$\psi(2S)$

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

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

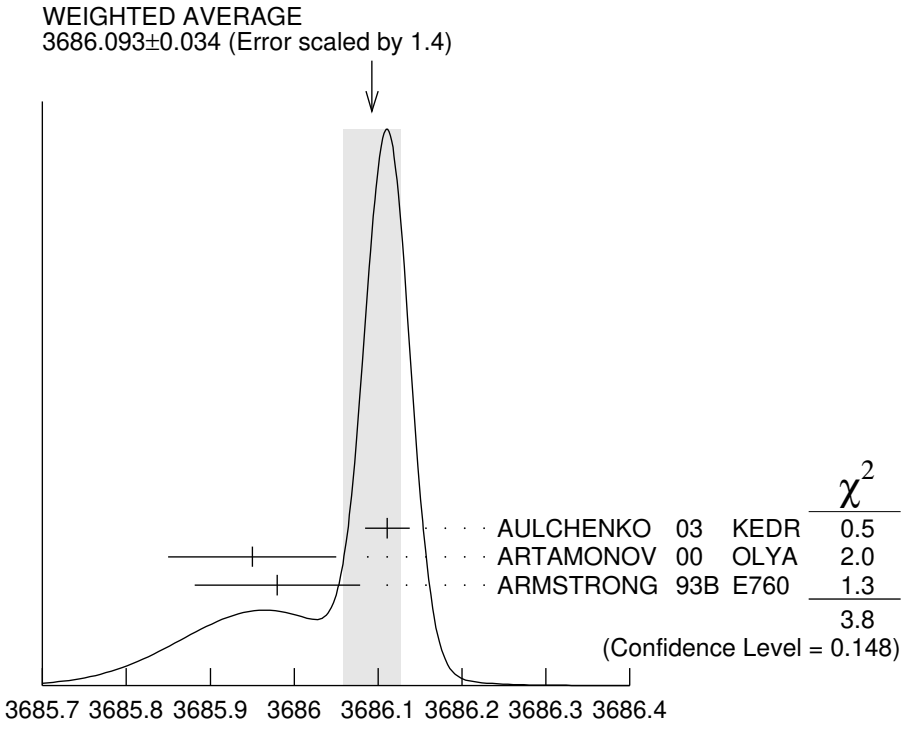
$\psi(2S)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
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. • • •					
3684 ±2		GRIBUSHIN	96	FMPS	515 π^- Be $\to 2\mu X$
3683 ±5	77	ANTONIAZZI	94	E705	300 $\pi^\pm$, pLi $\to$ $J/\psi\pi^+\pi^-$X
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[3] Superseded by ARTAMONOV 00.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)	DOCUMENT ID		TECN	COMMENT
337±13 OUR FIT				
277±22 OUR AVERAGE				
264±27	[6] BAI	02B	BES	e^+e^-
306±36±16	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.

$\psi(2S)$ 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	light hadrons		
Γ_4	e^+e^-	(7.35±0.18) × 10^{-3}	
Γ_5	$\mu^+\mu^-$	(7.3 ±0.8) × 10^{-3}	
Γ_6	$\tau^+\tau^-$	(2.8 ±0.7) × 10^{-3}	
	Decays into $J/\psi(1S)$ and anything		
Γ_7	$J/\psi(1S)$ anything	(56.1 ±0.9) %	
Γ_8	$J/\psi(1S)$ neutrals	(23.0 ±0.4) %	
Γ_9	$J/\psi(1S)\pi^+\pi^-$	(31.8 ±0.6) %	
Γ_{10}	$J/\psi(1S)\pi^0\pi^0$	(16.46±0.35) %	
Γ_{11}	$J/\psi(1S)\eta$	(3.09±0.08) %	
Γ_{12}	$J/\psi(1S)\pi^0$	(1.26±0.13) × 10^{-3}	S=1.3

Hadronic decays

Γ_{13}	$3(\pi^+\pi^-)\pi^0$	$(3.5 \pm 1.6) \times 10^{-3}$	
Γ_{14}	$2(\pi^+\pi^-)\pi^0$	$(2.66 \pm 0.29) \times 10^{-3}$	
Γ_{15}	$\rho\, a_2(1320)$	$(2.6 \pm 0.9) \times 10^{-4}$	
Γ_{16}	$p\overline{p}$	$(2.65 \pm 0.22) \times 10^{-4}$	S=1.4
Γ_{17}	$\Delta^{++}\overline{\Delta}^{--}$	$(1.28 \pm 0.35) \times 10^{-4}$	
Γ_{18}	$\Lambda\overline{\Lambda}$	$(2.5 \pm 0.7) \times 10^{-4}$	S=3.1
Γ_{19}	$\Sigma^+\overline{\Sigma}^-$	$(2.6 \pm 0.8) \times 10^{-4}$	
Γ_{20}	$\Sigma^0\overline{\Sigma}^0$	$(2.1 \pm 0.7) \times 10^{-4}$	S=2.0
Γ_{21}	$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$(1.1 \pm 0.4) \times 10^{-4}$	
Γ_{22}	$\Xi^-\overline{\Xi}^+$	$(1.5 \pm 0.7) \times 10^{-4}$	S=3.0
Γ_{23}	$\Xi^0\overline{\Xi}^0$	$(2.8 \pm 0.9) \times 10^{-4}$	
Γ_{24}	$\Xi(1530)^0\overline{\Xi}(1530)^0$	$< 8.1 \times 10^{-5}$	CL=90%
Γ_{25}	$\Omega^-\overline{\Omega}^+$	$< 7.3 \times 10^{-5}$	CL=90%
Γ_{26}	$\pi^0 p\overline{p}$	$(1.33 \pm 0.17) \times 10^{-4}$	
Γ_{27}	$\eta p\overline{p}$	$(6.0 \pm 1.2) \times 10^{-5}$	
Γ_{28}	$\omega p\overline{p}$	$(6.9 \pm 2.1) \times 10^{-5}$	
Γ_{29}	$\phi p\overline{p}$	$< 2.4 \times 10^{-5}$	CL=90%
Γ_{30}	$\pi^+\pi^- p\overline{p}$	$(6.0 \pm 0.4) \times 10^{-4}$	
Γ_{31}	$2(\pi^+\pi^-\pi^0)$	$(4.5 \pm 1.4) \times 10^{-3}$	
Γ_{32}	$\eta\pi^+\pi^-$	$< 1.6 \times 10^{-4}$	CL=90%
Γ_{33}	$\eta\pi^+\pi^-\pi^0$	$(9.5 \pm 1.7) \times 10^{-4}$	
Γ_{34}	$\eta'\pi^+\pi^-\pi^0$	$(4.5 \pm 2.1) \times 10^{-4}$	
Γ_{35}	$\omega\pi^+\pi^-$	$(6.6 \pm 1.7) \times 10^{-4}$	S=2.7
Γ_{36}	$b_1^\pm\pi^\mp$	$(3.6 \pm 0.6) \times 10^{-4}$	
Γ_{37}	$b_1^0\pi^0$	$(2.4 \pm 0.6) \times 10^{-4}$	
Γ_{38}	$\omega\, f_2(1270)$	$(2.0 \pm 0.6) \times 10^{-4}$	
Γ_{39}	$\pi^+\pi^- K^+K^-$	$(7.2 \pm 0.5) \times 10^{-4}$	
Γ_{40}	$\rho^0 K^+K^-$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{41}	$K^*(892)^0\overline{K}_2^*(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$	
Γ_{42}	$K^+K^-2(\pi^+\pi^-)$	$(1.8 \pm 0.9) \times 10^{-3}$	
Γ_{43}	$K_1(1270)^\pm K^\mp$	$(1.00 \pm 0.28) \times 10^{-3}$	
Γ_{44}	$K_S^0 K_S^0\pi^+\pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{45}	$\rho^0 p\overline{p}$	$(5.0 \pm 2.2) \times 10^{-5}$	
Γ_{46}	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(6.7 \pm 2.5) \times 10^{-4}$	
Γ_{47}	$2(\pi^+\pi^-)$	$(2.4 \pm 0.6) \times 10^{-4}$	S=2.2
Γ_{48}	$\rho^0\pi^+\pi^-$	$(2.2 \pm 0.6) \times 10^{-4}$	S=1.4
Γ_{49}	$K^+K^-\pi^+\pi^-\pi^0$	$(1.24 \pm 0.10) \times 10^{-3}$	
Γ_{50}	$\omega\, f_0(1710) \to \omega K^+K^-$	$(5.9 \pm 2.2) \times 10^{-5}$	
Γ_{51}	$K^*(892)^0 K^-\pi^+\pi^0$ + c.c.	$(8.6 \pm 2.2) \times 10^{-4}$	
Γ_{52}	$K^*(892)^+ K^-\pi^+\pi^-$ + c.c.	$(9.6 \pm 2.8) \times 10^{-4}$	
Γ_{53}	$K^*(892)^+ K^-\rho^0$ + c.c.	$(7.3 \pm 2.6) \times 10^{-4}$	
Γ_{54}	$K^*(892)^0 K^-\rho^+$ + c.c.	$(6.1 \pm 1.8) \times 10^{-4}$	
Γ_{55}	ηK^+K^-	$< 1.3 \times 10^{-4}$	CL=90%

Γ_{56}	$\omega K^+ K^-$	$(\ 1.85 \pm 0.25\ ) \times 10^{-4}$		S=1.1
Γ_{57}	$3(\pi^+\pi^-)$	$(\ 3.5 \ \pm 2.0\ ) \times 10^{-4}$		S=2.8
Γ_{58}	$p\overline{p}\pi^+\pi^-\pi^0$	$(\ 7.3 \ \pm 0.7\ ) \times 10^{-4}$		
Γ_{59}	$K^+ K^-$	$(\ 1.0 \ \pm 0.7\ ) \times 10^{-4}$		
Γ_{60}	$K^0_S K^0_L$	$(\ 5.2 \ \pm 0.7\ ) \times 10^{-5}$		
Γ_{61}	$\pi^+\pi^-\pi^0$	$(\ 1.68 \pm 0.26\ ) \times 10^{-4}$		S=1.4
Γ_{62}	$\rho(2150)\pi \rightarrow \ \pi^+\pi^-\pi^0$	$(\ 1.9\ ^{+1.2}_{-0.4}\ ) \times 10^{-4}$		
Γ_{63}	$\rho(770)\pi \rightarrow \ \pi^+\pi^-\pi^0$	$(\ 3.2 \ \pm 1.2\ ) \times 10^{-5}$		S=1.8
Γ_{64}	$\pi^+\pi^-$	$(\ 8 \ \ \pm 5\ \ ) \times 10^{-5}$		
Γ_{65}	$K_1(1400)^\pm K^\mp$	$<\ 3.1$	$\times 10^{-4}$	CL=90%
Γ_{66}	$K^+ K^-\pi^0$	$<\ 2.96$	$\times 10^{-5}$	CL=90%
Γ_{67}	$K^+\overline{K}^*(892)^- +$ c.c.	$(\ 1.7\ ^{+0.8}_{-0.7}\ ) \times 10^{-5}$		
Γ_{68}	$K^*(892)^0\overline{K}^0 +$ c.c.	$(\ 1.09 \pm 0.20\ ) \times 10^{-4}$		
Γ_{69}	$\phi\pi^+\pi^-$	$(\ 1.13 \pm 0.29\ ) \times 10^{-4}$		S=1.7
Γ_{70}	$\phi f_0(980) \rightarrow \ \pi^+\pi^-$	$(\ 6.0 \ \pm 2.2\ ) \times 10^{-5}$		
Γ_{71}	$2(K^+ K^-)$	$(\ 6.0 \ \pm 1.4\ ) \times 10^{-5}$		
Γ_{72}	$\phi K^+ K^-$	$(\ 7.0 \ \pm 1.6\ ) \times 10^{-5}$		
Γ_{73}	$2(K^+ K^-)\pi^0$	$(\ 1.10 \pm 0.28\ ) \times 10^{-4}$		
Γ_{74}	$\phi\eta$	$(\ 2.8\ ^{+1.0}_{-0.8}\ ) \times 10^{-5}$		
Γ_{75}	$\phi\eta'$	$(\ 3.1 \ \pm 1.6\ ) \times 10^{-5}$		
Γ_{76}	$\omega\eta'$	$(\ 3.2\ ^{+2.5}_{-2.1}\ ) \times 10^{-5}$		
Γ_{77}	$\omega\pi^0$	$(\ 2.1 \ \pm 0.6\ ) \times 10^{-5}$		
Γ_{78}	$\rho\eta'$	$(\ 1.9\ ^{+1.7}_{-1.2}\ ) \times 10^{-5}$		
Γ_{79}	$\rho\eta$	$(\ 2.2 \ \pm 0.6\ ) \times 10^{-5}$		S=1.1
Γ_{80}	$\omega\eta$	$<\ 1.1$	$\times 10^{-5}$	CL=90%
Γ_{81}	$\phi\pi^0$	$<\ 4$	$\times 10^{-6}$	CL=90%
Γ_{82}	$p\overline{p}K^+ K^-$	$(\ 2.7 \ \pm 0.7\ ) \times 10^{-5}$		
Γ_{83}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(\ 2.8 \ \pm 0.6\ ) \times 10^{-4}$		
Γ_{84}	$\Lambda\overline{p}K^+$	$(\ 1.00 \pm 0.14\ ) \times 10^{-4}$		
Γ_{85}	$\Lambda\overline{p}K^+\pi^+\pi^-$	$(\ 1.8 \ \pm 0.4\ ) \times 10^{-4}$		
Γ_{86}	$\phi f_2'(1525)$	$(\ 4.4 \ \pm 1.6\ ) \times 10^{-5}$		
Γ_{87}	$\Theta(1540)\overline{\Theta}(1540) \rightarrow \ K^0_S p K^-\overline{n} +$ c.c.	$<\ 8.8$	$\times 10^{-6}$	CL=90%
Γ_{88}	$\Theta(1540)K^-\overline{n} \rightarrow \ K^0_S p K^-\overline{n}$	$<\ 1.0$	$\times 10^{-5}$	CL=90%
Γ_{89}	$\Theta(1540)K^0_S\overline{p} \rightarrow \ K^0_S\overline{p}K^+ n$	$<\ 7.0$	$\times 10^{-6}$	CL=90%
Γ_{90}	$\overline{\Theta}(1540)K^+ n \rightarrow \ K^0_S\overline{p}K^+ n$	$<\ 2.6$	$\times 10^{-5}$	CL=90%
Γ_{91}	$\overline{\Theta}(1540)K^0_S p \rightarrow \ K^0_S p K^-\overline{n}$	$<\ 6.0$	$\times 10^{-6}$	CL=90%
Γ_{92}	$K^0_S K^0_S$	$<\ 4.6$	$\times 10^{-6}$	

Radiative decays

Γ_{93}	$\gamma\chi_{c0}(1P)$	(9.2 ±0.4) %		
Γ_{94}	$\gamma\chi_{c1}(1P)$	(8.7 ±0.4) %		
Γ_{95}	$\gamma\chi_{c2}(1P)$	(8.1 ±0.4) %		
Γ_{96}	$\gamma\eta_c(1S)$	(2.6 ±0.4)	$\times 10^{-3}$	
Γ_{97}	$\gamma\eta_c(2S)$	< 2.0	$\times 10^{-3}$	CL=90%
Γ_{98}	$\gamma\pi^0$			
Γ_{99}	$\gamma\eta'(958)$	(1.5 ±0.4)	$\times 10^{-4}$	
Γ_{100}	$\gamma f_2(1270)$	(2.1 ±0.4)	$\times 10^{-4}$	
Γ_{101}	$\gamma f_0(1710) \to \gamma\pi\pi$	(3.0 ±1.3)	$\times 10^{-5}$	
Γ_{102}	$\gamma f_0(1710) \to \gamma K\overline{K}$	(6.0 ±1.6)	$\times 10^{-5}$	
Γ_{103}	$\gamma\gamma$	< 1.3	$\times 10^{-4}$	CL=90%
Γ_{104}	$\gamma\eta$	< 9	$\times 10^{-5}$	CL=90%
Γ_{105}	$\gamma\eta(1405) \to \gamma K\overline{K}\pi$	< 1.2	$\times 10^{-4}$	CL=90%

$\psi(2S)$ 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	BES	e^+e^-
224±56	LUTH	75	MRK1	e^+e^-

$\Gamma(e^+e^-)$ Γ_4

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
2.48±0.06 OUR FIT				
2.14±0.21	ALEXANDER	89	RVUE	See Υ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.44±0.21	[8] BAI	02B	BES	e^+e^-
2.0 ±0.3	BRANDELIK	79C	DASP	e^+e^-
2.1 ±0.3	[7] LUTH	75	MRK1	e^+e^-

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

$\Gamma(\gamma\gamma)$ Γ_{103}

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

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

$\psi(2S)$ Γ(i)Γ(e^+e^-)/Γ(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.

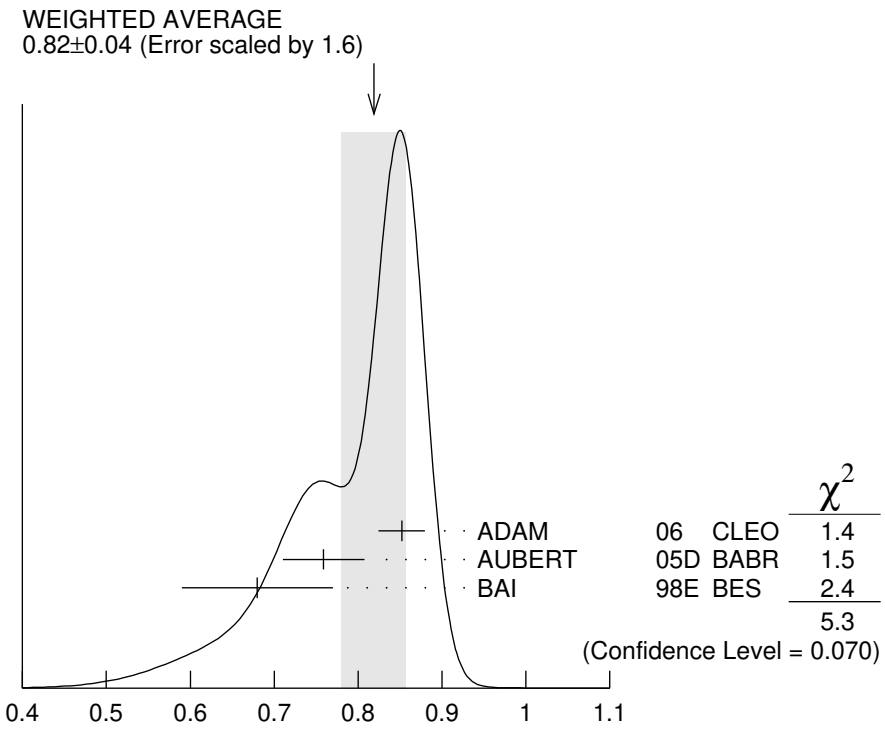
Γ(hadrons) × Γ(e^+e^-)/Γ_{total} — $\Gamma_1\Gamma_4/\Gamma$

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^-

Γ($J/\psi(1S)\pi^+\pi^-$) × Γ(e^+e^-)/Γ_{total} — $\Gamma_9\Gamma_4/\Gamma$

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.788 ± 0.019 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	[9] AUBERT	05D	BABR	10.6 $e^+e^- \to \pi^+\pi^-\mu^+\mu^-\gamma$
0.68 ± 0.09		[10] BAI	98E	BES	e^+e^-

[9] AUBERT 05D reports [Γ($\psi(2S) \to e^+e^-$) B($\psi(2S) \to J/\psi\pi^+\pi^-$)] × B($J/\psi \to \mu^+\mu^-$) = (0.0450 ± 0.0018 ± 0.0022) keV. We divide by our best value B($J/\psi \to \mu^+\mu^-$) = (5.93 ± 0.06) × 10^{-2}. Our first error is the total experiment's error and our second error is the systematic error from using our best value.



Γ($J/\psi(1S)\pi^+\pi^-$) × Γ(e^+e^-)/Γ_{total} — $\Gamma_9\Gamma_4/\Gamma$

$\Gamma(J/\psi(1S)\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{10}\Gamma_4/\Gamma$

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.408±0.011 OUR FIT					
0.411±0.008±0.018	3.6k±96	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

$\Gamma(J/\psi(1S)\eta) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{11}\Gamma_4/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
76.6±2.3 OUR FIT					
88 ±6 ±7	291 ± 24	ADAM	06	CLEO	3.773 $e^+e^- \to \gamma\psi(2S)$

$\Gamma(J/\psi(1S)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{12}\Gamma_4/\Gamma$

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

$\Gamma(2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{31}\Gamma_4/\Gamma$

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

$\Gamma(K^+K^-2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{42}\Gamma_4/\Gamma$

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

$\Gamma(p\bar{p}) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{16}\Gamma_4/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		COMMENT
0.70±0.17±0.03	22	AUBERT	06B	$e^+e^- \to p\bar{p}\gamma$

[10] 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 $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$.

$\psi(2S)$ 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	[12] BAI	02B	BES	e^+e^-
0.981 ±0.003	[12] LUTH	75	MRK1	e^+e^-

$\Gamma(\text{virtual}\,\gamma \to \text{hadrons})/\Gamma_{total}$ 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	[13,14] SETH	04	RVUE	e^+e^-
0.0199±0.0019	[13] BAI	02B	BES	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.029 ±0.004	[13] LUTH	75	MRK1	e^+e^-

$\Gamma(\text{light hadrons})/\Gamma_{\text{total}}$ Γ_3/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.169 ± 0.026	[11] ADAM	05A CLEO	$e^+e^- \to \psi(2S)$

[11] 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.

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
73.5 ± 1.8 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
88 ±13	[15] FELDMAN	77 RVUE	e^+e^-

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

VALUE (units 10^{-4})	DOCUMENT ID
73±8 OUR FIT	

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

VALUE (units 10^{-4})	DOCUMENT ID
28±7 OUR FIT	

$\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ Γ_5/Γ_4

VALUE	DOCUMENT ID	TECN	COMMENT
0.99±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^-

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

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

[14] 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.

[15] 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.

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

$\Gamma(J/\psi(1S)\text{anything})/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.561 ±0.009 OUR FIT				
0.592 ±0.018 OUR AVERAGE				
$0.5950 \pm 0.0015 \pm 0.0190$	151k	ADAM	05A CLEO	$e^+e^- \to \psi(2S)$
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

$\Gamma(J/\psi(1S)\text{neutrals})/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE	DOCUMENT ID
0.230±0.004 OUR FIT	

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_9/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.318 ±0.006 OUR FIT					
0.323 ±0.013 OUR AVERAGE					
0.323 ±0.014		BAI	02B	BES	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	[16] ADAM	05A	CLEO	$e^+e^- \to \psi(2S)$

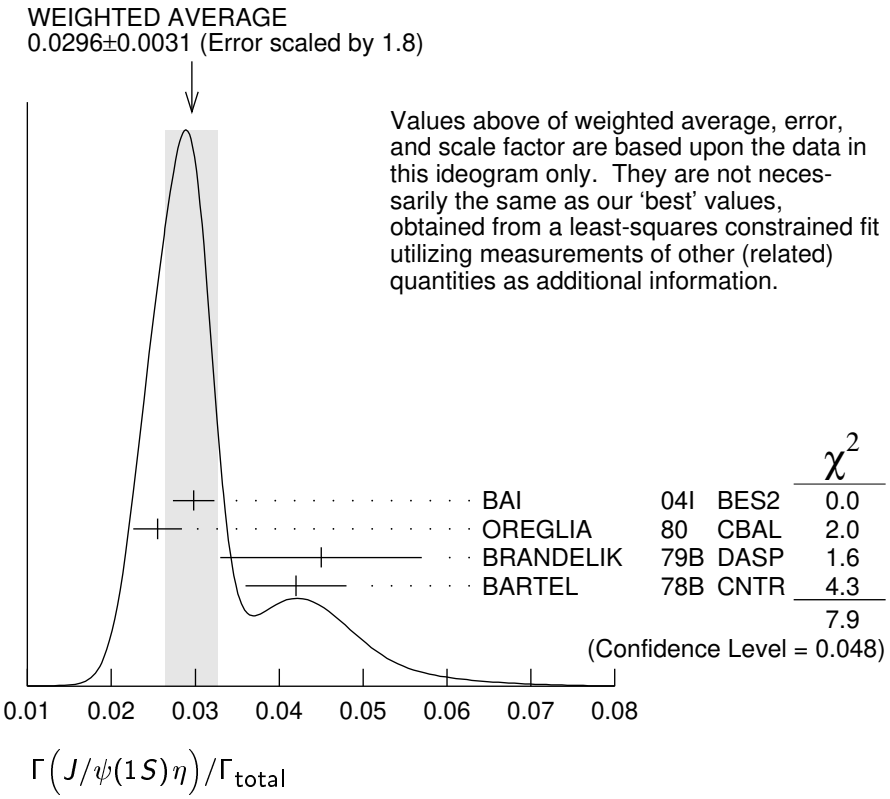
[16] Not independent from other values reported by ADAM 05A.

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.1646±0.0035 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.1652±0.0014±0.0058	13.4k	[16] ADAM	05A	CLEO	$e^+e^- \to \psi(2S)$

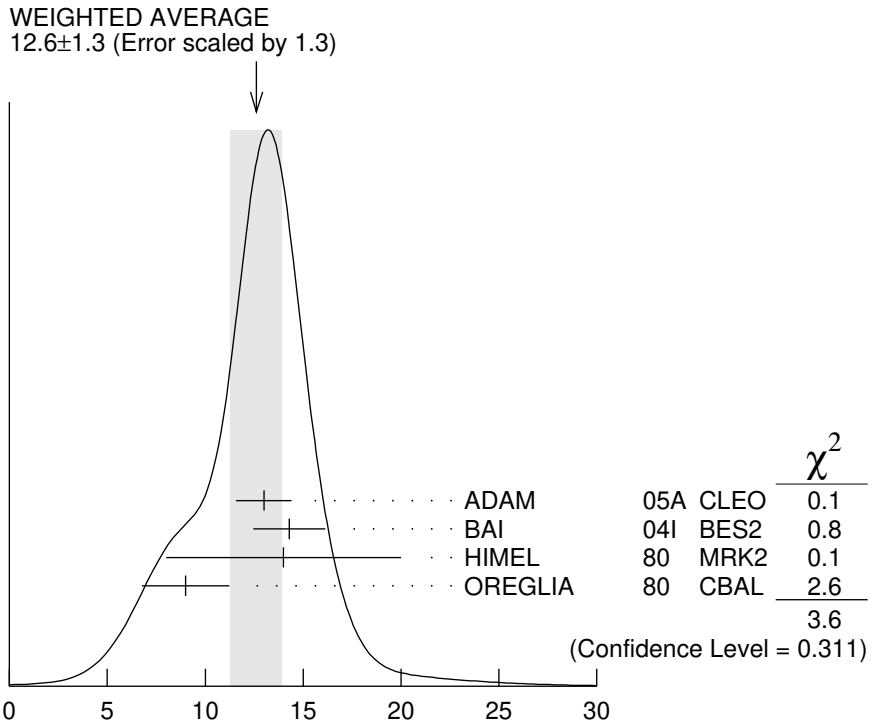
$\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0309±0.0008 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	[21] OREGLIA	80	CBAL	$e^+e^- \to J/\psi 2\gamma$
0.045 ±0.012	17	[22] BRANDELIK	79B	DASP	$e^+e^- \to J/\psi 2\gamma$
0.042 ±0.006	164	[22] BARTEL	78B	CNTR	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0325±0.0006±0.0011	2.8k	[16] ADAM	05A	CLEO	$e^+e^- \to \psi(2S)$
0.043 ±0.008	44	TANENBAUM	76	MRK1	e^+e^-



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

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
12.6±1.3 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.				
13 ±1 ±1	88	ADAM	05A	CLEO	$e^+e^- \to \psi(2S)$
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	[21] OREGLIA	80	CBAL	$\psi(2S) \to J/\psi 2\gamma$



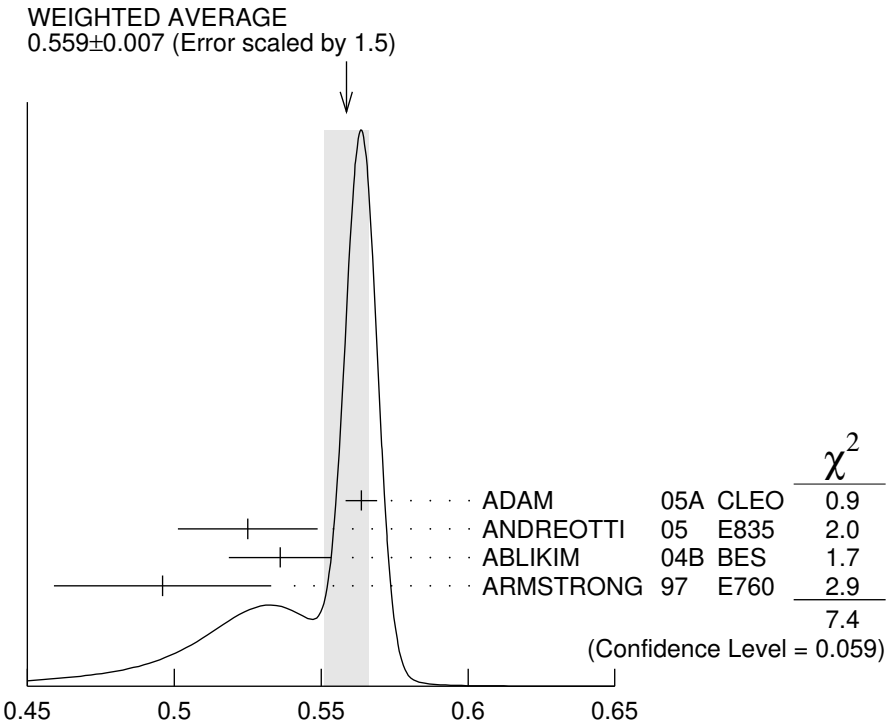
$\Gamma(J/\psi(1S)\text{neutrals})/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_8/Γ_9

VALUE	DOCUMENT ID	TECN	COMMENT
0.723±0.008 OUR FIT			
0.73 ±0.09	TANENBAUM 76	MRK1	e^+e^-

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\text{anything})$ Γ_9/Γ_7

VALUE	EVTS		DOCUMENT ID	TECN	COMMENT
0.5671±0.0032 OUR FIT					
0.559 ±0.007 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.					
0.5637±0.0027±0.0046	60k		ADAM	05A CLEO	$e^+e^- \to \psi(2S)$
0.525 ±0.009 ±0.022	4090 ± 67		ANDREOTTI	05 E835	$\psi(2S) \to J/\psi X$
0.536 ±0.007 ±0.016	20k	[17,23]	ABLIKIM	04B BES	$\psi(2S) \to J/\psi X$
0.496 ±0.037			ARMSTRONG	97 E760	$\overline{p}p \to \psi(2S)$

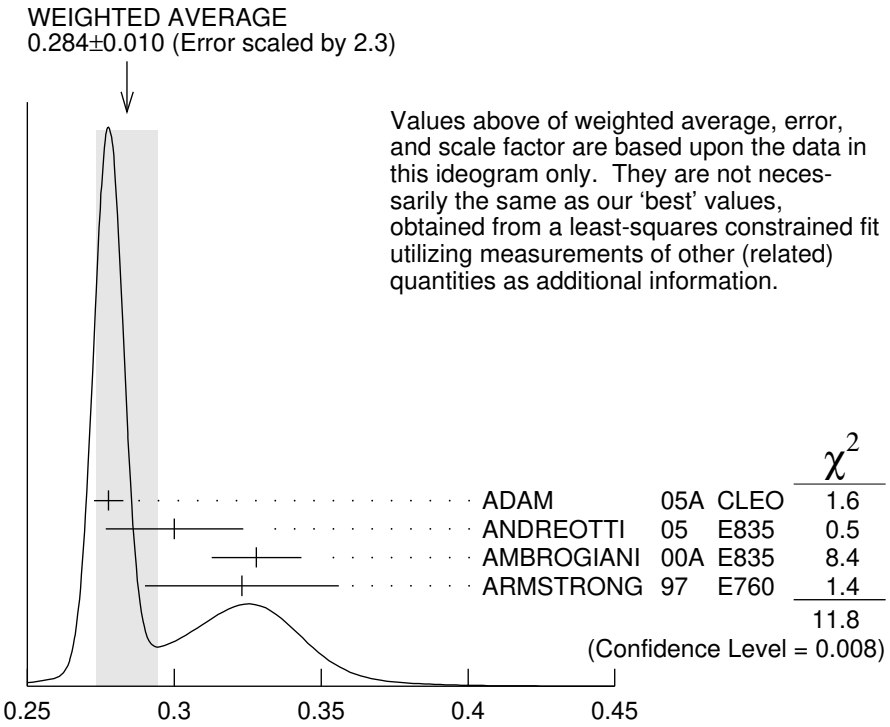
[17] ABLIKIM 04B quotes $B(\psi(2S) \to J/\psi X)$ / $B(\psi(2S) \to J/\psi\pi^+\pi^-)$.



$\Gamma\left(J/\psi(1S)\pi^+\pi^-\right)/\Gamma\left(J/\psi(1S)\text{anything}\right)$ Γ_9/Γ_7

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\text{anything})$ Γ_{10}/Γ_7

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.2933±0.0032 OUR FIT					
0.284 ±0.010 OUR AVERAGE Error includes scale factor of 2.3. See the ideogram below.					
0.2776±0.0025±0.0043	13.4k	ADAM	05A	CLEO	$e^+e^- \rightarrow \psi(2S)$
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	$\overline{p}p \rightarrow \psi(2S)$



$\Gamma\left(J/\psi(1S)\pi^0\pi^0\right)/\Gamma\left(J/\psi(1S)\text{anything}\right)$ Γ_{10}/Γ_7

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_{10}/Γ_9

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.517 ±0.018 OUR FIT					
0.570 ±0.009 ±0.026	14k	[23] 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	[16,18] ADAM	05A	CLEO	$e^+e^- \to \psi(2S)$
0.571 ±0.018 ±0.044		[24] ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$
0.53 ±0.06		TANENBAUM	76	MRK1	e^+e^-
0.64 ±0.15		[25] HILGER	75	SPEC	e^+e^-

[18] Using 13,217 $J/\psi\pi^0\pi^0$ and 60,010 $J/\psi\pi^+\pi^-$ events.

$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\text{anything})$ Γ_{11}/Γ_7

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0551±0.0011 OUR FIT					
0.0548±0.0012 OUR AVERAGE					
0.0546±0.0010±0.0007	2.8k	ADAM	05A	CLEO	$e^+e^- \to \psi(2S)$
0.050 ±0.006 ±0.003	298 ± 20	ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$
0.072 ±0.009		AMBROGIANI	00A	E835	$p\overline{p} \to \psi(2S)$
0.061 ±0.015		ARMSTRONG	97	E760	$\overline{p}p \to \psi(2S)$

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.097 ±0.004 OUR FIT					
0.096 ±0.010 OUR AVERAGE					
0.098 ±0.005 ±0.010	2k	[23] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
0.091 ±0.021		[26] 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	[16] ADAM	05A	CLEO	$e^+e^- \to \psi(2S)$
0.095 ±0.007 ±0.007		[24] ANDREOTTI	05	E835	$\psi(2S) \to J/\psi X$

$\Gamma(J/\psi(1S)\pi^0)/\Gamma(J/\psi(1S)\text{anything})$ Γ_{12}/Γ_7

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.22±0.02±0.01	[19] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to J/\psi\gamma\gamma$

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

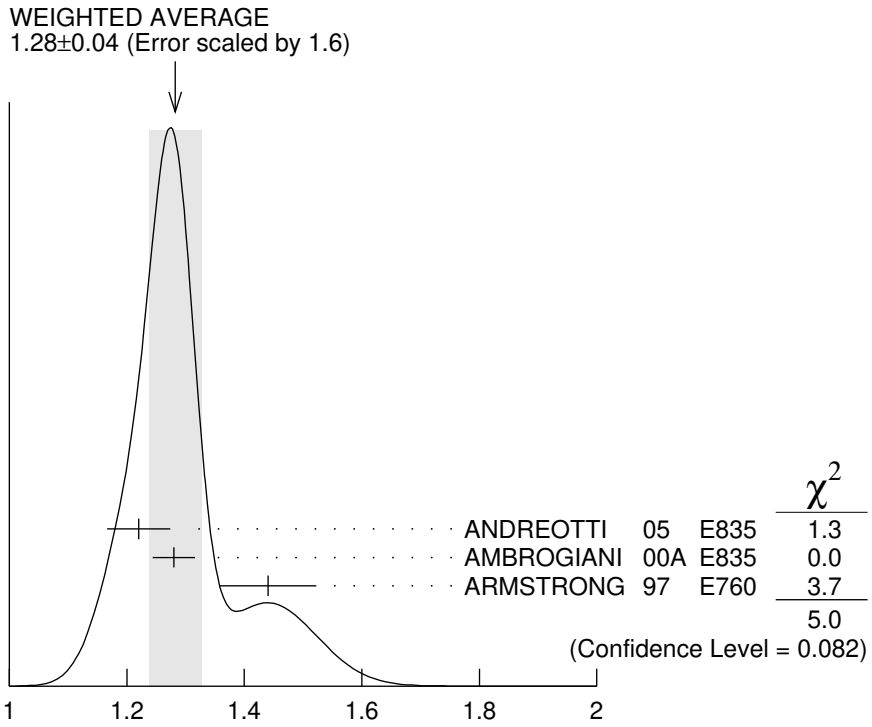
$\Gamma(J/\psi(1S)\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_{12}/Γ_9

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.39±0.04±0.01	[20] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to J/\psi\gamma\gamma$

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

$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\text{anything})$ Γ_4/Γ_7

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.310±0.027 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	[27] ANDREOTTI	05	E835	$p\overline{p} \to \psi(2S) \to e^+e^-$
1.28 ±0.03 ±0.02		[27] AMBROGIANI	00A	E835	$p\overline{p} \to \psi(2S)$
1.44 ±0.08 ±0.02		[27] ARMSTRONG	97	E760	$\overline{p}p \to \psi(2S)$



$\Gamma\left(e^+e^-\right)/\Gamma\left(J/\psi(1S)\text{anything}\right)$ Γ_4/Γ_7

$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_4/Γ_9

VALUE	DOCUMENT ID		TECN	COMMENT
0.0231±0.0008 OUR FIT				
0.0252±0.0028±0.0011	[27] AUBERT	02B	BABR	e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\text{anything})$ Γ_5/Γ_7

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

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_5/Γ_9

VALUE	DOCUMENT ID		TECN	COMMENT
0.0229±0.0026 OUR FIT				
0.0224±0.0029 OUR AVERAGE				
0.0216±0.0026±0.0014	[28] AUBERT	02B	BABR	e^+e^-
0.0327±0.0077±0.0072	[28] GRIBUSHIN	96	FMPS	515 π^- Be $\rightarrow$ $2\mu X$

$\Gamma(\tau^+\tau^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_6/Γ_9

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.7 ±2.1 OUR FIT				
8.73±1.39±1.57	BAI	02	BES	e^+e^-

[21] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020.
[22] Recalculated by us using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010.
[23] From a fit to the J/ψ recoil mass spectra.
[24] Not independent from other values reported by ANDREOTTI 05.
[25] Ignoring the $J/\psi(1S)\eta$ and $J/\psi(1S)\gamma\gamma$ decays.
[26] The value for B($\psi(2S) \to J/\psi(1s)\eta$) reported in HIMEL 80 is derived using B($\psi(2S)$) → $J/\psi(1S)\pi^+\pi^-$) = (33 ± 3))% and B($J/\psi(1S) \to \ell^+\ell^-$) = 0.138 ± 0.018. Calculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = (0.1181 ± 0.0020).
[27] Using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010.
[28] Using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010.

HADRONIC DECAYS

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{13}/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_{14}/Γ

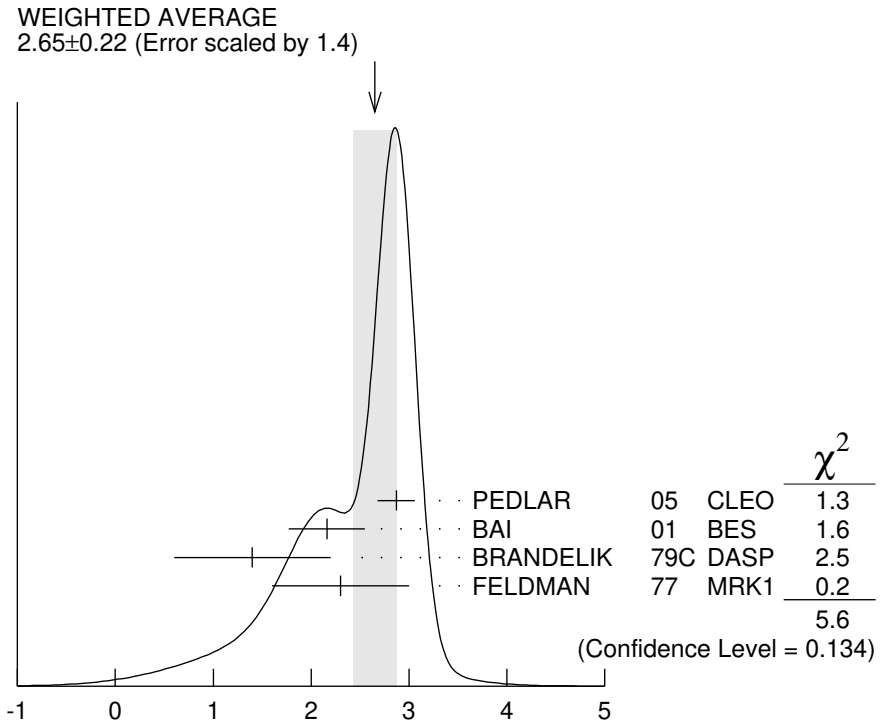
VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
26.6 ± 2.9 OUR AVERAGE					
26.1 ± 0.7 ± 3.0	1702.6	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to 2(\pi^+\pi^-)\pi^0$
30 ± 8	42	FRANKLIN	83	MRK2	e^+e^-

$\Gamma(\rho a_2(1320))/\Gamma_{total}$ Γ_{15}/Γ

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

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{16}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.65 ± 0.22 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.				
2.87 ± 0.12 ± 0.15	557	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to p\overline{p}$
2.16 ± 0.15 ± 0.36	201	[30] BAI	01	BES	$e^+e^- \to \psi(2S) \to p\overline{p}$
1.4 ± 0.8	4	BRANDELIK	79C	DASP	$e^+e^- \to \psi(2S) \to p\overline{p}$
2.3 ± 0.7		FELDMAN	77	MRK1	$e^+e^- \to \psi(2S) \to p\overline{p}$



$\Gamma\left(p\overline{p}\right)/\Gamma_{\text{total}}$ Γ_{16}/Γ

$\Gamma(\Delta^{++}\overline{\Delta}^{--})/\Gamma_{\text{total}}$ Γ_{17}/Γ

VALUE (units 10^{-5})	*EVTS*		*DOCUMENT ID*		*TECN*	*COMMENT*
12.8±1.0±3.4	157	[30]	BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{\text{total}}$ Γ_{18}/Γ

VALUE (units 10^{-4})	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.5 ±0.7 OUR AVERAGE			Error includes scale factor of 3.1.			
3.28±0.23±0.25		208	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
1.81±0.20±0.27		80	[30] 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

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{\text{total}}$ Γ_{19}/Γ

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

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{20}/Γ

VALUE (units 10^{-5})	*EVTS*		*DOCUMENT ID*		*TECN*	*COMMENT*
21 ±7 OUR AVERAGE			Error includes scale factor of 2.0.			
26.3±3.5±2.1	58		PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
12 ±4 ±4	8	[30]	BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

$\Gamma(\Sigma(1385)^+\overline{\Sigma}(1385)^-)/\Gamma_{total}$ Γ_{21}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
11±3±3	14	[30] BAI	01	BES	$e^+e^- \to \psi(2S) \to$ hadrons

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{22}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
15 ±7 OUR AVERAGE			Error includes scale factor of 3.0.			
23.8±3.0±2.1		63	PEDLAR	05	CLEO	$e^+e^- \to \psi(2S) \to$ hadrons
9.4±2.7±1.5		12	[30] 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

$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{total}$ Γ_{23}/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_{24}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 8.1	90	[30] 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

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

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 7.3	90	[30] 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

$\Gamma(\pi^0 p\overline{p})/\Gamma_{total}$ Γ_{26}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.33±0.17 OUR AVERAGE					
1.32±0.10±0.15	256 ± 18	[29] ABLIKIM	05E	BES2	$e^+e^- \to \psi(2S) \to p\overline{p}\gamma\gamma$
1.4 ±0.5	9	FRANKLIN	83	MRK2	e^+e^-

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

$\Gamma(\eta p\overline{p})/\Gamma_{total}$ Γ_{27}/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	[31] 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	$e^+e^- \to \psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

$\Gamma(\omega p\overline{p})/\Gamma_{total}$ Γ_{28}/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	[32] BAI	03B	BES	$\psi(2S) \to p\overline{p}\pi^+\pi^-\pi^0$

$\Gamma(\phi p\overline{p})/\Gamma_{total}$ Γ_{29}/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	[32] BAI	03B	BES	$\psi(2S) \to K^+K^-p\overline{p}$

$\Gamma(\pi^+\pi^-p\overline{p})/\Gamma_{total}$ Γ_{30}/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		[33] TANENBAUM	78	MRK1	e^+e^-

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{32}/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_{33}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.5±0.7±1.5		[34] 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	[35] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to \eta 3\pi(\eta \to \gamma\gamma)$
8.1±1.4±1.6	50.0	[35] BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to \eta 3\pi(\eta \to 3\pi)$

$\Gamma(\eta'\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{34}/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_{35}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.6±1.7 OUR AVERAGE Error includes scale factor of 2.7.					
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	[32] BAI	03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$

$\Gamma(b_1^{\pm}\pi^{\mp})/\Gamma_{total}$ Γ_{36}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.6 ±0.6 OUR AVERAGE					
$4.18^{+0.43}_{-0.42}\pm0.92$	170	ADAM	05	CLEO	$e^+e^- \to \psi(2S)$
3.2 ±0.6 ±0.5	61 ± 11	[32,36] 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		[36] BAI	99C	BES	Repl. by BAI 03B

$\Gamma(b_1^0\pi^0)/\Gamma_{total}$ Γ_{37}/Γ

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

$\Gamma(\omega f_2(1270))/\Gamma_{total}$ Γ_{38}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
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	[32] BAI		03B	BES	$\psi(2S) \to 2(\pi^+\pi^-)\pi^0$
<1.7	90	BAI		98J	BES	Repl. by BAI 03B

$\Gamma(\pi^+\pi^- K^+K^-)/\Gamma_{total}$ Γ_{39}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.2±0.5 OUR AVERAGE					
7.1±0.3±0.4	817.2	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$
16 ±4		[33] TANENBAUM	78	MRK1	e^+e^-

$\Gamma(\rho^0 K^+K^-)/\Gamma_{total}$ Γ_{40}/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_{41}/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^-

$\Gamma(K_1(1270)^{\pm}K^{\mp})/\Gamma_{total}$ Γ_{43}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
10.0±1.8±2.1	[37] BAI	99C	BES	e^+e^-

$\Gamma(\rho^0 p\overline{p})/\Gamma_{total}$ Γ_{45}/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_{46}/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_{47}/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_{48}/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_{49}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$12.4^{+1.0}_{-0.9}$ OUR AVERAGE					
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	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(\omega f_0(1710) \to \omega K^+K^-)/\Gamma_{\text{total}}$ Γ_{50}/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_{51}/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_{52}/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_{53}/Γ

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

$\Gamma(K^*(892)^0K^-\rho^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{54}/Γ

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

$\Gamma(\eta K^+ K^-)/\Gamma_{total}$ Γ_{55}/Γ

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

$\Gamma(\omega K^+ K^-)/\Gamma_{total}$ Γ_{56}/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	[32] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{57}/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		[33] TANENBAUM	78	MRK1	e^+e^-

$\Gamma(p\bar{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{58}/Γ

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

$\Gamma(K^+ K^-)/\Gamma_{total}$ Γ_{59}/Γ

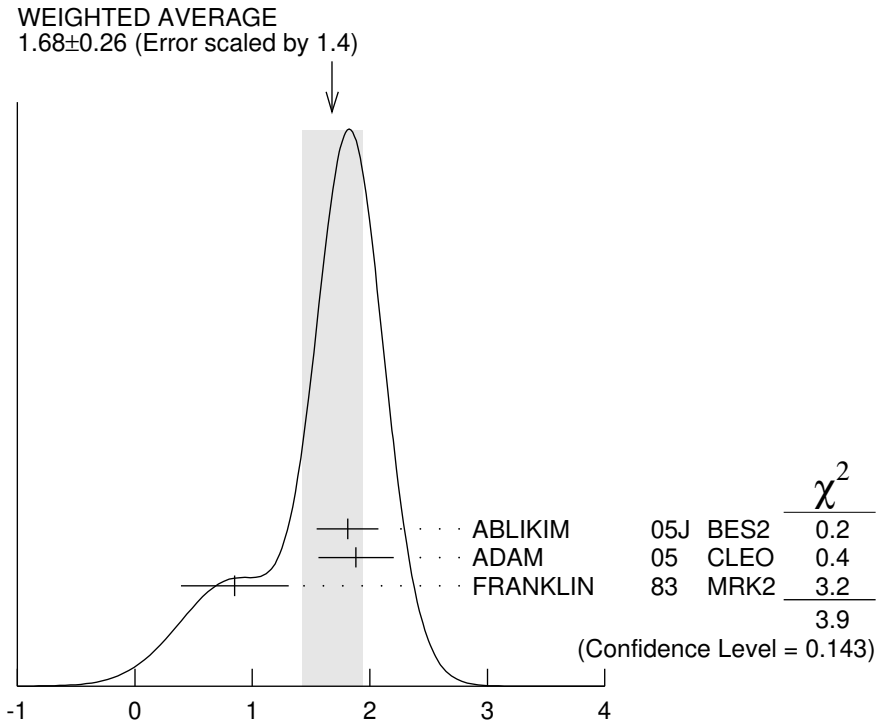
VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
1.0±0.7		BRANDELIK	79C	DASP	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.5	90	FELDMAN	77	MRK1	e^+e^-

$\Gamma(K^0_S K^0_L)/\Gamma_{total}$ Γ_{60}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.24±0.47±0.48	156 ± 14	[38] BAI	04B	BES2	$\psi(2S) \to K^0_S K^0_L \to \pi^+\pi^- X$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{61}/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	[39] 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



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

$\Gamma(\rho(2150)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ **Γ_{62}/Γ**

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$1.94\pm0.25^{+1.15}_{=0.34}$	[39] ABLIKIM	05J	BES2	$\psi(2S) \to \rho(2150)\pi \to \pi^+\pi^-\pi^0$

$\Gamma(\rho(770)\pi \to \pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ **Γ_{63}/Γ**

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.32 ± 0.12 OUR AVERAGE Error includes scale factor of 1.8.						
$0.51\pm0.07\pm0.11$			[39] 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		[40] ABRAMS	75	MRK1	e^+e^-

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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
0.8 ± 0.5		BRANDELIK	79C	DASP	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.5	90	FELDMAN	77	MRK1	e^+e^-

$\Gamma(K^0_S K^0_S \pi^+\pi^-)/\Gamma_{total}$ Γ_{44}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.20\pm0.25\pm0.37$	83 ± 9	ABLIKIM	05O	BES2	$e^+e^- \to \psi(2S)$

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{total}$ Γ_{65}/Γ

VALUE (units 10^{-4})	CL%		DOCUMENT ID		TECN	COMMENT
<3.1	90	[41]	BAI	99C	BES	e^+e^-

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{66}/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_{67}/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_{68}/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_{67}/Γ_{68}

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	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{69}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.13 ± 0.29 OUR AVERAGE Error includes scale factor of 1.7.					
$0.9 \pm0.2 \pm0.1$	47.6	BRIERE	05	CLEO	$e^+e^- \to \psi(2S) \to K^+K^-\pi^+\pi^-$
$1.5 \pm0.2 \pm0.2$	51.5 ± 8.3	[32] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

$\Gamma(\phi f_0(980) \to \pi^+\pi^-)/\Gamma_{total}$ Γ_{70}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.6\pm0.2 \pm0.1$	18.4 ± 6.4	[32] BAI	03B	BES	$\psi(2S) \to K^+K^-\pi^+\pi^-$

$\Gamma(2(K^+K^-))/\Gamma_{total}$ Γ_{71}/Γ

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

$\Gamma(\phi K^+K^-)/\Gamma_{total}$ Γ_{72}/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	[32] BAI	03B	BES	$\psi(2S) \to 2(K^+K^-)$

$\Gamma(2(K^+K^-)\pi^0)/\Gamma_{total}$ Γ_{73}/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_{74}/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±1.1±0.5	17	ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\eta')/\Gamma_{total}$ Γ_{75}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.1±1.4±0.7	8	[42] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\omega\eta')/\Gamma_{total}$ Γ_{76}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.2^{+2.4}_{-2.0}\pm0.7$	4	[42] ABLIKIM	04K	BES	$e^+e^- \to \psi(2S)$

$\Gamma(\omega\pi^0)/\Gamma_{total}$ Γ_{77}/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_{78}/Γ

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

$\Gamma(\rho\eta)/\Gamma_{\text{total}}$ Γ_{79}/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	$e^+e^- \to \psi(2S)$

$\Gamma(\omega\eta)/\Gamma_{\text{total}}$ Γ_{80}/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	$e^+e^- \to \psi(2S)$

$\Gamma(\phi\pi^0)/\Gamma_{\text{total}}$ Γ_{81}/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	$e^+e^- \to \psi(2S)$

$\Gamma(p\bar{p}K^+K^-)/\Gamma_{\text{total}}$ Γ_{82}/Γ

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

$\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{83}/Γ

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

$\Gamma(\Lambda\bar{p}K^+)/\Gamma_{\text{total}}$ Γ_{84}/Γ

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

$\Gamma(\Lambda\bar{p}K^+\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{85}/Γ

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

$\Gamma(\phi f_2'(1525))/\Gamma_{\text{total}}$ Γ_{86}/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	$e^+e^- \to 2(K^+K^-)$

$\Gamma(\Theta(1540)\overline{\Theta}(1540) \to K^0_S p K^- \overline{n} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{87}/Γ

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

$\Gamma(\Theta(1540)K^-\overline{n} \to K^0_S p K^- \overline{n})/\Gamma_{\text{total}}$ Γ_{88}/Γ

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

$\Gamma(\Theta(1540)K^0_S\overline{p} \to K^0_S \overline{p} K^+ n)/\Gamma_{\text{total}}$ Γ_{89}/Γ

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

$\Gamma(\overline{\Theta}(1540)K^+ n \to K^0_S \overline{p} K^+ n)/\Gamma_{\text{total}}$ Γ_{90}/Γ

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

$\Gamma(\overline{\Theta}(1540)K^0_S p \to K^0_S p K^- \overline{n})/\Gamma_{\text{total}}$ Γ_{91}/Γ

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

$\Gamma(K^0_S K^0_S)/\Gamma_{\text{total}}$ Γ_{92}/Γ

VALUE (units 10^{-4})		DOCUMENT ID		TECN	COMMENT
<0.046	[43]	BAI	04D	BES	e^+e^-

[30] Estimated using B($\psi(2S) \to J/\psi\pi^+\pi^-$)= 0.310 ± 0.028.
[31] Computed using B($\eta \to \gamma\gamma$) = (39.43 ± 0.26)%.
[32] Normalized to B($\psi(2S) \to J/\psi\pi^+\pi^-$) = 0.305 ± 0.016.
[33] Assuming entirely strong decay.
[34] Average of $\eta \to \gamma\gamma$ and $\eta \to 3\pi$.
[35] Not independent from other values reported by BRIERE 05.
[36] Assuming B($b_1 \to \omega\pi$)=1.
[37] Assuming B($K_1(1270) \to K\rho$)=0.42 ± 0.06
[38] Using B($K^0_S \to \pi^+\pi^-$) = 0.6860 ± 0.0027.
[39] From a PW analysis of $\psi(2S) \to \pi^+\pi^-\pi^0$.
[40] Final state $\rho^0\pi^0$.
[41] Assuming B($K_1(1400) \to K^*\pi$)=0.94 ± 0.06
[42] Calculated combining $\eta' \to \gamma\rho$ and $\eta\pi^+\pi^-$ channels.
[43] Forbidden by *CP*.

RADIATIVE DECAYS

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma_{\text{total}}$ Γ_{93}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.2 ±0.4 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		[44] GAISER	86	CBAL	$e^+e^- \to \gamma X$
7.2 ±2.3		[44] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
7.5 ±2.6		[44] WHITAKER	76	MRK1	e^+e^-

$\Gamma(\gamma\chi_{c1}(1P))/\Gamma_{total}$ Γ_{94}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.7 ±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		[45] GAISER	86	CBAL	$e^+e^- \to \gamma X$
7.1 ±1.9		[46] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma_{total}$ Γ_{95}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.1 ±0.4 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		[47] GAISER	86	CBAL	$e^+e^- \to \gamma X$
7.0 ±2.0		[46] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$

$[\Gamma(\gamma\chi_{c0}(1P)) + \Gamma(\gamma\chi_{c1}(1P)) + \Gamma(\gamma\chi_{c2}(1P))]/\Gamma_{total}$ $(\Gamma_{93}+\Gamma_{94}+\Gamma_{95})/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
27.6±0.3±2.0	[48] ATHAR	04	CLEO	$e^+e^- \to \gamma X$

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ Γ_{93}/Γ_{94}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.02±0.01±0.07	[48] ATHAR	04	CLEO	$e^+e^- \to \gamma X$

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ Γ_{95}/Γ_{94}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.03±0.02±0.03	[48] ATHAR	04	CLEO	$e^+e^- \to \gamma X$

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c2}(1P))$ Γ_{93}/Γ_{95}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.99±0.02±0.08	[48] ATHAR	04	CLEO	$e^+e^- \to \gamma X$

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ Γ_{96}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.27±0.04 OUR AVERAGE					
0.25±0.06	2560	[49] ATHAR	04	CLEO	$e^+e^- \to \gamma X$
0.28±0.06		GAISER	86	CBAL	$e^+e^- \to \gamma X$

$\Gamma(\gamma\eta_c(2S))/\Gamma_{total}$ Γ_{97}/Γ

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<0.20	90	ATHAR	04	CLEO	$e^+e^- \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.2 to 1.3	95	EDWARDS	82C	CBAL	$e^+e^- \to \gamma X$

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ Γ_{98}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 54	95	[50] LIBERMAN	75	SPEC	e^+e^-
<100	90	WIIK	75	DASP	e^+e^-

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ Γ_{99}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$1.54\pm0.31\pm0.20$		~ 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		[51] BRAUNSCH...	77	DASP	e^+e^-
<11	90		[52] BARTEL	76	CNTR	e^+e^-

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ Γ_{100}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$2.12\pm0.19\pm0.32$		[53,54] BAI	03C	BES	$\psi(2S) \to \gamma\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.08\pm0.19\pm0.33$	200.6 ± 18.8	[53] BAI	03C	BES	$\psi(2S) \to \gamma\pi^+\pi^-$
$2.90\pm1.08\pm1.07$	29.9 ± 11.1	[53] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$

$\Gamma(\gamma f_0(1710) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{101}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.301\pm0.041\pm0.124$	35.6 ± 4.8	[53] BAI	03C	BES	$\psi(2S) \to \gamma\pi^+\pi^-$

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{102}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$0.604\pm0.090\pm0.132$		39.6 ± 5.9	[53,55] 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	[53,55] BAI	03C	BES	$\psi(2S) \to \gamma K^0_S K^0_S$

$\Gamma(\gamma\eta)/\Gamma_{total}$ Γ_{104}/Γ

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

$\Gamma(\gamma\eta(1405) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ Γ_{105}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.12	90	[56] SCHARRE	80	MRK1	e^+e^-

[44] Angular distribution $(1+\cos^2\theta)$ assumed.
[45] Angular distribution $(1-0.189\ \cos^2\theta)$ assumed.
[46] Valid for isotropic distribution of the photon.
[47] Angular distribution $(1-0.052\ \cos^2\theta)$ assumed.
[48] Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.
[49] Using $\Gamma_{\eta_c}(1S) = (11.5 \pm 4.5)$ MeV.
[50] Restated by us using $B(\psi(2S) \to \mu^+\mu^-) = 0.0077$.
[51] Restated by us using total decay width 228 keV.
[52] The value is normalized to the branching ratio for $\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$.
[53] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.
[54] Combining the results from $\pi^+\pi^-$ and $\pi^0\pi^0$ decay modes.
[55] 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.
[56] Includes unknown branching fraction $\eta(1405) \to K\overline{K}\pi$.

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

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

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