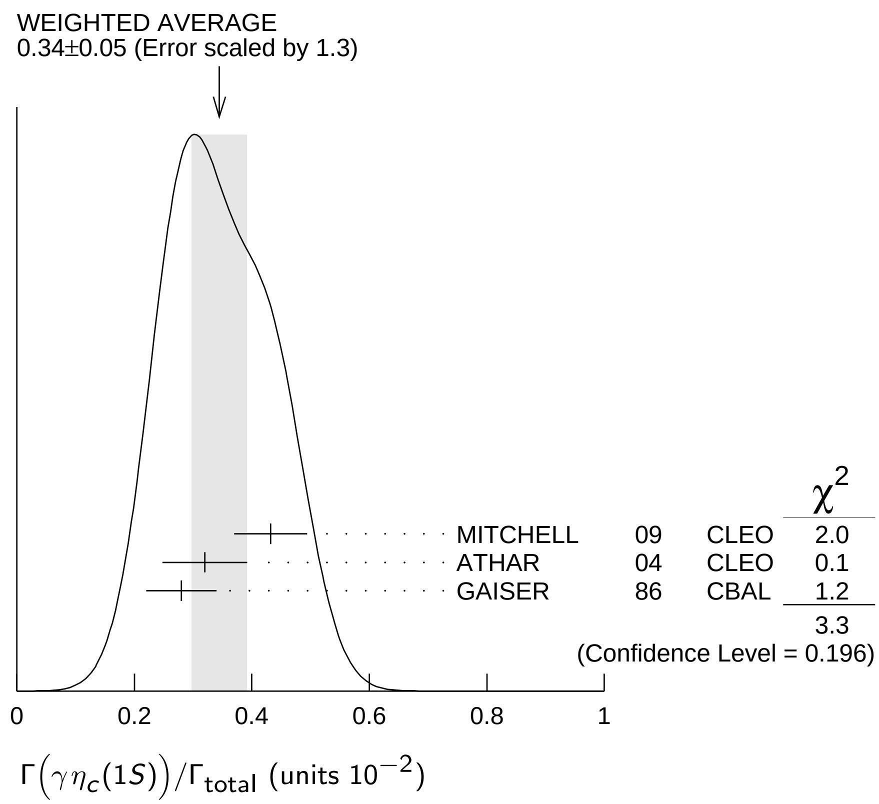
[1] Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ — Γ_{131}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.34 ±0.05 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
$0.432\pm0.016\pm0.060$		MITCHELL	09	CLEO	$e^+e^-\to\gamma X$
$0.32\pm0.04\pm0.06$	2560	[1] ATHAR	04	CLEO	$e^+e^-\to\gamma X$
0.28 ± 0.06		[2] GAISER	86	CBAL	$e^+e^-\to\gamma X$

[1] ATHAR 04 used $\Gamma_{\eta_c(1S)} = 24.8 \pm 4.9$ MeV to obtain this result.

[2] GAISER 86 used $\Gamma_{\eta_c(1S)} = 11.5 \pm 4.5$ MeV to obtain this result.



$\Gamma(\gamma\eta_c(2S))/\Gamma_{total}$ Γ_{132}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
7±2±4		[1] ABLIKIM	12G	BES3	$\psi(2S) \to \gamma K^0 K\pi$, $KK\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$ 8	90	[2] CRONIN-HEN..10		CLEO	$\psi(2S) \to \gamma K\overline{K}\pi$
$<$20	90	ATHAR	04	CLEO	$e^+e^- \to \gamma X$
20–130	95	EDWARDS	82C	CBAL	$e^+e^- \to \gamma X$

[1] ABLIKIM 12G reports $[\Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}] \times [B(\eta_c(2S) \to K\overline{K}\pi)] = (1.30 \pm 0.20 \pm 0.30) \times 10^{-5}$ which we divide by our best value $B(\eta_c(2S) \to K\overline{K}\pi) = (1.9 \pm 1.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] CRONIN-HENNESSY 10 reports $[\Gamma(\psi(2S) \to \gamma\eta_c(2S))/\Gamma_{total}] \times [B(\eta_c(2S) \to K\overline{K}\pi)] < 14.5 \times 10^{-6}$ which we divide by our best value $B(\eta_c(2S) \to K\overline{K}\pi) = 1.9 \times 10^{-2}$. This measurement assumes $\Gamma(\eta_c(2S)) = 14$ MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ Γ_{133}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.58±0.40±0.13		37	ABLIKIM	10F	BES3	$\psi(2S) \to \gamma\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$ 5	90		PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$
$<$5400	95		[1] LIBERMAN	75	SPEC	e^+e^-
$< 1 \times 10^4$	90		WIIK	75	DASP	e^+e^-

[1] Restated by us using $B(\psi(2S) \to \mu^+\mu^-) = 0.0077$.

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ Γ_{134}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.23±0.06 OUR AVERAGE						
1.26±0.03±0.08		2226	[1] ABLIKIM	10F	BES3	$\psi(2S) \to 3\gamma\pi^+\pi^-$, $2\gamma\pi^+\pi^-$
1.19±0.08±0.03			PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$
1.24±0.27±0.15		23	ABLIKIM	06R	BES2	$e^+e^- \to \psi(2S)$
1.54±0.31±0.20		$\sim$ 43	BAI	98F	BES	$\psi(2S) \to \pi^+\pi^- 2\gamma$, $\pi^+\pi^- 3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$ 60	90		[2] BRAUNSCH...	77	DASP	e^+e^-
$<$ 11	90		[3] BARTEL	76	CNTR	e^+e^-

[1] Combining the results from $\eta' \to \pi^+\pi^-\eta$ and $\eta' \to \pi^+\pi^-\gamma$ decay modes.
[2] Restated by us using total decay width 228 keV.
[3] The value is normalized to the branching ratio for $\Gamma(J/\psi(1S)\eta)/\Gamma_{total}$.

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ Γ_{135}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.12±0.19±0.32		[1,2] BAI	03C	BES	$\psi(2S) \to \gamma\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.08±0.19±0.33	200.6 ± 18.8	[1] BAI	03C	BES	$\psi(2S) \to \gamma\pi^+\pi^-$
2.90±1.08±1.07	29.9 ± 11.1	[1] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$

[1] Normalized to B($\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$) = 0.305 ± 0.016.
[2] Combining the results from $\pi^+ \pi^-$ and $\pi^0 \pi^0$ decay modes.

$\Gamma(\gamma f_0(1710) \rightarrow \gamma \pi \pi)/\Gamma_{total}$ — Γ_{137}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.301±0.041±0.124	35.6 ± 4.8	[1] BAI	03C	BES	$\psi(2S) \rightarrow \gamma \pi^+ \pi^-$

[1] Normalized to B($\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$) = 0.305 ± 0.016.

$\Gamma(\gamma f_0(1710) \rightarrow \gamma K \overline{K})/\Gamma_{total}$ — Γ_{138}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.604±0.090±0.132		39.6 ± 5.9	[1,2] BAI	03C	BES	$\psi(2S) \rightarrow \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 1.56	90	6.8 ± 3.1	[1,2] BAI	03C	BES	$\psi(2S) \rightarrow \gamma K^0_S K^0_S$

[1] Includes unknown branching fractions to $K^+ K^-$ or $K^0_S K^0_S$. We have multiplied the $K^+ K^-$ result by a factor of 2 and the $K^0_S K^0_S$ result by a factor of 4 to obtain the $K \overline{K}$ result.
[2] Normalized to B($\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$) = 0.305 ± 0.016.

$\Gamma(\gamma \eta)/\Gamma_{total}$ — Γ_{140}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.38±0.48±0.09		13	[1] ABLIKIM	10F	BES3	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- \pi^0$, $\gamma 3\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 2	90		PEDLAR	09	CLE3	$\psi(2S) \rightarrow \gamma X$
< 90	90		BAI	98F	BES	$\psi(2S) \rightarrow \pi^+ \pi^- 3\gamma$
<200	90		YAMADA	77	DASP	$e^+ e^- \rightarrow 3\gamma$

[1] Combining the results from $\eta \rightarrow \pi^+ \pi^- \pi^0$ and $\eta \rightarrow 3\pi^0$ decay modes.

$\Gamma(\gamma \eta \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{141}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.71±1.25±1.64	418	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma \eta \pi^+ \pi^-$

$\Gamma(\gamma \eta(1405) \rightarrow \gamma K \overline{K} \pi)/\Gamma_{total}$ — Γ_{143}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.9	90	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma K^0_S K^+ \pi^-$ + c.c.
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.3	90	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$
<1.2	90	[1] SCHARRE	80	MRK1	$e^+ e^-$

[1] Includes unknown branching fraction $\eta(1405) \rightarrow K \overline{K} \pi$.

$\Gamma(\gamma \eta(1405) \rightarrow \eta \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{144}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.36±0.25±0.05	10	ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma \eta \pi^+ \pi^-$

$\Gamma(\gamma\eta(1475) \to K\overline{K}\pi)/\Gamma_{total}$ — Γ_{146}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.4	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^+ K^- \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.5	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^0_S K^+ \pi^-$ + c.c.

$\Gamma(\gamma\eta(1475) \to \eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{147}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.88	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma 2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{148}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
39.6±2.8±5.0	583	ABLIKIM	07D	BES2	$e^+ e^- \to \psi(2S)$

$\Gamma(\gamma K^{*0} K^+ \pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{149}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
37.0±6.1±7.2	237	ABLIKIM	07D	BES2	$e^+ e^- \to \psi(2S)$

$\Gamma(\gamma K^{*0} \overline{K}^{*0})/\Gamma_{total}$ — Γ_{150}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
24.0±4.5±5.0	41	ABLIKIM	07D	BES2	$e^+ e^- \to \psi(2S)$

$\Gamma(\gamma K^0_S K^+ \pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{151}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
25.6±3.6±3.6	115	ABLIKIM	07D	BES2	$e^+ e^- \to \psi(2S)$

$\Gamma(\gamma K^+ K^- \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{152}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
19.1±2.7±4.3	132	ABLIKIM	07D	BES2	$e^+ e^- \to \psi(2S)$

$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ — Γ_{153}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.9 ±0.5 OUR AVERAGE Error includes scale factor of 2.0.					
4.18±0.26±0.18	348	[1] ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$
2.9 ±0.4 ±0.4	142	ABLIKIM	07D	BES2	$e^+ e^- \to \psi(2S)$

[1] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma f_2(1950)$, $\gamma f_2(2150)$, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p} < 2.85$ GeV, and accounting for backgrounds from $\psi(2S) \to \pi^0 p\overline{p}$ and continuum.

$\Gamma(\gamma f_2(1950) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{154}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
1.2±0.2±0.1	111	[1] ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

[1] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma f_2(1950)$, $\gamma f_2(2150)$, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p} < 2.85$ GeV, and accounting for backgrounds from $\psi(2S) \to \pi^0 p\overline{p}$ and continuum.

$\Gamma(\gamma f_2(2150) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{155}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.72±0.18±0.03	73	[1] ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

[1] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma f_2(1950)$, $\gamma f_2(2150)$, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p} < 2.85$ GeV, and accounting for backgrounds from $\psi(2S) \to \pi^0 p\overline{p}$ and continuum.

$\Gamma(\gamma X(1835) \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{156}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$4.57\pm0.36^{+1.77}_{-4.26}$		ABLIKIM	12D	BES3	$J/\psi \to \gamma p\overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.6	90	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$
<5.4	90	ABLIKIM	07D	BES	$\psi(2S) \to \gamma p\overline{p}$

$\Gamma(\gamma X \to \gamma p\overline{p})/\Gamma_{total}$ — Γ_{157}/Γ

For a narrow resonance in the range $2.2 < M(X) < 2.8$ GeV.

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

$\Gamma(\gamma\pi^+\pi^- p\overline{p})/\Gamma_{total}$ — Γ_{158}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±1.2±0.7	17	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma 2(\pi^+\pi^-)K^+K^-)/\Gamma_{total}$ — Γ_{159}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<22	90	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma 3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{160}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<17	90	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma K^+K^-K^+K^-)/\Gamma_{total}$ — Γ_{161}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(\gamma\gamma J/\psi)/\Gamma_{total}$ — Γ_{162}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.1\pm0.6^{+0.8}_{-1.0}$	1.1k	ABLIKIM	12O	BES3	$e^+e^- \to \psi(2S)$

OTHER DECAYS

$\Gamma(\text{invisible})/\Gamma(e^+e^-)$ — Γ_{163}/Γ_6

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.0	90	LEES	13I	BABR	$B \to K^{(*)}\psi(2S)$

$\psi(2S)$ CROSS-PARTICLE BRANCHING RATIOS

For measurements involving B($\psi(2S) \to \gamma \chi_{cJ}(1P)$)×B($\chi_{cJ}(1P) \to X$) see the corresponding entries in the $\chi_{cJ}(1P)$ sections.

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS $\psi(2S) \to \gamma \chi_{cJ}(1P)$ and $\chi_{cJ} \to \gamma J/\psi(1S)$

$a_2(\chi_{c1})/a_2(\chi_{c2})$ Magnetic quadrupole transition amplitude ratio

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{67^{+19}_{-13}}$	59k	[1] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

[1] Statistical and systematic errors combined. Using values from fits with floating *M2* amplitudes $a_2(\chi_{c1})$, $a_2(\chi_{c2})$, $b_2(\chi_{c1})$, $b_2(\chi_{c2})$ and fixed *E3* amplitudes of $a_3(\chi_{c2}) = b_3(\chi_{c2}) = 0$. Not independent of values for $a_2(\chi_{c1}(1P))$ and $a_2(\chi_{c2}(1P))$ from ARTUSO 09.

$b_2(\chi_{c2})/b_2(\chi_{c1})$ Magnetic quadrupole transition amplitude ratio

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{37^{+53}_{-47}}$	59k	[1] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

[1] Statistical and systematic errors combined. Using values from fits with floating *M2* amplitudes $a_2(\chi_{c1})$, $a_2(\chi_{c2})$, $b_2(\chi_{c1})$, $b_2(\chi_{c2})$ and fixed *E3* amplitudes of $a_3(\chi_{c2}) = b_3(\chi_{c2}) = 0$. Not independent of values for $b_2(\chi_{c1}(1P))$ and $b_2(\chi_{c2}(1P))$ from ARTUSO 09.

$\psi(2S)$ REFERENCES

ABLIKIM	13A	PRL 110 022001	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13D	PR D87 012007	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13F	PR D87 052007	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13M	PR D87 092006	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13R	PR D88 032007	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13S	PR D88 032010	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13W	PR D88 112007	M. Ablikim *et al.*	(BES III Collab.)
LEES	13I	PR D87 112005	J.P. Lees *et al.*	(BABAR Collab.)
LEES	13O	PR D87 092005	J.P. Lees *et al.*	(BABAR Collab.)
LEES	13Q	PR D88 032013	J.P. Lees *et al.*	(BABAR Collab.)
LEES	13Y	PR D88 072009	J.P. Lees *et al.*	(BABAR Collab.)
AAIJ	12H	EPJ C72 1972	R. Aaij *et al.*	(LHCb Collab.)
ABLIKIM	12D	PRL 108 112003	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	12G	PRL 109 042003	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	12H	PL B710 594	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	12L	PR D86 072011	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	12M	PR D86 092008	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	12O	PRL 109 172002	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	12Q	CP C36 1040	M. Ablikim *et al.*	(BES II Collab.)
ANASHIN	12	PL B711 280	V.V. Anashin *et al.*	(KEDR Collab.)
LEES	12E	PR D85 112009	J.P. Lees *et al.*	(BABAR Collab.)
METREVELI	12	PR D85 092007	Z. Metreveli *et al.*	(NWES, FLOR, WAYN+)
GE	11	PR D84 032008	J.Y. Ge *et al.*	(CLEO Collab.)
ABLIKIM	10B	PRL 104 132002	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	10F	PRL 105 261801	M. Ablikim *et al.*	(BES III Collab.)
ALEXANDER	10	PR D82 092002	J.P. Alexander *et al.*	(CLEO Collab.)
CRONIN-HEN...	10	PR D81 052002	D. Cronin-Hennessey *et al.*	(CLEO Collab.)
ADAMS	09	PR D80 051106	G.S. Adams *et al.*	(CLEO Collab.)
ARTUSO	09	PR D80 112003	M. Artuso *et al.*	(CLEO Collab.)
LIBBY	09	PR D80 072002	J. Libby *et al.*	(CLEO Collab.)
MITCHELL	09	PRL 102 011801	R.E. Mitchell *et al.*	(CLEO Collab.)
PEDLAR	09	PR D79 111101	T.K. Pedlar *et al.*	(CLEO Collab.)

ABLIKIM	08B	PL B659 74	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	08C	PL B659 789	M. Ablikim *et al.*	(BES Collab.)
DOBBS	08A	PRL 101 182003	S. Dobbs *et al.*	(CLEO Collab.)
MENDEZ	08	PR D78 011102	H. Mendez *et al.*	(CLEO Collab.)
PDG	08	PL B667 1	C. Amsler *et al.*	(PDG Collab.)
ABLIKIM	07C	PL B648 149	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	07D	PRL 99 011802	M. Ablikim *et al.*	(BES II Collab.)
ABLIKIM	07H	PR D76 092003	M. Ablikim *et al.*	(BES Collab.)
ANASHIN	07	JETPL 85 347	V.V. Anashin *et al.*	(KEDR Collab.)
		Translated from ZETFP 85 429.		
ANDREOTTI	07	PL B654 74	M. Andreotti *et al.*	(Femilab E835 Collab.)
AUBERT	07AK	PR D76 012008	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)
Also		PR D77 119902E (errat.)	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	07BD	PR D76 092006	B. Aubert *et al.*	(BABAR Collab.)
PDG	07	Unofficial 2007 WWW edition		(PDG Collab.)
PEDLAR	07	PR D75 011102	T.K. Pedlar *et al.*	(CLEO Collab.)
ABLIKIM	06G	PR D73 052004	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06I	PR D74 012004	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06L	PRL 97 121801	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06R	PR D74 072001	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06W	PR D74 112003	M. Ablikim *et al.*	(BES Collab.)
ADAM	06	PRL 96 082004	N.E. Adam *et al.*	(CLEO Collab.)
AUBERT	06B	PR D73 012005	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	06D	PR D73 052003	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,BE	06D	PR D74 091103	B. Aubert *et al.*	(BABAR Collab.)
DOBBS	06A	PR D74 011105	S. Dobbs *et al.*	(CLEO Collab.)
ABLIKIM	05E	PR D71 072006	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05H	PR D72 012002	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05I	PL B614 37	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05J	PL B619 247	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05O	PL B630 21	M. Ablikim *et al.*	(BES Collab.)
ADAM	05	PRL 94 012005	N.E. Adam *et al.*	(CLEO Collab.)
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)
ANDREOTTI	05	PR D71 032006	M. Andreotti *et al.*	(FNAL E835 Collab.)
AUBERT	05D	PR D71 052001	B. Aubert *et al.*	(BABAR Collab.)
BRIERE	05	PRL 95 062001	R.A. Briere *et al.*	(CLEO Collab.)
PEDLAR	05	PR D72 051108	T.K. Pedlar *et al.*	(CLEO Collab.)
ROSNER	05	PRL 95 102003	J.L. Rosner *et al.*	(CLEO Collab.)
ABLIKIM	04B	PR D70 012003	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	04K	PR D70 112003	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	04L	PR D70 112007	M. Ablikim *et al.*	(BES Collab.)
ATHAR	04	PR D70 112002	S.B. Athar *et al.*	(CLEO Collab.)
BAI	04B	PRL 92 052001	J.Z. Bai *et al.*	(BES Collab.)
BAI	04C	PR D69 072001	J.Z. Bai *et al.*	(BES Collab.)
BAI	04D	PL B589 7	J.Z. Bai *et al.*	(BES Collab.)
BAI	04G	PR D70 012004	J.Z. Bai *et al.*	(BES Collab.)
BAI	04I	PR D70 012006	J.Z. Bai *et al.*	(BES Collab.)
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)
SETH	04	PR D69 097503	K.K. Seth	
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)
BAI	03B	PR D67 052002	J.Z. Bai *et al.*	(BES Collab.)
BAI	03C	PR D67 032004	J.Z. Bai *et al.*	(BES Collab.)
AUBERT	02B	PR D65 031101	B. Aubert *et al.*	(BaBar Collab.)
BAI	02	PR D65 052004	J.Z. Bai *et al.*	(BES Collab.)
BAI	02B	PL B550 24	J.Z. Bai *et al.*	(BES Collab.)
BAI	02C	PRL 88 101802	J.Z. Bai *et al.*	(BES Collab.)
PDG	02	PR D66 010001	K. Hagiwara *et al.*	
BAI	01	PR D63 032002	J.Z. Bai *et al.*	(BES Collab.)
AMBROGIANI	00A	PR D62 032004	M. Ambrogiani *et al.*	(FNAL E835 Collab.)
ARTAMONOV	00	PL B474 427	A.S. Artamonov *et al.*	
BAI	00	PRL 84 594	J.Z. Bai *et al.*	(BES Collab.)
BAI	99C	PRL 83 1918	J.Z. Bai *et al.*	(BES Collab.)
BAI	98E	PR D57 3854	J.Z. Bai *et al.*	(BES Collab.)
BAI	98F	PR D58 097101	J.Z. Bai *et al.*	(BES Collab.)
BAI	98J	PRL 81 5080	J.Z. Bai *et al.*	(BES Collab.)
ARMSTRONG	97	PR D55 1153	T.A. Armstrong *et al.*	(E760 Collab.)
GRIBUSHIN	96	PR D53 4723	A. Gribushin *et al.*	(E672 Collab., E706 Collab.)
ARMSTRONG	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)
ALEXANDER	89	NP B320 45	J.P. Alexander *et al.*	(LBL, MICH, SLAC)
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)

GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)
		Translated from YAF 41 733.		
FRANKLIN	83	PRL 51 963	M.E.B. Franklin *et al.*	(LBL, SLAC)
EDWARDS	82C	PRL 48 70	C. Edwards *et al.*	(CIT, HARV, PRIN+)
LEMOIGNE	82	PL 113B 509	Y. Lemoigne *et al.*	(SACL, LOIC, SHMP+)
HIMEL	80	PRL 44 920	T. Himel *et al.*	(LBL, SLAC)
OREGLIA	80	PRL 45 959	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)
SCHARRE	80	PL 97B 329	D.L. Scharre *et al.*	(SLAC, LBL)
ZHOLENTZ	80	PL 96B 214	A.A. Zholents *et al.*	(NOVO)
Also		SJNP 34 814	A.A. Zholents *et al.*	(NOVO)
		Translated from YAF 34 1471.		
BRANDELIK	79B	NP B160 426	R. Brandelik *et al.*	(DASP Collab.)
BRANDELIK	79C	ZPHY C1 233	R. Brandelik *et al.*	(DASP Collab.)
BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum *et al.*	(SLAC, LBL)
BIDDICK	77	PRL 38 1324	C.J. Biddick *et al.*	(UCSD, UMD, PAVI+)
BRAUNSCH...	77	PL 67B 249	W. Braunschweig *et al.*	(DASP Collab.)
BURMESTER	77	PL 66B 395	J. Burmester *et al.*	(DESY, HAMB, SIEG+)
FELDMAN	77	PRPL 33C 285	G.J. Feldman, M.L. Perl	(LBL, SLAC)
YAMADA	77	Hamburg Conf. 69	S. Yamada	(DASP Collab.)
BARTEL	76	PL 64B 483	W. Bartel *et al.*	(DESY, HEIDP)
TANENBAUM	76	PRL 36 402	W.M. Tanenbaum *et al.*	(SLAC, LBL) IG
WHITAKER	76	PRL 37 1596	J.S. Whitaker *et al.*	(SLAC, LBL)
ABRAMS	75	Stanford Symp. 25	G.S. Abrams	(LBL)
ABRAMS	75B	PRL 34 1181	G.S. Abrams *et al.*	(LBL, SLAC)
BOYARSKI	75C	Palermo Conf. 54	A.M. Boyarski *et al.*	(SLAC, LBL)
HILGER	75	PRL 35 625	E. Hilger *et al.*	(STAN, PENN)
LIBERMAN	75	Stanford Symp. 55	A.D. Liberman	(STAN)
LUTH	75	PRL 35 1124	V. Luth *et al.*	(SLAC, LBL) JPC
WIIK	75	Stanford Symp. 69	B.H. Wiik	(DESY)