$\psi(2S)$

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

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

$\psi(2S)$ MASS

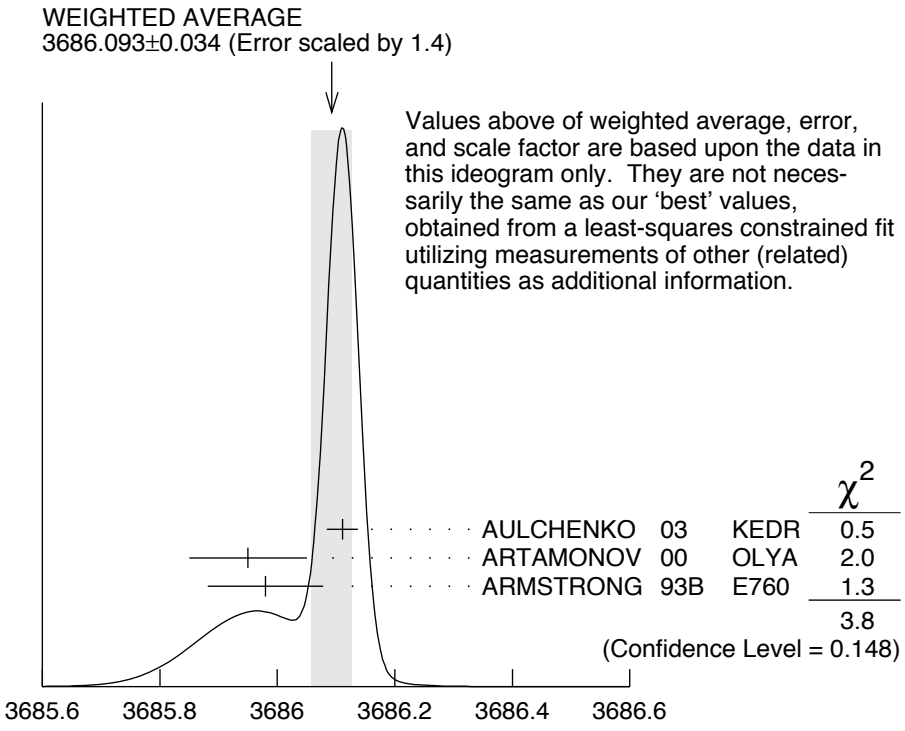
OUR FIT includes measurements of $m_{\psi(2S)}$, $m_{\psi(3770)}$, and $m_{\psi(3770)} - m_{\psi(2S)}$.

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3686.09 ±0.04 OUR FIT	Error includes scale factor of 1.6.				
3686.093±0.034 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.				
3686.111±0.025±0.009		AULCHENKO	03	KEDR	$e^+e^- \to$ hadrons
3685.95 ±0.10	413	[1] ARTAMONOV	00	OLYA	$e^+e^- \to$ hadrons
3685.98 ±0.09 ±0.04		[2] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3686.00 ±0.10	413	[3] ZHOLENTZ	80	OLYA	e^+e^-

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

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

[3] Superseded by ARTAMONOV 00.



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

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
589.188±0.028 OUR AVERAGE				
589.194±0.027±0.011	[4] AULCHENKO	03	KEDR	$e^+e^- \to$ hadrons
589.7 ±1.2	LEMOIGNE	82	GOLI	185 π^- Be $\to \gamma\mu^+\mu^-$ A
589.07 ±0.13	[4] 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	[5] BAI	98E	BES	e^+e^-

[4] Redundant with data in mass above.
[5] Systematic errors not evaluated.

$\psi(2S)$ WIDTH

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
304± 9 OUR FIT					
286±16 OUR AVERAGE					
358±88± 4		ABLIKIM	08B	BES2	$e^+e^- \to$ hadrons
290±25± 4	2.7k	ANDREOTTI	07	E835	$p\overline{p} \to e^+e^-$, $J/\psi X$
331±58± 2		ABLIKIM	06L	BES2	$e^+e^- \to$ hadrons
264±27		[6] BAI	02B	BES2	e^+e^-
287±37±16		[7] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$

[6] 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.
[7] The initial-state radiation correction reevaluated by ANDREOTTI 07 in its Ref. [4].

$\psi(2S)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	hadrons	(97.85±0.13) %	
Γ_2	virtual$\gamma \to$ hadrons	(1.73±0.14) %	S=1.5
Γ_3	ggg	(10.6 ±1.6) %	
Γ_4	γgg	(1.02±0.29) %	
Γ_5	light hadrons	(15.4 ±1.5) %	
Γ_6	e^+e^-	(7.72±0.17) $\times 10^{-3}$	
Γ_7	$\mu^+\mu^-$	(7.7 ±0.8) $\times 10^{-3}$	
Γ_8	$\tau^+\tau^-$	(3.0 ±0.4) $\times 10^{-3}$	

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

Γ_9	$J/\psi(1S)$anything	(59.5 ±0.8) %	
Γ_{10}	$J/\psi(1S)$neutrals	(24.5 ±0.4) %	
Γ_{11}	$J/\psi(1S)\pi^+\pi^-$	(33.6 ±0.4) %	
Γ_{12}	$J/\psi(1S)\pi^0\pi^0$	(17.73±0.34) %	
Γ_{13}	$J/\psi(1S)\eta$	(3.28±0.07) %	
Γ_{14}	$J/\psi(1S)\pi^0$	(1.30±0.10) $\times 10^{-3}$	S=1.4

Hadronic decays

Γ_{15}	$\pi^0 h_c(1P)$	seen	
Γ_{16}	$3(\pi^+\pi^-)\pi^0$	$(3.5 \pm 1.6) \times 10^{-3}$	
Γ_{17}	$2(\pi^+\pi^-)\pi^0$	$(2.9 \pm 1.0) \times 10^{-3}$	S=4.6
Γ_{18}	$\rho a_2(1320)$	$(2.6 \pm 0.9) \times 10^{-4}$	
Γ_{19}	$p\overline{p}$	$(2.76 \pm 0.12) \times 10^{-4}$	
Γ_{20}	$\Delta^{++}\overline{\Delta}^{--}$	$(1.28 \pm 0.35) \times 10^{-4}$	
Γ_{21}	$\Lambda\overline{\Lambda}\pi^0$	$< 1.2 \times 10^{-4}$	CL=90%
Γ_{22}	$\Lambda\overline{\Lambda}\eta$	$< 4.9 \times 10^{-5}$	CL=90%
Γ_{23}	$\Lambda\overline{p}K^+$	$(1.00 \pm 0.14) \times 10^{-4}$	
Γ_{24}	$\Lambda\overline{p}K^+\pi^+\pi^-$	$(1.8 \pm 0.4) \times 10^{-4}$	
Γ_{25}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(2.8 \pm 0.6) \times 10^{-4}$	
Γ_{26}	$\Lambda\overline{\Lambda}$	$(2.8 \pm 0.5) \times 10^{-4}$	S=2.6
Γ_{27}	$\Sigma^+\overline{\Sigma}^-$	$(2.6 \pm 0.8) \times 10^{-4}$	
Γ_{28}	$\Sigma^0\overline{\Sigma}^0$	$(2.2 \pm 0.4) \times 10^{-4}$	S=1.5
Γ_{29}	$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$(1.1 \pm 0.4) \times 10^{-4}$	
Γ_{30}	$\Xi^-\overline{\Xi}^+$	$(1.8 \pm 0.6) \times 10^{-4}$	S=2.8
Γ_{31}	$\Xi^0\overline{\Xi}^0$	$(2.8 \pm 0.9) \times 10^{-4}$	
Γ_{32}	$\Xi(1530)^0\overline{\Xi}(1530)^0$	$< 8.1 \times 10^{-5}$	CL=90%
Γ_{33}	$\Omega^-\overline{\Omega}^+$	$< 7.3 \times 10^{-5}$	CL=90%
Γ_{34}	$\pi^0 p\overline{p}$	$(1.33 \pm 0.17) \times 10^{-4}$	
Γ_{35}	$\eta p\overline{p}$	$(6.0 \pm 1.2) \times 10^{-5}$	
Γ_{36}	$\omega p\overline{p}$	$(6.9 \pm 2.1) \times 10^{-5}$	
Γ_{37}	$\phi p\overline{p}$	$< 2.4 \times 10^{-5}$	CL=90%
Γ_{38}	$\pi^+\pi^- p\overline{p}$	$(6.0 \pm 0.4) \times 10^{-4}$	
Γ_{39}	$p\overline{n}\pi^-$ or c.c.	$(2.48 \pm 0.17) \times 10^{-4}$	
Γ_{40}	$p\overline{n}\pi^-\pi^0$	$(3.2 \pm 0.7) \times 10^{-4}$	
Γ_{41}	$2(\pi^+\pi^-\pi^0)$	$(4.8 \pm 1.5) \times 10^{-3}$	
Γ_{42}	$\eta\pi^+\pi^-$	$< 1.6 \times 10^{-4}$	CL=90%
Γ_{43}	$\eta\pi^+\pi^-\pi^0$	$(9.5 \pm 1.7) \times 10^{-4}$	
Γ_{44}	$2(\pi^+\pi^-)\eta$	$(1.2 \pm 0.6) \times 10^{-3}$	
Γ_{45}	$\eta'\pi^+\pi^-\pi^0$	$(4.5 \pm 2.1) \times 10^{-4}$	
Γ_{46}	$\omega\pi^+\pi^-$	$(7.3 \pm 1.2) \times 10^{-4}$	S=2.1
Γ_{47}	$b_1^\pm\pi^\mp$	$(4.0 \pm 0.6) \times 10^{-4}$	S=1.1
Γ_{48}	$b_1^0\pi^0$	$(2.4 \pm 0.6) \times 10^{-4}$	
Γ_{49}	$\omega f_2(1270)$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{50}	$\pi^+\pi^- K^+K^-$	$(7.5 \pm 0.9) \times 10^{-4}$	S=1.9
Γ_{51}	$\rho^0 K^+K^-$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{52}	$K^*(892)^0\overline{K}_2^*(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$	
Γ_{53}	$K^+K^-\pi^+\pi^-\eta$	$(1.3 \pm 0.7) \times 10^{-3}$	
Γ_{54}	$K^+K^-2(\pi^+\pi^-)\pi^0$	$(1.00 \pm 0.31) \times 10^{-3}$	
Γ_{55}	$K^+K^-2(\pi^+\pi^-)$	$(1.9 \pm 0.9) \times 10^{-3}$	
Γ_{56}	$K_1(1270)^\pm K^\mp$	$(1.00 \pm 0.28) \times 10^{-3}$	
Γ_{57}	$K_S^0 K_S^0\pi^+\pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$	

Γ_{58}	$\rho^0 p\overline{p}$	$(5.0 \pm 2.2) \times 10^{-5}$	
Γ_{59}	$K^+ \overline{K}^*(892)^0 \pi^- +$ c.c.	$(6.7 \pm 2.5) \times 10^{-4}$	
Γ_{60}	$2(\pi^+ \pi^-)$	$(2.4 \pm 0.6) \times 10^{-4}$	S=2.2
Γ_{61}	$\rho^0 \pi^+ \pi^-$	$(2.2 \pm 0.6) \times 10^{-4}$	S=1.4
Γ_{62}	$K^+ K^- \pi^+ \pi^- \pi^0$	$(1.26 \pm 0.09) \times 10^{-3}$	
Γ_{63}	$\omega f_0(1710) \rightarrow \omega K^+ K^-$	$(5.9 \pm 2.2) \times 10^{-5}$	
Γ_{64}	$K^*(892)^0 K^- \pi^+ \pi^0 +$ c.c.	$(8.6 \pm 2.2) \times 10^{-4}$	
Γ_{65}	$K^*(892)^+ K^- \pi^+ \pi^- +$ c.c.	$(9.6 \pm 2.8) \times 10^{-4}$	
Γ_{66}	$K^*(892)^+ K^- \rho^0 +$ c.c.	$(7.3 \pm 2.6) \times 10^{-4}$	
Γ_{67}	$K^*(892)^0 K^- \rho^+ +$ c.c.	$(6.1 \pm 1.8) \times 10^{-4}$	
Γ_{68}	$\eta K^+ K^-$	$< 1.3 \times 10^{-4}$	CL=90%
Γ_{69}	$\omega K^+ K^-$	$(1.85 \pm 0.25) \times 10^{-4}$	S=1.1
Γ_{70}	$3(\pi^+ \pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8
Γ_{71}	$p\overline{p}\pi^+ \pi^- \pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$	
Γ_{72}	$K^+ K^-$	$(6.3 \pm 0.7) \times 10^{-5}$	
Γ_{73}	$K^0_S K^0_L$	$(5.4 \pm 0.5) \times 10^{-5}$	
Γ_{74}	$\pi^+ \pi^- \pi^0$	$(1.68 \pm 0.26) \times 10^{-4}$	S=1.4
Γ_{75}	$\rho(2150)\pi \rightarrow \pi^+ \pi^- \pi^0$	$(1.9 \ ^{+1.2}_{-0.4}) \times 10^{-4}$	
Γ_{76}	$\rho(770)\pi \rightarrow \pi^+ \pi^- \pi^0$	$(3.2 \pm 1.2) \times 10^{-5}$	S=1.8
Γ_{77}	$\pi^+ \pi^-$	$(8 \pm 5) \times 10^{-5}$	
Γ_{78}	$K_1(1400)^\pm K^\mp$	$< 3.1 \times 10^{-4}$	CL=90%
Γ_{79}	$K^+ K^- \pi^0$	$< 2.96 \times 10^{-5}$	CL=90%
Γ_{80}	$K^+ \overline{K}^*(892)^- +$ c.c.	$(1.7 \ ^{+0.8}_{-0.7}) \times 10^{-5}$	
Γ_{81}	$K^*(892)^0 \overline{K}^0 +$ c.c.	$(1.09 \pm 0.20) \times 10^{-4}$	
Γ_{82}	$\phi \pi^+ \pi^-$	$(1.17 \pm 0.29) \times 10^{-4}$	S=1.7
Γ_{83}	$\phi f_0(980) \rightarrow \pi^+ \pi^-$	$(6.8 \pm 2.4) \times 10^{-5}$	S=1.1
Γ_{84}	$2(K^+ K^-)$	$(6.0 \pm 1.4) \times 10^{-5}$	
Γ_{85}	$\phi K^+ K^-$	$(7.0 \pm 1.6) \times 10^{-5}$	
Γ_{86}	$2(K^+ K^-)\pi^0$	$(1.10 \pm 0.28) \times 10^{-4}$	
Γ_{87}	$\phi\eta$	$(2.8 \ ^{+1.0}_{-0.8}) \times 10^{-5}$	
Γ_{88}	$\phi\eta'$	$(3.1 \pm 1.6) \times 10^{-5}$	
Γ_{89}	$\omega\eta'$	$(3.2 \ ^{+2.5}_{-2.1}) \times 10^{-5}$	
Γ_{90}	$\omega\pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$	
Γ_{91}	$\rho\eta'$	$(1.9 \ ^{+1.7}_{-1.2}) \times 10^{-5}$	
Γ_{92}	$\rho\eta$	$(2.2 \pm 0.6) \times 10^{-5}$	S=1.1
Γ_{93}	$\omega\eta$	$< 1.1 \times 10^{-5}$	CL=90%
Γ_{94}	$\phi\pi^0$	$< 4 \times 10^{-6}$	CL=90%
Γ_{95}	$\eta_c \pi^+ \pi^- \pi^0$	$< 1.0 \times 10^{-3}$	CL=90%
Γ_{96}	$p\overline{p}K^+ K^-$	$(2.7 \pm 0.7) \times 10^{-5}$	
Γ_{97}	$\overline{\Lambda} n K^0_S +$ c.c.	$(8.1 \pm 1.8) \times 10^{-5}$	
Γ_{98}	$\phi f'_2(1525)$	$(4.4 \pm 1.6) \times 10^{-5}$	

Γ_{99}	$\Theta(1540)\overline{\Theta}(1540) \to K^0_S p K^- \overline{n}$ + c.c.	$<$	8.8	$\times 10^{-6}$	CL=90%
Γ_{100}	$\Theta(1540) K^- \overline{n} \to K^0_S p K^- \overline{n}$	$<$	1.0	$\times 10^{-5}$	CL=90%
Γ_{101}	$\Theta(1540) K^0_S \overline{p} \to K^0_S \overline{p} K^+ n$	$<$	7.0	$\times 10^{-6}$	CL=90%
Γ_{102}	$\overline{\Theta}(1540) K^+ n \to K^0_S \overline{p} K^+ n$	$<$	2.6	$\times 10^{-5}$	CL=90%
Γ_{103}	$\overline{\Theta}(1540) K^0_S p \to K^0_S p K^- \overline{n}$	$<$	6.0	$\times 10^{-6}$	CL=90%
Γ_{104}	$K^0_S K^0_S$	$<$	4.6	$\times 10^{-6}$	

Radiative decays

Γ_{105}	$\gamma\chi_{c0}(1P)$	(	9.62±0.31)	%	
Γ_{106}	$\gamma\chi_{c1}(1P)$	(	9.2 ±0.4)	%	
Γ_{107}	$\gamma\chi_{c2}(1P)$	(	8.74±0.35)	%	
Γ_{108}	$\pi^0 h_c \to \gamma\eta_c(1S)\pi^0$	(	4.2 ±0.5)	$\times 10^{-4}$	
Γ_{109}	$\gamma\eta_c(1S)$	(	3.4 ±0.5)	$\times 10^{-3}$	S=1.3
Γ_{110}	$\gamma\eta_c(2S)$	$<$	8	$\times 10^{-4}$	CL=90%
Γ_{111}	$\gamma\pi^0$	$<$	5	$\times 10^{-6}$	CL=90%
Γ_{112}	$\gamma\eta'(958)$	(	1.21±0.08)	$\times 10^{-4}$	
Γ_{113}	$\gamma f_2(1270)$	(	2.1 ±0.4)	$\times 10^{-4}$	
Γ_{114}	$\gamma f_0(1710)$				
Γ_{115}	$\gamma f_0(1710) \to \gamma\pi\pi$	(	3.0 ±1.3)	$\times 10^{-5}$	
Γ_{116}	$\gamma f_0(1710) \to \gamma K\overline{K}$	(	6.0 ±1.6)	$\times 10^{-5}$	
Γ_{117}	$\gamma\gamma$	$<$	1.4	$\times 10^{-4}$	CL=90%
Γ_{118}	$\gamma\eta$	$<$	2	$\times 10^{-6}$	CL=90%
Γ_{119}	$\gamma\eta\pi^+\pi^-$	(	8.7 ±2.1)	$\times 10^{-4}$	
Γ_{120}	$\gamma\eta(1405)$				
Γ_{121}	$\gamma\eta(1405) \to \gamma K\overline{K}\pi$	$<$	9	$\times 10^{-5}$	CL=90%
Γ_{122}	$\gamma\eta(1405) \to \eta\pi^+\pi^-$	(	3.6 ±2.5)	$\times 10^{-5}$	
Γ_{123}	$\gamma\eta(1475)$				
Γ_{124}	$\gamma\eta(1475) \to K\overline{K}\pi$	$<$	1.4	$\times 10^{-4}$	CL=90%
Γ_{125}	$\gamma\eta(1475) \to \eta\pi^+\pi^-$	$<$	8.8	$\times 10^{-5}$	CL=90%
Γ_{126}	$\gamma 2(\pi^+\pi^-)$	(	4.0 ±0.6)	$\times 10^{-4}$	
Γ_{127}	$\gamma K^{*0} K^+\pi^-$ + c.c.	(	3.7 ±0.9)	$\times 10^{-4}$	
Γ_{128}	$\gamma K^{*0}\overline{K}^{*0}$	(	2.4 ±0.7)	$\times 10^{-4}$	
Γ_{129}	$\gamma K^0_S K^+\pi^-$ + c.c.	(	2.6 ±0.5)	$\times 10^{-4}$	
Γ_{130}	$\gamma K^+ K^-\pi^+\pi^-$	(	1.9 ±0.5)	$\times 10^{-4}$	
Γ_{131}	$\gamma p\overline{p}$	(	2.9 ±0.6)	$\times 10^{-5}$	
Γ_{132}	$\gamma\pi^+\pi^- p\overline{p}$	(	2.8 ±1.4)	$\times 10^{-5}$	
Γ_{133}	$\gamma 2(\pi^+\pi^-) K^+ K^-$	$<$	2.2	$\times 10^{-4}$	CL=90%
Γ_{134}	$\gamma 3(\pi^+\pi^-)$	$<$	1.7	$\times 10^{-4}$	CL=90%
Γ_{135}	$\gamma K^+ K^- K^+ K^-$	$<$	4	$\times 10^{-5}$	CL=90%

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, 24 combinations of partial widths obtained from integrated cross section, and 82 branching ratios uses 213 measurements to determine 47 parameters. The overall fit has a $\chi^2 = 301.4$ for 166 degrees of freedom.

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

x_7	5									
x_8	1	0								
x_{11}	44	12	3							
x_{12}	40	8	2	64						
x_{13}	28	7	2	58	35					
x_{19}	2	1	0	7	5	4				
x_{105}	2	1	0	5	3	3	0			
x_{106}	2	1	0	5	2	3	0	0		
x_{107}	3	1	0	6	4	4	0	0	0	
Γ	−79	−6	−2	−52	−46	−32	−10	−2	−3	−4
	x_6	x_7	x_8	x_{11}	x_{12}	x_{13}	x_{19}	x_{105}	x_{106}	x_{107}

$\psi(2S)$ PARTIAL WIDTHS

Γ(hadrons) Γ_1

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

$\Gamma(e^+e^-)$ Γ_6

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2.35 ±0.04 OUR FIT				
2.33 ±0.07 OUR AVERAGE				
2.338 ± 0.037 ± 0.096	ABLIKIM	08B	BES2	$e^+e^- \to$ hadrons
2.330 ± 0.036 ± 0.110	ABLIKIM	06L	BES2	$e^+e^- \to$ hadrons
2.44 ±0.21	[8] BAI	02B	BES2	e^+e^-
2.14 ±0.21	ALEXANDER	89	RVUE	See Υ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.0 ±0.3	BRANDELIK	79C	DASP	e^+e^-
2.1 ±0.3	[9] LUTH	75	MRK1	e^+e^-

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

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

$\Gamma(\gamma\gamma)$ Γ_{117}

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

$\psi(2S)$ Γ(i)$\Gamma(e^+e^-)/\Gamma$(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 Γ(i) or the branching ratio Γ(i)/total.

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

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.2±0.4	ABRAMS	75	MRK1	e^+e^-

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

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9.0±2.6	79	[10] ANASHIN	07	KEDR	$e^+e^- \to \psi(2S) \to \tau^+\tau^-$

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

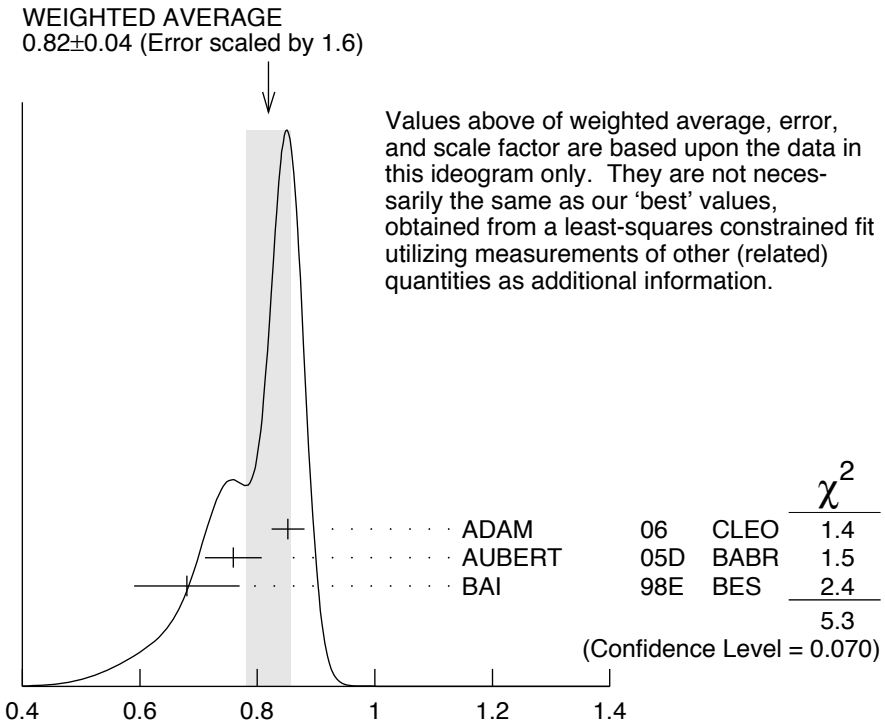
$\Gamma(J/\psi(1S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{11}\Gamma_6/\Gamma$

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.788±0.015 OUR FIT					
0.82 ±0.04 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.					
0.852±0.010±0.026	19.5k±243	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$
0.76 ±0.05 ±0.01	544	[11] AUBERT	05D	BABR	10.6 $e^+e^- \to \pi^+\pi^-\mu^+\mu^-\gamma$
0.68 ±0.09		[12] BAI	98E	BES	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.90 ±0.08 ±0.05	256	[13] AUBERT	07AU	BABR	10.6 $e^+e^- \to J/\psi\pi^+\pi^-\gamma$

[11] AUBERT 05D reports $[\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \mu^+\mu^-)] = 0.0450 \pm 0.0018 \pm 0.0022$ keV which we divide by our best value $B(J/\psi(1S) \to \mu^+\mu^-) = (5.93 \pm 0.06) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

[13] AUBERT 07AU reports $[\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \to \pi^+\pi^-\pi^0)] = 0.0186 \pm 0.0012 \pm 0.0011$ keV which we divide by our best value $B(J/\psi(1S) \to \pi^+\pi^-\pi^0) = (2.07 \pm 0.12) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.



$\Gamma\left(J/\psi(1S)\pi^+\pi^-\right) \times \Gamma\left(e^+e^-\right)/\Gamma_{\rm total}$ (keV)

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

VALUE (keV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.416±0.010 OUR FIT					
0.411±0.008±0.018	3.6k±96	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

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

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
77.0± 1.9 OUR FIT					
87 ± 9 OUR AVERAGE					
83 ±25 ±5	14	[14] AUBERT	07AU	BABR	10.6 $e^+e^- \to J/\psi\pi^+\pi^-\pi^0\gamma$
88 ± 6 ±7	291 ± 24	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

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

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

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

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

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.647±0.028 OUR FIT					
0.59 ±0.05 OUR AVERAGE					
0.579±0.038±0.036	2.7k	ANDREOTTI	07	E835	$p\overline{p} \to e^+e^-,\ J/\psi X$
0.70 ±0.17 ±0.03	22	AUBERT	06B		$e^+e^- \to p\overline{p}\gamma$

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

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

$\Gamma(2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{41}\Gamma_6/\Gamma$

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

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

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

$\Gamma(\pi^+\pi^-K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{50}\Gamma_6/\Gamma$

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

$\Gamma(\phi f_0(980) \to \pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{83}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.347±0.169±0.003	6 ± 3	[15] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$

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

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{82}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.57±0.23±0.01	10	[16] AUBERT,BE	06D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$

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

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

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

$\Gamma(\omega\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{46}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.01±0.84±0.02	37	[17] AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$

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

$\Gamma(2(\pi^+\pi^-)\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{44}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.87±1.41±0.01	16	[18] AUBERT	07AU	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)\eta\gamma$

[18] AUBERT 07AU reports $[\Gamma(\psi(2S) \to 2(\pi^+\pi^-)\eta) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to 2\gamma)] = 1.13 \pm 0.55 \pm 0.08$ eV which we divide by our best value $B(\eta \to 2\gamma) = (39.31 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{62}\Gamma_6/\Gamma$

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

$\Gamma(K^+K^-\pi^+\pi^-\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{53}\Gamma_6/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
3.05±1.80±0.02	7	[19] AUBERT	07AU	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\eta\gamma$

[19] AUBERT 07AU reports $[\Gamma(\psi(2S) \to K^+K^-\pi^+\pi^-\eta) \times \Gamma(\psi(2S) \to e^+e^-)/\Gamma_{total}] \times [B(\eta \to 2\gamma)] = 1.2 \pm 0.7 \pm 0.1$ eV which we divide by our best value $B(\eta \to 2\gamma) = (39.31 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\psi(2S)$ BRANCHING RATIOS

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.9785±0.0013 OUR AVERAGE				
0.9779±0.0015	[20] BAI	02B	BES2	e^+e^-
0.981 ±0.003	[20] LUTH	75	MRK1	e^+e^-

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.0173±0.0014 OUR AVERAGE Error includes scale factor of 1.5.				
0.0166±0.0010	[21,22] SETH	04	RVUE	e^+e^-
0.0199±0.0019	[21] BAI	02B	BES2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.029 ±0.004	[21] LUTH	75	MRK1	e^+e^-

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

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

$\Gamma(ggg)/\Gamma_{total}$ Γ_3/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
10.58±1.62	2.9 M	[23] LIBBY	09	CLEO	$\psi(2S) \to$ hadrons

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

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

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.025±0.288	200 k	[24] LIBBY	09	CLEO	$\psi(2S) \rightarrow \gamma +$ hadrons

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

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

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

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

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.154±0.015	[25] MENDEZ	08	CLEO	$e^+e^- \rightarrow \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.169±0.026	[26] ADAM	05A	CLEO	$e^+e^- \rightarrow \psi(2S)$

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

[26] 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_6/Γ

VALUE (units 10^{-4})	*DOCUMENT ID*		*TECN*	*COMMENT*
77.2± 1.7 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
88 ±13	[27] FELDMAN	77	RVUE	e^+e^-

[27] 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_7/Γ

VALUE (units 10^{-4})	*DOCUMENT ID*
77±8 OUR FIT	

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

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

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

VALUE (units 10^{-4})	*DOCUMENT ID*		*TECN*	*COMMENT*
30 ±4 OUR FIT				
30.8±2.1±3.8	[28] ABLIKIM	06W	BES	$e^+e^- \rightarrow \psi(2S)$

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

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

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

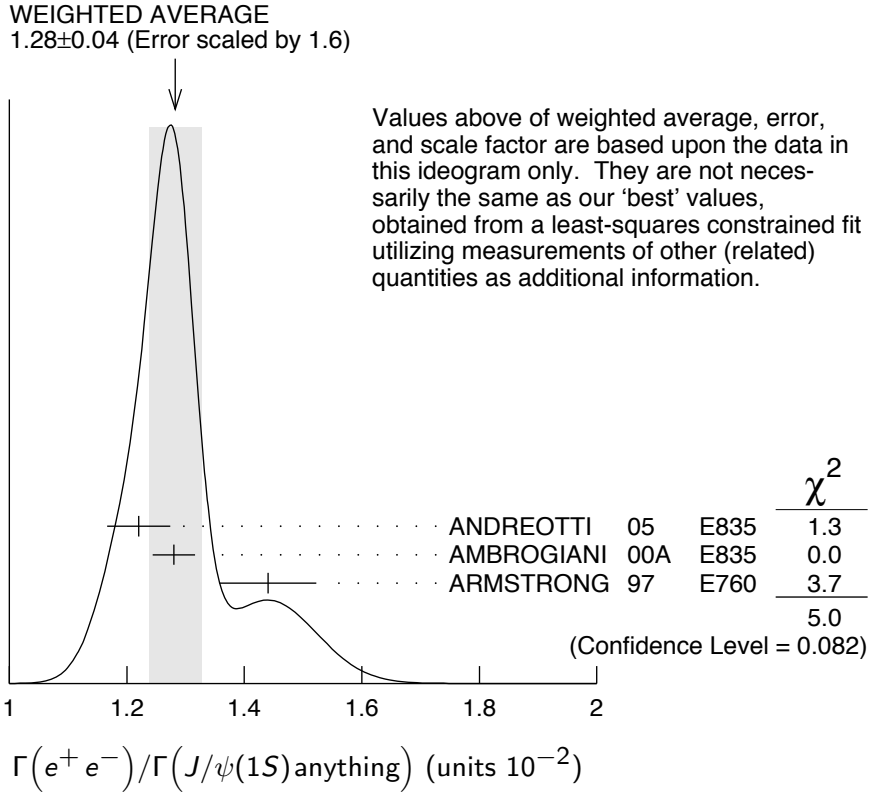
VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.595 ±0.008 OUR FIT					
0.55 ±0.07 OUR AVERAGE					
0.51 ±0.12		BRANDELIK	79C	DASP	$e^+e^- \to \mu^+\mu^- X$
0.57 ±0.08		ABRAMS	75B	MRK1	$e^+e^- \to \mu^+\mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.6254±0.0016±0.0155	1.1M	[29] MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^- X$
0.5950±0.0015±0.0190	151k	ADAM	05A	CLEO	Repl. by MENDEZ 08

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

$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\text{anything})$ $\Gamma_6/\Gamma_9 = \Gamma_6/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13}+0.344\Gamma_{106}+0.195\Gamma_{107})$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.299±0.026 OUR FIT					
1.28 ±0.04 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.					
1.22 ±0.02 ±0.05	5097 ± 73	[30] ANDREOTTI	05	E835	$p\overline{p} \to \psi(2S) \to e^+e^-$
1.28 ±0.03 ±0.02		[30] AMBROGIANI	00A	E835	$p\overline{p} \to \psi(2S)$
1.44 ±0.08 ±0.02		[30] ARMSTRONG	97	E760	$\overline{p}p \to \psi(2S)$

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



$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\text{anything})$ $\Gamma_7/\Gamma_9 = \Gamma_7/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13}+0.344\Gamma_{106}+0.195\Gamma_{107})$

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

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

VALUE	DOCUMENT ID
0.245±0.004 OUR FIT	

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.336 ±0.004 OUR FIT					
0.343 ±0.011 OUR AVERAGE		Error includes scale factor of 1.7.			
0.3504±0.0007±0.0077	565k	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\pi^+\pi^-$
0.323 ±0.014		BAI	02B	BES2	e^+e^-
0.32 ±0.04		ABRAMS	75B	MRK1	$e^+e^- \to J/\psi\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.3354±0.0014±0.0110	60k	[31] ADAM	05A	CLEO	Repl. by MENDEZ 08

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.0230±0.0005 OUR FIT				
0.0252±0.0028±0.0011	[32] AUBERT	02B	BABR	e^+e^-

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.0229±0.0025 OUR FIT				
0.0224±0.0029 OUR AVERAGE				
0.0216±0.0026±0.0014	[33] AUBERT	02B	BABR	e^+e^-
0.0327±0.0077±0.0072	[33] GRIBUSHIN	96	FMPS	515 π^- Be $\to 2\mu X$

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

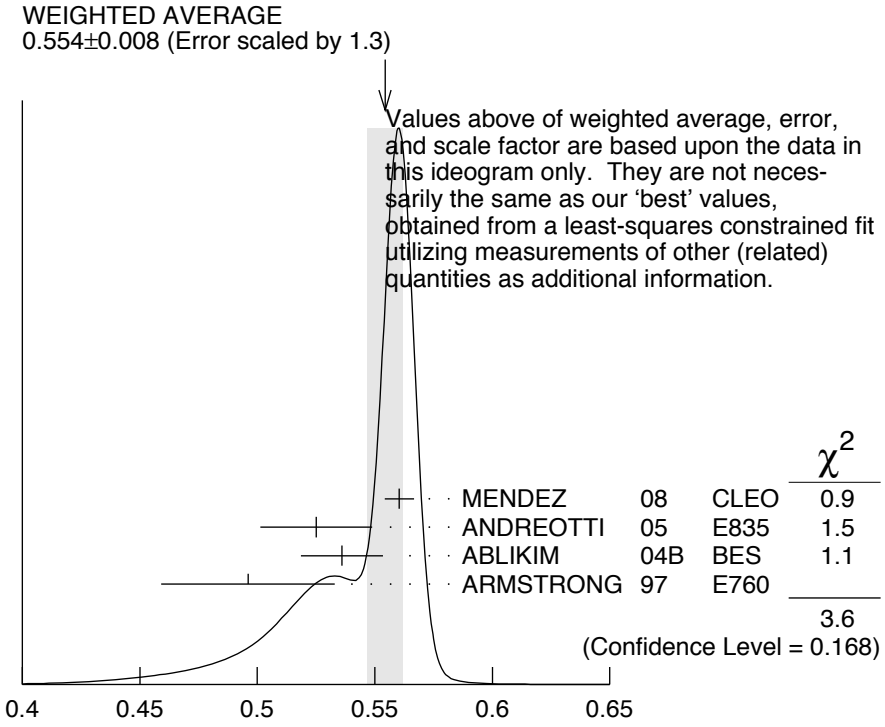
$\Gamma(\tau^+\tau^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_8/Γ_{11}

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
9.1 ±1.1 OUR FIT				
8.73±1.39±1.57	BAI	02	BES	e^+e^-

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.5646±0.0026 OUR FIT					
0.554 ±0.008 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
0.5604±0.0009±0.0062	565k	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\pi^+\pi^-$
0.525 ±0.009 ±0.022	4k	ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$
0.536 ±0.007 ±0.016	20k	[34,35] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
0.496 ±0.037		ARMSTRONG	97	E760	$\overline{p}p \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.5637±0.0027±0.0046	60k	ADAM	05A	CLEO	Repl. by MENDEZ 08

[34] From a fit to the J/ψ recoil mass spectra.
[35] ABLIKIM 04B quotes B($\psi(2S) \rightarrow J/\psi X$) / B($\psi(2S) \rightarrow J/\psi\pi^+\pi^-$).



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

$\Gamma(J/\psi(1S)\text{neutrals})/\Gamma(J/\psi(1S)\pi^+\pi^-)$
$\Gamma_{10}/\Gamma_{11} = (0.9761\Gamma_{12}+0.719\Gamma_{13}+0.344\Gamma_{106}+0.195\Gamma_{107})/\Gamma_{11}$

VALUE	*DOCUMENT ID*	*TECN*	*COMMENT*
0.731±0.008 OUR FIT			
0.73 ±0.09	TANENBAUM 76	MRK1	e^+e^-

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

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.1773±0.0034 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.1769±0.0008±0.0053	61k	[36] MENDEZ 08	CLEO	$\psi(2S) \rightarrow \ell^+\ell^- 2\pi^0$
0.1652±0.0014±0.0058	13.4k	[37] ADAM 05A	CLEO	Repl. by MENDEZ 08

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

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\text{anything})$ Γ_{12}/Γ_9

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
0.2982±0.0032 OUR FIT				
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	$p\overline{p} \rightarrow \psi(2S)$
0.323 ±0.033		ARMSTRONG 97	E760	$\overline{p}p \rightarrow \psi(2S)$
• • • 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_{12}/Γ_{11}

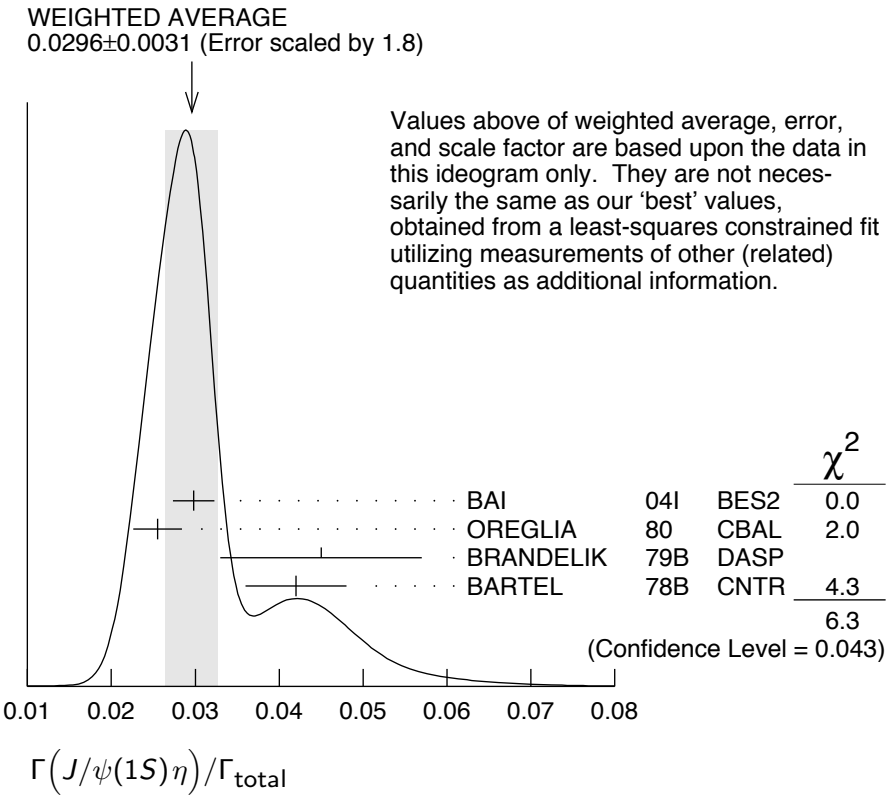
VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.528 ±0.008 OUR FIT					
0.513 ±0.022 OUR AVERAGE		Error includes scale factor of 2.2.			
0.5047±0.0022±0.0102	61k	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^- 2\pi^0$
0.570 ±0.009 ±0.026	14k	[38] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.4924±0.0047±0.0086	73k	[39,40] ADAM	05A	CLEO	Repl. by MENDEZ 08
0.571 ±0.018 ±0.044		[41] ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$
0.53 ±0.06		TANENBAUM	76	MRK1	e^+e^-
0.64 ±0.15		[42] HILGER	75	SPEC	e^+e^-

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

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0328±0.0007 OUR FIT					
0.0296±0.0031 OUR AVERAGE		Error includes scale factor of 1.8. See the ideogram below.			
0.0298±0.0009±0.0023	5.7k	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
0.0255±0.0029	386	[43] OREGLIA	80	CBAL	$e^+e^- \to J/\psi 2\gamma$
0.045 ±0.012	17	[44] BRANDELIK	79B	DASP	$e^+e^- \to J/\psi 2\gamma$
0.042 ±0.006	164	[44] BARTEL	78B	CNTR	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0343±0.0004±0.0009	18.4k	[45] MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\eta$
0.0325±0.0006±0.0011	2.8k	[46] ADAM	05A	CLEO	Repl. by MENDEZ 08
0.043 ±0.008	44	TANENBAUM	76	MRK1	e^+e^-

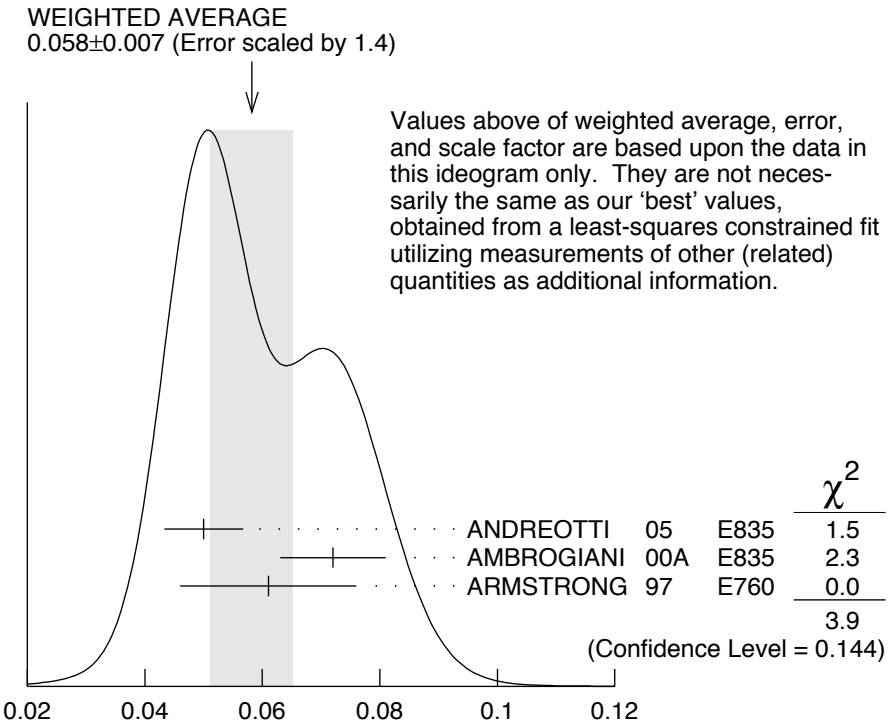
[43] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$.
[44] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$.
[45] Not independent from other measurements of MENDEZ 08.
[46] Not independent from other values reported by ADAM 05A.



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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0551±0.0009 OUR FIT					
0.058 ±0.007 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
0.050 ±0.006 ±0.003	298 ± 20	ANDREOTTI	05	E835	$\psi(2S) \rightarrow J/\psi X$
0.072 ±0.009		AMBROGIANI	00A	E835	$p\overline{p} \rightarrow \psi(2S)$
0.061 ±0.015		ARMSTRONG	97	E760	$\overline{p}p \rightarrow \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0549±0.0006±0.0009	18.4k	[47] MENDEZ	08	CLEO	$\psi(2S) \rightarrow \ell^+\ell^-\eta$
0.0546±0.0010±0.0007	2.8k	ADAM	05A	CLEO	Repl. by MENDEZ 08

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



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

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

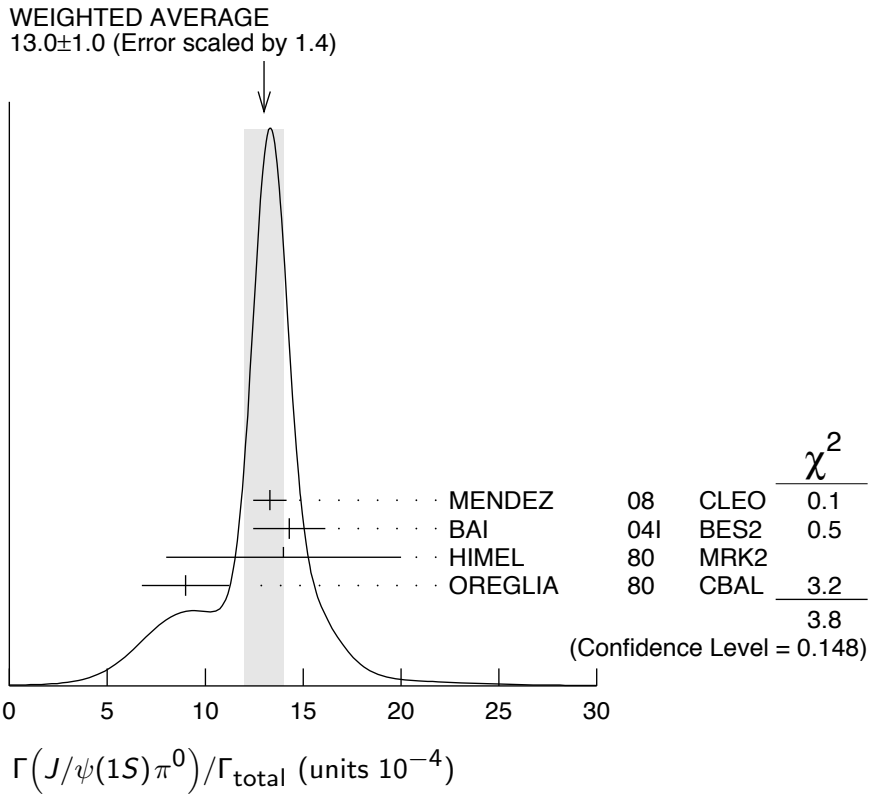
VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0976±0.0016 OUR FIT					
0.0979±0.0018 OUR AVERAGE					
0.0979±0.0010±0.0015	18.4k	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-\eta$
0.098 ±0.005 ±0.010	2k	[48] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
0.091 ±0.021		[49] HIMEL	80	MRK2	$e^+e^- \to \psi(2S)X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0968±0.0019±0.0013	2.8k	[50] ADAM	05A	CLEO	Repl. by MENDEZ 08
0.095 ±0.007 ±0.007		[51] ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$

[48] From a fit to the J/ψ recoil mass spectra.
[49] The value for B($\psi(2S) \to J/\psi(1s)\eta$) reported in HIMEL 80 is derived using B($\psi(2S)) \to J/\psi(1S)\pi^+\pi^-) = (33\pm3))$% and B($J/\psi(1S) \to \ell^+\ell^-) = 0.138\pm0.018$. Calculated by us using B($J/\psi(1S) \to \ell^+\ell^-) = (0.1181 \pm 0.0020)$.
[50] Not independent from other values reported by ADAM 05A.
[51] Not independent from other values reported by ANDREOTTI 05.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
13.0±1.0 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
13.3±0.8±0.3	530	MENDEZ	08	CLEO	$\psi(2S) \to \ell^+\ell^-2\gamma$
14.3±1.4±1.2	280	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
14 ±6	7	HIMEL	80	MRK2	e^+e^-
9 ±2 ±1	23	[52] OREGLIA	80	CBAL	$\psi(2S) \to J/\psi 2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
13 ±1 ±1	88	ADAM	05A	CLEO	Repl. by MENDEZ 08

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



$\Gamma(J/\psi(1S)\pi^0)/\Gamma(J/\psi(1S)\text{anything})$
$\Gamma_{14}/\Gamma_9 = \Gamma_{14}/(\Gamma_{11}+\Gamma_{12}+\Gamma_{13}+0.344\Gamma_{106}+0.195\Gamma_{107})$

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.213±0.012±0.003	527	[53] MENDEZ	08	CLEO	$e^+e^- \rightarrow J/\psi\gamma\gamma$
0.22 ±0.02 ±0.01		[54] ADAM	05A	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow J/\psi\gamma\gamma$

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

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

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.380±0.022±0.005	527	[55] MENDEZ	08	CLEO	$e^+e^- \rightarrow J/\psi\gamma\gamma$
0.39 ±0.04 ±0.01		[56] ADAM	05A	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow J/\psi\gamma\gamma$

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

HADRONIC DECAYS

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	92^{+23}_{-22}	ADAMS	09	CLEO	$\psi(2S) \to 2\pi^+ 2\pi^- 2\pi^0$
seen	1282	DOBBS	08A	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	168 ± 40	ROSNER	05	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$

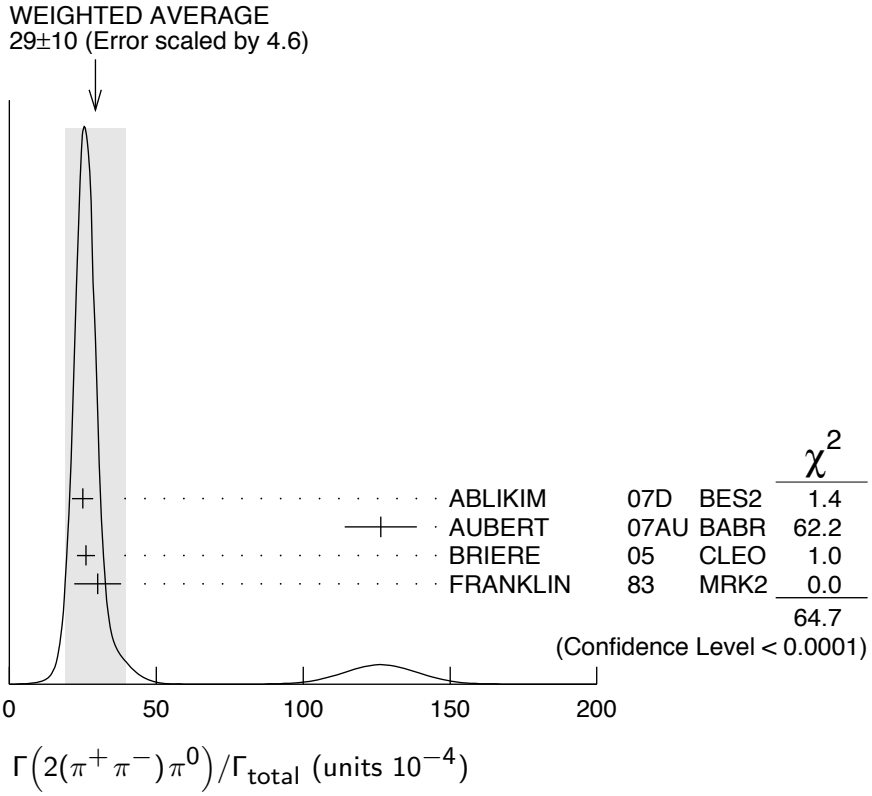
$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{16}/Γ

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

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
29 ±10 OUR AVERAGE		Error includes scale factor of 4.6. See the ideogram below.			
24.9± 0.7±3.6	2173	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$
126 ±12 ±2	410	[57] AUBERT	07AU	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)\pi^0\gamma$
26.1± 0.7±3.0	1703	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)\pi^0$
30 ± 8	42	FRANKLIN	83	MRK2	e^+e^-

[57] AUBERT 07AU reports $[\Gamma(\psi(2S) \to 2(\pi^+\pi^-)\pi^0)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (297 \pm 22 \pm 18) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

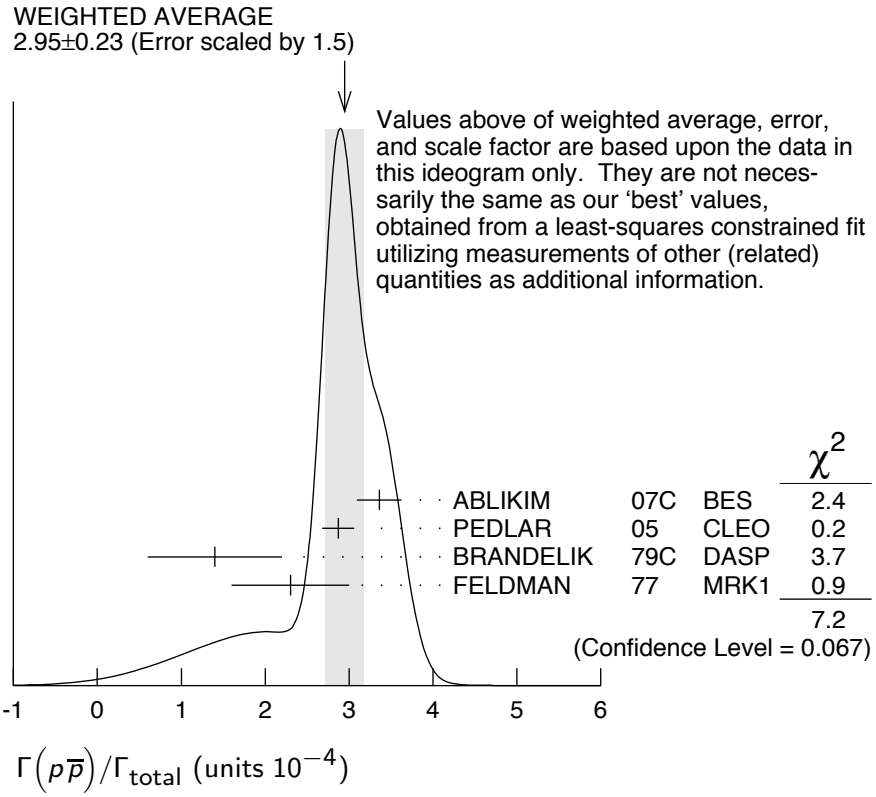


$\Gamma(\rho a_2(1320))/\Gamma_{total}$ Γ_{18}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$2.55\pm0.73\pm0.47$		112 ± 31	BAI	04C	BES2	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.3	90		BAI	98J	BES	e^+e^-

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.76 ± 0.12 OUR FIT					
2.95 ± 0.23 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.				
$3.36\pm0.09\pm0.25$	1618	ABLIKIM	07C	BES	$e^+e^- \to \psi(2S) \to p\overline{p}$
$2.87\pm0.12\pm0.15$	557	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}$
1.4 ± 0.8	4	BRANDELIK	79C	DASP	$e^+e^- \to \psi(2S) \to p\overline{p}$
2.3 ± 0.7		FELDMAN	77	MRK1	$e^+e^- \to \psi(2S) \to p\overline{p}$



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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
8.2 ± 0.4 OUR FIT				
$6.98\pm0.49\pm0.97$	BAI	01	BES	$e^+e^- \to \psi(2S) \to p\overline{p}$

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

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$12.8\pm1.0\pm3.4$	157	[58] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

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

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

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<1.2	90	[59] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

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

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

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.49	90	[60] ABLIKIM	07H	BES2	$e^+e^- \to \psi(2S)$

[60] Using B($\Lambda \to \pi^- p$) = 63.9%.

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

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

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

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

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

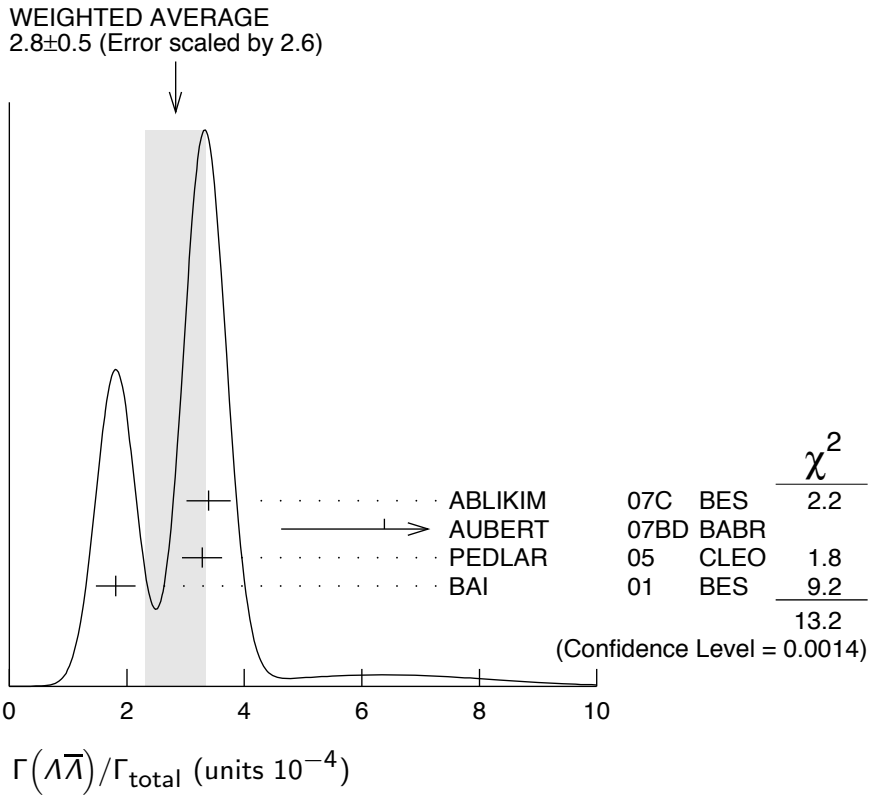
VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.8±0.4±0.5	73.4	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}2(\pi^+\pi^-)$

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

VALUE (units 10^{-4})	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.8 ±0.5 OUR AVERAGE			Error includes scale factor of 2.6. See the ideogram below.			
3.39±0.20±0.32		337	ABLIKIM	07C	BES	$e^+e^- \to \psi(2S) \to$ hadrons
6.4 ±1.8 ±0.1			[61] AUBERT	07BD	BABR	10.6 $e^+e^- \to \Lambda\overline{\Lambda}\gamma$
3.28±0.23±0.25		208	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
1.81±0.20±0.27		80	[62] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 4	90		FELDMAN	77	MRK1	$e^+e^- \to \psi(2S) \to$ hadrons

[61] AUBERT 07BD reports $[\Gamma(\psi(2S) \to \Lambda\overline{\Lambda})/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (15 \pm 4 \pm 1) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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



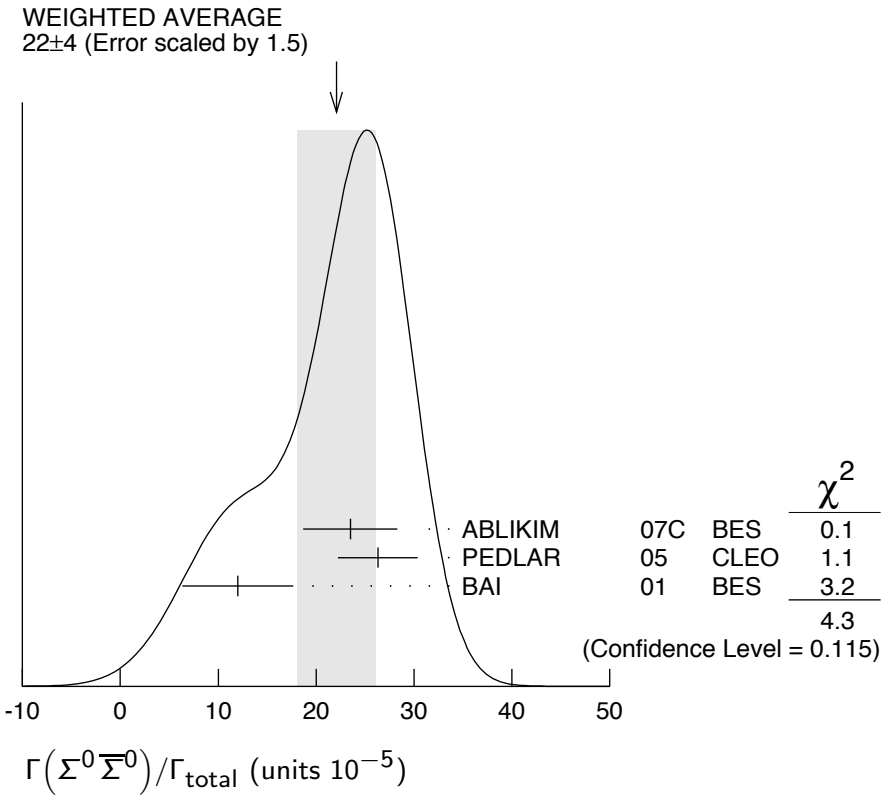
$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ Γ_{27}/Γ

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

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{28}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
22 ±4 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
23.5±3.6±3.2	59	ABLIKIM	07C	BES	$e^+e^- \to \psi(2S) \to$ hadrons
26.3±3.5±2.1	58	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
12 ±4 ±4	8	[63] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

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



$\Gamma(\Sigma(1385)^+\overline{\Sigma}(1385)^-)/\Gamma_{\text{total}}$ Γ_{29}/Γ

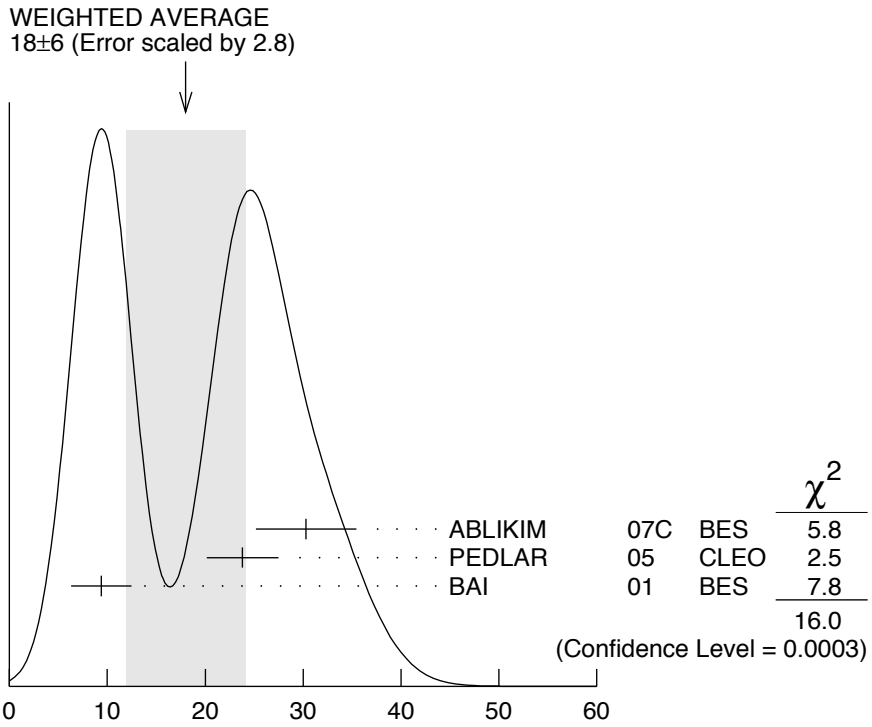
VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
11±3±3	14	[64] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

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

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

VALUE (units 10^{-5})	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
18 ±6 OUR AVERAGE			Error includes scale factor of 2.8. See the ideogram below.			
30.3±4.0±3.2		67	ABLIKIM	07C	BES	$e^+e^- \to \psi(2S) \to$ hadrons
23.8±3.0±2.1		63	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
9.4±2.7±1.5		12	[65] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<20	90		FELDMAN	77	MRK1	$e^+e^- \to \psi(2S) \to$ hadrons

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



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

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

$\Gamma(\Xi(1530)^0\overline{\Xi}(1530)^0)/\Gamma_{total}$ Γ_{32}/Γ

VALUE (units 10^{-5})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
< 8.1	90	[66] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<32	90	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons

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

$\Gamma(\Omega^-\overline{\Omega}^+)/\Gamma_{total}$ Γ_{33}/Γ

VALUE (units 10^{-5})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
< 7.3	90	[67] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<16	90	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons

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

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

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.33±0.17 OUR AVERAGE					
1.32±0.10±0.15	256 ± 18	[68] ABLIKIM	05E	BES2	$e^+e^- \to \psi(2S) \to p\overline{p}\gamma\gamma$
1.4 ±0.5	9	FRANKLIN	83	MRK2	e^+e^-

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

$\Gamma(\eta p\overline{p})/\Gamma_{total}$ Γ_{35}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.60±0.12 OUR AVERAGE					
0.58±0.11±0.07	44.8 ± 8.5	[69] ABLIKIM	05E	BES2	$e^+e^- \to \psi(2S) \to p\overline{p}\gamma\gamma$
0.8 ±0.3 ±0.3	9.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

[69] Computed using B($\eta \to \gamma\gamma$) = (39.43 ± 0.26)%.

$\Gamma(\omega p\overline{p})/\Gamma_{total}$ Γ_{36}/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	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$
0.8 ±0.3 ±0.1	14.9 ± 0.1	[70] BAI	03B	BES	$\psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

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

$\Gamma(\phi p\overline{p})/\Gamma_{total}$ Γ_{37}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.24	90	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}K^+K^-$

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

<0.26	90	[71] BAI	03B	BES	$\psi(2S) \to K^+K^-p\overline{p}$

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

$\Gamma(\pi^+\pi^-p\overline{p})/\Gamma_{total}$ Γ_{38}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.0±0.4 OUR AVERAGE					
5.9±0.2±0.4	904.5	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-$
8 ±2		[72] TANENBAUM	78	MRK1	e^+e^-

[72] Assuming entirely strong decay.

$\Gamma(p\overline{n}\pi^-$ or c.c.$)/\Gamma_{total}$ Γ_{39}/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	$e^+e^- \to p\pi^-X$
2.52±0.12±0.22	849	ABLIKIM	06I	BES2	$e^+e^- \to \overline{p}\pi^+X$

$\Gamma(p\overline{n}\pi^-\pi^0)/\Gamma_{total}$ Γ_{40}/Γ

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

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{42}/Γ

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

$\Gamma(\eta\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{43}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
9.5±0.7±1.5		[73] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadr
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10.3±0.8±1.4	201.7	[74] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to \eta 3\pi(\eta \to \gamma\gamma)$
8.1±1.4±1.6	50.0	[74] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to \eta 3\pi(\eta \to 3\pi)$

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

$\Gamma(2(\pi^+\pi^-)\eta)/\Gamma_{total}$ Γ_{44}/Γ

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.2±0.6±0.1	16	[75] AUBERT	07AU	BABR	10.6 $e^+e^- \to 2(\pi^+\pi^-)\eta\gamma$

[75] AUBERT 07AU quotes $\Gamma_{ee}^{\psi(2S)}\cdot B(\psi(2S) \to 2(\pi^+\pi)\eta)\cdot B(\eta \to \gamma\gamma) = 1.2\pm0.7\pm0.1$ eV.

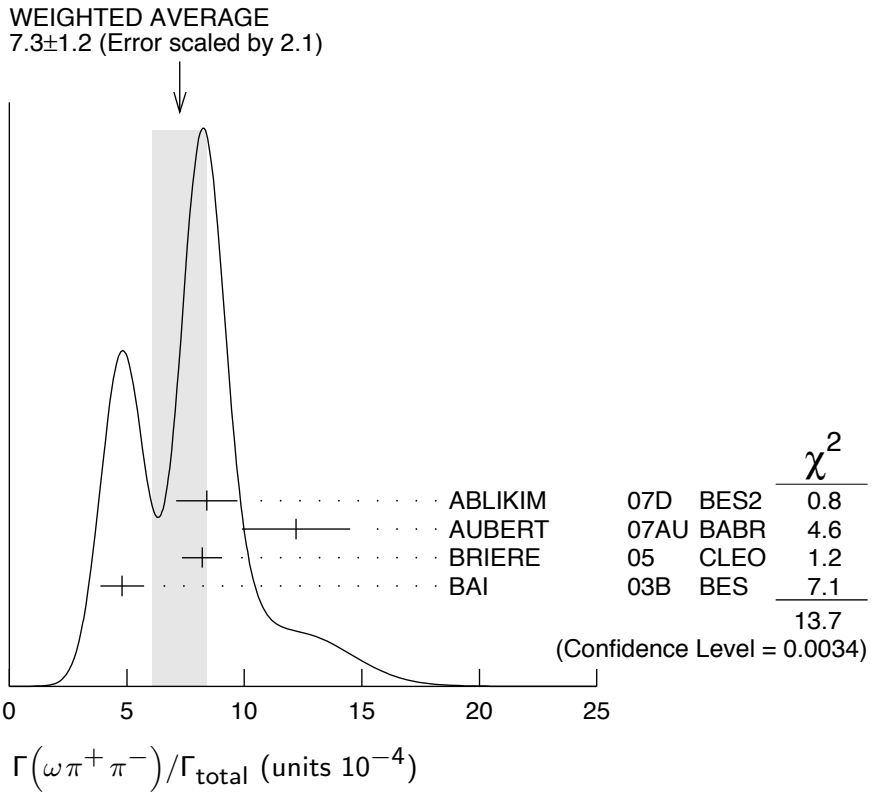
$\Gamma(\eta'\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{45}/Γ

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

$\Gamma(\omega\pi^+\pi^-)/\Gamma_{total}$ Γ_{46}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
7.3±1.2 OUR AVERAGE		Error includes scale factor of 2.1. See the ideogram below.			
8.4±0.5±1.2	386	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$
12.2±2.2±0.7	37	[76] AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
8.2±0.5±0.7	391	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)\pi^0$
4.8±0.6±0.7	100 ± 22	[77] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$

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



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

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.0 ±0.6 OUR AVERAGE Error includes scale factor of 1.1.					
5.1 ±0.6 ±0.8	202	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$
$4.18^{+0.43}_{-0.42}\pm0.92$	170	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
3.2 ±0.6 ±0.5	61 ± 11 [78,79]	BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.2 ±0.8 ±1.0	[78]	BAI	99C	BES	Repl. by BAI 03B

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

$\Gamma(b_1^0\pi^0)/\Gamma_{\text{total}}$ Γ_{48}/Γ

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

$\Gamma(\omega f_2(1270))/\Gamma_{\text{total}}$ Γ_{49}/Γ

VALUE (units 10^{-4})	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.2 ±0.4 OUR AVERAGE						
2.3 ±0.5 ±0.4		57	ABLIKIM	07D	BES2	$e^+e^- \to \psi(2S)$
2.05±0.41±0.38		62±12	BAI	04C	BES2	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.5	90		[80] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
<1.7	90		BAI	98J	BES	Repl. by BAI 03B

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

$\Gamma(\pi^+\pi^- K^+ K^-)/\Gamma_{total}$ Γ_{50}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.5±0.9 OUR AVERAGE		Error includes scale factor of 1.9.			
10.9±1.9±0.2	85	[81] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^- K^+ K^- \gamma$
7.1±0.3±0.4	817.2	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$
16 ±4		[82] TANENBAUM	78	MRK1	e^+e^-

[81] AUBERT 07AK reports $[\Gamma(\psi(2S) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (2.56 \pm 0.42 \pm 0.16) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[82] Assuming entirely strong decay.

$\Gamma(\rho^0 K^+ K^-)/\Gamma_{total}$ Γ_{51}/Γ

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

$\Gamma(K^*(892)^0 \overline{K}{}^*_2(1430)^0)/\Gamma_{total}$ Γ_{52}/Γ

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

$\Gamma(K^+K^-\pi^+\pi^-\eta)/\Gamma_{total}$ Γ_{53}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.3±0.7±0.1	7	[83] AUBERT	07AU	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\eta\gamma$

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

$\Gamma(K^+K^-2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{54}/Γ

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

$\Gamma(K_1(1270)^\pm K^\mp)/\Gamma_{total}$ Γ_{56}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
10.0±1.8±2.1	[84] BAI	99C	BES	e^+e^-

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

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

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

$\Gamma(\rho^0 p\overline{p})/\Gamma_{total}$ Γ_{58}/Γ

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

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{59}/Γ

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

$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_{60}/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	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)$
4.5±1.0		TANENBAUM	78	MRK1	e^+e^-

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{61}/Γ

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

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
12.6±0.9 OUR AVERAGE					
18.7±5.7±0.3	32	[85] AUBERT	07AU	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\pi^0\gamma$
11.7±1.0±1.5	597	ABLIKIM	06G	BES2	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$
12.7±0.5±1.0	711.6	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

[85] AUBERT 07AU reports $[\Gamma(\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (44 \pm 13 \pm 3) \times 10^{-4}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\omega f_0(1710) \to \omega K^+K^-)/\Gamma_{\text{total}}$ Γ_{63}/Γ

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

$\Gamma(K^*(892)^0K^-\pi^+\pi^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{64}/Γ

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

$\Gamma(K^*(892)^+K^-\pi^+\pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{65}/Γ

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

$\Gamma(K^*(892)^+ K^- \rho^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{66}/Γ

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

$\Gamma(K^*(892)^0 K^- \rho^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{67}/Γ

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

$\Gamma(\eta K^+ K^-)/\Gamma_{\text{total}}$ Γ_{68}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	BRIERE	05	CLEO	$e^+ e^- \to \psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(\omega K^+ K^-)/\Gamma_{\text{total}}$ Γ_{69}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.85±0.25 OUR AVERAGE Error includes scale factor of 1.1.					
2.38±0.37±0.29	78	ABLIKIM	06G	BES2	$\psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$
1.9 ±0.3 ±0.3	76.8	BRIERE	05	CLEO	$e^+ e^- \to \psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$
1.5 ±0.3 ±0.2	23.0 ± 5.2	[86] BAI	03B	BES	$\psi(2S) \to K^+ K^- \pi^+ \pi^- \pi^0$

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

$\Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_{70}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.5 ±2.0 OUR AVERAGE Error includes scale factor of 2.8.					
5.45±0.42±0.87	671	ABLIKIM	05H	BES2	$e^+ e^- \to \psi(2S) \to 3(\pi^+\pi^-)$
1.5 ±1.0		[87] TANENBAUM	78	MRK1	$e^+ e^-$

[87] Assuming entirely strong decay.

$\Gamma(p\bar{p}\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{71}/Γ

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

$\Gamma(K^+ K^-)/\Gamma_{\text{total}}$ Γ_{72}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
6.3±0.7 OUR AVERAGE					
6.3±0.6±0.3		DOBBS	06A	CLEO	$e^+ e^-$
10 ±7		BRANDELIK	79C	DASP	$e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 5	90	FELDMAN	77	MRK1	$e^+ e^-$

$\Gamma(K_S^0 K_L^0)/\Gamma_{total}$ Γ_{73}/Γ

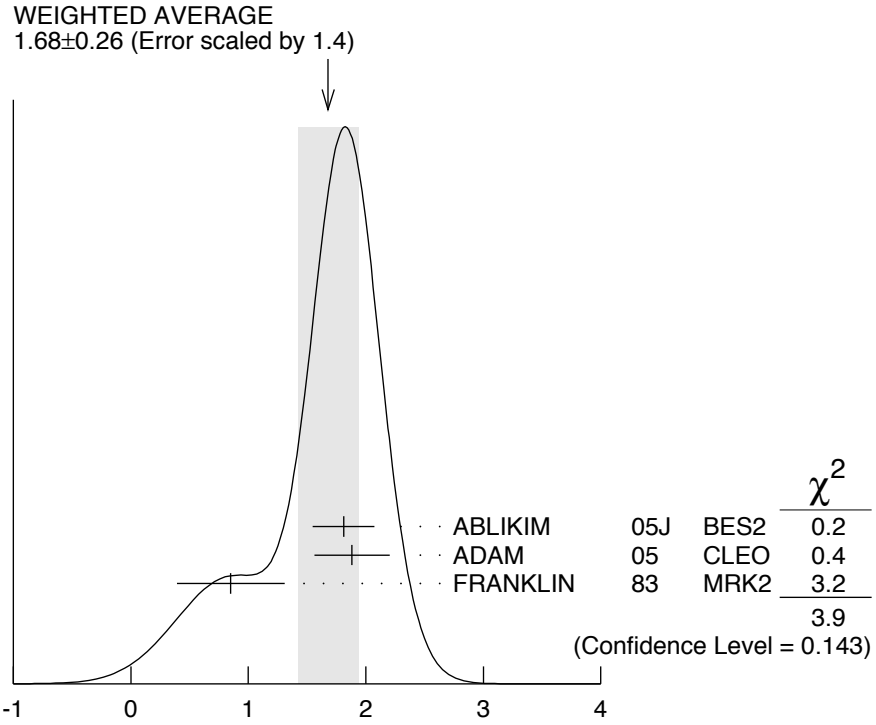
VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
5.4 ±0.5 OUR AVERAGE					
5.8 ±0.8 ±0.4		DOBBS	06A	CLEO	e^+e^-
5.24±0.47±0.48	156 ± 14	[88] BAI	04B	BES2	$\psi(2S) \to K_S^0 K_L^0 \to \pi^+\pi^- X$

[88] Using B($K_S^0 \to \pi^+\pi^-$) = 0.6860 ± 0.0027.

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{74}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.68±0.26 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.					
1.81±0.18±0.19	260 ± 19	[89] ABLIKIM	05J	BES2	$e^+e^- \to \psi(2S)$
$1.88^{+0.16}_{-0.15}$±0.28	194	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
0.85±0.46	4	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

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



$\Gamma(\rho(2150)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{75}/Γ

VALUE (units 10^{-4})	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{1.94\pm0.25^{+1.15}_{-0.34}}$	[90] ABLIKIM	05J	BES2	$\psi(2S) \to \rho(2150)\pi \to \pi^+\pi^-\pi^0$

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

$\Gamma(\rho(770)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{76}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.32±0.12 OUR AVERAGE Error includes scale factor of 1.8.						
$0.51\pm0.07\pm0.11$			[91] ABLIKIM	05J	BES2	$\psi(2S) \to \rho(770)\pi \to \pi^+\pi^-\pi^0$
$0.24^{+0.08}_{-0.07}\pm0.02$		22	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
• • • 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		[92] ABRAMS	75	MRK1	e^+e^-

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

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_{77}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
8 ±5		BRANDELIK	79C	DASP	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.1	90	DOBBS	06A	CLEO	$e^+e^- \to \psi(2S)$
<5	90	FELDMAN	77	MRK1	e^+e^-

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{total}$ Γ_{78}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.1	90	[93] BAI	99C	BES	e^+e^-

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

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{79}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<2.96	90	1	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

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

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$1.7^{+0.8}_{-0.7}$ OUR AVERAGE						
$2.9^{+1.3}_{-1.7}\pm0.4$		9.6 ± 4.2	ABLIKIM	05I	BES2	$e^+e^- \to \psi(2S)$
$1.3^{+1.0}_{-0.7}\pm0.3$		7	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<5.4	90		FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons

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

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

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.})/\Gamma(K^*(892)^0\overline{K}^0 + \text{c.c.})$ Γ_{80}/Γ_{81}

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

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{82}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.17±0.29 OUR AVERAGE Error includes scale factor of 1.7.					
2.43±0.95±0.04	10 ± 4	[94,95] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
0.9 ±0.2 ±0.1	47.6	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$
1.5 ±0.2 ±0.2	51.5±8.3	[96] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

[94] AUBERT 07AK reports $[\Gamma(\psi(2S) \to \phi\pi^+\pi^-)/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (0.57 \pm 0.22 \pm 0.04) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

$\Gamma(\phi f_0(980) \to \pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{83}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.68±0.24 OUR AVERAGE Error includes scale factor of 1.1.					
1.45±0.70±0.03	6 ± 3	[97,98] AUBERT	07AK	BABR	10.6 $e^+e^- \to \pi^+\pi^-K^+K^-\gamma$
0.6 ±0.2 ±0.1	18.4±6.4	[99] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

[97] AUBERT 07AK reports $[\Gamma(\psi(2S) \to \phi f_0(980) \to \pi^+\pi^-)/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \to e^+e^-)] = (0.34 \pm 0.16 \pm 0.04) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \to e^+e^-) = 2.35 \pm 0.04$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

$\Gamma(2(K^+K^-))/\Gamma_{\text{total}}$ Γ_{84}/Γ

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

$\Gamma(\phi K^+K^-)/\Gamma_{\text{total}}$ Γ_{85}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.70±0.16 OUR AVERAGE					
0.8 ±0.2 ±0.1	36.8	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(K^+K^-)$
0.6 ±0.2 ±0.1	16.1 ± 5.0	[100] BAI	03B	BES	$\psi(2S) \to 2(K^+K^-)$

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

$\Gamma(2(K^+K^-)\pi^0)/\Gamma_{total}$ Γ_{86}/Γ

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

$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{87}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$2.8^{+1.0}_{-0.8}$ OUR AVERAGE					
$2.0^{+1.5}_{-1.1}\pm0.4$	6	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
$3.3\pm1.1\pm0.5$	17	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\eta')/\Gamma_{total}$ Γ_{88}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3.1±1.4±0.7	8	[101] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

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

$\Gamma(\omega\eta')/\Gamma_{total}$ Γ_{89}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$3.2^{+2.4}_{-2.0}\pm0.7$	4	[102] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

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

$\Gamma(\omega\pi^0)/\Gamma_{total}$ Γ_{90}/Γ

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

$\Gamma(\rho\eta')/\Gamma_{total}$ Γ_{91}/Γ

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

$\Gamma(\rho\eta)/\Gamma_{total}$ Γ_{92}/Γ

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

$\Gamma(\omega\eta)/\Gamma_{total}$ Γ_{93}/Γ

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

$\Gamma(\phi\pi^0)/\Gamma_{total}$ Γ_{94}/Γ

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

$\Gamma(\eta_c\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{95}/Γ

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

$\Gamma(p\bar{p}K^+K^-)/\Gamma_{total}$ Γ_{96}/Γ

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

$\Gamma(\overline{\Lambda}nK^0_S + \text{c.c.})/\Gamma_{total}$ Γ_{97}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.81±0.11±0.14	50	[103] ABLIKIM	08C	BES2	$e^+e^- \to J/\psi$

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

$\Gamma(\phi f_2'(1525))/\Gamma_{total}$ Γ_{98}/Γ

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

$\Gamma(\Theta(1540)\overline{\Theta}(1540) \to K^0_S pK^-\overline{n} + \text{c.c.})/\Gamma_{total}$ Γ_{99}/Γ

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

$\Gamma(\Theta(1540)K^-\overline{n} \to K^0_S pK^-\overline{n})/\Gamma_{total}$ Γ_{100}/Γ

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

$\Gamma(\Theta(1540)K^0_S\overline{p} \to K^0_S\overline{p}K^+n)/\Gamma_{total}$ Γ_{101}/Γ

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

$\Gamma(\overline{\Theta}(1540)K^+n \to K^0_S\overline{p}K^+n)/\Gamma_{total}$ Γ_{102}/Γ

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

$\Gamma(\overline{\Theta}(1540)K^0_S p \to K^0_S pK^-\overline{n})/\Gamma_{total}$ Γ_{103}/Γ

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

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ Γ_{104}/Γ

VALUE (units 10^{-4})		*DOCUMENT ID*		*TECN*	*COMMENT*
<0.046	[104]	BAI	04D	BES	e^+e^-

[104] Forbidden by *CP*.

RADIATIVE DECAYS

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma_{total}$ Γ_{105}/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
9.62±0.31 OUR FIT					
9.2 ±0.4 OUR AVERAGE					
9.22±0.11±0.46	72600	ATHAR	04	CLEO	$e^+e^- \to \gamma X$
9.9 ±0.5 ±0.8		[105] GAISER	86	CBAL	$e^+e^- \to \gamma X$
7.2 ±2.3		[105] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
7.5 ±2.6		[105] WHITAKER	76	MRK1	e^+e^-

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

$\Gamma(\gamma\chi_{c1}(1P))/\Gamma_{total}$ Γ_{106}/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
9.2 ±0.4 OUR FIT					
8.9 ±0.5 OUR AVERAGE					
9.07±0.11±0.54	76700	ATHAR	04	CLEO	$e^+e^- \to \gamma X$
9.0 ±0.5 ±0.7		[106] GAISER	86	CBAL	$e^+e^- \to \gamma X$
7.1 ±1.9		[107] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$

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

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma_{total}$ Γ_{107}/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
8.74±0.35 OUR FIT					
8.8 ±0.5 OUR AVERAGE Error includes scale factor of 1.1.					
9.33±0.14±0.61	79300	ATHAR	04	CLEO	$e^+e^- \to \gamma X$
8.0 ±0.5 ±0.7		[108] GAISER	86	CBAL	$e^+e^- \to \gamma X$
7.0 ±2.0		[109] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$

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

$[\Gamma(\gamma\chi_{c0}(1P)) + \Gamma(\gamma\chi_{c1}(1P)) + \Gamma(\gamma\chi_{c2}(1P))]/\Gamma_{total}$ $(\Gamma_{105}+\Gamma_{106}+\Gamma_{107})/\Gamma$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
27.6±0.3±2.0	[110] ATHAR	04	CLEO	$e^+e^- \to \gamma X$

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

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ $\Gamma_{105}/\Gamma_{106}$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.02±0.01±0.07	[111] ATHAR	04	CLEO	$e^+e^- \to \gamma X$

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

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ $\Gamma_{107}/\Gamma_{106}$

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.03\pm0.02\pm0.03$	[112] ATHAR	04	CLEO	$e^+e^-\to\gamma X$

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

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c2}(1P))$ $\Gamma_{105}/\Gamma_{107}$

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.99\pm0.02\pm0.08$	[113] ATHAR	04	CLEO	$e^+e^-\to\gamma X$

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

$\Gamma(\pi^0 h_c\to\gamma\eta_c(1S)\pi^0)/\Gamma_{\rm total}$ Γ_{108}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$4.16\pm0.30\pm0.37$	1282	[114] DOBBS	08A	CLEO	$\psi(2S)\to\pi^0\eta_c\gamma$

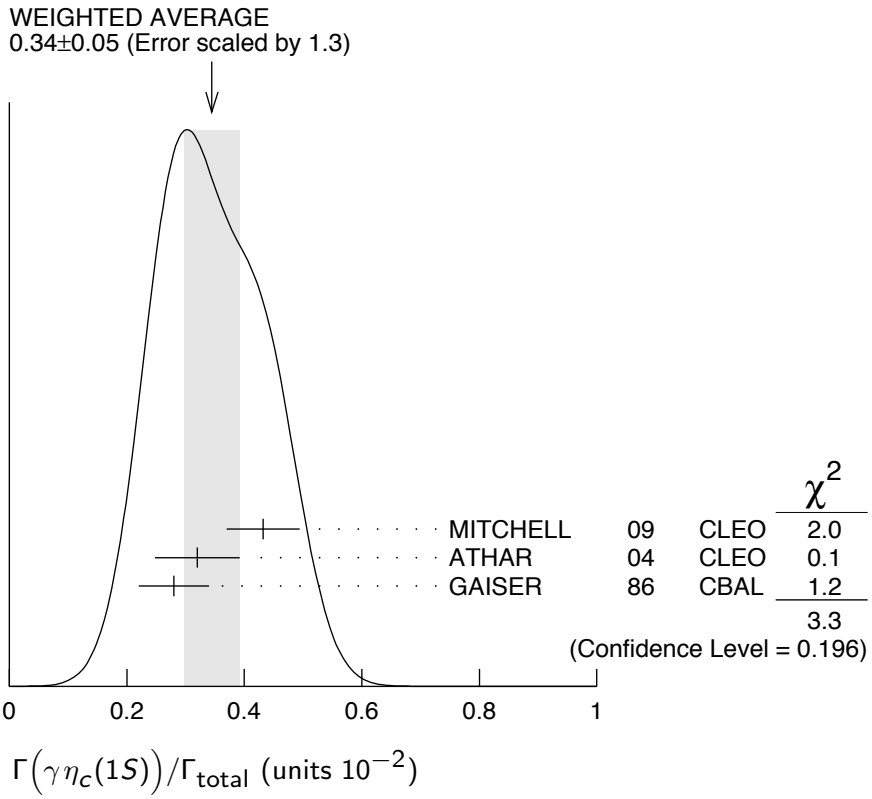
[114] Combination of exclusive and inclusive analyses for the reaction $\psi(2S)\to\pi^0 h_c\to\pi^0\eta_c\gamma$. This result is the average of DOBBS 08A and ROSNER 05.

$\Gamma(\gamma\eta_c(1S))/\Gamma_{\rm total}$ Γ_{109}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.34\ \pm0.05$ OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
$0.432\pm0.016\pm0.060$		MITCHELL	09	CLEO	$e^+e^-\to\gamma X$
$0.32\ \pm0.04\ \pm0.06$	2560	[115] ATHAR	04	CLEO	$e^+e^-\to\gamma X$
$0.28\ \pm0.06$		[116] GAISER	86	CBAL	$e^+e^-\to\gamma X$

[115] ATHAR 04 used $\Gamma_{\eta_c(1S)}=24.8\pm4.9$ MeV to obtain this result.

[116] GAISER 86 used $\Gamma_{\eta_c(1S)}=11.5\pm4.5$ MeV to obtain this result.



$\Gamma(\gamma\eta_c(2S))/\Gamma_{total}$ Γ_{110}/Γ

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
$<8\times10^{-4}$	90	[117] CRONIN-HEN..10		CLEO	$\psi(2S)\to\gamma K\overline{K}\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2\times10^{-3}$	90	ATHAR	04	CLEO	$e^+e^-\to\gamma X$
$0.2–1.3\times10^{-2}$	95	EDWARDS	82C	CBAL	$e^+e^-\to\gamma X$

[117] CRONIN-HENNESSY 10 reports $[\Gamma(\psi(2S)\to\gamma\eta_c(2S))/\Gamma_{total}]\times[B(\eta_c(2S)\to K\overline{K}\pi)]<14.5\times10^{-6}$ which we divide by our best value $B(\eta_c(2S)\to K\overline{K}\pi)=1.9\times10^{-2}$. This measurement assumes $\Gamma(\eta_c(2S))=14$ MeV. CRONIN-HENNESSY 10 gives the analytic dependence of limits on width.

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ Γ_{111}/Γ

VALUE (units 10^{-4})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
< 0.05	90	PEDLAR	09	CLE3	$\psi(2S)\to\gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 54	95	[118] LIBERMAN	75	SPEC	e^+e^-
<100	90	WIIK	75	DASP	e^+e^-

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

$\Gamma(\gamma\eta'(958))/\Gamma_{\text{total}}$ Γ_{112}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.21±0.08 OUR AVERAGE						
1.19±0.08±0.03			PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$
1.24±0.27±0.15		23	ABLIKIM	06R	BES2	$e^+e^- \to \psi(2S)$
1.54±0.31±0.20		∼ 43	BAI	98F	BES	$\psi(2S) \to \pi^+\pi^- 2\gamma$, $\pi^+\pi^- 3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 60	90		[119] BRAUNSCH...	77	DASP	e^+e^-
< 11	90		[120] BARTEL	76	CNTR	e^+e^-

[119] Restated by us using total decay width 228 keV.
[120] 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_{113}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.12±0.19±0.32		[121,122] BAI	03C	BES	$\psi(2S) \to \gamma\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.08±0.19±0.33	200.6 ± 18.8	[121] BAI	03C	BES	$\psi(2S) \to \gamma\pi^+\pi^-$
2.90±1.08±1.07	29.9 ± 11.1	[121] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$

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

$\Gamma(\gamma f_0(1710) \to \gamma\pi\pi)/\Gamma_{\text{total}}$ Γ_{115}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.301±0.041±0.124	35.6 ± 4.8	[123] BAI	03C	BES	$\psi(2S) \to \gamma\pi^+\pi^-$

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

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{\text{total}}$ Γ_{116}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.604±0.090±0.132		39.6 ± 5.9	[124,125] BAI	03C	BES	$\psi(2S) \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 1.56	90	6.8 ± 3.1	[124,125] BAI	03C	BES	$\psi(2S) \to \gamma K^0_S K^0_S$

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

$\Gamma(\gamma\eta)/\Gamma_{\text{total}}$ Γ_{118}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.02	90	PEDLAR	09	CLE3	$\psi(2S) \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.9	90	BAI	98F	BES	$\psi(2S) \to \pi^+\pi^- 3\gamma$
<2	90	YAMADA	77	DASP	$e^+e^- \to 3\gamma$

$\Gamma(\gamma\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{119}/Γ

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

$\Gamma(\gamma\eta(1405) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ Γ_{121}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.9	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^0_S K^+\pi^- +$ c.c.
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.3	90	ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^+ K^-\pi^0$
<1.2	90	[126] SCHARRE	80	MRK1	e^+e^-

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

$\Gamma(\gamma\eta(1405) \to \eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{122}/Γ

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

$\Gamma(\gamma\eta(1475) \to K\overline{K}\pi)/\Gamma_{total}$ Γ_{124}/Γ

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

$\Gamma(\gamma\eta(1475) \to \eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{125}/Γ

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

$\Gamma(\gamma 2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{126}/Γ

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

$\Gamma(\gamma K^{*0}K^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{127}/Γ

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

$\Gamma(\gamma K^{*0}\overline{K}^{*0})/\Gamma_{total}$ Γ_{128}/Γ

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

$\Gamma(\gamma K^0_S K^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{129}/Γ

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

$\Gamma(\gamma K^+K^-\pi^+\pi^-)/\Gamma_{total}$ Γ_{130}/Γ

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

$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ Γ_{131}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±0.4±0.4	142	ABLIKIM	07D	BES2	$e^+e^- \rightarrow \psi(2S)$

$\Gamma(\gamma\pi^+\pi^- p\overline{p})/\Gamma_{total}$ Γ_{132}/Γ

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

$\Gamma(\gamma 2(\pi^+\pi^-)K^+K^-)/\Gamma_{total}$ Γ_{133}/Γ

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

$\Gamma(\gamma 3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{134}/Γ

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

$\Gamma(\gamma K^+K^-K^+K^-)/\Gamma_{total}$ Γ_{135}/Γ

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

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

For measurements involving $B(\psi(2S) \rightarrow \gamma\chi_{cJ}(1P))\times B(\chi_{cJ}(1P) \rightarrow X)$ see the corresponding entries in the $\chi_{cJ}(1P)$ 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
$\mathbf{67^{+19}_{-13}}$	59k	[127] ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

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

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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{37^{+53}_{-47}}$	59k	[128] ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

[128] 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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ARTUSO	09	PR D80 112003	M. Artuso *et al.*	(CLEO Collab.)
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MITCHELL	09	PRL 102 011801	R.E. Mitchell *et al.*	(CLEO Collab.)
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ABLIKIM	08B	PL B659 74	M. Ablikim *et al.*	(BES Collab.)
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ABLIKIM	07C	PL B648 149	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	07D	PRL 99 011802	M. Ablikim *et al.*	(BES Collab.)
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ABLIKIM	06G	PR D73 052004	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06I	PR D74 012004	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06L	PRL 97 121801	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06R	PR D74 072001	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06W	PR D74 112003	M. Ablikim *et al.*	(BES Collab.)
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ABLIKIM	05E	PR D71 072006	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05H	PR D72 012002	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05I	PL B614 37	M. Ablikim *et al.*	(BES Collab.)
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ABLIKIM	05O	PL B630 21	M. Ablikim *et al.*	(BES Collab.)
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BAI	04B	PRL 92 052001	J.Z. Bai *et al.*	(BES Collab.)
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BAI	03B	PR D67 052002	J.Z. Bai *et al.*	(BES Collab.)
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BAI	02	PR D65 052004	J.Z. Bai *et al.*	(BES Collab.)
BAI	02B	PL B550 24	J.Z. Bai *et al.*	(BES Collab.)
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COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)
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LEMOIGNE	82	PL 113B 509	Y. Lemoigne *et al.*	(SACL, LOIC, SHMP+)
HIMEL	80	PRL 44 920	T. Himel *et al.*	(LBL, SLAC)
OREGLIA	80	PRL 45 959	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)
SCHARRE	80	PL 97B 329	D.L. Scharre *et al.*	(SLAC, LBL)
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BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)
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BARTEL	76	PL 64B 483	W. Bartel *et al.*	(DESY, HEIDP)
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LUTH	75	PRL 35 1124	V. Luth *et al.*	(SLAC, LBL) JPC
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