

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

See the Review on “Branching Ratios of $\psi(2S)$, $\chi_{c0,1,2}$ and $\eta_c(1S)$ ” 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)	EVS	DOCUMENT ID	TECN	COMMENT
3686.097±0.011 OUR FIT Error includes scale factor of 1.1.				
3686.097±0.010 OUR AVERAGE				
3686.099±0.004±0.009		¹ ANASHIN	15 KEDR	$e^+e^- \rightarrow \text{hadrons}$
3686.12 ±0.06 ±0.10	4k	AAIJ	12H LHCb	$pp \rightarrow J/\psi \pi^+ \pi^- X$
3685.95 ±0.10	413	² ARTAMONOV	00 OLYA	$e^+e^- \rightarrow \text{hadrons}$
3685.98 ±0.09 ±0.04		³ ARMSTRONG	93B E760	$\bar{p}p \rightarrow e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3686.08 ±0.07	1301	⁴ AAII	23AP LHCb	$B_s^0 \rightarrow J/\psi 2(\pi^+ \pi^-)$
3686.114±0.007 ^{+0.011} _{-0.016}		⁵ ANASHIN	12 KEDR	$e^+e^- \rightarrow \text{hadrons}$
3686.111±0.025±0.009		AULCHENKO	03 KEDR	$e^+e^- \rightarrow \text{hadrons}$
3686.00 ±0.10	413	⁶ ZHOLENTZ	80 OLYA	e^+e^-

¹Supersedes AULCHENKO 03 and ANASHIN 12.
²Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85).
³Mass 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.
⁴From a fit of a relativistic S -wave Breit-Wigner convolved with the detector resolution. The width of $\psi(2S)$ is constrained to the PDG 22 value. Systematic errors not evaluated.
⁵From 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.
⁶Superseded by ARTAMONOV 00.

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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
589.188±0.028 OUR AVERAGE			
589.194±0.027±0.011	¹ AULCHENKO	03 KEDR	$e^+e^- \rightarrow \text{hadrons}$
589.7 ±1.2	LEMOIGNE	82 GOLI	$185 \pi^- \text{Be} \rightarrow \gamma \mu^+ \mu^- \text{A}$
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^-

¹Redundant with data in mass above.
²Systematic errors not evaluated.

$\psi(2S)$ WIDTH

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
293 ± 9 OUR FIT	Error includes scale factor of 1.2.			
286 ± 16 OUR AVERAGE				
$358 \pm 88 \pm 4$		ABLIKIM	08B BES2	$e^+e^- \rightarrow \text{hadrons}$
$290 \pm 25 \pm 4$	2.7k	ANDREOTTI	07 E835	$p\bar{p} \rightarrow e^+e^-, J/\psi X$
$331 \pm 58 \pm 2$		ABLIKIM	06L BES2	$e^+e^- \rightarrow \text{hadrons}$
264 ± 27		¹ BAI	02B BES2	e^+e^-
$287 \pm 37 \pm 16$		² ARMSTRONG	93B E760	$\bar{p}p \rightarrow e^+e^-$

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 $\pm$ 0.13) %	
Γ_2 virtual $\gamma \rightarrow \text{hadrons}$	(1.79 $\pm$ 0.04) %	
Γ_3 ggg	(10.6 $\pm$ 1.6) %	
Γ_4 $\gamma g g$	(1.03 $\pm$ 0.29) %	
Γ_5 light hadrons	(15.4 $\pm$ 1.5) %	
Γ_6 K_S^0 anything	(16.0 $\pm$ 1.1) %	
Γ_7 e^+e^-	(7.94 $\pm$ 0.22) $\times 10^{-3}$	S=1.3
Γ_8 $\mu^+\mu^-$	(8.0 $\pm$ 0.6) $\times 10^{-3}$	
Γ_9 $\tau^+\tau^-$	(3.1 $\pm$ 0.4) $\times 10^{-3}$	

Decays into $J/\psi(1S)$ and anything

Γ_{10} $J/\psi(1S)$ anything	(61.5 $\pm$ 0.7) %	S=1.3
Γ_{11} $J/\psi(1S)$ neutrals	(25.4 $\pm$ 0.5) %	S=1.6
Γ_{12} $J/\psi(1S)\pi^+\pi^-$	(34.69 $\pm$ 0.34) %	S=1.1
Γ_{13} $J/\psi(1S)\pi^0\pi^0$	(18.2 $\pm$ 0.5) %	S=1.6
Γ_{14} $J/\psi(1S)\eta$	(3.37 $\pm$ 0.06) %	S=1.2
Γ_{15} $J/\psi(1S)\pi^0$	(1.268 $\pm$ 0.032) $\times 10^{-3}$	

Hadronic decays

Γ_{16} $\pi^+\pi^-$	(7.8 $\pm$ 2.6) $\times 10^{-6}$	
Γ_{17} $\pi^+\pi^-\pi^0$	(2.01 $\pm$ 0.17) $\times 10^{-4}$	S=1.7
Γ_{18} $\rho(770)\pi \rightarrow \pi^+\pi^-\pi^0$	(3.2 $\pm$ 1.2) $\times 10^{-5}$	S=1.8
Γ_{19} $\rho(2150)\pi \rightarrow \pi^+\pi^-\pi^0$	(1.9 $^{+1.2}_{-0.4}$) $\times 10^{-4}$	
Γ_{20} $2(\pi^+\pi^-)$	(2.4 $\pm$ 0.6) $\times 10^{-4}$	S=2.2
Γ_{21} $\rho^0\pi^+\pi^-$	(2.2 $\pm$ 0.6) $\times 10^{-4}$	S=1.4
Γ_{22} $2(\pi^+\pi^-)\pi^0$	(2.9 $\pm$ 1.0) $\times 10^{-3}$	S=4.7
Γ_{23} $\rho a_2(1320)$	(2.6 $\pm$ 0.9) $\times 10^{-4}$	
Γ_{24} $\pi^+\pi^-\pi^0\pi^0\pi^0$	(5.3 $\pm$ 1.0) $\times 10^{-3}$	

Γ_{25}	$\rho^{\pm} \pi^{\mp} \pi^0 \pi^0$	$< 2.7 \times 10^{-3}$	CL=90%
Γ_{26}	$\pi^+ \pi^- 4\pi^0$	$(1.4 \pm 1.0) \times 10^{-3}$	
Γ_{27}	$3(\pi^+ \pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8
Γ_{28}	$2(\pi^+ \pi^- \pi^0)$	$(4.8 \pm 1.5) \times 10^{-3}$	
Γ_{29}	$3(\pi^+ \pi^-) \pi^0$	$(3.5 \pm 1.6) \times 10^{-3}$	
Γ_{30}	$2(\pi^+ \pi^-) 3\pi^0$	$(1.42 \pm 0.31) \%$	
Γ_{31}	$\eta \pi^+ \pi^-$	$< 1.6 \times 10^{-4}$	CL=90%
Γ_{32}	$\eta \pi^+ \pi^- \pi^0$	$(9.5 \pm 1.7) \times 10^{-4}$	
Γ_{33}	$\eta 2(\pi^+ \pi^-)$	$(1.2 \pm 0.6) \times 10^{-3}$	
Γ_{34}	$\eta \pi^+ \pi^- \pi^0 \pi^0$	$< 4 \times 10^{-4}$	CL=90%
Γ_{35}	$\eta \pi^+ \pi^- 3\pi^0$	$< 2.1 \times 10^{-3}$	CL=90%
Γ_{36}	$\eta 2(\pi^+ \pi^- \pi^0)$	$< 2.1 \times 10^{-3}$	CL=90%
Γ_{37}	$\rho \eta$	$(2.2 \pm 0.6) \times 10^{-5}$	S=1.1
Γ_{38}	$\eta' \pi^+ \pi^- \pi^0$	$(4.5 \pm 2.1) \times 10^{-4}$	
Γ_{39}	$\eta' \rho$	$(1.9 \pm 1.7 \pm 1.2) \times 10^{-5}$	
Γ_{40}	$\omega \pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$	
Γ_{41}	$\omega \pi^+ \pi^-$	$(7.3 \pm 1.2) \times 10^{-4}$	S=2.1
Γ_{42}	$\omega \pi^+ \pi^- 2\pi^0$	$(8.7 \pm 2.4) \times 10^{-3}$	
Γ_{43}	$b_1^{\pm} \pi^{\mp}$	$(4.0 \pm 0.6) \times 10^{-4}$	S=1.1
Γ_{44}	$\omega f_2(1270)$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{45}	$\omega \pi^0 \pi^0$	$(1.11 \pm 0.35) \times 10^{-3}$	
Γ_{46}	$\omega 3\pi^0$	$< 8 \times 10^{-4}$	CL=90%
Γ_{47}	$b_1^0 \pi^0$	$(2.4 \pm 0.6) \times 10^{-4}$	
Γ_{48}	$\omega \eta$	$< 1.1 \times 10^{-5}$	CL=90%
Γ_{49}	$\omega \eta'$	$(3.2 \pm 2.5 \pm 2.1) \times 10^{-5}$	
Γ_{50}	$\phi \pi^0$	$< 4 \times 10^{-7}$	CL=90%
Γ_{51}	$\phi \pi^+ \pi^-$	$(1.18 \pm 0.26) \times 10^{-4}$	S=1.5
Γ_{52}	$\phi f_0(980) \rightarrow \pi^+ \pi^-$	$(7.5 \pm 3.3) \times 10^{-5}$	S=1.6
Γ_{53}	$\phi \eta$	$(3.10 \pm 0.31) \times 10^{-5}$	
Γ_{54}	$\eta \phi(2170), \phi(2170) \rightarrow \phi f_0(980), f_0 \rightarrow \pi^+ \pi^-$	$< 2.2 \times 10^{-6}$	CL=90%
Γ_{55}	$\phi \eta'$	$(1.54 \pm 0.20) \times 10^{-5}$	
Γ_{56}	$\phi \phi \phi$	$(1.46 \pm 0.18) \times 10^{-5}$	
Γ_{57}	$\phi f_1(1285)$	$(3.0 \pm 1.3) \times 10^{-5}$	
Γ_{58}	$\phi \eta(1405) \rightarrow \phi \pi^+ \pi^- \eta$	$(8.5 \pm 1.7) \times 10^{-6}$	
Γ_{59}	$\phi f_2'(1525)$	$(4.4 \pm 1.6) \times 10^{-5}$	
Γ_{60}	$K^+ K^-$	$(7.5 \pm 0.5) \times 10^{-5}$	
Γ_{61}	$K^+ K^- \pi^+ \pi^-$	$(7.3 \pm 0.5) \times 10^{-4}$	
Γ_{62}	$K^+ K^- \pi^0$	$(4.07 \pm 0.31) \times 10^{-5}$	
Γ_{63}	$K_S^0 K_S^0$	$< 4.6 \times 10^{-6}$	
Γ_{64}	$K_S^0 K_L^0$	$(5.34 \pm 0.33) \times 10^{-5}$	
Γ_{65}	$K_S^0 K_L^0 \pi^0$	$< 3.0 \times 10^{-4}$	CL=90%

Γ_{66}	$K^+ K^- \pi^0 \pi^0$	$(2.6 \pm 1.3) \times 10^{-4}$	
Γ_{67}	$K^+ K^- \pi^0 \pi^0 \pi^0$	$(6.6 \pm 2.8) \times 10^{-4}$	
Γ_{68}	$K_S^0 K^\pm \pi^\mp \pi^0 \pi^0$	$(1.7 \pm 0.6) \times 10^{-3}$	
Γ_{69}	$K_S^0 K^\pm \pi^\mp \pi^+ \pi^-$	$(2.2 \pm 0.4) \times 10^{-3}$	
Γ_{70}	$K^+ K^- \pi^+ \pi^- \pi^0$	$(1.26 \pm 0.09) \times 10^{-3}$	
Γ_{71}	$\omega f_0(1710) \rightarrow \omega K^+ K^-$	$(5.9 \pm 2.2) \times 10^{-5}$	
Γ_{72}	$K^*(892)^0 K^- \pi^+ \pi^0 + \text{c.c.}$	$(8.6 \pm 2.2) \times 10^{-4}$	
Γ_{73}	$K^*(892)^+ K^- \pi^+ \pi^- + \text{c.c.}$	$(9.6 \pm 2.8) \times 10^{-4}$	
Γ_{74}	$K^*(892)^+ K^- \rho^0 + \text{c.c.}$	$(7.3 \pm 2.6) \times 10^{-4}$	
Γ_{75}	$K^*(892)^0 K^- \rho^+ + \text{c.c.}$	$(6.1 \pm 1.8) \times 10^{-4}$	
Γ_{76}	$K_S^0 K_S^0 \pi^+ \pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{77}	$K_S^0 K_L^0 \pi^0 \pi^0$	$(1.3 \pm 0.6) \times 10^{-3}$	
Γ_{78}	$K_S^0 K^*(892)^0 \pi^0 \pi^0$	$(3.0 \pm 1.3) \times 10^{-4}$	
Γ_{79}	$K_S^0 K^\pm \rho(770)^\mp \pi^0$	$< 7 \times 10^{-4}$	CL=90%
Γ_{80}	$K_S^0 K^\pm \pi^\mp \rho(770)^0$	$< 7 \times 10^{-4}$	CL=90%
Γ_{81}	$K^\mp K^*(892)^\pm \pi^0 \pi^0$	$(7.0 \pm 2.9) \times 10^{-4}$	
Γ_{82}	$K^*(892)^+ K^*(892)^- \pi^0$	$(3.6 \pm 1.8) \times 10^{-3}$	
Γ_{83}	$K_S^0 K_L^0 \eta$	$(1.3 \pm 0.5) \times 10^{-3}$	
Γ_{84}	$K^+ K^- \rho^0$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{85}	$K^*(892)^0 \bar{K}_2^*(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$	
Γ_{86}	$K^+ K^- \pi^+ \pi^- \eta$	$(1.3 \pm 0.7) \times 10^{-3}$	
Γ_{87}	$K^+ K^- 2(\pi^+ \pi^-)$	$(1.9 \pm 0.9) \times 10^{-3}$	
Γ_{88}	$K^+ K^- 2(\pi^+ \pi^-) \pi^0$	$(1.00 \pm 0.31) \times 10^{-3}$	
Γ_{89}	$K^+ K^*(892)^- + \text{c.c.}$	$(2.9 \pm 0.4) \times 10^{-5}$	S=1.2
Γ_{90}	$2(K^+ K^-)$	$(6.3 \pm 1.3) \times 10^{-5}$	
Γ_{91}	$2(K^+ K^-) \pi^0$	$(1.10 \pm 0.28) \times 10^{-4}$	
Γ_{92}	$K^+ K^- \phi$	$(7.0 \pm 1.6) \times 10^{-5}$	
Γ_{93}	$K_S^0 K_S^0 \phi$	$(3.53 \pm 0.29) \times 10^{-5}$	
Γ_{94}	$K_1(1270)^\pm K^\mp$	$(1.00 \pm 0.28) \times 10^{-3}$	
Γ_{95}	$K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.}$	$(6.7 \pm 2.5) \times 10^{-4}$	
Γ_{96}	$\eta K^+ K^-$, no $\eta \phi$	$(3.49 \pm 0.17) \times 10^{-5}$	
Γ_{97}	$\eta K^+ K^-$	$< 2.6 \times 10^{-4}$	CL=90%
Γ_{98}	$X(1750) \eta \rightarrow K^+ K^- \eta$	$(4.8 \pm 2.8) \times 10^{-6}$	
Γ_{99}	$K_1(1400)^\pm K^\mp$	$< 3.1 \times 10^{-4}$	CL=90%
Γ_{100}	$K_2^*(1430)^\pm K^\mp$	$(7.1 \pm 1.3 - 0.9) \times 10^{-5}$	
Γ_{101}	$K^*(892)^0 \bar{K}^0 + \text{c.c.}$	$(1.09 \pm 0.20) \times 10^{-4}$	
Γ_{102}	$\omega K^+ K^-$	$(1.62 \pm 0.11) \times 10^{-4}$	S=1.1
Γ_{103}	$\omega K_S^0 K_S^0$	$(7.0 \pm 0.5) \times 10^{-5}$	
Γ_{104}	$\omega K^*(892)^+ K^- + \text{c.c.}$	$(2.07 \pm 0.26) \times 10^{-4}$	
Γ_{105}	$\omega K_2^*(1430)^+ K^- + \text{c.c.}$	$(6.1 \pm 1.2) \times 10^{-5}$	
Γ_{106}	$\omega \bar{K}^*(892)^0 K^0$	$(1.68 \pm 0.30) \times 10^{-4}$	
Γ_{107}	$\omega \bar{K}_2^*(1430)^0 K^0$	$(5.8 \pm 2.2) \times 10^{-5}$	

Γ_{108}	$\omega X(1440) \rightarrow \omega K_S^0 K^- \pi^+ +$	$(1.6 \pm 0.4) \times 10^{-5}$	
	c.c.		
Γ_{109}	$\omega X(1440) \rightarrow \omega K^+ K^- \pi^0$	$(1.09 \pm 0.26) \times 10^{-5}$	
Γ_{110}	$\omega f_1(1285) \rightarrow \omega K_S^0 K^- \pi^+ +$	$(3.0 \pm 1.0) \times 10^{-6}$	
	c.c.		
Γ_{111}	$\omega f_1(1285) \rightarrow \omega K^+ K^- \pi^0$	$(1.2 \pm 0.7) \times 10^{-6}$	
Γ_{112}	$p\bar{p}$	$(2.94 \pm 0.09) \times 10^{-4}$	S=1.3
Γ_{113}	$n\bar{n}$	$(3.06 \pm 0.15) \times 10^{-4}$	
Γ_{114}	$p\bar{p}\pi^0$	$(1.53 \pm 0.07) \times 10^{-4}$	
Γ_{115}	$N(940)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0$	$(6.4 \pm_{-1.3}^{+1.8}) \times 10^{-5}$	
Γ_{116}	$N(1440)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0$	$(7.3 \pm_{-1.5}^{+1.7}) \times 10^{-5}$	S=2.5
Γ_{117}	$N(1520)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0$	$(6.4 \pm_{-1.8}^{+2.3}) \times 10^{-6}$	
Γ_{118}	$N(1535)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0$	$(2.5 \pm 1.0) \times 10^{-5}$	
Γ_{119}	$N(1650)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0$	$(3.8 \pm_{-1.7}^{+1.4}) \times 10^{-5}$	
Γ_{120}	$N(1720)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0$	$(1.79 \pm_{-0.70}^{+0.26}) \times 10^{-5}$	
Γ_{121}	$N(2300)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0$	$(2.6 \pm_{-0.7}^{+1.2}) \times 10^{-5}$	
Γ_{122}	$N(2570)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0$	$(2.13 \pm_{-0.31}^{+0.40}) \times 10^{-5}$	
Γ_{123}	$p\bar{p}\pi^+\pi^-$	$(6.0 \pm 0.4) \times 10^{-4}$	
Γ_{124}	$p\bar{p}K^+K^-$	$(2.7 \pm 0.7) \times 10^{-5}$	
Γ_{125}	$p\bar{p}\eta$	$(6.0 \pm 0.4) \times 10^{-5}$	
Γ_{126}	$N(1535)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\eta$	$(4.5 \pm_{-0.6}^{+0.7}) \times 10^{-5}$	
Γ_{127}	$p\bar{p}\pi^+\pi^-\pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$	
Γ_{128}	$p\bar{p}\rho^0$	$(5.0 \pm 2.2) \times 10^{-5}$	
Γ_{129}	$p\bar{p}\omega$	$(6.9 \pm 2.1) \times 10^{-5}$	
Γ_{130}	$p\bar{p}\eta'$	$(1.10 \pm 0.13) \times 10^{-5}$	
Γ_{131}	$p\bar{p}\phi$	$(6.1 \pm 0.6) \times 10^{-6}$	
Γ_{132}	$\phi X(1835) \rightarrow p\bar{p}\phi$	$< 1.82 \times 10^{-7}$	CL=90%
Γ_{133}	$p\bar{n}\pi^- \text{ or c.c.}$	$(2.48 \pm 0.17) \times 10^{-4}$	
Γ_{134}	$p\bar{n}\pi^-\pi^0$	$(3.2 \pm 0.7) \times 10^{-4}$	
Γ_{135}	$\Lambda\bar{\Lambda}$	$(3.81 \pm 0.13) \times 10^{-4}$	S=1.4
Γ_{136}	$\Lambda\bar{\Lambda}\pi^0$	$(1.4 \pm 0.7) \times 10^{-6}$	
Γ_{137}	$\Lambda\bar{\Lambda}\eta$	$(2.43 \pm 0.32) \times 10^{-5}$	
Γ_{138}	$\Lambda(1670)\bar{\Lambda} \rightarrow \Lambda\bar{\Lambda}\eta$	$(1.3 \pm 0.7) \times 10^{-5}$	
Γ_{139}	$\Lambda\bar{\Lambda}\eta'$	$(7.3 \pm 1.0) \times 10^{-6}$	
Γ_{140}	$\Lambda\bar{\Lambda}\omega(782)$	$(3.3 \pm 0.4) \times 10^{-5}$	
Γ_{141}	$\Lambda\bar{\Lambda}\pi^+\pi^-$	$(2.8 \pm 0.6) \times 10^{-4}$	
Γ_{142}	$\Lambda\bar{p}K^+$	$(1.00 \pm 0.14) \times 10^{-4}$	
Γ_{143}	$\Lambda\bar{p}K^*(892)^+ + \text{c.c.}$	$(6.3 \pm 0.7) \times 10^{-5}$	
Γ_{144}	$\Lambda\bar{p}K^+\pi^+\pi^-$	$(1.8 \pm 0.4) \times 10^{-4}$	
Γ_{145}	$\bar{\Lambda}nK_S^0 + \text{c.c.}$	$(8.1 \pm 1.8) \times 10^{-5}$	

Γ_{146}	$\Delta^{++}\bar{\Delta}^{--}$	$(1.28 \pm 0.35) \times 10^{-4}$	
Γ_{147}	$\Lambda\bar{\Sigma}^+\pi^- + \text{c.c.}$	$(1.40 \pm 0.13) \times 10^{-4}$	
Γ_{148}	$\Lambda\bar{\Sigma}^-\pi^+ + \text{c.c.}$	$(1.54 \pm 0.14) \times 10^{-4}$	
Γ_{149}	$\Lambda\bar{\Sigma}^0 + \text{c.c.}$	$(1.6 \pm 0.7) \times 10^{-6}$	
Γ_{150}	$\Lambda\bar{\Sigma}^0$		
Γ_{151}	$\Sigma^0\bar{p}K^+ + \text{c.c.}$	$(1.67 \pm 0.18) \times 10^{-5}$	
Γ_{152}	$\Sigma^+\bar{\Sigma}^-$	$(2.43 \pm 0.10) \times 10^{-4}$	S=1.4
Γ_{153}	$\Sigma^0\bar{\Sigma}^0$	$(2.35 \pm 0.09) \times 10^{-4}$	S=1.1
Γ_{154}	$\Sigma^-\bar{\Sigma}^+$	$(2.82 \pm 0.09) \times 10^{-4}$	
Γ_{155}	$\Sigma^+\bar{\Sigma}^-\eta$	$(9.6 \pm 2.4) \times 10^{-6}$	
Γ_{156}	$\Sigma^+\bar{\Sigma}^-\omega$	$(1.89 \pm 0.28) \times 10^{-5}$	
Γ_{157}	$\Sigma^+\bar{\Sigma}^-\phi$	$(3.0 \pm 0.7) \times 10^{-6}$	
Γ_{158}	$\Sigma(1385)^+\bar{\Sigma}(1385)^-$	$(8.5 \pm 0.7) \times 10^{-5}$	
Γ_{159}	$\Sigma(1385)^-\bar{\Sigma}(1385)^+$	$(8.5 \pm 0.8) \times 10^{-5}$	
Γ_{160}	$\Sigma(1385)^0\bar{\Sigma}(1385)^0$	$(6.9 \pm 0.7) \times 10^{-5}$	
Γ_{161}	$\Xi^-\bar{\Xi}^+$	$(2.87 \pm 0.11) \times 10^{-4}$	S=1.1
Γ_{162}	$\Xi^0\bar{\Xi}^0$	$(2.3 \pm 0.4) \times 10^{-4}$	S=4.2
Γ_{163}	$\Xi(1530)^0\bar{\Xi}(1530)^0$	$(6.8 \pm 0.4) \times 10^{-5}$	
Γ_{164}	$\Lambda\bar{\Xi}^+K^- + \text{c.c.}$	$(3.67 \pm 0.22) \times 10^{-5}$	
Γ_{165}	$\Xi(1690)^-\bar{\Xi}^+ \rightarrow K^-\Lambda\bar{\Xi}^+ + \text{c.c.}$	$(6.2 \pm 2.1) \times 10^{-6}$	S=1.5
Γ_{166}	$\Xi(1820)^-\bar{\Xi}^+ \rightarrow K^-\Lambda\bar{\Xi}^+ + \text{c.c.}$	$(1.48 \pm 0.29) \times 10^{-5}$	S=1.2
Γ_{167}	$\Xi(1530)^-\bar{\Xi}(1530)^+$	$(1.15 \pm 0.07) \times 10^{-4}$	
Γ_{168}	$\Xi(1530)^-\bar{\Xi}^+$	$(7.0 \pm 1.2) \times 10^{-6}$	
Γ_{169}	$\Xi(1530)^0\bar{\Xi}^0$	$(5.3 \pm 0.5) \times 10^{-6}$	
Γ_{170}	$\Sigma^0\bar{\Xi}^+K^- + \text{c.c.}$	$(3.7 \pm 0.4) \times 10^{-5}$	
Γ_{171}	$\Omega^-K^+\bar{\Xi}^0 + \text{c.c.}$	$(2.8 \pm 0.4) \times 10^{-6}$	
Γ_{172}	$\Omega^-\bar{\Omega}^+$	$(5.66 \pm 0.30) \times 10^{-5}$	S=1.3
Γ_{173}	$\eta_c\pi^+\pi^-\pi^0$	$< 1.0 \times 10^{-3}$	CL=90%
Γ_{174}	$h_c(1P)\pi^0$	$(7.4 \pm 0.5) \times 10^{-4}$	
Γ_{175}	$\Lambda_c^+\bar{p}e^+e^- + \text{c.c.}$	$< 1.7 \times 10^{-6}$	CL=90%
Γ_{176}	$\Theta(1540)\bar{\Theta}(1540) \rightarrow K_S^0 p K^- \bar{n} + \text{c.c.}$	$[a] < 8.8 \times 10^{-6}$	CL=90%
Γ_{177}	$\Theta(1540)K^-\bar{n} \rightarrow K_S^0 p K^- \bar{n}$	$[a] < 1.0 \times 10^{-5}$	CL=90%
Γ_{178}	$\Theta(1540)K_S^0\bar{p} \rightarrow K_S^0\bar{p}K^+n$	$[a] < 7.0 \times 10^{-6}$	CL=90%
Γ_{179}	$\bar{\Theta}(1540)K^+n \rightarrow K_S^0\bar{p}K^+n$	$[a] < 2.6 \times 10^{-5}$	CL=90%
Γ_{180}	$\bar{\Theta}(1540)K_S^0p \rightarrow K_S^0pK^-\bar{n}$	$[a] < 6.0 \times 10^{-6}$	CL=90%

Radiative decays

Γ_{181}	$\gamma\chi_{c0}(1P)$	$(9.75 \pm 0.22) \%$	S=1.1
Γ_{182}	$\gamma\chi_{c1}(1P)$	$(9.75 \pm 0.27) \%$	S=1.1
Γ_{183}	$\gamma\chi_{c2}(1P)$	$(9.38 \pm 0.23) \%$	S=1.2
Γ_{184}	$\gamma\eta_c(1S)$	$(3.6 \pm 0.5) \times 10^{-3}$	S=1.3

$\Gamma_{185} \gamma \eta_c(2S)$	$(5.4 \pm 3.4_{-2.9}) \times 10^{-4}$	
$\Gamma_{186} \gamma \pi^0$		
$\Gamma_{187} \gamma 2(\pi^+ \pi^-)$	$(4.0 \pm 0.6) \times 10^{-4}$	
$\Gamma_{188} \gamma 3(\pi^+ \pi^-)$	$< 1.7 \times 10^{-4}$	CL=90%
$\Gamma_{189} \gamma \eta'(958)$	$(1.24 \pm 0.04) \times 10^{-4}$	
$\Gamma_{190} \gamma f_2(1270)$	$(2.73 \pm 0.29_{-0.25}) \times 10^{-4}$	S=1.8
$\Gamma_{191} \gamma f_0(1370) \rightarrow \gamma K \bar{K}$	$(3.1 \pm 1.7) \times 10^{-5}$	
$\Gamma_{192} \gamma f_0(1500)$	$(9.3 \pm 1.9) \times 10^{-5}$	
$\Gamma_{193} \gamma f'_2(1525)$	$(3.3 \pm 0.8) \times 10^{-5}$	
$\Gamma_{194} \gamma f_0(1710)$	seen	
$\Gamma_{195} \gamma f_0(1710) \rightarrow \gamma \pi \pi$	$(3.5 \pm 0.6) \times 10^{-5}$	
$\Gamma_{196} \gamma f_0(1710) \rightarrow \gamma K \bar{K}$	$(6.6 \pm 0.7) \times 10^{-5}$	
$\Gamma_{197} \gamma f_0(2100) \rightarrow \gamma \pi \pi$	$(4.8 \pm 1.0) \times 10^{-6}$	
$\Gamma_{198} \gamma f_0(2200) \rightarrow \gamma K \bar{K}$	$(3.2 \pm 1.0) \times 10^{-6}$	
$\Gamma_{199} \gamma f_J(2220) \rightarrow \gamma \pi \pi$	$< 5.8 \times 10^{-6}$	CL=90%
$\Gamma_{200} \gamma f_J(2220) \rightarrow \gamma K \bar{K}$	$< 9.5 \times 10^{-6}$	CL=90%
$\Gamma_{201} \gamma \eta$	$(9.2 \pm 1.8) \times 10^{-7}$	
$\Gamma_{202} \gamma \eta \pi^+ \pi^-$	$(8.7 \pm 2.1) \times 10^{-4}$	
$\Gamma_{203} \gamma \eta(1405)$	seen	
$\Gamma_{204} \gamma \eta(1405) \rightarrow \gamma K \bar{K} \pi$	$< 9 \times 10^{-5}$	CL=90%
$\Gamma_{205} \gamma \eta(1405) \rightarrow \gamma \eta \pi^+ \pi^-$	$(3.6 \pm 2.5) \times 10^{-5}$	
$\Gamma_{206} \gamma \eta(1405) \rightarrow \gamma f_0(980) \pi^0 \rightarrow \gamma \pi^+ \pi^- \pi^0$	$< 5.0 \times 10^{-7}$	CL=90%
$\Gamma_{207} \gamma \eta(1475)$	seen	
$\Gamma_{208} \gamma \eta(1475) \rightarrow \gamma K \bar{K} \pi$	$< 1.4 \times 10^{-4}$	CL=90%
$\Gamma_{209} \gamma \eta(1475) \rightarrow \gamma \eta \pi^+ \pi^-$	$< 8.8 \times 10^{-5}$	CL=90%
$\Gamma_{210} \gamma K^{*0} K^+ \pi^- + \text{c.c.}$	$(3.7 \pm 0.9) \times 10^{-4}$	
$\Gamma_{211} \gamma K^{*0} \bar{K}^{*0}$	$(2.4 \pm 0.7) \times 10^{-4}$	
$\Gamma_{212} \gamma K_S^0 K^+ \pi^- + \text{c.c.}$	$(2.6 \pm 0.5) \times 10^{-4}$	
$\Gamma_{213} \gamma K^+ K^- \pi^+ \pi^-$	$(1.9 \pm 0.5) \times 10^{-4}$	
$\Gamma_{214} \gamma K^+ K^- 2(\pi^+ \pi^-)$	$< 2.2 \times 10^{-4}$	CL=90%
$\Gamma_{215} \gamma 2(K^+ K^-)$	$< 4 \times 10^{-5}$	CL=90%
$\Gamma_{216} \gamma p \bar{p}$	$(3.9 \pm 0.5) \times 10^{-5}$	S=2.0
$\Gamma_{217} \gamma f_2(1950) \rightarrow \gamma p \bar{p}$	$(1.20 \pm 0.22) \times 10^{-5}$	
$\Gamma_{218} \gamma f_2(2150) \rightarrow \gamma p \bar{p}$	$(7.2 \pm 1.8) \times 10^{-6}$	
$\Gamma_{219} \gamma X(1835) \rightarrow \gamma p \bar{p}$	$(4.6 \pm 1.8_{-4.0}) \times 10^{-6}$	
$\Gamma_{220} \gamma X \rightarrow \gamma p \bar{p}$	$[b] < 2 \times 10^{-6}$	CL=90%
$\Gamma_{221} \gamma p \bar{p} \pi^+ \pi^-$	$(2.8 \pm 1.4) \times 10^{-5}$	
$\Gamma_{222} \gamma \gamma$	$< 1.5 \times 10^{-4}$	CL=90%
$\Gamma_{223} \gamma \gamma J/\psi$	$(3.1 \pm 1.0_{-1.2}) \times 10^{-4}$	
$\Gamma_{224} e^+ e^- \eta'$	$(1.90 \pm 0.26) \times 10^{-6}$	

Γ_{225}	$e^+ e^- \eta_c(1S)$	$(3.8 \pm 0.4) \times 10^{-5}$
Γ_{226}	$e^+ e^- \chi_{c0}(1P)$	$(1.05 \pm 0.25) \times 10^{-3}$
Γ_{227}	$e^+ e^- \chi_{c1}(1P)$	$(8.5 \pm 0.7) \times 10^{-4}$
Γ_{228}	$e^+ e^- \chi_{c2}(1P)$	$(6.8 \pm 0.8) \times 10^{-4}$

Weak decays

Γ_{229}	$D^0 e^+ e^- + \text{c.c.}$	< 1.4	$\times 10^{-7}$	CL=90%
Γ_{230}	$\Lambda_c^+ \bar{\Sigma}^- + \text{c.c.}$	< 1.4	$\times 10^{-5}$	CL=90%

Other decays

Γ_{231}	invisible	< 1.6	%	CL=90%
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[a] $\Theta(1540)$ is a hypothetical pentaquark state of 1.54 GeV/c² mass and a width of less than 25 MeV/c².

[b] 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 88 branching ratios uses 255 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 393.1$ for 206 degrees of freedom.

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

x_8	3									
x_9	0	0								
x_{12}	21	13	2							
x_{13}	22	5	1	28						
x_{14}	11	6	1	44	11					
x_{112}	0	0	0	3	2	1				
x_{181}	0	0	0	2	0	1	0			
x_{182}	1	0	0	2	0	1	0	0		
x_{183}	1	1	0	4	0	2	0	0	0	
Γ	-85	-4	-1	-29	-31	-15	-4	0	-1	-1
	x_7	x_8	x_9	x_{12}	x_{13}	x_{14}	x_{112}	x_{181}	x_{182}	x_{183}

FIT INFORMATION

A multiparticle fit to $\eta_c(1S)$, $J/\psi(1S)$, $\psi(2S)$, $h_c(1P)$, and $B^\pm$ with the total width, 10 combinations of partial widths obtained from integrated cross section, and 38 branching ratios uses 113 measurements to determine 19 parameters. The overall fit has a $\chi^2 = 184.6$ for 94 degrees of freedom.

$\psi(2S)$ PARTIAL WIDTHS

$\Gamma(\text{hadrons})$

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_7

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
2.33 ± 0.04 OUR FIT	Error includes scale factor of 1.1.		
2.29 ± 0.06 OUR AVERAGE			
$2.23 \pm 0.10 \pm 0.02$	¹ ABLIKIM	15V	BES3 $4.0\text{--}4.4 e^+e^- \rightarrow \pi^+\pi^- J/\psi$
$2.338 \pm 0.037 \pm 0.096$	ABLIKIM	08B	BES2 $e^+e^- \rightarrow \text{hadrons}$
$2.330 \pm 0.036 \pm 0.110$	ABLIKIM	06L	BES2 $e^+e^- \rightarrow \text{hadrons}$
2.44 ± 0.21	² 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. • • •			
$2.279 \pm 0.015 \pm 0.042$	³ ANASHIN	18	KEDR e^+e^-
$2.282 \pm 0.015 \pm 0.042$	⁴ ANASHIN	18	KEDR e^+e^-
2.0 ± 0.3	BRANDELIK	79C	DASP e^+e^-
2.1 ± 0.3	⁵ LUTH	75	MRK1 e^+e^-

¹ ABLIKIM 15V reports $2.213 \pm 0.018 \pm 0.099$ keV from a measurement of $[\Gamma(\psi(2S) \rightarrow e^+e^-)] \times [B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)]$ assuming $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (34.95 \pm 0.45) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (34.69 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² From a simultaneous fit to e^+e^- , $\mu^+\mu^-$, and hadronic channel, assuming $\Gamma_e = \Gamma_\mu = \Gamma_\tau/0.38847$.

³ Combining $\Gamma_{e^+e^-} \cdot B(\mu^+\mu^-)$ from ANASHIN 18 with $\Gamma_{e^+e^-} \cdot B(\text{hadrons})$ from ANASHIN 12 and assuming lepton universality.

⁴ From the sum of $\Gamma_{e^+e^-} \cdot B(\text{hadrons})$ from ANASHIN 12, $\Gamma_{e^+e^-} \cdot B(e^+e^-)$ and $\Gamma_{e^+e^-} \cdot B(\mu^+\mu^-)$ from ANASHIN 18, and $\Gamma_{e^+e^-} \cdot B(\tau^+\tau^-)$ from ANASHIN 07.

⁵ From a simultaneous fit to e^+e^- , $\mu^+\mu^-$, and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$.

$\Gamma(\gamma\gamma)$

Γ_{222}

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 $\Gamma(i)/\text{total}$.

 $\Gamma(\text{hadrons}) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}} \quad \Gamma_1 \Gamma_7 / \Gamma$

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
2.233 ± 0.015 ± 0.042	¹ ANASHIN	12	KEDR $e^+ e^- \rightarrow \text{hadrons}$
• • • 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 $2.233 \pm 0.015 \pm 0.037 \pm 0.020$ keV, where the third uncertainty is due to assumptions on the interference between the resonance and hadronic continuum. We combined the two systematic uncertainties.

 $\Gamma(K_S^0 \text{ anything}) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}} \quad \Gamma_6 \Gamma_7 / \Gamma$

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
0.3738 ± 0.0067 ± 0.0200	ABLIKIM	21S	BES3 $e^+ e^- \rightarrow K_S^0 \text{ anything}$

 $\Gamma(e^+ e^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}} \quad \Gamma_7 \Gamma_7 / \Gamma$

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
21.2 ± 0.7 ± 1.2	¹ ANASHIN	18	KEDR $e^+ e^-$

¹ From the average of nine scans of the $\psi(2S)$.

 $\Gamma(\mu^+ \mu^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}} \quad \Gamma_8 \Gamma_7 / \Gamma$

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
19.3 ± 0.3 ± 0.5	¹ ANASHIN	18	KEDR $\psi(2S) \rightarrow \mu^+ \mu^-$

¹ From the average of nine scans of the $\psi(2S)$.

 $\Gamma(\tau^+ \tau^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}} \quad \Gamma_9 \Gamma_7 / \Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
9.0 ± 2.6	79	¹ ANASHIN	07	KEDR $e^+ e^- \rightarrow \psi(2S) \rightarrow \tau^+ \tau^-$

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

 $\Gamma(J/\psi(1S) \pi^+ \pi^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}} \quad \Gamma_{12} \Gamma_7 / \Gamma$

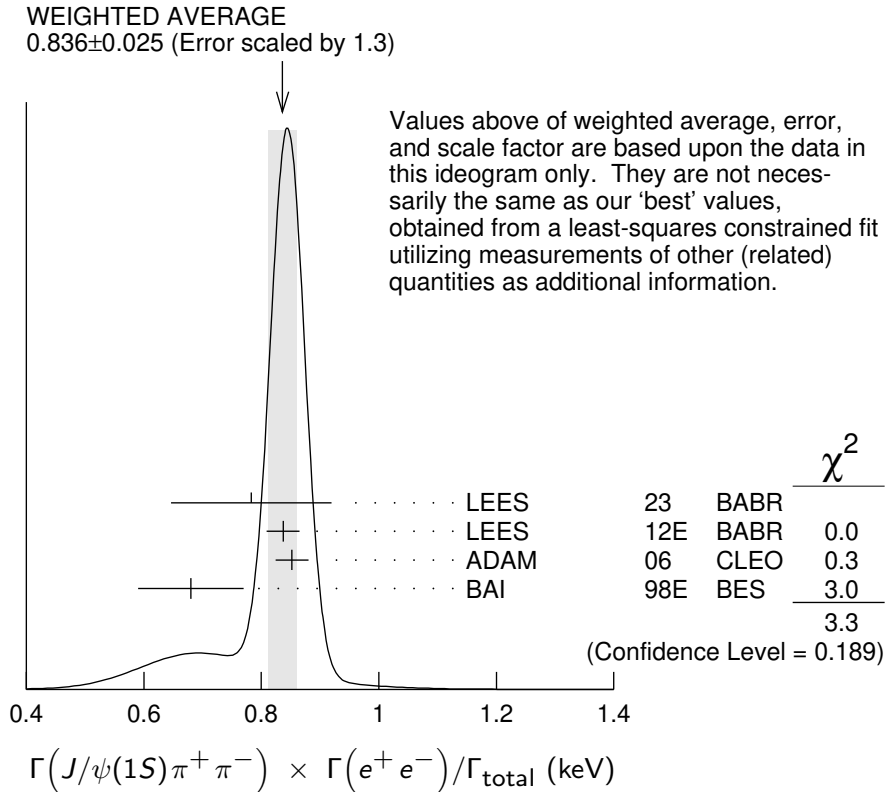
VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.808 ± 0.014 OUR FIT	Error includes scale factor of 1.1.			
0.836 ± 0.025 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			

0.78 ± 0.12 ± 0.07	¹ LEES	23	BABR	$e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$
0.837 ± 0.028 ± 0.005	² LEES	12E	BABR	10.6 $e^+ e^- \rightarrow 2\pi^+ 2\pi^- \gamma$
0.852 ± 0.010 ± 0.026	19.5k	ADAM	06	CLEO 3.773 $e^+ e^- \rightarrow \gamma \psi(2S)$
0.68 ± 0.09	³ BAI	98E	BES	$e^+ e^-$

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

0.93 ± 0.08 ± 0.03	256	⁴ AUBERT	07AU	BABR 10.6 $e^+ e^- \rightarrow J/\psi \pi^+ \pi^- \gamma$
0.755 ± 0.048 ± 0.004	544	⁵ AUBERT	05D	BABR 10.6 $e^+ e^- \rightarrow \pi^+ \pi^- \mu^+ \mu^- \gamma$

- ¹ LEES 23 reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow K_S^0 K^\pm \pi^\mp)] = (4.14 \pm 0.55 \pm 0.29) \times 10^{-3}$ keV which we divide by our best value $B(J/\psi(1S) \rightarrow K_S^0 K^\pm \pi^\mp) = (5.3 \pm 0.5) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ² LEES 12E reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow \mu^+\mu^-)] = (49.9 \pm 1.3 \pm 1.0) \times 10^{-3}$ keV which we divide by our best value $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = (5.961 \pm 0.033) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³ The value of $\Gamma(e^+e^-)$ quoted in BAI 98E is derived using $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6) \times 10^{-2}$ and $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1203 \pm 0.0038$. Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$.
- ⁴ AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow \pi^+\pi^-\pi^0)] = 0.0186 \pm 0.0012 \pm 0.0011$ keV which we divide by our best value $B(J/\psi(1S) \rightarrow \pi^+\pi^-\pi^0) = (2.00 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ⁵ AUBERT 05D reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow \mu^+\mu^-)] = 0.0450 \pm 0.0018 \pm 0.0022$ keV which we divide by our best value $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = (5.961 \pm 0.033) \times 10^{-2}$. 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.



$$\Gamma(J/\psi(1S)\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{13}\Gamma_7/\Gamma$$

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
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0.425±0.012 OUR FIT Error includes scale factor of 1.4.

0.413±0.019 OUR AVERAGE

0.45 ±0.13 ±0.02		¹ LEES	23	BABR	$e^+e^- \rightarrow \gamma_{ISR} \text{hadrons}$
0.45 ±0.12 ±0.04		² LEES	23	BABR	$e^+e^- \rightarrow \gamma_{ISR} \text{hadrons}$
0.411±0.008±0.018	3.6k	ADAM	06	CLEO	$3.773 e^+e^- \rightarrow \gamma\psi(2S)$

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

0.51 ±0.09 ±0.02	142	³ LEES	18E	BABR	$10.6 e^+e^- \rightarrow J/\psi\pi^0\pi^0\gamma$
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¹ LEES 23 reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^0\pi^0) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow K^+K^-\pi^0)] = (1.31 \pm 0.35 \pm 0.13) \times 10^{-3}$ keV which we divide by our best value $B(J/\psi(1S) \rightarrow K^+K^-\pi^0) = (2.88 \pm 0.12) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² LEES 23 reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^0\pi^0) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow K_S^0 K^\pm \pi^\mp)] = (2.36 \pm 0.59 \pm 0.24) \times 10^{-3}$ keV which we divide by our best value $B(J/\psi(1S) \rightarrow K_S^0 K^\pm \pi^\mp) = (5.3 \pm 0.5) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

³ LEES 18E reports $[\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^0\pi^0) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow \pi^+\pi^-\pi^0)] = 0.0101 \pm 0.0015 \pm 0.0011$ keV which we divide by our best value $B(J/\psi(1S) \rightarrow \pi^+\pi^-\pi^0) = (2.00 \pm 0.07) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(J/\psi(1S)\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{14}\Gamma_7/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
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78.6± 1.8 OUR FIT Error includes scale factor of 1.1.

87 ± 9 OUR AVERAGE

83 ±25 ±5	14	¹ AUBERT	07AU	BABR	$10.6 e^+e^- \rightarrow J/\psi\pi^+\pi^-\pi^0\gamma$
88 ± 6 ±7	291 ± 24	ADAM	06	CLEO	$3.773 e^+e^- \rightarrow \gamma\psi(2S)$

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

$$\Gamma(J/\psi(1S)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{15}\Gamma_7/\Gamma$$

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

$$\Gamma(2(\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{22}\Gamma_7/\Gamma$$

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

$$\Gamma(\pi^+\pi^-\pi^0\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{24}\Gamma_7/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
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12.4±1.8±1.2 177 LEES 18E BABR $10.6 e^+e^- \rightarrow \pi^+\pi^-3\pi^0\gamma$

$$\Gamma(\pi^+\pi^-4\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{26}\Gamma_7/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
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3.3±2.3±0.5 18 LEES 21C BABR $e^+e^- \rightarrow \gamma_{ISR}(\pi^+\pi^-4\pi^0)$

$$\Gamma(\rho^\pm \pi^\mp \pi^0 \pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{25}\Gamma_7/\Gamma$$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<6.2	90	LEES	18E BABR	10.6 $e^+ e^- \rightarrow \pi^+ \pi^- 3\pi^0 \gamma$

$$\Gamma(2(\pi^+ \pi^- \pi^0)) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{28}\Gamma_7/\Gamma$$

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

$$\Gamma(2(\pi^+ \pi^-) 3\pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{30}\Gamma_7/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
33±5±5	14k	LEES	21 BABR	10.6 $e^+ e^- \rightarrow 2(\pi^+ \pi^-) 3\pi^0 \gamma$

$$\Gamma(\eta 2(\pi^+ \pi^-)) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{33}\Gamma_7/\Gamma$$

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

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

<7	90	14k	² LEES	21 BABR	10.6 $e^+ e^- \rightarrow 2(\pi^+ \pi^-) 3\pi^0 \gamma$
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¹ AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow \eta 2(\pi^+ \pi^-)) \times \Gamma(\psi(2S) \rightarrow e^+ e^-)/\Gamma_{\text{total}}] \times [B(\eta \rightarrow 2\gamma)] = 1.13 \pm 0.55 \pm 0.08$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² LEES 21 reports $[\Gamma(\psi(2S) \rightarrow \eta 2(\pi^+ \pi^-)) \times \Gamma(\psi(2S) \rightarrow e^+ e^-)/\Gamma_{\text{total}}] \times [B(\eta \rightarrow 3\pi^0)] < 2.3$ eV which we divide by our best value $B(\eta \rightarrow 3\pi^0) = 32.56 \times 10^{-2}$.

$$\Gamma(\eta \pi^+ \pi^- \pi^0 \pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{34}\Gamma_7/\Gamma$$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<0.85	90	LEES	18E BABR	10.6 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \pi^0 \eta \gamma$

$$\Gamma(\eta \pi^+ \pi^- 3\pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{35}\Gamma_7/\Gamma$$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<5	90	¹ LEES	21C BABR	$e^+ e^- \rightarrow \gamma_{ISR}(\pi^+ \pi^- 3\pi^0 \gamma \gamma)$

¹ LEES 21C reports $[\Gamma(\psi(2S) \rightarrow \eta \pi^+ \pi^- 3\pi^0) \times \Gamma(\psi(2S) \rightarrow e^+ e^-)/\Gamma_{\text{total}}] \times [B(\eta \rightarrow 2\gamma)] < 1.9$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$.

$$\Gamma(\eta 2(\pi^+ \pi^- \pi^0)) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{36}\Gamma_7/\Gamma$$

VALUE (eV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<5	90	14k	¹ LEES	21 BABR	10.6 $e^+ e^- \rightarrow 2(\pi^+ \pi^-) 3\pi^0 \gamma$

¹ LEES 21 reports $[\Gamma(\psi(2S) \rightarrow \eta 2(\pi^+ \pi^- \pi^0)) \times \Gamma(\psi(2S) \rightarrow e^+ e^-)/\Gamma_{\text{total}}] \times [B(\eta \rightarrow 2\gamma)] < 1.9$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$.

$$\Gamma(\omega \pi^+ \pi^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{41}\Gamma_7/\Gamma$$

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

¹AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow \omega\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(\omega(782) \rightarrow \pi^+\pi^-\pi^0)] = 2.69 \pm 0.73 \pm 0.16 \text{ eV}$ 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.

$\Gamma(\omega\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{42}\Gamma_7/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
20.2±5.6±0.1	14k	¹ LEES	21	BABR 10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)3\pi^0\gamma$

¹LEES 21 reports $[\Gamma(\psi(2S) \rightarrow \omega\pi^+\pi^-\pi^0) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(\omega(782) \rightarrow \pi^+\pi^-\pi^0)] = 18 \pm 4 \pm 3 \text{ eV}$ 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.

$\Gamma(\omega\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{45}\Gamma_7/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.58±0.82±0.02	33	¹ LEES	18E	BABR 10.6 $e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$

¹LEES 18E reports $[\Gamma(\psi(2S) \rightarrow \omega\pi^0\pi^0) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(\omega(782) \rightarrow \pi^+\pi^-\pi^0)] = 2.3 \pm 0.7 \pm 0.2 \text{ eV}$ 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.

$\Gamma(\omega 3\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{46}\Gamma_7/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<1.8	90	¹ LEES	21C	BABR $e^+e^- \rightarrow \gamma_{ISR}(\pi^+\pi^-\pi^0)$

¹LEES 21C reports $[\Gamma(\psi(2S) \rightarrow \omega 3\pi^0) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(\omega(782) \rightarrow \pi^+\pi^-\pi^0)] < 1.6 \text{ eV}$ which we divide by our best value $B(\omega(782) \rightarrow \pi^+\pi^-\pi^0) = 89.2 \times 10^{-2}$.

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{51}\Gamma_7/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.54±0.18±0.01	19	¹ LEES	12F	BABR 10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

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

0.56±0.22±0.01 10 ² AUBERT,BE 06D BABR 10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$

¹LEES 12F reports $[\Gamma(\psi(2S) \rightarrow \phi\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+K^-)] = 0.27 \pm 0.09 \pm 0.02 \text{ eV}$ which we divide by our best value $B(\phi(1020) \rightarrow K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

²Superseded by LEES 12F. AUBERT,BE 06D reports $[\Gamma(\psi(2S) \rightarrow \phi\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+K^-)] = 0.28 \pm 0.11 \pm 0.02 \text{ eV}$ which we divide by our best value $B(\phi(1020) \rightarrow K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi f_0(980) \rightarrow \pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{52}\Gamma_7/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.341±0.127±0.004	12	¹ LEES	12F	BABR 10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$

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

$0.341 \pm 0.165 \pm 0.004$ 6 ± 3 ² AUBERT 07AK BABR $10.6 \text{ e}^+ \text{e}^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$

¹ LEES 12F reports $[\Gamma(\psi(2S) \rightarrow \phi f_0(980) \rightarrow \pi^+ \pi^-) \times \Gamma(\psi(2S) \rightarrow e^+ e^-) / \Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+ K^-)] = 0.17 \pm 0.06 \pm 0.02 \text{ eV}$ which we divide by our best value $B(\phi(1020) \rightarrow K^+ K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(\psi(2S) \rightarrow \phi f_0(980) \rightarrow \pi^+ \pi^-) \times \Gamma(\psi(2S) \rightarrow e^+ e^-) / \Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+ K^-)] = 0.17 \pm 0.08 \pm 0.02 \text{ eV}$ which we divide by our best value $B(\phi(1020) \rightarrow K^+ K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ K^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ **$\Gamma_{60} \Gamma_7 / \Gamma$**

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.147 \pm 0.035 \pm 0.005$ 66 ¹ LEES 15J BABR $e^+ e^- \rightarrow K^+ K^- \gamma$
 $0.197 \pm 0.035 \pm 0.005$ 66 ² LEES 15J BABR $e^+ e^- \rightarrow K^+ K^- \gamma$
 $0.35 \pm 0.14 \pm 0.03$ 11 ³ LEES 13Q BABR $e^+ e^- \rightarrow K^+ K^- \gamma$

¹ $\sin \phi > 0$.

² $\sin \phi < 0$.

³ Interference with non-resonant $K^+ K^-$ production not taken into account.

$\Gamma(K^+ K^- \pi^+ \pi^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ **$\Gamma_{61} \Gamma_7 / \Gamma$**

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
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$1.92 \pm 0.30 \pm 0.06$ 133 LEES 12F BABR $10.6 \text{ e}^+ \text{e}^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$

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

$2.56 \pm 0.42 \pm 0.16$ 85 ¹ AUBERT 07AK BABR $10.6 \text{ e}^+ \text{e}^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$

¹ Superseded by LEES 12F.

$\Gamma(K_S^0 K_L^0 \pi^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ **$\Gamma_{65} \Gamma_7 / \Gamma$**

VALUE (eV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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< 0.7 90 8 LEES 17A BABR $e^+ e^- \rightarrow K_S^0 K_L^0 \pi^0 \gamma$

$\Gamma(K^+ K^- \pi^0 \pi^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ **$\Gamma_{66} \Gamma_7 / \Gamma$**

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
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$0.60 \pm 0.31 \pm 0.03$ 17 LEES 12F BABR $10.6 \text{ e}^+ \text{e}^- \rightarrow \pi^0 \pi^0 K^+ K^- \gamma$

$\Gamma(K^+ K^- \pi^0 \pi^0 \pi^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ **$\Gamma_{67} \Gamma_7 / \Gamma$**

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
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$1.54 \pm 0.63 \pm 0.15$ LEES 23 BABR $e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$

$\Gamma(K_S^0 K^\pm \pi^\mp \pi^0 \pi^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ **$\Gamma_{68} \Gamma_7 / \Gamma$**

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
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$4.0 \pm 1.4 \pm 0.4$ LEES 23 BABR $e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$

$\Gamma(K_S^0 K^\pm \pi^\mp \pi^+ \pi^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{69}\Gamma_7/\Gamma$
VALUE (eV)		DOCUMENT ID	TECN	COMMENT	
5.1±0.7±0.4		LEES	23	BABR	$e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$
$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{70}\Gamma_7/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
4.4±1.3±0.3	32	AUBERT	07AU	BABR	$10.6 e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \pi^0 \gamma$
$\Gamma(K_S^0 K_L^0 \pi^0 \pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{77}\Gamma_7/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
2.92±1.27±0.15	14	LEES	17A	BABR	$e^+ e^- \rightarrow K_S^0 K_L^0 \pi^0 \pi^0 \gamma$
$\Gamma(K_S^0 K^*(892)^0 \pi^0 \pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{78}\Gamma_7/\Gamma$
VALUE (eV)		DOCUMENT ID	TECN	COMMENT	
0.71±0.29±0.07		LEES	23	BABR	$e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$
$\Gamma(K_S^0 K^\pm \rho(770)^\mp \pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{79}\Gamma_7/\Gamma$
VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT	
<1.6	90	LEES	23	BABR	$e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$
$\Gamma(K_S^0 K^\pm \pi^\mp \rho(770)^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{80}\Gamma_7/\Gamma$
VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT	
<1.6	90	LEES	23	BABR	$e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$
$\Gamma(K^*(892)^+ K^*(892)^- \pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{82}\Gamma_7/\Gamma$
VALUE (eV)		DOCUMENT ID	TECN	COMMENT	
8.46±4.05±0.90		LEES	23	BABR	$e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$
$\Gamma(K^\mp K^*(892)^\pm \pi^0 \pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{81}\Gamma_7/\Gamma$
VALUE (eV)		DOCUMENT ID	TECN	COMMENT	
1.62±0.66±0.15		LEES	23	BABR	$e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$
$\Gamma(K_S^0 K_L^0 \eta) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{83}\Gamma_7/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
3.14±1.08±0.16	16	LEES	17A	BABR	$e^+ e^- \rightarrow K_S^0 K_L^0 \eta \gamma$
$\Gamma(K^+ K^- \pi^+ \pi^- \eta) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{86}\Gamma_7/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
3.05±1.80±0.01	7	¹ AUBERT	07AU	BABR	$10.6 e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \eta \gamma$
¹ AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \eta) \times \Gamma(\psi(2S) \rightarrow e^+ e^-)/\Gamma_{\text{total}}] \times [B(\eta \rightarrow 2\gamma)] = 1.2 \pm 0.7 \pm 0.1 \text{ eV}$ which we divide by our best value $B(\eta \rightarrow 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.					
$\Gamma(K^+ K^- 2(\pi^+ \pi^-)) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$					$\Gamma_{87}\Gamma_7/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
4.4±2.1±0.3	26	AUBERT	06D	BABR	$10.6 e^+ e^- \rightarrow K^+ K^- 2(\pi^+ \pi^-) \gamma$

$$\Gamma(2(K^+ K^-)) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{90}\Gamma_7/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.22±0.10±0.02	13	LEES	12F BABR	10.6 $e^+ e^- \rightarrow K^+ K^- K^+ K^- \gamma$

$$\Gamma(p\bar{p}) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{112}\Gamma_7/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.686±0.024 OUR FIT	Error includes scale factor of 1.2.			
0.63 ±0.05 OUR AVERAGE	Error includes scale factor of 1.2.			
0.67 ±0.12 ±0.02	43	¹ LEES	130 BABR	$e^+ e^- \rightarrow p\bar{p}\gamma$
0.74 ±0.07 ±0.04	142	² LEES	13Y BABR	$e^+ e^- \rightarrow p\bar{p}\gamma$
0.579±0.038±0.036	2.7k	ANDREOTTI	07 E835	$p\bar{p} \rightarrow e^+ e^-, J/\psi X$

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

0.70 ±0.17 ±0.03	22	³ AUBERT	06B BABR	$e^+ e^- \rightarrow p\bar{p}\gamma$
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¹ ISR photon reconstructed in the detector

² ISR photon undetected

³ Superseded by LEES 130

$$\Gamma(\Lambda\bar{\Lambda}) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}} \quad \Gamma_{135}\Gamma_7/\Gamma$$

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

$\psi(2S)$ BRANCHING RATIOS

$$\Gamma(\text{hadrons})/\Gamma_{\text{total}} \quad \Gamma_1/\Gamma$$

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 $J/\psi(1S)$.

$$\Gamma(\text{virtual}\gamma \rightarrow \text{hadrons})/\Gamma_{\text{total}} \quad \Gamma_2/\Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
0.0179±0.0004	¹ LIAO	23 RVUE	$e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.0166±0.0010	^{2,3} SETH	04 RVUE	$e^+ e^-$
0.0199±0.0019	² BAI	02B BES2	$e^+ e^-$
0.029 ±0.004	² LUTH	75 MRK1	$e^+ e^-$

¹ Using $B(\psi(2S) \rightarrow \ell^+ \ell^-) = (0.794 \pm 0.017)\%$ and $R = 2.26 \pm 0.01$ determined by a fit to data from Mark-I, DM2, BESII, KEDR, and BESIII.

² Included in $\Gamma(\text{hadrons})/\Gamma_{\text{total}}$.

³ 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. Superseded by LIAO 23.

$$\Gamma(g g g)/\Gamma_{\text{total}} \quad \Gamma_3/\Gamma$$

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

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

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

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

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

$\Gamma(\gamma g g)/\Gamma(g g g)$ 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	$\psi(2S) \rightarrow (\gamma +) \text{hadrons}$

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

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

¹ Uses $B(\psi(2S) \rightarrow J/\psi X)$ 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.

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

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
79.4 ± 2.2 OUR FIT	Error includes scale factor of 1.3.		

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

88 ± 13	¹ FELDMAN 77	RVUE	$e^+ e^-$
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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.

$\Gamma(\mu^+ \mu^-)/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE (units 10^{-4})	DOCUMENT ID
80 ± 6 OUR FIT	

$\Gamma(\mu^+ \mu^-)/\Gamma(e^+ e^-)$ Γ_8/Γ_7

VALUE	DOCUMENT ID	TECN	COMMENT
1.00 ± 0.08 OUR FIT			

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

0.89 ± 0.16	BOYARSKI 75C	MRK1	$e^+ e^-$
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$\Gamma(\tau^+ \tau^-)/\Gamma_{\text{total}}$ Γ_9/Γ

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

¹ Computed using PDG 02 value of $B(\psi(2S) \rightarrow \text{hadrons}) = 0.9810 \pm 0.0030$ to estimate the total number of $\psi(2S)$ events.

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

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

$$\Gamma_{10}/\Gamma = (\Gamma_{12} + \Gamma_{13} + \Gamma_{14} + 0.343\Gamma_{182} + 0.195\Gamma_{183})/\Gamma$$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.615 ± 0.007 OUR FIT				Error includes scale factor of 1.3.
0.55 ± 0.07 OUR AVERAGE				
0.51 ± 0.12		BRANDELIK 79C	DASP	$e^+e^- \rightarrow \mu^+\mu^-X$
0.57 ± 0.08		ABRAMS 75B	MRK1	$e^+e^- \rightarrow \mu^+\mu^-X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.644 ± 0.006 ± 0.016		¹ ABLIKIM 21Z	BES3	$e^+e^- \rightarrow \ell^+\ell^-X$
0.6254 ± 0.0016 ± 0.0155	1.1M	² MENDEZ 08	CLEO	$\psi(2S) \rightarrow \ell^+\ell^-X$
0.5950 ± 0.0015 ± 0.0190	151k	ADAM 05A	CLEO	Repl. by MENDEZ 08

¹ From a fit to the $e^+e^- \rightarrow J/\psi X$ cross section between 3.645 and 3.891 GeV, with $\Gamma(ee)$ and Γ fixed to the PDG 20 values of the cross particle fit which are correlated to "OUR FIT" value for $B(\psi(2S) \rightarrow J/\psi X)$.

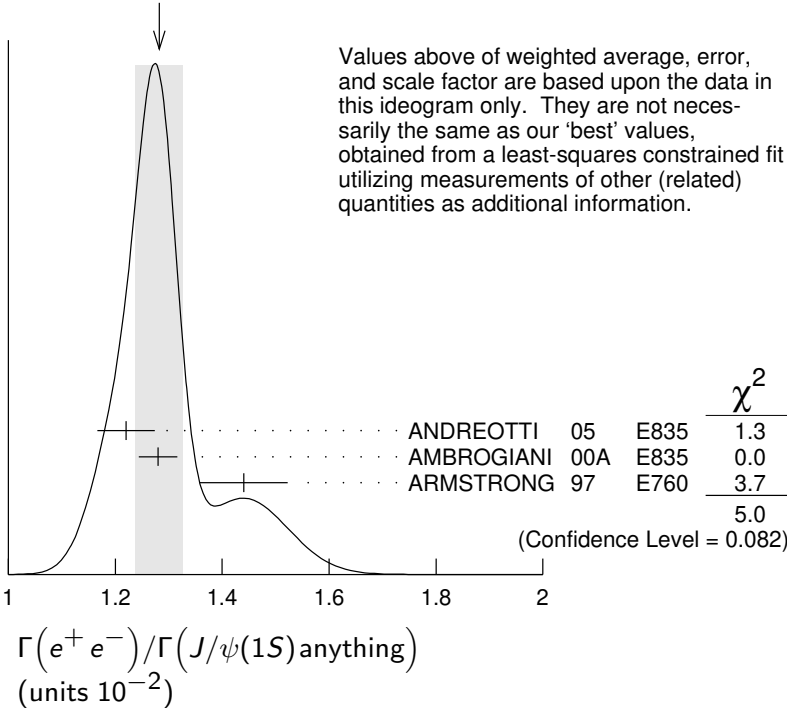
² Not independent from other measurements of MENDEZ 08.

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

Γ_7/Γ_{10}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.291 ± 0.035 OUR FIT				Error includes scale factor of 1.3.
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	$p\bar{p} \rightarrow \psi(2S) \rightarrow e^+e^-$
1.28 ± 0.03 ± 0.02		¹ AMBROGIANI 00A	E835	$p\bar{p} \rightarrow \psi(2S)$
1.44 ± 0.08 ± 0.02		¹ ARMSTRONG 97	E760	$\bar{p}p \rightarrow \psi(2S)$

WEIGHTED AVERAGE
1.28 ± 0.04 (Error scaled by 1.6)



¹Using $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0593 \pm 0.0010$.

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\text{anything})$ Γ_8/Γ_{10}

VALUE	DOCUMENT ID	TECN	COMMENT
0.0130 ± 0.0010 OUR FIT			
0.014 ± 0.003	HILGER	75	SPEC e^+e^-

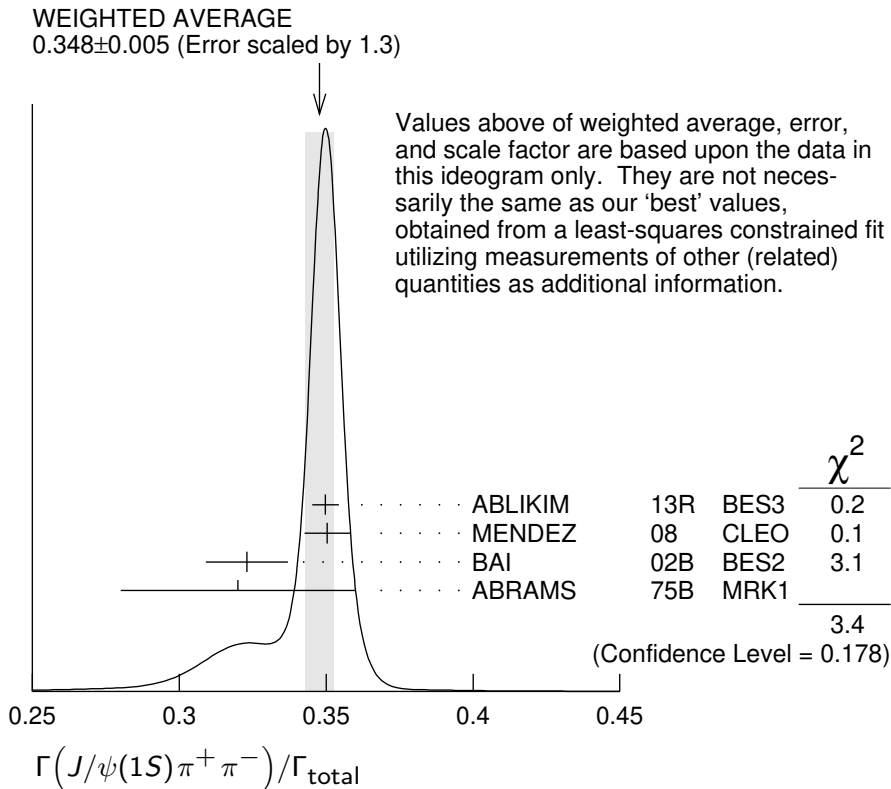
$\Gamma(J/\psi(1S)\text{neutrals})/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE	DOCUMENT ID
0.254 ± 0.005 OUR FIT	Error includes scale factor of 1.6.

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.3469 ± 0.0034 OUR FIT				Error includes scale factor of 1.1.
0.348 ± 0.005 OUR AVERAGE				Error includes scale factor of 1.3. See the ideogram below.
$0.3498 \pm 0.0002 \pm 0.0045$	20M	ABLIKIM	13R	BES3 $\psi(2S) \rightarrow J/\psi\pi^+\pi^-$
$0.3504 \pm 0.0007 \pm 0.0077$	565k	MENDEZ	08	CLEO $\psi(2S) \rightarrow \ell^+\ell^-\pi^+\pi^-$
0.323 ± 0.014		BAI	02B	BES2 e^+e^-
0.32 ± 0.04		ABRAMS	75B	MRK1 $e^+e^- \rightarrow J/\psi\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.3354 \pm 0.0014 \pm 0.0110$	60k	¹ ADAM	05A	CLEO Repl. by MENDEZ 08

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



$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_7/Γ_{12}

VALUE	DOCUMENT ID	TECN	COMMENT
0.0229 ± 0.0006 OUR FIT			Error includes scale factor of 1.3.
$0.0252 \pm 0.0028 \pm 0.0011$	¹ AUBERT	02B	BABR e^+e^-

¹Using $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0593 \pm 0.0010$.

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_8/Γ_{12}

VALUE	DOCUMENT ID	TECN	COMMENT
0.0230±0.0017 OUR FIT			
0.0228±0.0018 OUR AVERAGE			
0.0230±0.0020±0.0012	¹ AAIJ	16Y	LHCB $\Lambda_b^0 \rightarrow \psi(2S)X$
0.0216±0.0026±0.0014	² AUBERT	02B	BABR e^+e^-
0.0327±0.0077±0.0072	² GRIBUSHIN	96	FMPs 515 $\pi^- \text{Be} \rightarrow 2\mu X$

¹Using $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = (5.961 \pm 0.033) \times 10^{-2}$.

²Using $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = (5.88 \pm 0.10) \times 10^{-2}$.

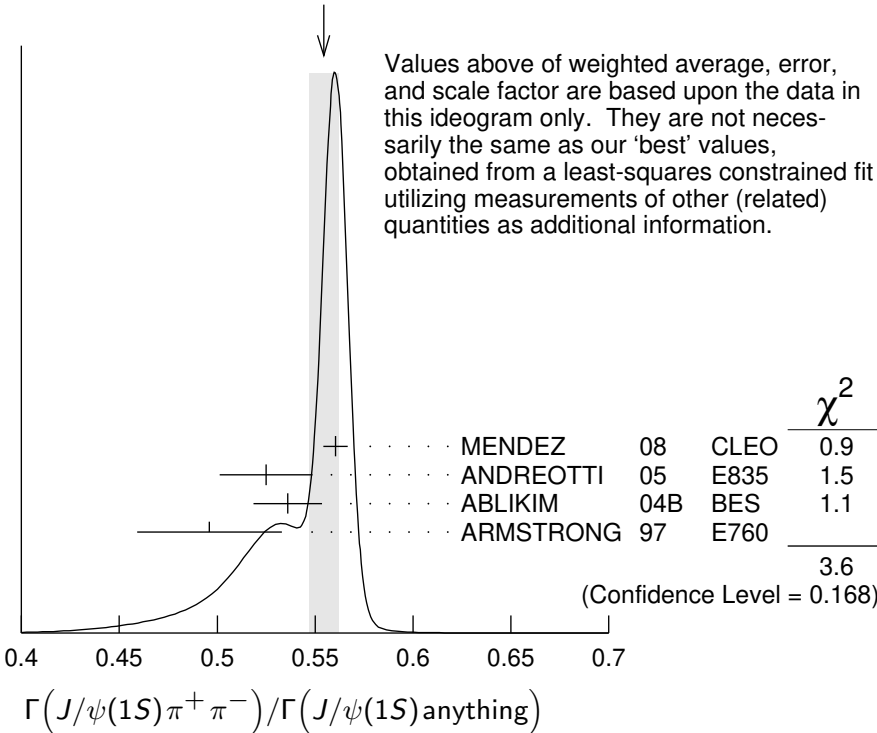
$\Gamma(\tau^+\tau^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_9/Γ_{12}

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
8.8 ±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_{12}/Γ_{10}

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.564 ±0.004 OUR FIT				Error includes scale factor of 1.7.
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 $\psi(2S) \rightarrow \ell^+\ell^-\pi^+\pi^-$
0.525 ±0.009 ±0.022	4k	ANDREOTTI	05	E835 $\psi(2S) \rightarrow J/\psi X$
0.536 ±0.007 ±0.016	20k	^{1,2} ABLIKIM	04B	BES $\psi(2S) \rightarrow J/\psi X$
0.496 ±0.037		ARMSTRONG	97	E760 $\bar{p}p \rightarrow \psi(2S)$
• • • 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

WEIGHTED AVERAGE
0.554±0.008 (Error scaled by 1.3)



¹ From a fit to the J/ψ recoil mass spectra.² ABLIKIM 04B quotes $B(\psi(2S) \rightarrow J/\psi X) / B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-)$. $\Gamma(J/\psi(1S)\text{neutrals})/\Gamma(J/\psi(1S)\pi^+\pi^-)$

$$\Gamma_{11}/\Gamma_{12} = (0.9761\Gamma_{13} + 0.719\Gamma_{14} + 0.343\Gamma_{182} + 0.195\Gamma_{183})/\Gamma_{12}$$

VALUE	DOCUMENT ID	TECN	COMMENT
0.732 ± 0.013 OUR FIT	Error includes scale factor of 1.7.		
0.73 ± 0.09	TANENBAUM 76	MRK1	e^+e^-

 $\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\text{anything})$ Γ_{13}/Γ_{10}

VALUE	EVTs	DOCUMENT ID	TECN	COMMENT
0.297 ± 0.005 OUR FIT	Error includes scale factor of 1.7.			
0.320 ± 0.012 OUR AVERAGE				
0.300 ± 0.008 ± 0.022	1655 ± 44	ANDREOTTI 05	E835	$\psi(2S) \rightarrow J/\psi X$
0.328 ± 0.013 ± 0.008		AMBROGIANI 00A	E835	$p\bar{p} \rightarrow \psi(2S)$
0.323 ± 0.033		ARMSTRONG 97	E760	$\bar{p}p \rightarrow \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.2829 ± 0.0012 ± 0.0056	61k	MENDEZ	08	CLEO $\psi(2S) \rightarrow \ell^+ \ell^- 2\pi^0$
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_{13}/Γ_{12}

VALUE	EVTs	DOCUMENT ID	TECN	COMMENT
0.526 ± 0.013 OUR FIT	Error includes scale factor of 1.7.			
0.513 ± 0.022 OUR AVERAGE	Error includes scale factor of 2.2.			
0.5047 ± 0.0022 ± 0.0102	61k	MENDEZ	08	CLEO $\psi(2S) \rightarrow \ell^+ \ell^- 2\pi^0$
0.570 ± 0.009 ± 0.026	14k	¹ ABLIKIM	04B	BES $\psi(2S) \rightarrow J/\psi X$
• • • 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	$\psi(2S) \rightarrow J/\psi X$
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. $\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$ Γ_{14}/Γ

VALUE (units 10^{-3})	EVTs	DOCUMENT ID	TECN	COMMENT
33.7 ± 0.6 OUR FIT	Error includes scale factor of 1.2.			
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 $e^+e^- \rightarrow \ell^+ \ell^- 2\gamma$
29.8 ± 0.9 ± 2.3	5.7k	BAI	04I	BES2 $\psi(2S) \rightarrow J/\psi\gamma\gamma$
25.5 ± 2.9	386	¹ OREGLIA	80	CBAL $e^+e^- \rightarrow J/\psi 2\gamma$
45 ± 12	17	² BRANDELIK	79B	DASP $e^+e^- \rightarrow J/\psi 2\gamma$
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 $\psi(2S) \rightarrow \ell^+ \ell^- \eta$

32.5 ± 0.6 ± 1.1 2.8k ⁴ ADAM 05A CLEO Repl. by MENDEZ 08

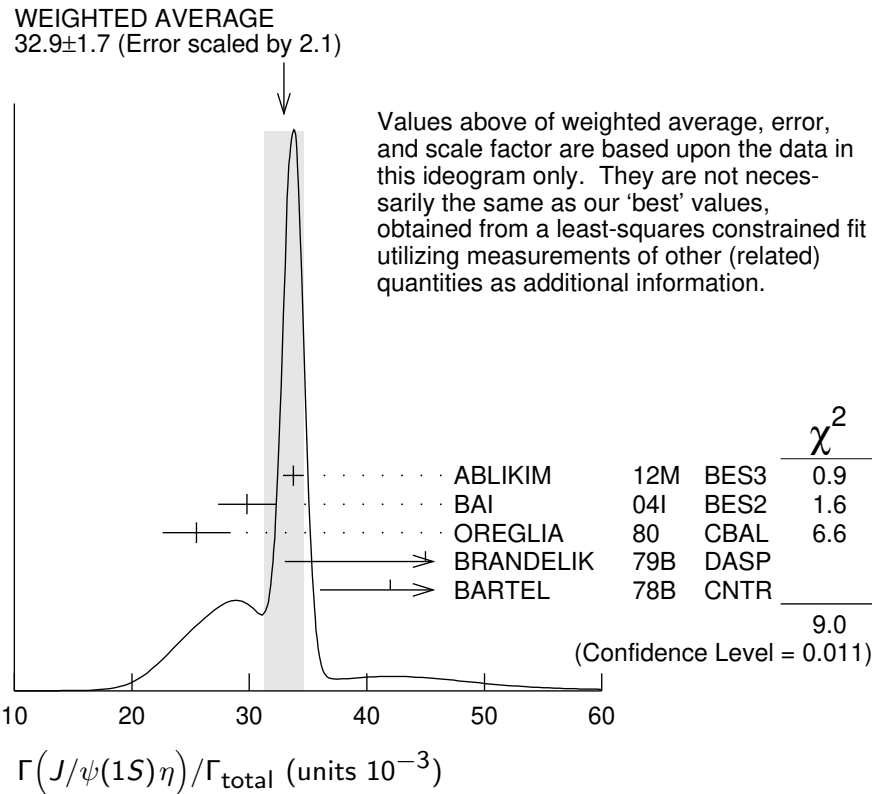
43 ± 8 44 TANENBAUM 76 MRK1 e⁺e⁻

¹ Recalculated by us using B(J/ψ(1S) → ℓ⁺ℓ⁻) = 0.1181 ± 0.0020.

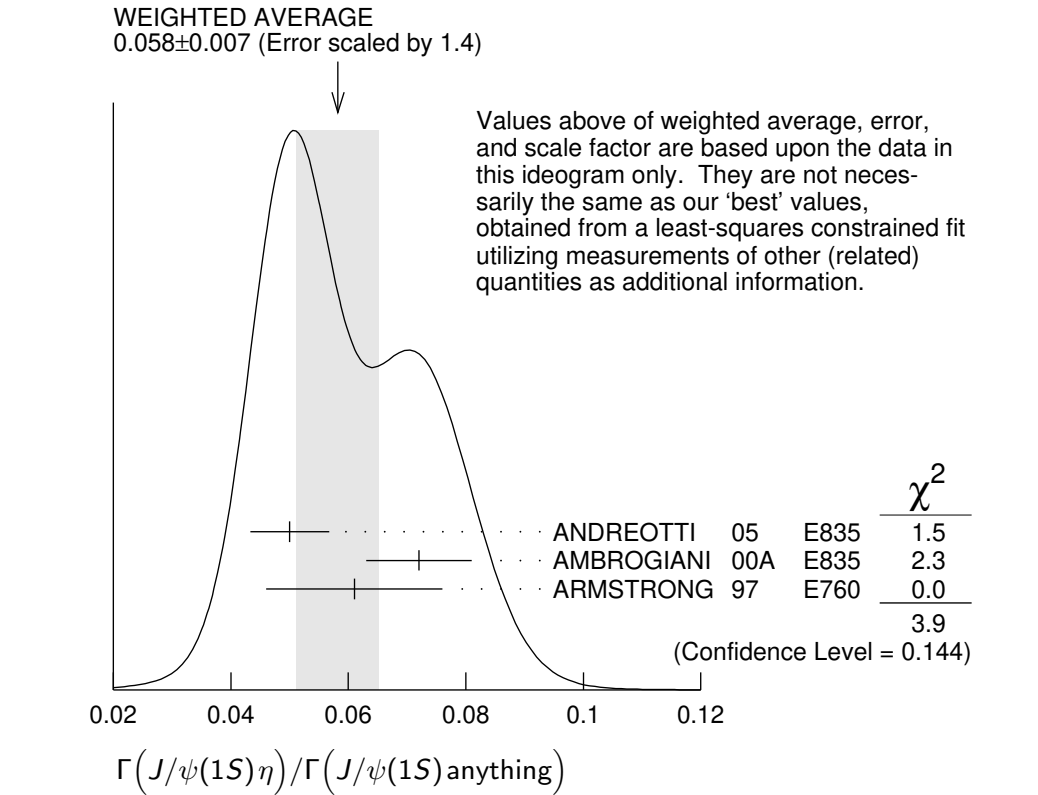
² Recalculated by us using B(J/ψ(1S) → μ⁺μ⁻) = 0.0588 ± 0.0010.

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_{14}/Γ_{10}
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
0.0549±0.0009 OUR FIT Error includes scale factor of 1.2.					
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	ψ(2S) → J/ψ X	
0.072 ±0.009		AMBROGIANI 00A	E835	p̄p → ψ(2S)	
0.061 ±0.015		ARMSTRONG 97	E760	p̄p → ψ(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	ψ(2S) → ℓ ⁺ ℓ ⁻ η	
0.0546±0.0010±0.0007	2.8k	ADAM 05A	CLEO	Repl. by MENDEZ 08	
¹ Not independent from other measurements of MENDEZ 08.					



$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\pi^+\pi^-)$					Γ_{14}/Γ_{12}
VALUE	EVTs	DOCUMENT ID	TECN	COMMENT	
0.0972 ± 0.0016 OUR FIT	Error includes scale factor of 1.1.				
0.0979 ± 0.0018 OUR AVERAGE					
$0.0979 \pm 0.0010 \pm 0.0015$	18.4k	MENDEZ 08	CLEO	$\psi(2S) \rightarrow \ell^+\ell^-\eta$	
$0.098 \pm 0.005 \pm 0.010$	2k	¹ ABLIKIM 04B	BES	$\psi(2S) \rightarrow J/\psi X$	
0.091 ± 0.021		² HIMEL 80	MRK2	$e^+e^- \rightarrow \psi(2S)X$	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
$0.0968 \pm 0.0019 \pm 0.0013$	2.8k	³ ADAM 05A	CLEO	Repl. by MENDEZ 08	
$0.095 \pm 0.007 \pm 0.007$		⁴ ANDREOTTI 05	E835	$\psi(2S) \rightarrow J/\psi X$	

¹ From a fit to the J/ψ recoil mass spectra.
² The value for $B(\psi(2S) \rightarrow J/\psi(1S)\eta)$ reported in HIMEL 80 is derived using $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (33 \pm 3)\%$ and $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.138 \pm 0.018$. Calculated by us using $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = (0.1181 \pm 0.0020)$.
³ Not independent from other values reported by ADAM 05A.
⁴ Not independent from other values reported by ANDREOTTI 05.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{\text{total}}$					Γ_{15}/Γ
VALUE (units 10^{-4})	EVTs	DOCUMENT ID	TECN	COMMENT	
12.68 ± 0.32 OUR AVERAGE					
$12.6 \pm 0.2 \pm 0.3$	4.1k	ABLIKIM 12M	BES3	$e^+e^- \rightarrow \ell^+\ell^-2\gamma$	
$13.3 \pm 0.8 \pm 0.3$	530	MENDEZ 08	CLEO	$\psi(2S) \rightarrow \ell^+\ell^-2\gamma$	
$14.3 \pm 1.4 \pm 1.2$	280	BAI 04I	BES2	$\psi(2S) \rightarrow J/\psi\gamma\gamma$	
14 ± 6	7	HIMEL 80	MRK2	e^+e^-	
$9 \pm 2 \pm 1$	23	¹ OREGLIA 80	CBAL	$\psi(2S) \rightarrow J/\psi2\gamma$	

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

13 ± 1 ± 1 88 ADAM 05A CLEO Repl. by MENDEZ 08

¹ Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1181 \pm 0.0020$.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma(J/\psi(1S)\text{anything})$

$$\Gamma_{15}/\Gamma_{10} = \Gamma_{15}/(\Gamma_{12} + \Gamma_{13} + \Gamma_{14} + 0.343\Gamma_{182} + 0.195\Gamma_{183})$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.213 \pm 0.012 \pm 0.003$	527	¹ MENDEZ	08	CLEO $e^+e^- \rightarrow J/\psi\gamma\gamma$
$0.22 \pm 0.02 \pm 0.01$		² ADAM	05A	CLEO $e^+e^- \rightarrow \psi(2S) \rightarrow J/\psi\gamma\gamma$

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_{15}/Γ_{12}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.380 \pm 0.022 \pm 0.005$	527	¹ MENDEZ	08	CLEO $e^+e^- \rightarrow J/\psi\gamma\gamma$
$0.39 \pm 0.04 \pm 0.01$		² ADAM	05A	CLEO $e^+e^- \rightarrow \psi(2S) \rightarrow J/\psi\gamma\gamma$

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

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

Γ_{16}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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0.78 $\pm$ 0.26 OUR AVERAGE

$0.76 \pm 0.25 \pm 0.06$	30	¹ METREVELI	12		$\psi(2S) \rightarrow \pi^+\pi^-$
8 $\pm$ 5		BRANDELIK	79C	DASP	e^+e^-

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

< 2.1	90	DOBBS	06A	CLEO	$e^+e^- \rightarrow \psi(2S)$
< 5	90	FELDMAN	77	MRK1	e^+e^-

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

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

Γ_{17}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
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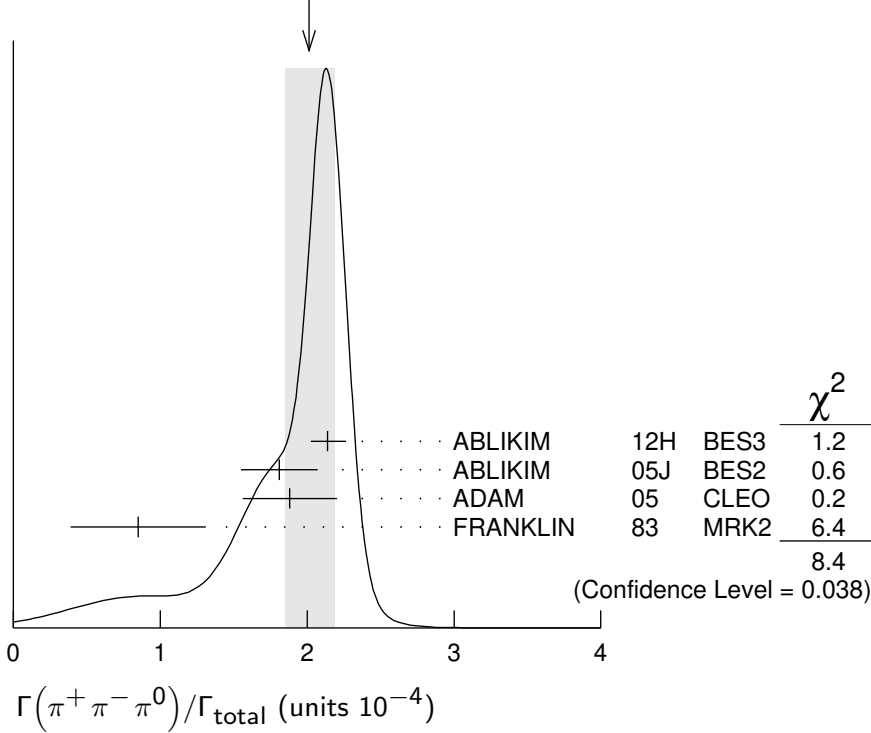
2.01 $\pm$ 0.17 OUR AVERAGE Error includes scale factor of 1.7. See the ideogram below.

$2.14 \pm 0.03^{+0.12}_{-0.11}$	7k	¹ ABLIKIM	12H	BES3	$e^+e^- \rightarrow \psi(2S)$
$1.81 \pm 0.18 \pm 0.19$	260 $\pm$ 19	² ABLIKIM	05J	BES2	$e^+e^- \rightarrow \psi(2S)$
$1.88^{+0.16}_{-0.15} \pm 0.28$	194	ADAM	05	CLEO	$e^+e^- \rightarrow \psi(2S)$
0.85 ± 0.46	4	FRANKLIN	83	MRK2	$e^+e^- \rightarrow \text{hadrons}$

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 $\psi(2S) \rightarrow \pi^+\pi^-\pi^0$.

WEIGHTED AVERAGE
2.01±0.17 (Error scaled by 1.7)



$\Gamma(\rho(770)\pi \rightarrow \pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{18}/Γ

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±0.07±0.11			¹ ABLIKIM	05J BES2	$\psi(2S) \rightarrow \rho(770)\pi \rightarrow \pi^+\pi^-\pi^0$
0.24 ^{+0.08} _{-0.07} ±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 $\rho^0\pi^0$.

$\Gamma(\rho(2150)\pi \rightarrow \pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{19}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.94±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 $\psi(2S) \rightarrow \pi^+\pi^-\pi^0$.

$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_{20}/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^-

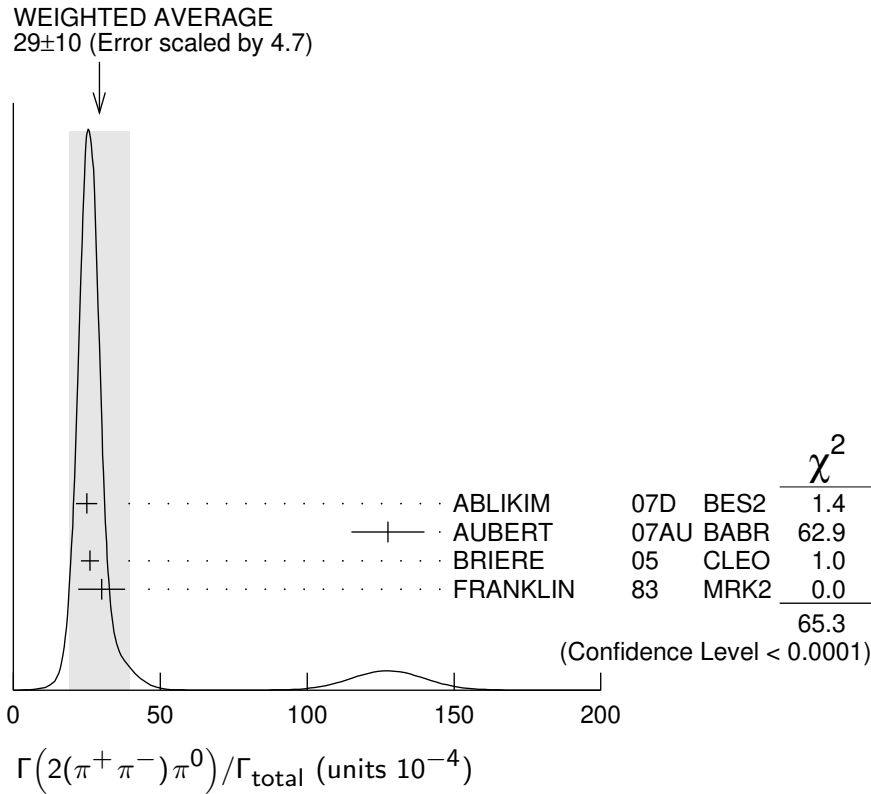
$\Gamma(\rho^0 \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{21}/Γ

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

$\Gamma(2(\pi^+ \pi^-) \pi^0)/\Gamma_{\text{total}}$ Γ_{22}/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 $e^+ e^- \rightarrow \psi(2S)$
$127 \pm 12 \pm 2$	410	¹ AUBERT	07AU	BABR $10.6 e^+ e^- \rightarrow 2(\pi^+ \pi^-) \pi^0 \gamma$
$26.1 \pm 0.7 \pm 3.0$	1703	BRIERE	05	CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow 2(\pi^+ \pi^-) \pi^0$
30 ± 8	42	FRANKLIN	83	MRK2 $e^+ e^-$

¹ AUBERT 07AU reports $[\Gamma(\psi(2S) \rightarrow 2(\pi^+ \pi^-) \pi^0)/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \rightarrow e^+ e^-)] = (297 \pm 22 \pm 18) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \rightarrow e^+ e^-) = 2.33 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.



$\Gamma(\rho a_2(1320))/\Gamma_{\text{total}}$ Γ_{23}/Γ

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

$\Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_{27}/Γ

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

¹ Assuming entirely strong decay.
 $\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{\text{total}}$ Γ_{29}/Γ

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

 $\Gamma(\eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{31}/Γ

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

 $\Gamma(\eta\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{32}/Γ

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

¹ Average of $\eta \rightarrow \gamma\gamma$ and $\eta \rightarrow 3\pi$.² Not independent from other values reported by BRIERE 05.
 $\Gamma(\rho\eta)/\Gamma_{\text{total}}$ Γ_{37}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
2.2 $\pm$ 0.6 OUR AVERAGE		Error includes scale factor of 1.1.		
3.0 $^{+1.1}_{-0.9} \pm 0.2$	18	ADAM	05 CLEO	$e^+e^- \rightarrow \psi(2S)$
1.78 $^{+0.67}_{-0.62} \pm 0.17$	13	ABLIKIM	04L BES	$e^+e^- \rightarrow \psi(2S)$

 $\Gamma(\eta'\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{38}/Γ

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

 $\Gamma(\eta'\rho)/\Gamma_{\text{total}}$ Γ_{39}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
1.87 $^{+1.64}_{-1.11} \pm 0.33$	2	ABLIKIM	04L BES	$e^+e^- \rightarrow \psi(2S)$

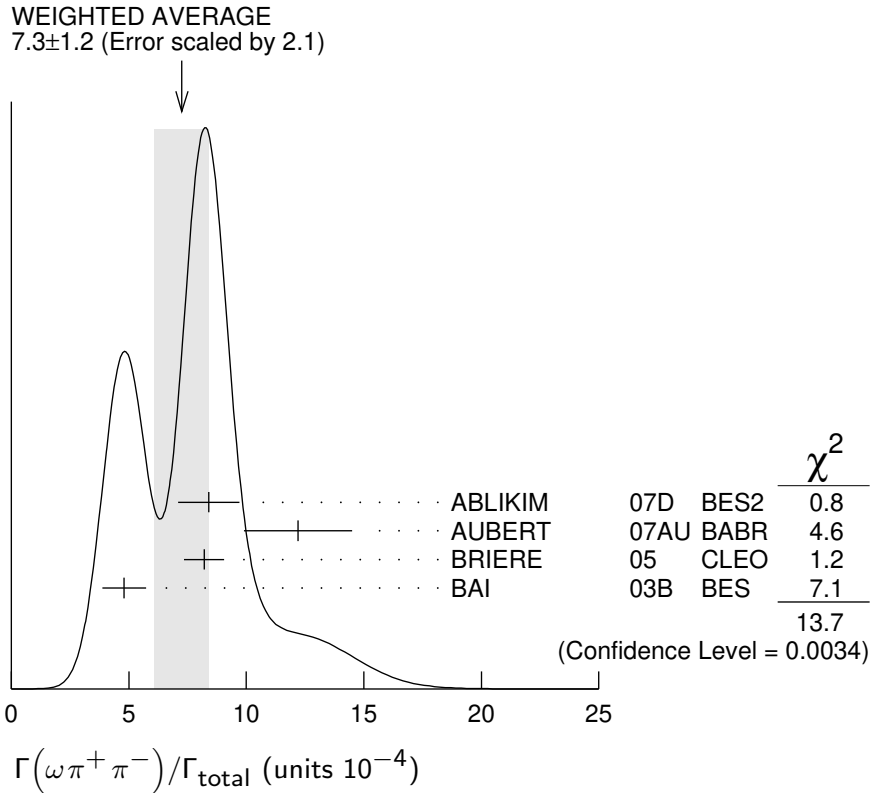
• • • We do not use the following data for averages, fits, limits, etc. • • •

1.02 $\pm$ 0.11 $\pm$ 0.24	143	¹ ABLIKIM	17AK BES3	$e^+e^- \rightarrow \psi(2S)$
0.569 $\pm$ 0.128 $\pm$ 0.236	80	² ABLIKIM	17AK BES3	$e^+e^- \rightarrow \psi(2S)$

- ¹ Destructive-interference solution of a partial wave analysis of the decay $\psi(2S) \rightarrow \pi^+ \pi^- \eta'$.
² Constructive-interference solution of a partial wave analysis of the decay $\psi(2S) \rightarrow \pi^+ \pi^- \eta'$.

$\Gamma(\omega\pi^0)/\Gamma_{\text{total}}$					Γ_{40}/Γ	
<i>VALUE</i> (units 10^{-5})	<i>EVTS</i>	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>		
2.1 ±0.6 OUR AVERAGE						
2.5 ^{+1.2} _{-1.0} ±0.2	14	ADAM	05	CLEO	$e^+e^- \rightarrow \psi(2S)$	
1.87 ^{+0.68} _{-0.62} ±0.28	14	ABLIKIM	04L	BES	$e^+e^- \rightarrow \psi(2S)$	

$\Gamma(\omega\pi^+\pi^-)/\Gamma_{\text{total}}$					Γ_{41}/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	$e^+e^- \rightarrow \psi(2S)$
12.2±2.2±0.7	37	¹ AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$
8.2±0.5±0.7	391	BRIERE	05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ $2(\pi^+\pi^-)\pi^0$
4.8±0.6±0.7	100 ± 22	² BAI	03B	BES	$\psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$
¹ AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot B(\psi(2S) \rightarrow \omega\pi^+\pi^-) \cdot B(\omega \rightarrow 3\pi) = 2.69 \pm 0.73 \pm 0.16$ eV.					
² Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.					



$\Gamma(b_1^\pm \pi^\mp)/\Gamma_{\text{total}}$ Γ_{43}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
4.0 $\pm$ 0.6 OUR AVERAGE		Error includes scale factor of 1.1.		
5.1 $\pm$ 0.6 $\pm$ 0.8	202	ABLIKIM	07D BES2	$e^+ e^- \rightarrow \psi(2S)$
4.18 $^{+0.43}_{-0.42} \pm$ 0.92	170	ADAM	05 CLEO	$e^+ e^- \rightarrow \psi(2S)$
3.2 $\pm$ 0.6 $\pm$ 0.5	61 $\pm$ 11	^{1,2} BAI	03B BES	$\psi(2S) \rightarrow 2(\pi^+ \pi^-) \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.2 $\pm$ 0.8 $\pm$ 1.0		¹ BAI	99C BES	Repl. by BAI 03B

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

$\Gamma(\omega f_2(1270))/\Gamma_{\text{total}}$ Γ_{44}/Γ

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

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

$\Gamma(b_1^0 \pi^0)/\Gamma_{\text{total}}$ Γ_{47}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.35$^{+0.47}_{-0.42} \pm$ 0.40	45	ADAM	05 CLEO	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma(\omega \eta)/\Gamma_{\text{total}}$ Γ_{48}/Γ

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

$\Gamma(\omega \eta')/\Gamma_{\text{total}}$ Γ_{49}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
3.2$^{+2.4}_{-2.0} \pm$ 0.7	4	¹ ABLIKIM	04K BES	$e^+ e^- \rightarrow \psi(2S)$

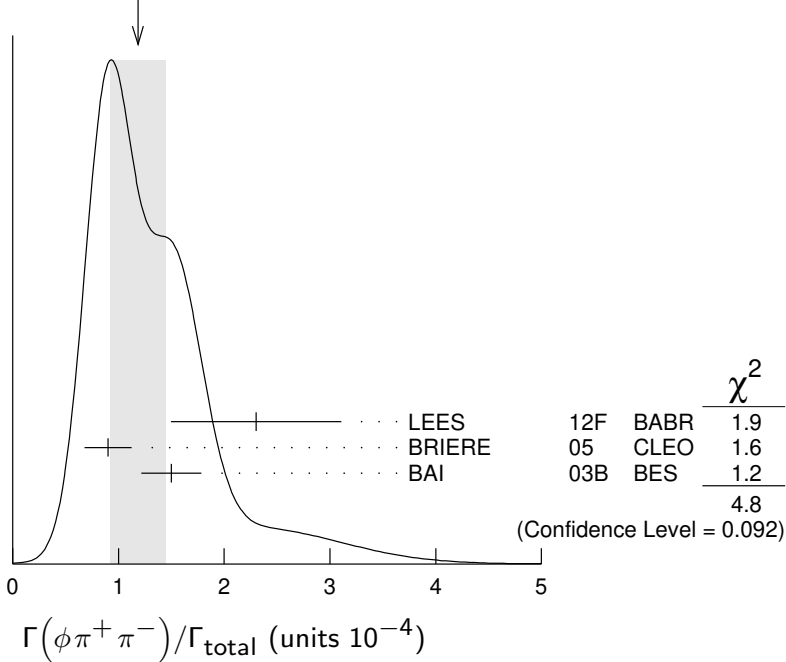
¹ Calculated combining $\eta' \rightarrow \gamma \rho$ and $\eta \pi^+ \pi^-$ channels.

$\Gamma(\phi \pi^0)/\Gamma_{\text{total}}$ Γ_{50}/Γ

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

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{51}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.18 ± 0.26 OUR AVERAGE		Error includes scale factor of 1.5.		See the ideogram below.
$2.3 \pm 0.8 \pm 0.1$	19 ± 6	LEES	12F BABR	$10.6 e^+e^- \rightarrow \pi^+\pi^- K^+K^- \gamma$
$0.9 \pm 0.2 \pm 0.1$	47.6	BRIERE	05 CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow K^+K^-\pi^+\pi^-$
$1.5 \pm 0.2 \pm 0.2$	51.5 ± 8.3	¹ BAI	03B BES	$\psi(2S) \rightarrow K^+K^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.45 \pm 0.96 \pm 0.04$	10 ± 4	^{2,3} AUBERT	07AK BABR	$10.6 e^+e^- \rightarrow \pi^+\pi^- K^+K^- \gamma$

¹ Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.² Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(\psi(2S) \rightarrow \phi\pi^+\pi^-)/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \rightarrow e^+e^-)] = (0.57 \pm 0.22 \pm 0.04) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \rightarrow e^+e^-) = 2.33 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.³ Using $B(\phi \rightarrow K^+K^-) = (49.3 \pm 0.6)\%$.WEIGHTED AVERAGE
 1.18 ± 0.26 (Error scaled by 1.5) $\Gamma(\phi f_0(980) \rightarrow \pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{52}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.75 ± 0.33 OUR AVERAGE		Error includes scale factor of 1.6.		
$1.5 \pm 0.5 \pm 0.1$	12 ± 4	LEES	12F BABR	$10.6 e^+e^- \rightarrow \pi^+\pi^- K^+K^- \gamma$
$0.6 \pm 0.2 \pm 0.1$	18.4 ± 6.4	¹ BAI	03B BES	$\psi(2S) \rightarrow K^+K^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.46 \pm 0.71 \pm 0.02$	6 ± 3	^{2,3} AUBERT	07AK BABR	$10.6 e^+e^- \rightarrow \pi^+\pi^- K^+K^- \gamma$

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

²Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(\psi(2S) \rightarrow \phi f_0(980) \rightarrow \pi^+ \pi^-) / \Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \rightarrow e^+ e^-)] = (0.34 \pm 0.16 \pm 0.04) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \rightarrow e^+ e^-) = 2.33 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

³Using $B(\phi \rightarrow K^+ K^-) = (49.3 \pm 0.6)\%$.

$\Gamma(\phi\eta)/\Gamma_{\text{total}}$ Γ_{53}/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	$e^+ e^- \rightarrow \psi(2S)$
2.0 $^{+1.5}_{-1.1} \pm 0.4$	6	ADAM	05 CLEO	$e^+ e^- \rightarrow \psi(2S)$
3.3 ±1.1 ±0.5	17	ABLIKIM	04K BES	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma(\eta\phi(2170), \phi(2170) \rightarrow \phi f_0(980), f_0 \rightarrow \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{54}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<2.2 × 10⁻⁶	90	ABLIKIM	19I BES3	$e^+ e^- \rightarrow \eta\phi f_0(980)$

$\Gamma(\phi\eta')/\Gamma_{\text{total}}$ Γ_{55}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
1.54±0.20 OUR AVERAGE				
1.51±0.16±0.12	201	ABLIKIM	19BA BES3	$e^+ e^- \rightarrow \psi(2S)$
3.1 ±1.4 ±0.7	8	¹ ABLIKIM	04K BES	$e^+ e^- \rightarrow \psi(2S)$

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

$\Gamma(\phi\phi\phi)/\Gamma_{\text{total}}$ Γ_{56}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
1.46±0.05±0.17	1.3k	¹ ABLIKIM	24O BES3	$e^+ e^- \rightarrow \psi(2S)$

¹Data at 3.773 GeV assumed to be $e^+ e^- (3.773) \rightarrow 3\phi$ events yield an estimate for the continuum amplitude at the $\psi(2S)$. No interference between the $\psi(2S)$ and continuum amplitudes is assumed.

$\Gamma(\phi f_1(1285))/\Gamma_{\text{total}}$ Γ_{57}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
3.0±0.4±1.3	234	¹ ABLIKIM	19BA BES3	$e^+ e^- \rightarrow \psi(2S)$

¹ABLIKIM 19BA reports $[\Gamma(\psi(2S) \rightarrow \phi f_1(1285))/\Gamma_{\text{total}}] \times [B(f_1(1285) \rightarrow \eta\pi^+\pi^-)] = (1.03 \pm 0.10 \pm 0.09) \times 10^{-5}$ which we divide by our best value $B(f_1(1285) \rightarrow \eta\pi^+\pi^-) = (35 \pm 15) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi\eta(1405) \rightarrow \phi\pi^+\pi^-\eta)/\Gamma_{\text{total}}$ Γ_{58}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
8.46±1.37±0.92	195	ABLIKIM	19BA BES3	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma(\phi f'_2(1525))/\Gamma_{\text{total}}$ Γ_{59}/Γ

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

$\Gamma(K^+ K^-)/\Gamma_{\text{total}}$ Γ_{60}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$7.48 \pm 0.23 \pm 0.39$		1.3k	¹ METREVELI	12	$\psi(2S) \rightarrow K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$6.2 \pm 1.5 \pm 0.2$		66	^{2,3} LEES	15J BABR	$e^+ e^- \rightarrow K^+ K^- \gamma$
$8.3 \pm 1.5 \pm 0.2$		66	^{3,4} LEES	15J BABR	$e^+ e^- \rightarrow K^+ K^- \gamma$
$6.3 \pm 0.6 \pm 0.3$			⁵ DOBBS	06A CLEO	$e^+ e^-$
10 ± 7			⁵ BRANDELIK	79C DASP	$e^+ e^-$
< 5	90		FELDMAN	77 MRK1	$e^+ e^-$

¹ Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.² $\sin\phi > 0$.³ Using $\Gamma(\psi(2S) \rightarrow e^+ e^-) = (2.37 \pm 0.04) \text{ keV}$.⁴ $\sin\phi < 0$.⁵ Interference with non-resonant $K^+ K^-$ production not taken into account.

$\Gamma(K^+ K^- \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{61}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
7.3 ± 0.5 OUR AVERAGE				
$8.1 \pm 1.3 \pm 0.3$	133	LEES	12F BABR	$10.6 e^+ e^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$
$7.1 \pm 0.3 \pm 0.4$	817.2	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^+ K^- \pi^+ \pi^-$
16 ± 4		¹ TANENBAUM	78 MRK1	$e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$11.0 \pm 1.9 \pm 0.2$	85	² AUBERT	07AK BABR	$10.6 e^+ e^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$

¹ Assuming entirely strong decay.² Superseded by LEES 12F. AUBERT 07AK reports $[\Gamma(\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \rightarrow e^+ e^-)] = (2.56 \pm 0.42 \pm 0.16) \times 10^{-3} \text{ keV}$ which we divide by our best value $\Gamma(\psi(2S) \rightarrow e^+ e^-) = 2.33 \pm 0.04 \text{ keV}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ K^- \pi^0)/\Gamma_{\text{total}}$ Γ_{62}/Γ

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

$\Gamma(K_S^0 K_S^0)/\Gamma_{\text{total}}$ Γ_{63}/Γ

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

¹ Forbidden by *CP*.

$\Gamma(K_S^0 K_L^0)/\Gamma_{\text{total}}$ Γ_{64}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
5.34 ± 0.33 OUR AVERAGE				
$5.28 \pm 0.25 \pm 0.34$	478 ± 23	¹ METREVELI	12	$\psi(2S) \rightarrow K_S^0 K_L^0$

5.8 ± 0.8 ± 0.4		DOBBS	06A CLEO	e^+e^-
5.24 ± 0.47 ± 0.48	156 ± 14	² BAI	04B BES2	$\psi(2S) \rightarrow K_S^0 K_L^0 \rightarrow \pi^+ \pi^- X$

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

² Using $B(K_S^0 \rightarrow \pi^+ \pi^-) = 0.6860 \pm 0.0027$.

$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$ Γ_{70}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
12.6 ± 0.9 OUR AVERAGE				
18.9 ± 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 $[\Gamma(\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \rightarrow e^+ e^-)] = (44 \pm 13 \pm 3) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \rightarrow e^+ e^-) = 2.33 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\omega f_0(1710) \rightarrow \omega K^+ K^-)/\Gamma_{\text{total}}$ Γ_{71}/Γ

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

$\Gamma(K^*(892)^0 K^- \pi^+ \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{72}/Γ

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

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

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

$\Gamma(K^*(892)^+ K^- \rho^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{74}/Γ

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

$\Gamma(K^*(892)^0 K^- \rho^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{75}/Γ

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

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.20 ± 0.25 ± 0.37	83 ± 9	ABLIKIM	050 BES2	$e^+e^- \rightarrow \psi(2S)$

$\Gamma(K^+ K^- \rho^0)/\Gamma_{\text{total}}$ Γ_{84}/Γ

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

 $\Gamma(K^*(892)^0 \bar{K}_2^*(1430)^0)/\Gamma_{\text{total}}$ Γ_{85}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$1.86 \pm 0.32 \pm 0.43$		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	$e^+ e^-$

 $\Gamma(K^+ K^- \pi^+ \pi^- \eta)/\Gamma_{\text{total}}$ Γ_{86}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.3 \pm 0.7 \pm 0.1$	7	¹ AUBERT 07AU	BABR	$10.6 e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \eta \gamma$
¹ AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)} \cdot B(\psi(2S) \rightarrow 2(\pi^+ \pi^-) \eta) \cdot B(\eta \rightarrow \gamma \gamma) = 1.2 \pm 0.7 \pm 0.1 \text{ eV}$.				

 $\Gamma(K^+ K^- 2(\pi^+ \pi^-) \pi^0)/\Gamma_{\text{total}}$ Γ_{88}/Γ

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

 $\Gamma(K^+ K^*(892)^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{89}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
2.9 ± 0.4 OUR AVERAGE			Error includes scale factor of 1.2.		
$3.18 \pm 0.30^{+0.26}_{-0.31}$		0.2k	ABLIKIM 12L	BES3	$e^+ e^- \rightarrow \psi(2S)$
$2.9^{+1.3}_{-1.7} \pm 0.4$		9.6 ± 4.2	ABLIKIM 05I	BES2	$e^+ e^- \rightarrow \psi(2S)$
$1.3^{+1.0}_{-0.7} \pm 0.3$		7	ADAM 05	CLEO	$e^+ e^- \rightarrow \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<5.4		90	FRANKLIN 83	MRK2	$e^+ e^- \rightarrow \text{hadrons}$

 $\Gamma(2(K^+ K^-))/\Gamma_{\text{total}}$ Γ_{90}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.63 ± 0.13 OUR AVERAGE				
$0.9 \pm 0.4 \pm 0.1$	13	LEES 12F	BABR	$10.6 e^+ e^- \rightarrow 2(K^+ K^-) \gamma$
$0.6 \pm 0.1 \pm 0.1$	59.2	BRIERE 05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow 2(K^+ K^-)$

 $\Gamma(2(K^+ K^-) \pi^0)/\Gamma_{\text{total}}$ Γ_{91}/Γ

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

 $\Gamma(K^+ K^- \phi)/\Gamma_{\text{total}}$ Γ_{92}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.70 ± 0.16 OUR AVERAGE				
$0.8 \pm 0.2 \pm 0.1$	36.8	BRIERE 05	CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow 2(K^+ K^-)$

$0.6 \pm 0.2 \pm 0.1$ 16.1 ± 5.0 1 BAI 03B BES $\psi(2S) \rightarrow 2(K^+ K^-)$

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

$\Gamma(K_S^0 K_S^0 \phi)/\Gamma_{\text{total}}$ Γ_{93}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$0.353 \pm 0.020 \pm 0.021$	687	1 ABLIKIM	23BA BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow K_S^0 K_S^0 K^+ K^-$

1 Solution with a constructive interference of the signal with the continuum background.

$\Gamma(K_1(1270)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{94}/Γ

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

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

$\Gamma(K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{95}/Γ

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

$\Gamma(\eta K^+ K^-, \text{no } \eta \phi)/\Gamma_{\text{total}}$ Γ_{96}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$3.49 \pm 0.09 \pm 0.15$	1.8k	1	ABLIKIM	20F BES3	$\psi(2S) \rightarrow K^+ K^- \gamma \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.08 \pm 0.29 \pm 0.25$	0.3k	1,2	ABLIKIM	12L BES3	$\psi(2S) \rightarrow K^+ K^- \gamma \gamma$
<13	90		BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

1 Excluding $\eta \phi$.

2 Superseded by ABLIKIM 20F.

$\Gamma(\eta K^+ K^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_{97}\Gamma_7/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<0.6	90	1 LEES	23 BABR	$e^+ e^- \rightarrow \gamma_{ISR} \text{ hadrons}$

1 LEES 23 reports $[\Gamma(\psi(2S) \rightarrow \eta K^+ K^-) \times \Gamma(\psi(2S) \rightarrow e^+ e^-)/\Gamma_{\text{total}}] \times [B(\eta \rightarrow 3\pi^0)] < 0.2$ eV which we divide by our best value $B(\eta \rightarrow 3\pi^0) = 32.56 \times 10^{-2}$.

$\Gamma(X(1750)\eta \rightarrow K^+ K^- \eta)/\Gamma_{\text{total}}$ Γ_{98}/Γ

VALUE (units 10^{-6})	DOCUMENT ID	TECN	COMMENT
$4.8 \pm 1.0 \pm 2.6$	ABLIKIM	20F BES3	$\psi(2S) \rightarrow K^+ K^- \eta$

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{99}/Γ

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

1 Assuming $B(K_1(1400) \rightarrow K^* \pi) = 0.94 \pm 0.06$

$\Gamma(K_2^*(1430)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{100}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$7.12 \pm 0.62^{+1.13}_{-0.61}$	251 ± 22	ABLIKIM	12L BES3	$e^+ e^- \rightarrow \psi(2S)$

$$\Gamma(K^*(892)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{101}/\Gamma$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
10.9$\pm$2.0 OUR AVERAGE				
13.3 $^{+2.4}_{-2.8} \pm 1.7$	65.6 $\pm$ 9.0	ABLIKIM	05I BES2	$e^+ e^- \rightarrow \psi(2S)$
9.2 $^{+2.7}_{-2.2} \pm 0.9$	25	ADAM	05 CLEO	$e^+ e^- \rightarrow \psi(2S)$

$$\Gamma(K^+ K^*(892)^- + \text{c.c.})/\Gamma(K^*(892)^0 \bar{K}^0 + \text{c.c.}) \quad \Gamma_{89}/\Gamma_{101}$$

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

$$\Gamma(\omega K^+ K^-)/\Gamma_{\text{total}} \quad \Gamma_{102}/\Gamma$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.62$\pm$0.11 OUR AVERAGE Error includes scale factor of 1.1.				
1.56 $\pm$ 0.04 $\pm$ 0.11	2.8k	ABLIKIM	14G BES3	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
2.38 $\pm$ 0.37 $\pm$ 0.29	78	ABLIKIM	06G BES2	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
1.9 $\pm$ 0.3 $\pm$ 0.3	76.8	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
1.5 $\pm$ 0.3 $\pm$ 0.2	23	¹ BAI	03B BES	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

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

$$\Gamma(\omega K_S^0 K_S^0)/\Gamma_{\text{total}} \quad \Gamma_{103}/\Gamma$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
7.04$\pm$0.39$\pm$0.36	1.5k	ABLIKIM	21AL BES3	$\psi(2S) \rightarrow \pi^+ \pi^- \pi^0 K_S^0 K_S^0$

$$\Gamma(\omega K^*(892)^+ K^- + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{104}/\Gamma$$

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

$$\Gamma(\omega K_2^*(1430)^+ K^- + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{105}/\Gamma$$

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

$$\Gamma(\omega \bar{K}^*(892)^0 K^0)/\Gamma_{\text{total}} \quad \Gamma_{106}/\Gamma$$

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

$$\Gamma(\omega \bar{K}_2^*(1430)^0 K^0)/\Gamma_{\text{total}} \quad \Gamma_{107}/\Gamma$$

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

$$\Gamma(\omega X(1440) \rightarrow \omega K_S^0 K^- \pi^+ + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{108}/\Gamma$$

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

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

$$\Gamma(\omega X(1440) \rightarrow \omega K^+ K^- \pi^0)/\Gamma_{\text{total}} \quad \Gamma_{109}/\Gamma$$

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.

$$\Gamma(\omega f_1(1285) \rightarrow \omega K_S^0 K^- \pi^+ + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{110}/\Gamma$$

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

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

$$\Gamma(\omega f_1(1285) \rightarrow \omega K^+ K^- \pi^0)/\Gamma_{\text{total}} \quad \Gamma_{111}/\Gamma$$

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

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

$$\Gamma(p\bar{p})/\Gamma_{\text{total}} \quad \Gamma_{112}/\Gamma$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.94±0.09 OUR FIT	Error includes scale factor of 1.3.			
3.02±0.08 OUR AVERAGE				

3.05±0.02±0.12	19k	ABLIKIM	18T BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$
3.08±0.05±0.18	4.5k	¹ DOBBS	14	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$
3.36±0.09±0.25	1.6k	ABLIKIM	07C BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$
2.87±0.12±0.15	557	PEDLAR	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$
1.4 ±0.8	4	BRANDELIK	79C DASP	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$
2.3 ±0.7		FELDMAN	77 MRK1	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

$$\Gamma(p\bar{p})/\Gamma(J/\psi(1S)\pi^+\pi^-) \quad \Gamma_{112}/\Gamma_{12}$$

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
8.49±0.28 OUR FIT	Error includes scale factor of 1.3.		
6.98±0.49±0.97	BAI	01 BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$

$$\Gamma(n\bar{n})/\Gamma_{\text{total}} \quad \Gamma_{113}/\Gamma$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
3.06±0.06±0.14	6k	ABLIKIM	18T BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow n\bar{n}$

$$\Gamma(p\bar{p}\pi^0)/\Gamma_{\text{total}} \quad \Gamma_{114}/\Gamma$$

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	$\psi(2S) \rightarrow p\bar{p}\pi^0$
1.54±0.06±0.06	948	ALEXANDER	10 CLEO	$\psi(2S) \rightarrow \pi^0 p\bar{p}$

1.32±0.10±0.15 256 ¹ ABLIKIM 05E BES2 $e^+e^- \rightarrow \psi(2S) \rightarrow p\bar{p}\gamma\gamma$
 1.4 ±0.5 9 FRANKLIN 83 MRK2 e^+e^-

¹ Computed using $B(\pi^0 \rightarrow \gamma\gamma) = (98.80 \pm 0.03)\%$.

$\Gamma(N(940)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{115}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
6.42±0.20^{+1.78}_{-1.28}	1.9k	¹ ABLIKIM	13A	BES3 $\psi(2S) \rightarrow p\bar{p}\pi^0$

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

$\Gamma(N(1440)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{116}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
7.3 ^{+1.7}_{-1.5} OUR AVERAGE				Error includes scale factor of 2.5.

3.58±0.25 ^{+1.59} _{-0.84}	1.1k	¹ ABLIKIM	13A	BES3 $\psi(2S) \rightarrow p\bar{p}\pi^0$
8.1 ±0.7 ±0.3	474	² ALEXANDER	10	CLEO $\psi(2S) \rightarrow \pi^0 p\bar{p}$

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

² From a fit of the $p\bar{p}$ and $p\pi^0$ mass distributions to a combination of $N(1440)\bar{p}$, a broad $p\bar{p}$ enhancement around 2100 MeV, and two other broad, unestablished resonances.

$\Gamma(N(1520)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{117}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
0.64±0.05^{+0.22}_{-0.17}	0.2k	¹ ABLIKIM	13A	BES3 $\psi(2S) \rightarrow p\bar{p}\pi^0$

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

$\Gamma(N(1535)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{118}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
2.47±0.28^{+0.99}_{-0.97}	0.7k	¹ ABLIKIM	13A	BES3 $\psi(2S) \rightarrow p\bar{p}\pi^0$

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

$\Gamma(N(1650)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{119}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
3.76±0.28^{+1.37}_{-1.66}	1.1k	¹ ABLIKIM	13A	BES3 $\psi(2S) \rightarrow p\bar{p}\pi^0$

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

$\Gamma(N(1720)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{120}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
1.79±0.10^{+0.24}_{-0.71}	0.5k	¹ ABLIKIM	13A	BES3 $\psi(2S) \rightarrow p\bar{p}\pi^0$

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

$\Gamma(N(2300)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{121}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
2.62±0.28^{+1.12}_{-0.64}	0.9k	¹ ABLIKIM	13A	BES3 $\psi(2S) \rightarrow p\bar{p}\pi^0$

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

$\Gamma(N(2570)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{122}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$2.13 \pm 0.08^{+0.40}_{-0.30}$	0.8k	¹ ABLIKIM	13A	BES3 $\psi(2S) \rightarrow p\bar{p}\pi^0$

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

 $\Gamma(p\bar{p}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{123}/Γ

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

¹ Assuming entirely strong decay.

 $\Gamma(p\bar{p}K^+K^-)/\Gamma_{\text{total}}$ Γ_{124}/Γ

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

 $\Gamma(p\bar{p}\eta)/\Gamma_{\text{total}}$ Γ_{125}/Γ

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

¹ With $N(1535)$ decaying to $p\eta$.

² Computed using $B(\eta \rightarrow \gamma\gamma) = (39.43 \pm 0.26)\%$.

 $\Gamma(N(1535)\bar{p} + \text{c.c.} \rightarrow p\bar{p}\eta)/\Gamma_{\text{total}}$ Γ_{126}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$4.5^{+0.7}_{-0.6}$ OUR AVERAGE				
$5.2 \pm 0.3^{+3.2}_{-1.2}$	527	¹ ABLIKIM	13S	BES3 $\psi(2S) \rightarrow \eta p\bar{p}$
$4.4 \pm 0.6 \pm 0.3$	123	² ALEXANDER	10	CLEO $\psi(2S) \rightarrow \eta p\bar{p}$

¹ With $N(1535)$ decaying to $p\eta$.

² From a fit of the $p\bar{p}$ and $p\eta$ distributions to a combination of $N^*(1535)\bar{p}$ and a broad $p\bar{p}$ enhancement around 2100 MeV.

 $\Gamma(p\bar{p}\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{127}/Γ

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

 $\Gamma(p\bar{p}\rho^0)/\Gamma_{\text{total}}$ Γ_{128}/Γ

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

$\Gamma(p\bar{p}\omega)/\Gamma_{\text{total}}$ Γ_{129}/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	$e^+e^- \rightarrow \psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\pi^0$

0.8 ±0.3 ±0.1 14.9 ± 0.1 ¹ BAI 03B BES $\psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\pi^0$

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

$\Gamma(p\bar{p}\eta')/\Gamma_{\text{total}}$ Γ_{130}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
1.10±0.10±0.08	491	¹ ABLIKIM	19N BES3	$\psi(2S) \rightarrow \eta' p\bar{p}$

¹ From the combination of $p\bar{p}\eta' \rightarrow p\bar{p}\pi^+\pi^-\eta$ and $p\bar{p}\eta' \rightarrow p\bar{p}\pi^+\pi^-\gamma$ channels.

$\Gamma(p\bar{p}\phi)/\Gamma_{\text{total}}$ Γ_{131}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
6.06±0.38±0.48		753	ABLIKIM	19AO BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow p\bar{p}K^+K^-$

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

<24	90	BRIERE	05 CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow p\bar{p}K^+K^-$
<26	90	¹ BAI	03B BES	$\psi(2S) \rightarrow K^+K^-p\bar{p}$

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

$\Gamma(\phi X(1835) \rightarrow p\bar{p}\phi)/\Gamma_{\text{total}}$ Γ_{132}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.82 × 10⁻⁷	90	ABLIKIM	19AO BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow p\bar{p}K^+K^-$

$\Gamma(p\bar{n}\pi^- \text{ or c.c.})/\Gamma_{\text{total}}$ Γ_{133}/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	$e^+e^- \rightarrow \bar{p}\pi^+X$

$\Gamma(p\bar{n}\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{134}/Γ

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

$\Gamma(\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$ Γ_{135}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
3.81±0.13 OUR AVERAGE					Error includes scale factor of 1.4. See the ideogram below.
3.97±0.02±0.12	31k	ABLIKIM	17L BES3		$e^+e^- \rightarrow \Lambda\bar{\Lambda}$
3.71±0.05±0.15	6.5k	¹ DOBBS	17		$e^+e^- \rightarrow \Lambda\bar{\Lambda}$
3.39±0.20±0.32	337	ABLIKIM	07C BES		$e^+e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
6.4 ±1.8 ±0.1		² AUBERT	07BD BABR	10.6	$e^+e^- \rightarrow \Lambda\bar{\Lambda}\gamma$
3.28±0.23±0.25	208	PEDLAR	05 CLEO		$e^+e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

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

$3.75 \pm 0.09 \pm 0.23$	1.9k	^{1,3} DOBBS	14		$e^+e^- \rightarrow \Lambda\bar{\Lambda}$
$1.81 \pm 0.20 \pm 0.27$	80	⁴ BAI	01	BES	$e^+e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
< 4	90	FELDMAN	77	MRK1	$e^+e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

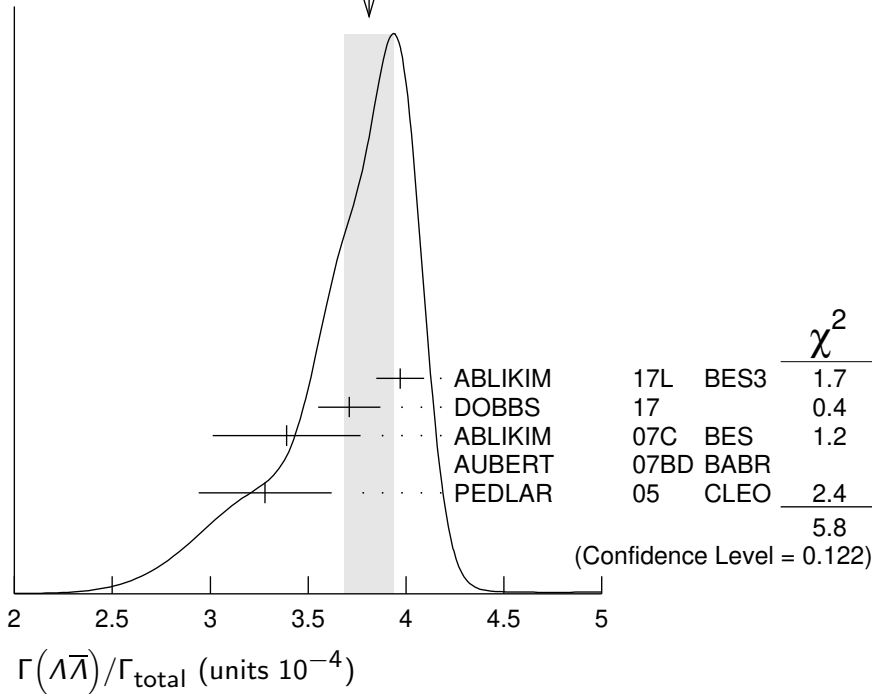
² AUBERT 07BD reports $[\Gamma(\psi(2S) \rightarrow \Lambda\bar{\Lambda})/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \rightarrow e^+e^-)] = (15 \pm 4 \pm 1) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \rightarrow e^+e^-) = 2.33 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

³ Superseded by DOBBS 17.

⁴ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$.

WEIGHTED AVERAGE

3.81 ± 0.13 (Error scaled by 1.4)



$\Gamma(\Lambda\bar{\Lambda}\pi^0)/\Gamma_{\text{total}}$

Γ_{136}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$1.42 \pm 0.39 \pm 0.59$		23	¹ ABLIKIM	22AP BES3	$\psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\gamma\gamma$

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

< 2.9	90	² ABLIKIM	13F	BES3	$\psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\gamma\gamma$
< 120	90	³ ABLIKIM	07H	BES2	$e^+e^- \rightarrow \psi(2S)$

¹ With a significance of 3.7σ . The corresponding 90% CL upper limit is 2.47×10^{-6} .

² Using $B(\Lambda \rightarrow \pi^- p) = 63.9\%$ and $B(\pi^0 \rightarrow \gamma\gamma) = 98.8\%$.

³ Using $B(\Lambda \rightarrow \pi^- p) = 63.9\%$ and $B(\eta \rightarrow \gamma\gamma) = 39.4\%$.

$\Gamma(\Lambda\bar{\Lambda}\eta)/\Gamma_{\text{total}}$

Γ_{137}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
2.43 ± 0.32 OUR AVERAGE					
$2.34 \pm 0.18 \pm 0.52$		218	ABLIKIM	22AP BES3	$\psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\gamma\gamma$

- 2.48±0.34±0.19 60 ¹ ABLIKIM 13F BES3 $\psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\gamma\gamma$
 • • • We do not use the following data for averages, fits, limits, etc. • • •
 <4.9 90 ² ABLIKIM 07H BES2 $e^+e^- \rightarrow \psi(2S)$
¹ Using $B(\Lambda \rightarrow \pi^- p) = 63.9\%$ and $B(\eta \rightarrow \gamma\gamma) = 39.31\%$.
² Using $B(\Lambda \rightarrow \pi^- p) = 63.9\%$.

$\Gamma(\Lambda\bar{\Lambda}\eta')/\Gamma_{\text{total}}$ Γ_{139}/Γ

VALUE (units 10 ⁻⁶)	EVTS	DOCUMENT ID	TECN	COMMENT
7.34±0.94±0.43	218	ABLIKIM	23BV BES3	$\psi(2S) \rightarrow p\bar{p}2(\pi^+\pi^-\gamma(\gamma))$

$\Gamma(\Lambda\bar{\Lambda}\omega(782))/\Gamma_{\text{total}}$ Γ_{140}/Γ

VALUE (units 10 ⁻⁵)	EVTS	DOCUMENT ID	TECN	COMMENT
3.30±0.34±0.29	207	¹ ABLIKIM	22AZ BES3	$e^+e^- \rightarrow \psi(2S)$

¹ Using $B(\Lambda \rightarrow \pi^- p) = 0.639$ and $B(\omega \rightarrow \pi^+\pi^-\pi^0) = 0.893$.

$\Gamma(\Lambda(1670)\bar{\Lambda} \rightarrow \Lambda\bar{\Lambda}\eta)/\Gamma_{\text{total}}$ Γ_{138}/Γ

VALUE (units 10 ⁻⁵)	EVTS	DOCUMENT ID	TECN	COMMENT
1.29±0.31±0.62	116	¹ ABLIKIM	22AP BES3	$\psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\gamma\gamma$

¹ From a partial wave analysis of the $\Lambda\eta$ system.

$\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{141}/Γ

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

$\Gamma(\Lambda\bar{p}K^+)/\Gamma_{\text{total}}$ Γ_{142}/Γ

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

$\Gamma(\Lambda\bar{p}K^*(892)^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{143}/Γ

VALUE (units 10 ⁻⁵)	EVTS	DOCUMENT ID	TECN	COMMENT
6.3±0.5±0.5	1011	ABLIKIM	19AU BES3	$e^+e^- \rightarrow \psi(2S)$

$\Gamma(\Lambda\bar{p}K^+\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{144}/Γ

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

$\Gamma(\bar{\Lambda}nK_S^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{145}/Γ

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

¹ Using $B(\bar{\Lambda} \rightarrow \bar{p}\pi^+) = 63.9\%$ and $B(K_S^0 \rightarrow \pi^+\pi^-) = 69.2\%$.

$\Gamma(\Delta^{++}\bar{\Delta}^{--})/\Gamma_{\text{total}}$ Γ_{146}/Γ

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

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

$\Gamma(\Lambda \bar{\Sigma}^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{147}/Γ

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

$\Gamma(\Lambda \bar{\Sigma}^- \pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{148}/Γ

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

$\Gamma(\Lambda \bar{\Sigma}^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{149}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
1.60±0.31±0.59	60	ABLIKIM	21L	BES3 $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

$\Gamma(\Lambda \bar{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{150}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.23±0.23±0.08 30 ¹ DOBBS 17 $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(\Sigma^0 \bar{p} K^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{151}/Γ

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

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

$\Gamma(\Sigma^+ \bar{\Sigma}^-)/\Gamma_{\text{total}}$ Γ_{152}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
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2.43±0.10 OUR AVERAGE Error includes scale factor of 1.4.

2.52±0.04±0.09 5.4k ABLIKIM 21AT BES3 $\psi(2S) \rightarrow p \pi^0 \bar{p} \pi^0$

2.31±0.06±0.10 1.9k ¹ DOBBS 17 $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

2.57±0.44±0.68 35 PEDLAR 05 CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

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

2.51±0.15±0.16 281 ^{1,2} DOBBS 14 $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² Superseded by DOBBS 17.

$\Gamma(\Sigma^0 \bar{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{153}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
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2.35±0.09 OUR AVERAGE Error includes scale factor of 1.1.

2.44±0.03±0.11 7k ABLIKIM 17L BES3 $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

2.22±0.05±0.11 2.6k ¹ DOBBS 17 $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

2.35±0.36±0.32 59 ABLIKIM 07C BES $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

2.63±0.35±0.21 58 PEDLAR 05 CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

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

2.25±0.11±0.16 439 ^{1,2} DOBBS 14 $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

1.2 ±0.4 ±0.4 8 ³ BAI 01 BES $e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.² Superseded by DOBBS 17.³ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$. $\Gamma(\Sigma^- \bar{\Sigma}^+)/\Gamma_{\text{total}}$ Γ_{154}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$2.82 \pm 0.04 \pm 0.08$	6.6k	ABLIKIM	22AV BES3	$\psi(2S) \rightarrow n \pi^- \bar{n} \pi^+$

 $\Gamma(\Sigma^+ \bar{\Sigma}^- \eta)/\Gamma_{\text{total}}$ Γ_{155}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
$9.59 \pm 2.37 \pm 0.61$	21	ABLIKIM	22AY BES3	$\psi(2S) \rightarrow \Sigma^+ \bar{\Sigma}^- \eta$

 $\Gamma(\Sigma^+ \bar{\Sigma}^- \omega)/\Gamma_{\text{total}}$ Γ_{156}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.89 \pm 0.18 \pm 0.21$	199	ABLIKIM	23BE BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

 $\Gamma(\Sigma^+ \bar{\Sigma}^- \phi)/\Gamma_{\text{total}}$ Γ_{157}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
$2.96 \pm 0.54 \pm 0.41$	55	ABLIKIM	23BE BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

 $\Gamma(\Sigma(1385)^+ \bar{\Sigma}(1385)^-)/\Gamma_{\text{total}}$ Γ_{158}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
8.5 ± 0.7 OUR AVERAGE				
$8.4 \pm 0.5 \pm 0.5$	1.5k	ABLIKIM	16L BES3	$\psi(2S) \rightarrow \Sigma(1385)^+ \bar{\Sigma}(1385)^-$
$11 \pm 3 \pm 3$	14	¹ BAI	01 BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

¹ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$. $\Gamma(\Sigma(1385)^- \bar{\Sigma}(1385)^+)/\Gamma_{\text{total}}$ Γ_{159}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$8.5 \pm 0.6 \pm 0.6$	1.4k	ABLIKIM	16L BES3	$\psi(2S) \rightarrow \Sigma(1385)^- \bar{\Sigma}(1385)^+$

 $\Gamma(\Sigma(1385)^0 \bar{\Sigma}(1385)^0)/\Gamma_{\text{total}}$ Γ_{160}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$0.69 \pm 0.05 \pm 0.05$	2.2k	ABLIKIM	17E BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

 $\Gamma(\Xi^- \bar{\Xi}^+)/\Gamma_{\text{total}}$ Γ_{161}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
2.87 ± 0.11 OUR AVERAGE			Error includes scale factor of 1.1.		
$3.03 \pm 0.05 \pm 0.14$	3.6k	¹	DOBBS	17	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
$2.78 \pm 0.05 \pm 0.14$	5k		ABLIKIM	16L BES3	$\psi(2S) \rightarrow \Xi^- \bar{\Xi}^+$
$3.03 \pm 0.40 \pm 0.32$	67		ABLIKIM	07C BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
$2.38 \pm 0.30 \pm 0.21$	63		PEDLAR	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.66 \pm 0.12 \pm 0.20$	548	^{1,2}	DOBBS	14	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
$0.94 \pm 0.27 \pm 0.15$	12	³	BAI	01 BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons
<2	90		FELDMAN	77 MRK1	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

¹ Using CLEO-c data but not authored by the CLEO Collaboration.² Superseded by DOBBS 17.³ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$. $\Gamma(\Xi^0 \Xi^0)/\Gamma_{\text{total}}$ Γ_{162}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.3 ± 0.4	OUR AVERAGE	Error includes scale factor of 4.2.		
$2.73 \pm 0.03 \pm 0.13$	11k	ABLIKIM	17E BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
$1.97 \pm 0.06 \pm 0.11$	1.2k	¹ DOBBS	17	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
$2.75 \pm 0.64 \pm 0.61$	19	PEDLAR	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.02 \pm 0.19 \pm 0.15$	112	^{1,2} DOBBS	14	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.² Superseded by DOBBS 17. $\Gamma(\Xi(1530)^0 \Xi(1530)^0)/\Gamma_{\text{total}}$ Γ_{163}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$6.77 \pm 0.14 \pm 0.39$		2951	ABLIKIM	21AO BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 32	90	PEDLAR	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$	
< 8.1	90	¹ BAI	01 BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$	

¹ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$. $\Gamma(\Lambda \Xi^+ K^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{164}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
3.67 ± 0.22	OUR AVERAGE			
$3.60 \pm 0.10 \pm 0.24$	1572	ABLIKIM	24N BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^- \Lambda \Xi^+ + \text{c.c.}$
$3.86 \pm 0.27 \pm 0.32$	236	ABLIKIM	15I BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^- \Lambda \Xi^+ + \text{c.c.}$

 $\Gamma(\Xi(1530)^- \Xi(1530)^+)/\Gamma_{\text{total}}$ Γ_{167}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$11.45 \pm 0.40 \pm 0.59$	5k	ABLIKIM	19AT BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

 $\Gamma(\Xi(1530)^- \Xi^+)/\Gamma_{\text{total}}$ Γ_{168}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
$7.0 \pm 1.1 \pm 0.4$	399	ABLIKIM	19AT BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

 $\Gamma(\Xi(1530)^0 \Xi^0)/\Gamma_{\text{total}}$ Γ_{169}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$0.53 \pm 0.04 \pm 0.03$	278	ABLIKIM	21AO BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

 $\Gamma(\Xi(1690)^- \Xi^+ \rightarrow K^- \Lambda \Xi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{165}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.2 ± 2.1	OUR AVERAGE	Error includes scale factor of 1.5.		
$10.6 \pm 1.0 \pm 3.1$	464	ABLIKIM	24N BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^- \Lambda \Xi^+ + \text{c.c.}$

5.21 ± 1.48 ± 0.57 74 ABLIKIM 15l BES3 $e^+e^- \rightarrow \psi(2S) \rightarrow K^- \Lambda \Xi^+ + \text{c.c.}$

$\Gamma(\Xi(1820)^- \Xi^+ \rightarrow K^- \Lambda \Xi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{166}/Γ

VALUE (units 10 ⁻⁶)	EVTS	DOCUMENT ID	TECN	COMMENT
14.8 ± 2.9 OUR AVERAGE	Error	includes scale factor of 1.2.		
17.8 ± 1.0 ± 3.2	776	ABLIKIM	24N BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow K^- \Lambda \Xi^+ + \text{c.c.}$
12.03 ± 2.94 ± 1.22	136	ABLIKIM	15l BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow K^- \Lambda \Xi^+ + \text{c.c.}$

$\Gamma(\Sigma^0 \Xi^+ K^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{170}/Γ

VALUE (units 10 ⁻⁵)	EVTS	DOCUMENT ID	TECN	COMMENT
3.67 ± 0.33 ± 0.28	142	ABLIKIM	15l BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow K^- \Sigma^0 \Xi^+ + \text{c.c.}$

$\Gamma(\Omega^- K^+ \Xi^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{171}/Γ

VALUE (units 10 ⁻⁶)	EVTS	DOCUMENT ID	TECN	COMMENT
2.78 ± 0.40 ± 0.18	242	ABLIKIM	24AG BES3	$e^+e^- \rightarrow \psi(2S)$

$\Gamma(\Omega^- \bar{\Omega}^+)/\Gamma_{\text{total}}$ Γ_{172}/Γ

VALUE (units 10 ⁻⁵)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
5.66 ± 0.30 OUR AVERAGE			Error includes scale factor of 1.3.		
5.85 ± 0.12 ± 0.25	4k	¹	ABLIKIM	21E BES3	$\psi(2S) \rightarrow \Omega^- \bar{\Omega}^+ \rightarrow \Lambda K^- \bar{\Lambda} K^+$
5.2 ± 0.3 ± 0.3	326	^{1,2}	DOBBS	17	$e^+e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
4.7 ± 0.9 ± 0.5	27	^{1,2,3}	DOBBS	14	$e^+e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
<15	90		ABLIKIM	12Q BES2	$e^+e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
<16	90		PEDLAR	05 CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$
< 7.3	90	⁴	BAI	01 BES	$e^+e^- \rightarrow \psi(2S) \rightarrow \text{hadrons}$

¹ Using $B(\Omega^- \rightarrow \Lambda K^-) = (67.8 \pm 0.7)\%$ and $B(\Lambda \rightarrow p \pi^-) = (63.9 \pm 0.5)\%$.

² Using CLEO-c data but not authored by the CLEO Collaboration.

³ Superseded by DOBBS 17.

⁴ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$.

$\Gamma(\eta_c \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$ Γ_{173}/Γ

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

$\Gamma(h_c(1P) \pi^0)/\Gamma_{\text{total}}$ Γ_{174}/Γ

VALUE (units 10 ⁻⁴)	EVTS	DOCUMENT ID	TECN	COMMENT
7.4 ± 0.5 OUR AVERAGE				
7.32 ± 0.34 ± 0.41	46k	ABLIKIM	22AQ BES3	$\psi(2S) \rightarrow \pi^0 \text{ hadrons}$
9.0 ± 1.5 ± 1.3	3k	¹ GE	11 CLEO	$\psi(2S) \rightarrow \pi^0 \text{ anything}$

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

8.4 ± 1.3 ± 1.0	11k	² ABLIKIM	10B	BES3	$\psi(2S) \rightarrow \pi^0 h_c$
seen	92 ⁺²³ ₋₂₂	ADAMS	09	CLEO	$\psi(2S) \rightarrow 2\pi^+ 2\pi^- 2\pi^0$
seen	1282	DOBBS	08A	CLEO	$\psi(2S) \rightarrow \pi^0 \eta_c \gamma$
seen	168 ± 40	ROSNER	05	CLEO	$\psi(2S) \rightarrow \pi^0 \eta_c \gamma$

¹ Assuming a width $\Gamma(h_c(1P)) = 0.86 \text{ MeV} \equiv \Gamma_0$, 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.

² Superseded by ABLIKIM 22AQ

$\Gamma(\Lambda_c^+ \bar{p} e^+ e^- + \text{c.c.})/\Gamma_{\text{total}}$						Γ_{175}/Γ
VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT	
<1.7 × 10⁻⁶	90	450M	ABLIKIM	18Q	BES3	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma(\Theta(1540) \bar{\Theta}(1540) \rightarrow K_S^0 p K^- \bar{n} + \text{c.c.})/\Gamma_{\text{total}}$						Γ_{176}/Γ
VALUE (units 10 ⁻⁵)	CL%	DOCUMENT ID	TECN	COMMENT		
<0.88	90	BAI	04G	BES2	$e^+ e^-$	

$\Gamma(\Theta(1540) K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n})/\Gamma_{\text{total}}$						Γ_{177}/Γ
VALUE (units 10 ⁻⁵)	CL%	DOCUMENT ID	TECN	COMMENT		
<1.0	90	BAI	04G	BES2	$e^+ e^-$	

$\Gamma(\Theta(1540) K_S^0 \bar{p} \rightarrow K_S^0 \bar{p} K^+ n)/\Gamma_{\text{total}}$						Γ_{178}/Γ
VALUE (units 10 ⁻⁵)	CL%	DOCUMENT ID	TECN	COMMENT		
<0.70	90	BAI	04G	BES2	$e^+ e^-$	

$\Gamma(\bar{\Theta}(1540) K^+ n \rightarrow K_S^0 \bar{p} K^+ n)/\Gamma_{\text{total}}$						Γ_{179}/Γ
VALUE (units 10 ⁻⁵)	CL%	DOCUMENT ID	TECN	COMMENT		
<2.6	90	BAI	04G	BES2	$e^+ e^-$	

$\Gamma(\bar{\Theta}(1540) K_S^0 p \rightarrow K_S^0 p K^- \bar{n})/\Gamma_{\text{total}}$						Γ_{180}/Γ
VALUE (units 10 ⁻⁵)	CL%	DOCUMENT ID	TECN	COMMENT		
<0.60	90	BAI	04G	BES2	$e^+ e^-$	

RADIATIVE DECAYS

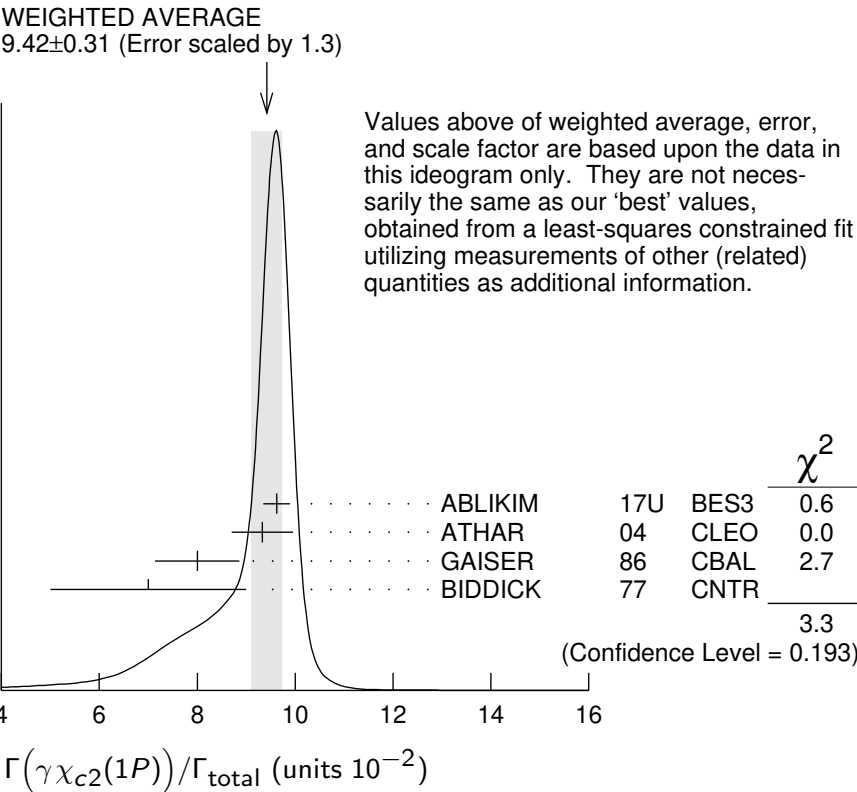
$\Gamma(\gamma \chi_{c0}(1P))/\Gamma_{\text{total}}$						Γ_{181}/Γ
VALUE (units 10 ⁻²)	EVTS	DOCUMENT ID	TECN	COMMENT		
9.75 ± 0.22 OUR FIT	Error includes scale factor of 1.1.					
9.33 ± 0.26 OUR AVERAGE						
9.389 ± 0.014 ± 0.332	4.7M	ABLIKIM	17U	BES3	$e^+ e^- \rightarrow \gamma X$	
9.22 ± 0.11 ± 0.46	72k	ATHAR	04	CLEO	$e^+ e^- \rightarrow \gamma X$	
9.9 ± 0.5 ± 0.8		¹ GAISER	86	CBAL	$e^+ e^- \rightarrow \gamma X$	
7.2 ± 2.3		¹ BIDDICK	77	CNTR	$e^+ e^- \rightarrow \gamma X$	
7.5 ± 2.6		¹ WHITAKER	76	MRK1	$e^+ e^-$	

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

$\Gamma(\gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$					Γ_{182}/Γ
VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT	
9.75 $\pm$ 0.27	OUR FIT	Error includes scale factor of 1.1.			
9.54 $\pm$ 0.29	OUR AVERAGE				
9.905 $\pm$ 0.011 $\pm$ 0.353	5.0M	ABLIKIM	17U	BES3	$e^+e^- \rightarrow \gamma X$
9.07 $\pm$ 0.11 $\pm$ 0.54	76k	ATHAR	04	CLEO	$e^+e^- \rightarrow \gamma X$
9.0 $\pm$ 0.5 $\pm$ 0.7		¹ GAISER	86	CBAL	$e^+e^- \rightarrow \gamma X$
7.1 $\pm$ 1.9		² BIDDICK	77	CNTR	$e^+e^- \rightarrow \gamma X$
¹ Angular distribution $(1-0.189 \cos^2\theta)$ assumed.					
² Valid for isotropic distribution of the photon.					

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c1}(1P))$					$\Gamma_{181}/\Gamma_{182}$
VALUE	DOCUMENT ID	TECN	COMMENT		
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.02 $\pm$ 0.01 $\pm$ 0.07	¹ ATHAR	04	CLEO	$e^+e^- \rightarrow \gamma X$	
¹ Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.					

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma_{\text{total}}$					Γ_{183}/Γ
VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT	
9.38 $\pm$ 0.23	OUR FIT	Error includes scale factor of 1.2.			
9.42 $\pm$ 0.31	OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
9.621 $\pm$ 0.013 $\pm$ 0.272	4.2M	ABLIKIM	17U	BES3	$e^+e^- \rightarrow \gamma X$
9.33 $\pm$ 0.14 $\pm$ 0.61	79k	ATHAR	04	CLEO	$e^+e^- \rightarrow \gamma X$
8.0 $\pm$ 0.5 $\pm$ 0.7		¹ GAISER	86	CBAL	$e^+e^- \rightarrow \gamma X$
7.0 $\pm$ 2.0		² BIDDICK	77	CNTR	$e^+e^- \rightarrow \gamma X$



¹ Angular distribution $(1-0.052 \cos^2\theta)$ assumed.

² Valid for isotropic distribution of the photon.

$$[\Gamma(\gamma\chi_{c0}(1P)) + \Gamma(\gamma\chi_{c1}(1P)) + \Gamma(\gamma\chi_{c2}(1P))]/\Gamma_{\text{total}} \quad (\Gamma_{181}+\Gamma_{182}+\Gamma_{183})/\Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$27.6 \pm 0.3 \pm 2.0$ ¹ ATHAR 04 CLEO $e^+e^- \rightarrow \gamma X$

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

$$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c2}(1P)) \quad \Gamma_{181}/\Gamma_{183}$$

VALUE	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.99 \pm 0.02 \pm 0.08$ ¹ ATHAR 04 CLEO $e^+e^- \rightarrow \gamma X$

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

$$\Gamma(\gamma\chi_{c2}(1P))/\Gamma(\gamma\chi_{c1}(1P)) \quad \Gamma_{183}/\Gamma_{182}$$

VALUE	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.03 \pm 0.02 \pm 0.03$ ¹ ATHAR 04 CLEO $e^+e^- \rightarrow \gamma X$

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

$$\Gamma(\gamma\eta_c(1S))/\Gamma_{\text{total}} \quad \Gamma_{184}/\Gamma$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
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0.36 ± 0.05 OUR FIT Error includes scale factor of 1.3.

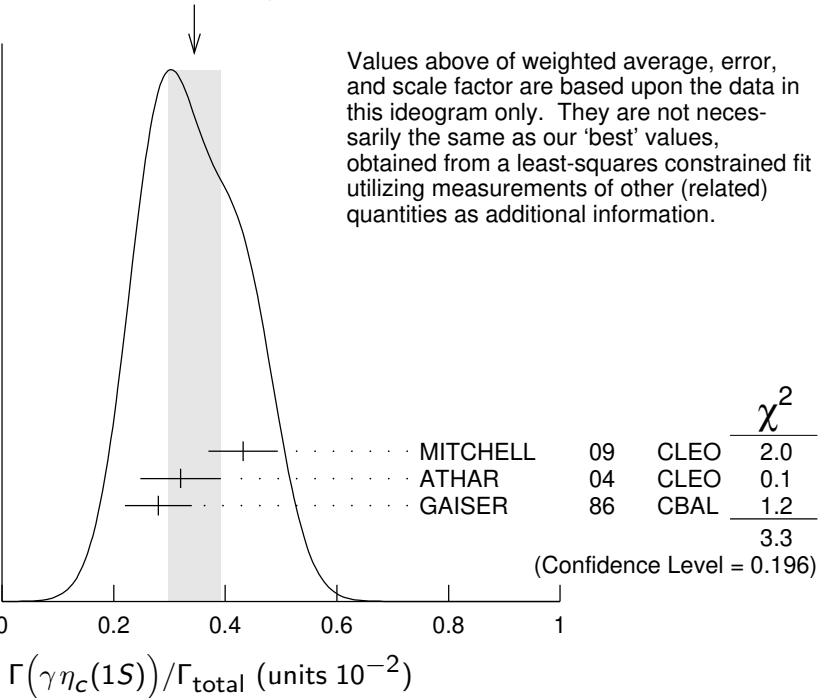
0.34 ± 0.05 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.

$0.432 \pm 0.016 \pm 0.060$ MITCHELL 09 CLEO $e^+e^- \rightarrow \gamma X$

$0.32 \pm 0.04 \pm 0.06$ 2.5k ¹ ATHAR 04 CLEO $e^+e^- \rightarrow \gamma X$

0.28 ± 0.06 ² GAISER 86 CBAL $e^+e^- \rightarrow \gamma X$

WEIGHTED AVERAGE
 0.34 ± 0.05 (Error scaled by 1.3)



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

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

$\Gamma(\gamma\eta_c(2S))/\Gamma_{\text{total}}$ Γ_{185}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$5.1 \pm 0.6^{+2.7}_{-3.1}$		1.6k	¹ ABLIKIM	24J BES3	$\psi(2S) \rightarrow \gamma\eta_c \rightarrow \gamma K \bar{K} \pi$
$7 \pm 2 \pm 4$			² ABLIKIM	12G BES3	$\psi(2S) \rightarrow \gamma K^0 K \pi, K K \pi^0$
< 8	90		³ CRONIN-HEN..10	CLEO	$\psi(2S) \rightarrow \gamma K \bar{K} \pi$
< 20	90		ATHAR	04 CLEO	$e^+e^- \rightarrow \gamma X$
20–130	95		EDWARDS	82C CBAL	$e^+e^- \rightarrow \gamma X$

¹ABLIKIM 24J reports $[\Gamma(\psi(2S) \rightarrow \gamma\eta_c(2S))/\Gamma_{\text{total}}] \times [B(\eta_c(2S) \rightarrow K \bar{K} \pi)] = (0.97 \pm 0.06 \pm 0.09) \times 10^{-5}$ which we divide by our best value $B(\eta_c(2S) \rightarrow K \bar{K} \pi) = (1.9^{+1.2}_{-1.0}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

²ABLIKIM 12G reports $[\Gamma(\psi(2S) \rightarrow \gamma\eta_c(2S))/\Gamma_{\text{total}}] \times [B(\eta_c(2S) \rightarrow K \bar{K} \pi)] = (1.30 \pm 0.20 \pm 0.30) \times 10^{-5}$ which we divide by our best value $B(\eta_c(2S) \rightarrow K \bar{K} \pi) = (1.9^{+1.2}_{-1.0}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

³CRONIN-HENNESSY 10 reports $[\Gamma(\psi(2S) \rightarrow \gamma\eta_c(2S))/\Gamma_{\text{total}}] \times [B(\eta_c(2S) \rightarrow K \bar{K} \pi)] < 14.5 \times 10^{-6}$ which we divide by our best value $B(\eta_c(2S) \rightarrow K \bar{K} \pi) = 1.9 \times 10^{-2}$. This measurement assumes $\Gamma(\eta_c(2S)) = 14$ MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

$\Gamma(\gamma\pi^0)/\Gamma_{\text{total}}$ Γ_{186}/Γ

VALUE (units 10^{-7})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
2.7 to 9.7	68		¹ ABLIKIM	24BS BES3	$\psi(2S) \rightarrow \gamma\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$9.5 \pm 1.6 \pm 0.5$		423	² ABLIKIM	17X BES3	$\psi(2S) \rightarrow \gamma\pi^0$
$15.8 \pm 4.0 \pm 1.3$		37	² ABLIKIM	10F BES3	$\psi(2S) \rightarrow \gamma\pi^0$
< 50	90		PEDLAR	09 CLE3	$\psi(2S) \rightarrow \gamma X$
< 54000	95		³ LIBERMAN	75 SPEC	e^+e^-
< 100000	90		WIJK	75 DASP	e^+e^-

¹Taking into account interference between $\psi(2S)$ and continuum amplitudes. Range of the 1σ contour in the plane of $B(\psi(2S) \rightarrow \gamma\pi^0)$ versus ϕ , the relative phase of the amplitudes. The fit provides two solutions for $B(\psi(2S) \rightarrow \gamma\pi^0)$: 3.74×10^{-7} ($\phi = 3.93$ rad) and 7.87×10^{-7} ($\phi = 2.08$ rad).

²Interference between $\psi(2S)$ and the continuum is not taken into account.

³Restated by us using $B(\psi(2S) \rightarrow \mu^+ \mu^-) = 0.0077$.

$\Gamma(\gamma 2(\pi^+ \pi^-))/\Gamma_{\text{total}}$ Γ_{187}/Γ

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

$\Gamma(\gamma 3(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_{188}/Γ

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

$\Gamma(\gamma \eta'(958))/\Gamma_{\text{total}}$ Γ_{189}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
1.24 ± 0.04 OUR AVERAGE					
1.251 $\pm 0.022 \pm 0.062$		56k	ABLIKIM	17X BES3	$\psi(2S) \rightarrow \gamma \pi^+\pi^-\eta$, $\gamma \pi^0\pi^0\eta$
1.26 $\pm 0.03 \pm 0.08$		2226	¹ ABLIKIM	10F BES3	$\psi(2S) \rightarrow 3\gamma \pi^+\pi^-$, $2\gamma \pi^+\pi^-$
1.19 $\pm 0.08 \pm 0.03$			PEDLAR	09 CLE3	$\psi(2S) \rightarrow \gamma X$
1.24 $\pm 0.27 \pm 0.15$		23	ABLIKIM	06R BES2	$e^+e^- \rightarrow \psi(2S)$
1.54 $\pm 0.31 \pm 0.20$		~ 43	BAI	98F BES	$\psi(2S) \rightarrow \pi^+\pi^-2\gamma$, $\pi^+\pi^-3\gamma$

• • • 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 $\eta' \rightarrow \pi^+\pi^-\eta$ and $\eta' \rightarrow \pi^+\pi^-\gamma$ decay modes.

² Restated by us using total decay width 228 keV.

³ The value is normalized to the branching ratio for $\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$.

$\Gamma(\gamma f_2(1270))/\Gamma_{\text{total}}$ Γ_{190}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.73^{+0.29}_{-0.25} OUR AVERAGE				Error includes scale factor of 1.8.

2.84 $\pm 0.15^{+0.03}_{-0.10}$	1.9k	^{1,2} DOBBS	15	$\psi(2S) \rightarrow \gamma \pi \pi$
2.12 $\pm 0.19 \pm 0.32$		^{3,4} BAI	03C BES	$\psi(2S) \rightarrow \gamma \pi \pi$

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

2.08 $\pm 0.19 \pm 0.33$	200.6 ± 18.8	³ BAI	03C BES	$\psi(2S) \rightarrow \gamma \pi^+\pi^-$
2.90 $\pm 1.08 \pm 1.07$	29.9 ± 11.1	³ BAI	03C BES	$\psi(2S) \rightarrow \gamma \pi^0\pi^0$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² DOBBS 15 reports $[\Gamma(\psi(2S) \rightarrow \gamma f_2(1270))/\Gamma_{\text{total}}] \times [B(f_2(1270) \rightarrow \pi\pi)] = (2.39 \pm 0.09 \pm 0.09) \times 10^{-4}$ which we divide by our best value $B(f_2(1270) \rightarrow \pi\pi) = (84.3^{+2.8}_{-1.0}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

⁴ Combining the results from $\pi^+\pi^-$ and $\pi^0\pi^0$ decay modes.

$\Gamma(\gamma f_0(1370) \rightarrow \gamma K \bar{K})/\Gamma_{\text{total}}$ Γ_{191}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	COMMENT
3.1 $\pm 1.0 \pm 1.4$	175	¹ DOBBS 15	$\psi(2S) \rightarrow \gamma K \bar{K}$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(\gamma f_0(1500))/\Gamma_{\text{total}}$ Γ_{192}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	COMMENT
9.3 $\pm 1.8 \pm 0.6$	274	^{1,2} DOBBS 15	$\psi(2S) \rightarrow \gamma \pi \pi$

¹ DOBBS 15 reports $[\Gamma(\psi(2S) \rightarrow \gamma f_0(1500))/\Gamma_{\text{total}}] \times [B(f_0(1500) \rightarrow \pi\pi)] = (3.2 \pm 0.6 \pm 0.2) \times 10^{-5}$ which we divide by our best value $B(f_0(1500) \rightarrow \pi\pi) = (34.5 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² Using CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(\gamma f'_2(1525))/\Gamma_{\text{total}}$ Γ_{193}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	COMMENT
$3.3 \pm 0.8 \pm 0.1$	136	^{1,2} DOBBS 15	$\psi(2S) \rightarrow \gamma K \bar{K}$

¹ DOBBS 15 reports $[\Gamma(\psi(2S) \rightarrow \gamma f'_2(1525))/\Gamma_{\text{total}}] \times [B(f'_2(1525) \rightarrow K \bar{K})] = (2.9 \pm 0.6 \pm 0.3) \times 10^{-5}$ which we divide by our best value $B(f'_2(1525) \rightarrow K \bar{K}) = (88.8 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² Using CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(\gamma f_0(1710) \rightarrow \gamma \pi \pi)/\Gamma_{\text{total}}$ Γ_{195}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
3.5 ± 0.6 OUR AVERAGE				
$3.6 \pm 0.4 \pm 0.5$	290	¹ DOBBS 15		$\psi(2S) \rightarrow \gamma \pi \pi$
$3.01 \pm 0.41 \pm 1.24$	35.6 ± 4.8	² BAI 03c BES		$\psi(2S) \rightarrow \gamma \pi^+ \pi^-$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

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

$\Gamma(\gamma f_0(1710) \rightarrow \gamma K \bar{K})/\Gamma_{\text{total}}$ Γ_{196}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
6.6 ± 0.7 OUR AVERAGE					
$6.7 \pm 0.6 \pm 0.6$		375	¹ DOBBS 15		$\psi(2S) \rightarrow \gamma K \bar{K}$
$6.04 \pm 0.90 \pm 1.32$	39.6 ± 5.9		^{2,3} BAI 03c BES		$\psi(2S) \rightarrow \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 15.6	90	6.8 ± 3.1	^{2,3} BAI 03c BES		$\psi(2S) \rightarrow \gamma K_S^0 K_S^0$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² Includes unknown branching fractions to $K^+ K^-$ or $K_S^0 K_S^0$. We have multiplied the $K^+ K^-$ result by a factor of 2 and the $K_S^0 K_S^0$ result by a factor of 4 to obtain the $K \bar{K}$ result.

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

$\Gamma(\gamma f_0(2100) \rightarrow \gamma \pi \pi)/\Gamma_{\text{total}}$ Γ_{197}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	COMMENT
$4.8 \pm 0.5 \pm 0.9$	373	¹ DOBBS 15	$\psi(2S) \rightarrow \gamma \pi \pi$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(\gamma f_0(2200) \rightarrow \gamma K \bar{K})/\Gamma_{\text{total}}$ Γ_{198}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	COMMENT
$3.2 \pm 0.6 \pm 0.8$	207	¹ DOBBS 15	$\psi(2S) \rightarrow \gamma K \bar{K}$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(\gamma f_J(2220) \rightarrow \gamma \pi \pi) / \Gamma_{\text{total}}$ Γ_{199} / Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 5.8 \times 10^{-6}$	90	1,2 DOBBS	15	$\psi(2S) \rightarrow \gamma \pi \pi$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² For $\Gamma = 20/50$ MeV, the 90% CL upper limits for $\pi^+ \pi^-$ and $\pi^0 \pi^0$ are $3.2/4.3 \times 10^{-6}$ and $2.6/4.0 \times 10^{-6}$, respectively.

 $\Gamma(\gamma f_J(2220) \rightarrow \gamma K \bar{K}) / \Gamma_{\text{total}}$ Γ_{200} / Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 9.5 \times 10^{-6}$	90	1,2 DOBBS	15	$\psi(2S) \rightarrow \gamma K \bar{K}$

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² For $\Gamma = 20/50$ MeV, the 90% CL upper limits for $K^+ K^-$ and $K_S^0 K_S^0$ are $2.1/4.3 \times 10^{-6}$ and $3.7/5.5 \times 10^{-6}$, respectively.

 $\Gamma(\gamma \eta) / \Gamma_{\text{total}}$ Γ_{201} / Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.92 ± 0.18 OUR AVERAGE					
$0.85 \pm 0.18 \pm 0.04$	382	¹ ABLIKIM	17X	BES3	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- \pi^0, \gamma 3\pi^0$
$1.38 \pm 0.48 \pm 0.09$	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.

 $\Gamma(\gamma \eta \pi^+ \pi^-) / \Gamma_{\text{total}}$ Γ_{202} / Γ

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

 $\Gamma(\gamma \eta(1405) \rightarrow \gamma K \bar{K} \pi) / \Gamma_{\text{total}}$ Γ_{204} / Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
< 0.9	90	ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma K_S^0 K^+ \pi^- + \text{c.c.}$

• • • 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 $\eta(1405) \rightarrow K \bar{K} \pi$.

 $\Gamma(\gamma \eta(1405) \rightarrow \gamma \eta \pi^+ \pi^-) / \Gamma_{\text{total}}$ Γ_{205} / Γ

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

 $\Gamma(\gamma \eta(1405) \rightarrow \gamma f_0(980) \pi^0 \rightarrow \gamma \pi^+ \pi^- \pi^0) / \Gamma_{\text{total}}$ Γ_{206} / Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 5.0 \times 10^{-7}$	90	ABLIKIM	17AJ	BES3 $\psi(2S) \rightarrow \gamma \pi^+ \pi^- \pi^0$

$\Gamma(\gamma\eta(1475) \rightarrow \gamma K \bar{K} \pi) / \Gamma_{\text{total}}$ Γ_{208} / Γ

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

 $\Gamma(\gamma\eta(1475) \rightarrow \gamma \eta \pi^+ \pi^-) / \Gamma_{\text{total}}$ Γ_{209} / Γ

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

 $\Gamma(\gamma K^{*0} K^+ \pi^- + \text{c.c.}) / \Gamma_{\text{total}}$ Γ_{210} / Γ

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

 $\Gamma(\gamma K^{*0} \bar{K}^{*0}) / \Gamma_{\text{total}}$ Γ_{211} / Γ

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

 $\Gamma(\gamma K_S^0 K^+ \pi^- + \text{c.c.}) / \Gamma_{\text{total}}$ Γ_{212} / Γ

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

 $\Gamma(\gamma K^+ K^- \pi^+ \pi^-) / \Gamma_{\text{total}}$ Γ_{213} / Γ

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

 $\Gamma(\gamma K^+ K^- 2(\pi^+ \pi^-)) / \Gamma_{\text{total}}$ Γ_{214} / Γ

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

 $\Gamma(\gamma 2(K^+ K^-)) / \Gamma_{\text{total}}$ Γ_{215} / Γ

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

 $\Gamma(\gamma p \bar{p}) / \Gamma_{\text{total}}$ Γ_{216} / 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	$\psi(2S) \rightarrow \gamma p \bar{p}$
2.9 ± 0.4 ± 0.4	142	ABLIKIM	07D BES2	$e^+ e^- \rightarrow \psi(2S)$

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

 $\Gamma(\gamma f_2(1950) \rightarrow \gamma p \bar{p}) / \Gamma_{\text{total}}$ Γ_{217} / Γ

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

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

$\Gamma(\gamma f_2(2150) \rightarrow \gamma p\bar{p})/\Gamma_{\text{total}}$ Γ_{218}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$0.72 \pm 0.18 \pm 0.03$	73	¹ ALEXANDER	10 CLEO	$\psi(2S) \rightarrow \gamma p\bar{p}$

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

$\Gamma(\gamma X(1835) \rightarrow \gamma p\bar{p})/\Gamma_{\text{total}}$ Γ_{219}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
$4.57 \pm 0.36^{+1.77}_{-4.26}$		ABLIKIM	12D BES3	$J/\psi \rightarrow \gamma p\bar{p}$

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

<1.6	90	ALEXANDER	10 CLEO	$\psi(2S) \rightarrow \gamma p\bar{p}$
<5.4	90	ABLIKIM	07D BES	$\psi(2S) \rightarrow \gamma p\bar{p}$

$\Gamma(\gamma X \rightarrow \gamma p\bar{p})/\Gamma_{\text{total}}$ Γ_{220}/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	$\psi(2S) \rightarrow \gamma p\bar{p}$

$\Gamma(\gamma p\bar{p}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{221}/Γ

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

$\Gamma(\gamma\gamma J/\psi)/\Gamma_{\text{total}}$ Γ_{223}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$3.1 \pm 0.6^{+0.8}_{-1.0}$	1.1k	ABLIKIM	12O BES3	$e^+e^- \rightarrow \psi(2S)$

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

3.2 ± 0.6	1.1k	¹ ABLIKIM	17N BES3	$\psi(2S) \rightarrow \gamma\gamma J/\psi$
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¹ Uses $B(J/\psi \rightarrow e^+e^-) = (5.971 \pm 0.032)\%$ and $B(J/\psi \rightarrow \mu^+\mu^-) = (5.961 \pm 0.033)\%$. No systematic error estimation.

$\Gamma(e^+e^-\eta')/\Gamma_{\text{total}}$ Γ_{224}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
1.90 ± 0.26 OUR AVERAGE				
$1.99 \pm 0.33 \pm 0.12$	57	ABLIKIM	18Z BES3	$\psi(2S) \rightarrow \eta' e^+e^-$, $\eta' \rightarrow \gamma\pi^+\pi^-$
$1.79 \pm 0.38 \pm 0.11$	20	ABLIKIM	18Z BES3	$\psi(2S) \rightarrow \eta' e^+e^-$, $\eta' \rightarrow \eta\pi^+\pi^-$

$\Gamma(e^+e^-\eta_c(1S))/\Gamma_{\text{total}}$ Γ_{225}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$3.77 \pm 0.40 \pm 0.18$	3k	¹ ABLIKIM	22AX BES3	$e^+e^- \rightarrow \psi(2S)$

¹ From a fit to the recoil mass distribution of e^+e^- with inclusive $\eta_c(1S)$ decays.

$\Gamma(e^+e^- \chi_{c0}(1P))/\Gamma_{\text{total}}$ Γ_{226}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$10.5 \pm 2.4 \pm 0.7$	48	¹ ABLIKIM	17I BES3	$\psi(2S) \rightarrow e^+e^- \gamma J/\psi$

¹ ABLIKIM 17I reports $(11.7 \pm 2.5 \pm 1.0) \times 10^{-4}$ from a measurement of $[\Gamma(\psi(2S) \rightarrow e^+e^- \chi_{c0}(1P))/\Gamma_{\text{total}}] \times [B(\chi_{c0}(1P) \rightarrow \gamma J/\psi(1S))]$ assuming $B(\chi_{c0}(1P) \rightarrow \gamma J/\psi(1S)) = (1.27 \pm 0.06) \times 10^{-2}$, which we rescale to our best value $B(\chi_{c0}(1P) \rightarrow \gamma J/\psi(1S)) = (1.41 \pm 0.09) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(e^+e^- \chi_{c0}(1P))/\Gamma(\gamma \chi_{c0}(1P))$ $\Gamma_{226}/\Gamma_{181}$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$9.4 \pm 1.9 \pm 0.6$	48	¹ ABLIKIM	17I BES3	$\psi(2S) \rightarrow e^+e^- \gamma J/\psi$

¹ Uses $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) \times B(\chi_{c0}(1P) \rightarrow \gamma J/\psi(1S)) = (15.8 \pm 0.3 \pm 0.6) \times 10^{-4}$ from ABLIKIM 17N and accounts for common systematic errors.

 $\Gamma(e^+e^- \chi_{c1}(1P))/\Gamma_{\text{total}}$ Γ_{227}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$8.5 \pm 0.6 \pm 0.3$	873	¹ ABLIKIM	17I BES3	$\psi(2S) \rightarrow e^+e^- \gamma J/\psi$

¹ ABLIKIM 17I reports $(8.6 \pm 0.3 \pm 0.6) \times 10^{-4}$ from a measurement of $[\Gamma(\psi(2S) \rightarrow e^+e^- \chi_{c1}(1P))/\Gamma_{\text{total}}] \times [B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))]$ assuming $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (33.9 \pm 1.2) \times 10^{-2}$, which we rescale to our best value $B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (34.3 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(e^+e^- \chi_{c1}(1P))/\Gamma(\gamma \chi_{c1}(1P))$ $\Gamma_{227}/\Gamma_{182}$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$8.3 \pm 0.3 \pm 0.4$	873	¹ ABLIKIM	17I BES3	$\psi(2S) \rightarrow e^+e^- \gamma J/\psi$

¹ Uses $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) \times B(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)) = (351.8 \pm 1.0 \pm 12.0) \times 10^{-4}$ from ABLIKIM 17N and accounts for common systematic errors.

 $\Gamma(e^+e^- \chi_{c2}(1P))/\Gamma_{\text{total}}$ Γ_{228}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$6.8 \pm 0.7 \pm 0.3$	227	¹ ABLIKIM	17I BES3	$\psi(2S) \rightarrow e^+e^- \gamma J/\psi$

¹ ABLIKIM 17I reports $(6.9 \pm 0.5 \pm 0.6) \times 10^{-4}$ from a measurement of $[\Gamma(\psi(2S) \rightarrow e^+e^- \chi_{c2}(1P))/\Gamma_{\text{total}}] \times [B(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S))]$ assuming $B(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) = (19.2 \pm 0.7) \times 10^{-2}$, which we rescale to our best value $B(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) = (19.5 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(e^+e^- \chi_{c2}(1P))/\Gamma(\gamma \chi_{c2}(1P))$ $\Gamma_{228}/\Gamma_{183}$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$6.6 \pm 0.5 \pm 0.4$	227	¹ ABLIKIM	17I BES3	$\psi(2S) \rightarrow e^+e^- \gamma J/\psi$

¹ Uses $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) \times B(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) = (199.6 \pm 0.8 \pm 7.0) \times 10^{-4}$ from ABLIKIM 17N and accounts for common systematic errors.

WEAK DECAYS

 $\Gamma(D^0 e^+ e^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{229}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.4 \times 10^{-7}$	90	¹ ABLIKIM	17AF BES3	$e^+ e^- \rightarrow \psi(2S)$

¹ Using D^0 decays to $K^- \pi^+$, $K^- \pi^+ \pi^0$, and $K^- \pi^+ \pi^+ \pi^-$.

 $\Gamma(\Lambda_c^+ \bar{\Sigma}^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{230}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.4 \times 10^{-5}$	90	¹ ABLIKIM	23 BES3	$e^+ e^- \rightarrow \psi(2S)$

¹ Using $\Lambda_c^+ \rightarrow p K^- \pi^+$ and $\bar{\Sigma}^- \rightarrow \bar{p} \pi^0$.

OTHER DECAYS

 $\Gamma(\text{invisible})/\Gamma(e^+ e^-)$ Γ_{231}/Γ_7

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

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

For measurements involving $B(\psi(2S) \rightarrow \gamma \eta_c(2S)) \times B(\eta_c(2S) \rightarrow X)$ see the corresponding entries in the $\eta_c(2S)$ sections.

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS

 $\psi(2S) \rightarrow \gamma \chi_{cJ}(1P)$ and $\chi_{cJ} \rightarrow \gamma J/\psi(1S)$ $a_2(\chi_{c1})/a_2(\chi_{c2})$ Magnetic quadrupole transition amplitude ratio

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
63 ± 7 OUR AVERAGE				
61.7 ± 8.3	253k	¹ ABLIKIM	17N BES3	$\psi(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$
67^{+19}_{-13}	59k	² ARTUSO	09 CLEO	$\psi(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$

¹ Statistical and systematic errors combined.

² 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
60 ± 31 OUR AVERAGE				
74 ± 40	253k	¹ ABLIKIM	17N BES3	$\psi(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$
37^{+53}_{-47}	59k	² ARTUSO	09 CLEO	$\psi(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$

¹ Statistical and systematic errors combined. Derived from the reported measurement of $b_2(\chi_{c1})/b_2(\chi_{c2}) = 1.35 \pm 0.72$.

² 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

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ABLIKIM	24BS	PR D110 052011	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24J	PR D109 032004	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24N	PR D109 072008	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24O	PR D109 072015	M. Ablikim <i>et al.</i>	(BESIII Collab.)
AAIJ	23AP	JHEP 2307 084	R. Aaij <i>et al.</i>	(LHCb Collab.)
ABLIKIM	23	CP C47 013002	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	23BA	PR D108 052001	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	23BE	PR D108 092011	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	23BV	PR D108 112014	M. Ablikim <i>et al.</i>	(BESIII Collab.)
LEES	23	PR D107 072001	J.P. Lees <i>et al.</i>	(BABAR Collab.)
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ABLIKIM	22AP	PR D106 072006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	22AQ	PR D106 072007	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	22AV	JHEP 2212 016	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	22AX	PR D106 112002	M. Ablikim <i>et al.</i>	(BESIII Collab.)
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PDG	22	PTEP 2022 083C01	R.L. Workman <i>et al.</i>	(PDG Collab.)
ABLIKIM	21AL	PR D104 092003	M. Ablikim <i>et al.</i>	(BESIII Collab.)
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ABLIKIM	21AT	JHEP 2111 226	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	21E	PRL 126 092002	M. Ablikim <i>et al.</i>	(BESIII Collab.)
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ABLIKIM	21S	PL B820 136576	M. Ablikim <i>et al.</i>	(BESIII Collab.)
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LEES	21	PR D103 092001	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LEES	21C	PR D104 112004	J.P. Lees <i>et al.</i>	(BABAR Collab.)
ABLIKIM	20F	PR D101 032008	M. Ablikim <i>et al.</i>	(BESIII Collab.)
PDG	20	PTEP 2020 083C01	P.A. Zyla <i>et al.</i>	(PDG Collab.)
ABLIKIM	19AO	PR D99 112010	M. Ablikim <i>et al.</i>	(BESIII Collab.)
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ABLIKIM	18Z	PL B783 452	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ANASHIN	18	PL B781 174	V.V. Anashin <i>et al.</i>	(KEDR Collab.)
LEES	18E	PR D98 112015	J.P. Lees <i>et al.</i>	(BABAR Collab.)
ABLIKIM	17AF	PR D96 111101	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	17AJ	PR D96 112008	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	17AK	PR D96 112012	M. Ablikim <i>et al.</i>	(BESIII Collab.)
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ABLIKIM	16L	PR D93 072003	M. Ablikim <i>et al.</i>	(BESIII Collab.)
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ABLIKIM	14G	PR D89 112006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
DOBBS	14	PL B739 90	S. Dobbs <i>et al.</i>	(NWES, WAYN)
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ADAM	06	PRL 96 082004	N.E. Adam <i>et al.</i>	(CLEO Collab.)
AUBERT	06B	PR D73 012005	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06D	PR D73 052003	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	06D	PR D74 091103	B. Aubert <i>et al.</i>	(BABAR Collab.)
DOBBS	06A	PR D74 011105	S. Dobbs <i>et al.</i>	(CLEO Collab.)
ABLIKIM	05E	PR D71 072006	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05H	PR D72 012002	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05I	PL B614 37	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05J	PL B619 247	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05O	PL B630 21	M. Ablikim <i>et al.</i>	(BES Collab.)
ADAM	05	PRL 94 012005	N.E. Adam <i>et al.</i>	(CLEO Collab.)
ADAM	05A	PRL 94 232002	N.E. Adam <i>et al.</i>	(CLEO Collab.)
ANDREOTTI	05	PR D71 032006	M. Andreotti <i>et al.</i>	(FNAL E835 Collab.)
AUBERT	05D	PR D71 052001	B. Aubert <i>et al.</i>	(BABAR Collab.)
BRIERE	05	PRL 95 062001	R.A. Briere <i>et al.</i>	(CLEO Collab.)
PEDLAR	05	PR D72 051108	T.K. Pedlar <i>et al.</i>	(CLEO Collab.)
ROSNER	05	PRL 95 102003	J.L. Rosner <i>et al.</i>	(CLEO Collab.)
ABLIKIM	04B	PR D70 012003	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	04K	PR D70 112003	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	04L	PR D70 112007	M. Ablikim <i>et al.</i>	(BES Collab.)
ATHAR	04	PR D70 112002	S.B. Athar <i>et al.</i>	(CLEO Collab.)
BAI	04B	PRL 92 052001	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	04C	PR D69 072001	J.Z. Bai <i>et al.</i>	(BES Collab.)

BAI	04D	PL B589 7	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	04G	PR D70 012004	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	04I	PR D70 012006	J.Z. Bai <i>et al.</i>	(BES Collab.)
PDG	04	PL B592 1	S. Eidelman <i>et al.</i>	(PDG Collab.)
SETH	04	PR D69 097503	K.K. Seth	
AULCHENKO	03	PL B573 63	V.M. Aulchenko <i>et al.</i>	(KEDR Collab.)
BAI	03B	PR D67 052002	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	03C	PR D67 032004	J.Z. Bai <i>et al.</i>	(BES Collab.)
AUBERT	02B	PR D65 031101	B. Aubert <i>et al.</i>	(BABAR Collab.)
BAI	02	PR D65 052004	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	02B	PL B550 24	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	02C	PRL 88 101802	J.Z. Bai <i>et al.</i>	(BES Collab.)
PDG	02	PR D66 010001	K. Hagiwara <i>et al.</i>	(PDG Collab.)
BAI	01	PR D63 032002	J.Z. Bai <i>et al.</i>	(BES Collab.)
AMBROGIANI	00A	PR D62 032004	M. Ambrogiani <i>et al.</i>	(FNAL E835 Collab.)
ARTAMONOV	00	PL B474 427	A.S. Artamonov <i>et al.</i>	
BAI	00	PRL 84 594	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	99C	PRL 83 1918	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98E	PR D57 3854	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98F	PR D58 097101	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98J	PRL 81 5080	J.Z. Bai <i>et al.</i>	(BES Collab.)
ARMSTRONG	97	PR D55 1153	T.A. Armstrong <i>et al.</i>	(E760 Collab.)
GRIBUSHIN	96	PR D53 4723	A. Gribushin <i>et al.</i>	(E672 and E706 Collab.)
ARMSTRONG	93B	PR D47 772	T.A. Armstrong <i>et al.</i>	(FNAL E760 Collab.)
ALEXANDER	89	NP B320 45	J.P. Alexander <i>et al.</i>	(LBL, MICH, SLAC)
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)
GAISER	86	PR D34 711	J. Gaiser <i>et al.</i>	(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 <i>et al.</i>	(LBL, SLAC)
EDWARDS	82C	PRL 48 70	C. Edwards <i>et al.</i>	(CIT, HARV, PRIN+)
LEMOIGNE	82	PL 113B 509	Y. Lemoigne <i>et al.</i>	(SACL, LOIC, SHMP+)
HIMEL	80	PRL 44 920	T. Himel <i>et al.</i>	(LBL, SLAC)
OREGLIA	80	PRL 45 959	M.J. Oreglia <i>et al.</i>	(SLAC, CIT, HARV+)
SCHARRE	80	PL 97B 329	D.L. Scharre <i>et al.</i>	(SLAC, LBL)
ZHOLENTZ	80	PL 96B 214	A.A. Zholents <i>et al.</i>	(NOVO)
Also		SJNP 34 814	A.A. Zholents <i>et al.</i>	(NOVO)
		Translated from YAF 34 1471.		
BRANDELIK	79B	NP B160 426	R. Brandelik <i>et al.</i>	(DASP Collab.)
BRANDELIK	79C	ZPHY C1 233	R. Brandelik <i>et al.</i>	(DASP Collab.)
BARTEL	78B	PL 79B 492	W. Bartel <i>et al.</i>	(DESY, HEIDP)
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum <i>et al.</i>	(SLAC, LBL)
BIDDICK	77	PRL 38 1324	C.J. Biddick <i>et al.</i>	(UCSD, UMD, PAVI+)
BRAUNSCH...	77	PL 67B 249	W. Braunschweig <i>et al.</i>	(DASP Collab.)
BURMESTER	77	PL 66B 395	J. Burmester <i>et al.</i>	(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 <i>et al.</i>	(DESY, HEIDP)
TANENBAUM	76	PRL 36 402	W.M. Tanenbaum <i>et al.</i>	(SLAC, LBL) IG
WHITAKER	76	PRL 37 1596	J.S. Whitaker <i>et al.</i>	(SLAC, LBL)
ABRAMS	75	Stanford Symp. 25	G.S. Abrams	(LBL)
ABRAMS	75B	PRL 34 1181	G.S. Abrams <i>et al.</i>	(LBL, SLAC)
BOYARSKI	75C	Palermo Conf. 54	A.M. Boyarski <i>et al.</i>	(SLAC, LBL)
HILGER	75	PRL 35 625	E. Hilger <i>et al.</i>	(STAN, PENN)
LIBERMAN	75	Stanford Symp. 55	A.D. Liberman	(STAN)
LUTH	75	PRL 35 1124	V. Luth <i>et al.</i>	(SLAC, LBL) JPC
WIIK	75	Stanford Symp. 69	B.H. Wiik	(DESY)