$\chi_{c2}(1P)$

$I^G(J^{PC}) = 0^+(2^{++})$

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

$\chi_{c2}(1P)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
3556.17 ± 0.07 OUR AVERAGE				
3557.3 ± 1.7 ±0.7	611	[1] AAIJ 17BB	LHCB	$pp \to b\overline{b}X \to 2(K^+K^-)X$
3556.10 ± 0.06 ±0.11	4.0k	[2] AAIJ 17BI	LHCB	$\chi_{c2} \to J/\psi \mu^+\mu^-$
3555.3 ± 0.6 ±2.2	2.5k	UEHARA 08	BELL	$\gamma\gamma \to$ hadrons
3555.70 ± 0.59 ±0.39		ABLIKIM 05G	BES2	$\psi(2S) \to \gamma\chi_{c2}$
3556.173± 0.123±0.020		ANDREOTTI 05A	E835	$p\overline{p} \to e^+e^-\gamma$
3559.9 ± 2.9		EISENSTEIN 01	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$
3556.4 ± 0.7		BAI 99B	BES	$\psi(2S) \to \gamma X$
3556.22 ± 0.131±0.020	585	[3] ARMSTRONG 92	E760	$\overline{p}p \to e^+e^-\gamma$
3556.9 ± 0.4 ±0.5	50	BAGLIN 86B	SPEC	$\overline{p}p \to e^+e^-X$
3557.8 ± 0.2 ±4		[4] GAISER 86	CBAL	$\psi(2S) \to \gamma X$
3553.4 ± 2.2	66	[5] LEMOIGNE 82	GOLI	185 π^- Be $\to \gamma\mu^+\mu^-$ A
3555.9 ± 0.7		[6] OREGLIA 82	CBAL	$e^+e^- \to J/\psi 2\gamma$
3557 ± 1.5	69	[7] HIMEL 80	MRK2	$e^+e^- \to J/\psi 2\gamma$
3551 ±11	15	BRANDELIK 79B	DASP	$e^+e^- \to J/\psi 2\gamma$
3553 ± 4		[7] BARTEL 78B	CNTR	$e^+e^- \to J/\psi 2\gamma$
3553 ± 4 ±4		[7,8] TANENBAUM 78	MRK1	e^+e^-
3563 ± 7	360	[7] BIDDICK 77	CNTR	$e^+e^- \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3555.4 ± 1.3	53	UEHARA 13	BELL	$\gamma\gamma \to K^0_S K^0_S$
3543 ±10	4	WHITAKER 76	MRK1	$e^+e^- \to J/\psi 2\gamma$

[1] From a fit of the $\phi\phi$ invariant mass with the width of $\chi_{c2}(1P)$ fixed to the PDG 16 value.
[2] AAIJ 17BI reports also $m(\chi_{c2}) - m(\chi_{c1}) = 45.39 \pm 0.07 \pm 0.03$ MeV.
[3] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03.
[4] Using mass of $\psi(2S) = 3686.0$ MeV.
[5] $J/\psi(1S)$ mass constrained to 3097 MeV.
[6] Assuming $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.
[7] Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.
[8] From a simultaneous fit to radiative and hadronic decay channels.

$\chi_{c2}(1P)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.97 ±0.09 OUR FIT					
2.00 ±0.11 OUR AVERAGE					
2.10 ±0.20 ±0.02	4.0k	AAIJ	17BI	LHCB	$\chi_{c2} \to J/\psi \mu^+ \mu^-$
1.915±0.188±0.013		ANDREOTTI	05A	E835	$p\overline{p} \to e^+ e^- \gamma$
1.96 ±0.17 ±0.07	585	[1] ARMSTRONG	92	E760	$\overline{p}p \to e^+ e^- \gamma$
2.6 $^{+1.4}_{-1.0}$	50	BAGLIN	86B	SPEC	$\overline{p}p \to e^+ e^- X$
2.8 $^{+2.1}_{-2.0}$		[2] GAISER	86	CBAL	$\psi(2S) \to \gamma X$

[1] Recalculated by ANDREOTTI 05A.
[2] Errors correspond to 90% confidence level; authors give only width range.

$\chi_{c2}(1P)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
	Hadronic decays		
Γ_1	$2(\pi^+\pi^-)$	(1.02±0.09) %	
Γ_2	$\rho\rho$		
Γ_3	$\pi^+\pi^-\pi^0\pi^0$	(1.83±0.23) %	
Γ_4	$\rho^+\pi^-\pi^0 +$ c.c.	(2.19±0.34) %	
Γ_5	$4\pi^0$	(1.11±0.15) $\times 10^{-3}$	
Γ_6	$K^+K^-\pi^0\pi^0$	(2.1 ±0.4) $\times 10^{-3}$	
Γ_7	$K^+\pi^-\overline{K}^0\pi^0 +$ c.c.	(1.38±0.20) %	
Γ_8	$\rho^- K^+\overline{K}^0 +$ c.c.	(4.1 ±1.2) $\times 10^{-3}$	
Γ_9	$K^*(892)^0 K^-\pi^+ \to K^-\pi^+K^0\pi^0 +$ c.c.	(2.9 ±0.8) $\times 10^{-3}$	
Γ_{10}	$K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0 +$ c.c.	(3.8 ±0.9) $\times 10^{-3}$	
Γ_{11}	$K^*(892)^- K^+\pi^0 \to K^+\pi^-\overline{K}^0\pi^0 +$ c.c.	(3.7 ±0.8) $\times 10^{-3}$	
Γ_{12}	$K^*(892)^+\overline{K}^0\pi^- \to K^+\pi^-\overline{K}^0\pi^0 +$ c.c.	(2.9 ±0.8) $\times 10^{-3}$	
Γ_{13}	$K^+K^-\eta\pi^0$	(1.3 ±0.4) $\times 10^{-3}$	
Γ_{14}	$K^+K^-\pi^+\pi^-$	(8.4 ±0.9) $\times 10^{-3}$	
Γ_{15}	$K^+K^-\pi^+\pi^-\pi^0$	(1.17±0.13) %	
Γ_{16}	$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	(7.3 ±0.8) $\times 10^{-3}$	
Γ_{17}	$K^+\overline{K}^*(892)^0\pi^- +$ c.c.	(2.1 ±1.1) $\times 10^{-3}$	
Γ_{18}	$K^*(892)^0\overline{K}^*(892)^0$	(2.3 ±0.4) $\times 10^{-3}$	
Γ_{19}	$3(\pi^+\pi^-)$	(8.6 ±1.8) $\times 10^{-3}$	
Γ_{20}	$\phi\phi$	(1.06±0.09) $\times 10^{-3}$	
Γ_{21}	$\phi\phi\eta$	(5.3 ±0.6) $\times 10^{-4}$	
Γ_{22}	$\omega\omega$	(8.4 ±1.0) $\times 10^{-4}$	
Γ_{23}	ωK^+K^-	(7.3 ±0.9) $\times 10^{-4}$	

Γ_{24}	$\omega\phi$	$(9.6 \pm 2.7) \times 10^{-6}$	
Γ_{25}	$\pi\pi$	$(2.23 \pm 0.09) \times 10^{-3}$	
Γ_{26}	$\rho^0\pi^+\pi^-$	$(3.7 \pm 1.6) \times 10^{-3}$	
Γ_{27}	$\pi^+\pi^-\pi^0$ (non-resonant)	$(2.0 \pm 0.4) \times 10^{-5}$	
Γ_{28}	$\rho(770)^{\pm}\pi^{\mp}$	$(6 \pm 4) \times 10^{-6}$	
Γ_{29}	$\pi^+\pi^-\eta$	$(4.8 \pm 1.3) \times 10^{-4}$	
Γ_{30}	$\pi^+\pi^-\eta'$	$(5.0 \pm 1.8) \times 10^{-4}$	
Γ_{31}	$\eta\eta$	$(5.4 \pm 0.4) \times 10^{-4}$	
Γ_{32}	K^+K^-	$(1.01 \pm 0.06) \times 10^{-3}$	
Γ_{33}	$K^0_S K^0_S$	$(5.2 \pm 0.4) \times 10^{-4}$	
Γ_{34}	$K^*(892)^{\pm}K^{\mp}$	$(1.44 \pm 0.21) \times 10^{-4}$	
Γ_{35}	$K^*(892)^0\overline{K}^0$ + c.c.	$(1.24 \pm 0.27) \times 10^{-4}$	
Γ_{36}	$K^*_2(1430)^{\pm}K^{\mp}$	$(1.48 \pm 0.12) \times 10^{-3}$	
Γ_{37}	$K^*_2(1430)^0\overline{K}^0$ + c.c.	$(1.24 \pm 0.17) \times 10^{-3}$	
Γ_{38}	$K^*_3(1780)^{\pm}K^{\mp}$	$(5.2 \pm 0.8) \times 10^{-4}$	
Γ_{39}	$K^*_3(1780)^0\overline{K}^0$ + c.c.	$(5.6 \pm 2.1) \times 10^{-4}$	
Γ_{40}	$a_2(1320)^0\pi^0$	$(1.29 \pm 0.34) \times 10^{-3}$	
Γ_{41}	$a_2(1320)^{\pm}\pi^{\mp}$	$(1.8 \pm 0.6) \times 10^{-3}$	
Γ_{42}	$\overline{K}^0K^+\pi^-$ + c.c.	$(1.28 \pm 0.18) \times 10^{-3}$	
Γ_{43}	$K^+K^-\pi^0$	$(3.0 \pm 0.8) \times 10^{-4}$	
Γ_{44}	$K^+K^-\eta$	$< 3.2 \times 10^{-4}$	90%
Γ_{45}	$K^+K^-\eta'(958)$	$(1.94 \pm 0.34) \times 10^{-4}$	
Γ_{46}	$\eta\eta'$	$(2.2 \pm 0.5) \times 10^{-5}$	
Γ_{47}	$\eta'\eta'$	$(4.6 \pm 0.6) \times 10^{-5}$	
Γ_{48}	$\pi^+\pi^-K^0_S K^0_S$	$(2.2 \pm 0.5) \times 10^{-3}$	
Γ_{49}	$K^+K^-K^0_S K^0_S$	$< 4 \times 10^{-4}$	90%
Γ_{50}	$K^0_S K^0_S K^0_S K^0_S$	$(1.13 \pm 0.18) \times 10^{-4}$	
Γ_{51}	$K^+K^-K^+K^-$	$(1.65 \pm 0.20) \times 10^{-3}$	
Γ_{52}	$K^+K^-\phi$	$(1.42 \pm 0.29) \times 10^{-3}$	
Γ_{53}	$\overline{K}^0K^+\pi^-\phi$ + c.c.	$(4.8 \pm 0.7) \times 10^{-3}$	
Γ_{54}	$K^+K^-\pi^0\phi$	$(2.7 \pm 0.5) \times 10^{-3}$	
Γ_{55}	$\phi\pi^+\pi^-\pi^0$	$(9.3 \pm 1.2) \times 10^{-4}$	
Γ_{56}	$p\overline{p}$	$(7.33 \pm 0.33) \times 10^{-5}$	
Γ_{57}	$p\overline{p}\pi^0$	$(4.7 \pm 0.4) \times 10^{-4}$	
Γ_{58}	$p\overline{p}\eta$	$(1.74 \pm 0.25) \times 10^{-4}$	
Γ_{59}	$p\overline{p}\omega$	$(3.6 \pm 0.4) \times 10^{-4}$	
Γ_{60}	$p\overline{p}\phi$	$(2.8 \pm 0.9) \times 10^{-5}$	
Γ_{61}	$p\overline{p}\pi^+\pi^-$	$(1.32 \pm 0.34) \times 10^{-3}$	
Γ_{62}	$p\overline{p}\pi^0\pi^0$	$(7.8 \pm 2.3) \times 10^{-4}$	
Γ_{63}	$p\overline{p}K^+K^-$ (non-resonant)	$(1.91 \pm 0.32) \times 10^{-4}$	
Γ_{64}	$p\overline{p}K^0_S K^0_S$	$< 7.9 \times 10^{-4}$	90%
Γ_{65}	$p\overline{n}\pi^-$	$(8.5 \pm 0.9) \times 10^{-4}$	
Γ_{66}	$\overline{p}n\pi^+$	$(8.9 \pm 0.8) \times 10^{-4}$	

Γ_{67}	$p\overline{n}\pi^-\pi^0$		$(2.17\pm0.18)\times10^{-3}$	
Γ_{68}	$\overline{p}n\pi^+\pi^0$		$(2.11\pm0.18)\times10^{-3}$	
Γ_{69}	$\Lambda\overline{\Lambda}$		$(1.84\pm0.15)\times10^{-4}$	
Γ_{70}	$\Lambda\overline{\Lambda}\pi^+\pi^-$		$(1.25\pm0.15)\times10^{-3}$	
Γ_{71}	$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)		$(6.6\pm1.5)\times10^{-4}$	
Γ_{72}	$\Sigma(1385)^+\overline{\Lambda}\pi^-$ + c.c.	$<$	4×10^{-4}	90%
Γ_{73}	$\Sigma(1385)^-\overline{\Lambda}\pi^+$ + c.c.	$<$	6×10^{-4}	90%
Γ_{74}	$K^+\overline{p}\Lambda$ + c.c.		$(7.8\pm0.5)\times10^{-4}$	
Γ_{75}	$K^*(892)^+\overline{p}\Lambda$+ c.c.		$(8.2\pm1.1)\times10^{-4}$	
Γ_{76}	$K^+\overline{p}\Lambda(1520)$+ c.c.		$(2.8\pm0.7)\times10^{-4}$	
Γ_{77}	$\Lambda(1520)\overline{\Lambda}(1520)$		$(4.6\pm1.5)\times10^{-4}$	
Γ_{78}	$\Sigma^0\overline{\Sigma}^0$		$(3.7\pm0.6)\times10^{-5}$	
Γ_{79}	$\Sigma^+\overline{p}K^0_S$+ c.c.		$(8.2\pm0.9)\times10^{-5}$	
Γ_{80}	$\Sigma^0\overline{p}K^+$+ c.c.		$(9.1\pm0.8)\times10^{-5}$	
Γ_{81}	$\Sigma^+\overline{\Sigma}^-$		$(3.4\pm0.7)\times10^{-5}$	
Γ_{82}	$\Sigma^-\overline{\Sigma}^+$		$(4.4\pm1.8)\times10^{-5}$	
Γ_{83}	$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$<$	1.6×10^{-4}	90%
Γ_{84}	$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$<$	8×10^{-5}	90%
Γ_{85}	$K^-\Lambda\overline{\Xi}^+$+ c.c.		$(1.76\pm0.32)\times10^{-4}$	
Γ_{86}	$\Xi^0\overline{\Xi}^0$	$<$	1.0×10^{-4}	90%
Γ_{87}	$\Xi^-\overline{\Xi}^+$		$(1.42\pm0.32)\times10^{-4}$	
Γ_{88}	$J/\psi(1S)\pi^+\pi^-\pi^0$	$<$	1.5 %	90%
Γ_{89}	$\pi^0\eta_c$	$<$	3.2×10^{-3}	90%
Γ_{90}	$\eta_c(1S)\pi^+\pi^-$	$<$	5.4×10^{-3}	90%
	Radiative decays			
Γ_{91}	$\gamma J/\psi(1S)$		(19.0 ± 0.5) %	
Γ_{92}	$\gamma\rho^0$	$<$	1.9×10^{-5}	90%
Γ_{93}	$\gamma\omega$	$<$	6×10^{-6}	90%
Γ_{94}	$\gamma\phi$	$<$	7×10^{-6}	90%
Γ_{95}	$\gamma\gamma$		$(2.85\pm0.10)\times10^{-4}$	
Γ_{96}	$e^+e^-J/\psi(1S)$		$(2.15\pm0.14)\times10^{-3}$	
Γ_{97}	$\mu^+\mu^-J/\psi(1S)$		$(2.02\pm0.33)\times10^{-4}$	

CONSTRAINED FIT INFORMATION

A multiparticle fit to $\chi_{c1}(1P)$, $\chi_{c0}(1P)$, $\chi_{c2}(1P)$, and $\psi(2S)$ with 4 total widths, a partial width, 25 combinations of partial widths obtained from integrated cross section, and 84 branching ratios uses 248 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 378.1$ for 199 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_1	x_{14}	x_{17}	x_{18}	x_{20}	x_{25}	x_{26}	x_{31}	x_{32}	x_{33}
x_{14}	7									
x_{17}	2	21								
x_{18}	4	3	1							
x_{20}	7	5	1	3						
x_{25}	7	6	1	4	10					
x_{26}	18	2	0	1	1	1				
x_{31}	3	3	1	2	5	12	1			
x_{32}	5	4	1	3	7	15	1	8		
x_{33}	5	4	1	2	6	13	1	7	8	
x_{42}	2	2	0	1	3	7	0	3	4	4
x_{51}	4	3	1	2	4	7	1	4	5	4
x_{56}	10	9	2	5	9	11	2	5	8	7
x_{69}	3	3	1	2	5	13	1	7	8	7
x_{91}	12	10	2	6	15	34	2	18	22	18
x_{95}	−6	−4	−1	−2	2	20	−2	12	12	10
Γ	−23	−19	−4	−11	−19	−25	−5	−12	−18	−15

	x_{42}	x_{51}	x_{56}	x_{69}	x_{91}	x_{95}
x_{51}	2					
x_{56}	4	5				
x_{69}	4	4	6			
x_{91}	10	11	4	18		
x_{95}	5	4	18	12	34	
Γ	−8	−11	−45	−12	−46	−43

$\chi_{c2}(1P)$ PARTIAL WIDTHS

$\chi_{c2}(1P)$ Γ(i)Γ($\gamma J/\psi(1S)$)/Γ(total)

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ **$\Gamma_{56}\Gamma_{91}/\Gamma$**

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
27.5±1.2 OUR FIT				
27.5±1.5 OUR AVERAGE				
27.0±1.5±1.1	[1] ANDREOTTI	05A	E835	$p\overline{p} \rightarrow e^+e^-\gamma$
27.7±1.5±2.0	[1,2] ARMSTRONG	92	E760	$\overline{p}p \rightarrow e^+e^-\gamma$
36 ±8	[1] BAGLIN	86B	SPEC	$\overline{p}p \rightarrow e^+e^-X$

[1] Calculated by us using B($J/\psi(1S) \rightarrow e^+e^-$) = 0.0593 ± 0.0010.

[2] Recalculated by ANDREOTTI 05A.

$\Gamma(\gamma\gamma) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — $\Gamma_{95}\Gamma_{91}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
107± 5 OUR FIT					
117± 10 OUR AVERAGE					
111± 12± 9	147 ± 15	[1] DOBBS	06	CLE3	10.4 $e^+e^- \to e^+e^-\chi_{c2}$
114± 11± 9	136 ± 13.3	[1,2] ABE	02T	BELL	$e^+e^- \to e^+e^-\chi_{c2}$
139± 55± 21		[1,3] ACCIARRI	99E	L3	$e^+e^- \to e^+e^-\chi_{c2}$
242± 65± 51		[1,4] ACKER..,K...	98	OPAL	$e^+e^- \to e^+e^-\chi_{c2}$
150± 42± 36		[1,5] DOMINICK	94	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$
470±240±120		[1,6] BAUER	93	TPC	$e^+e^- \to e^+e^-\chi_{c2}$

[1] Calculated by us using $B(J/\psi \to \ell^+\ell^-) = 0.1187 \pm 0.0008$.

[2] All systematic errors added in quadrature.

[3] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in ACCIARRI 99E is derived using $B(\chi_{c2} \to \gamma J/\psi(1S)) \times B(J/\psi(1S) \to \ell^+\ell^-) = 0.0162 \pm 0.0014$.

[4] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in ACKERSTAFF,K 98 is derived using $B(\chi_{c2} \to \gamma J/\psi(1S)) = 0.135 \pm 0.011$ and $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1203 \pm 0.0038$.

[5] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in DOMINICK 94 is derived using $B(\chi_{c2} \to \gamma J/\psi(1S))= 0.135 \pm 0.011$, $B(J/\psi(1S) \to e^+e^-) = 0.0627 \pm 0.0020$, and $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0597 \pm 0.0025$.

[6] The value for $\Gamma(\chi_{c2} \to \gamma\gamma)$ reported in BAUER 93 is derived using $B(\chi_{c2} \to \gamma J/\psi(1S))= 0.135 \pm 0.011$, $B(J/\psi(1S) \to e^+e^-) = 0.0627 \pm 0.0020$, and $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0597 \pm 0.0025$.

$\chi_{c2}(1P)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(total)$

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
5.7 ±0.5 OUR FIT					
5.2 ±0.7 OUR AVERAGE					
5.01±0.44±0.55	1597±138	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(\pi^+\pi^-)$
6.4 ±1.8 ±0.8		EISENSTEIN	01	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$

$\Gamma(\rho\rho) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_2\Gamma_{95}/\Gamma$

VALUE (eV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<7.8	90	<598	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(\pi^+\pi^-)$

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{14}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.7 ±0.5 OUR FIT					
4.42±0.42±0.53	780 ± 74	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to K^+K^-\pi^+\pi^-$

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{15}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
6.5±0.9±1.5	1250	DEL-AMO-SA..11M		BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{18}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.26±0.24 OUR FIT					
0.8 ±0.17±0.27	151 ± 30	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to K^+ K^- \pi^+ \pi^-$

$\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{20}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.60±0.05 OUR FIT					
0.62±0.07±0.05	89 ± 11	[1] LIU	12B	BELL	$\gamma\gamma \to 2(K^+ K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.58±0.18±0.16	26.5 ± 8.1	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(K^+ K^-)$

[1] Supersedes UEHARA 08. Using B($\phi \to K^+ K^-$) = (48.9 ± 0.5)%.

$\Gamma(\omega\omega) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{22}\Gamma_{95}/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.64	90	[1] LIU	12B	BELL	$\gamma\gamma \to 2(\pi^+ \pi^- \pi^0)$

[1] Using B($\omega \to \pi^+ \pi^- \pi^0$) = (89.2 ± 0.7)%.

$\Gamma(\omega\phi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{24}\Gamma_{95}/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.04	90	[1] LIU	12B	BELL	$\gamma\gamma \to K^+ K^- \pi^+ \pi^- \pi^0$

[1] Using B($\phi \to K^+ K^-$) = (48.9 ± 0.5)% and B($\omega \to \pi^+ \pi^- \pi^0$) = (89.2 ± 0.7)%.

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{25}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.25±0.07 OUR FIT					
1.18±0.25 OUR AVERAGE					
1.44±0.54±0.47	34 ± 13	[1] UEHARA	09	BELL	10.6 $e^+ e^- \to e^+ e^- \pi^0 \pi^0$
1.14±0.21±0.17	54 ± 10	[2] NAKAZAWA	05	BELL	10.6 $e^+ e^- \to e^+ e^- \pi^+ \pi^-$

[1] We multiplied the measurement by 3 to convert from $\pi^0 \pi^0$ to $\pi\pi$. Interference with the continuum included.

[2] We have multiplied $\pi^+ \pi^-$ measurement by 3/2 to obtain $\pi\pi$.

$\Gamma(\rho^0 \pi^+ \pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{26}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.1±0.9 OUR FIT					
3.2±1.9±0.5	986 ± 578	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(\pi^+ \pi^-)$

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{31}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.53±0.22±0.09	8	[1] UEHARA	10A	BELL	10.6 $e^+ e^- \to e^+ e^- \eta\eta$

[1] Interference with the continuum not included.

$\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{32}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.56±0.04 OUR FIT					
0.44±0.11±0.07	33 ± 8	NAKAZAWA	05	BELL	10.6 $e^+ e^- \to e^+ e^- K^+ K^-$

$\Gamma(K^0_S K^0_S) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{33}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.294±0.025 OUR FIT					
0.27 $^{+0.07}_{-0.06}$ ±0.03	53	[1] UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.31 ±0.05 ±0.03	38 ± 7	CHEN	07B	BELL	$e^+ e^- \to e^+ e^- \chi_{c2}$

[1] Supersedes CHEN 07B.

$\Gamma(\overline{K}^0 K^+ \pi^- + \text{c.c.}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{42}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.72±0.11 OUR FIT					
1.20±0.33±0.13	126	[1] DEL-AMO-SA..11M		BABR	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$

[1] We have multiplied $\overline{K} K \pi$ by 2/3 to obtain $\overline{K}^0 K^+ \pi^-$ + c.c.

$\Gamma(K^+ K^- K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{51}\Gamma_{95}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
0.93±0.11 OUR FIT					
1.10±0.21±0.15	126 ± 24	UEHARA	08	BELL	$\gamma\gamma \to \chi_{c2} \to 2(K^+ K^-)$

$\Gamma(\eta_c(1S)\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{90}\Gamma_{95}/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<15.7	90	LEES	12AE	BABR	$e^+ e^- \to e^+ e^- \pi^+ \pi^- \eta_c$

$\chi_{c2}(1P)$ BRANCHING RATIOS

HADRONIC DECAYS

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_1/Γ

VALUE	DOCUMENT ID
0.0102±0.0009 OUR FIT	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-))$ — Γ_{26}/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
0.36±0.15 OUR FIT				
0.31±0.17	TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ — Γ_3/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.83±0.23±0.04	903.5	[1] HE	08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 1.87 ± 0.07 ± 0.22 ± 0.13 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{total}$ — Γ_4/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
2.19±0.34±0.05	1031.9	[1,2] HE	08B	CLEO	$e^+ e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 2.23 ± 0.11 ± 0.32 ± 0.16 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to \rho^+\pi^-\pi^0+$ c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33\pm0.14\pm0.61)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Calculated by us. We have added the values from HE 08B for $\rho^+\pi^-\pi^0$ and $\rho^-\pi^+\pi^0$ decays assuming uncorrelated statistical and fully correlated systematic uncertainties.

$\Gamma(4\pi^0)/\Gamma_{total}$ — Γ_5/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.11±0.15±0.02	1164	[1] ABLIKIM	11A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[1] ABLIKIM 11A reports $(1.21\pm0.05\pm0.16)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to 4\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+K^-\pi^0\pi^0)/\Gamma_{total}$ — Γ_6/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.206±0.040±0.004	76.9	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports 0.21 ± 0.03 ± 0.03 ± 0.01 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+\pi^-\overline{K}^0\pi^0+\text{c.c.})/\Gamma_{total}$ — Γ_7/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.38±0.19±0.03	211.6	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports 1.41 ± 0.11 ± 0.16 ± 0.10 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+\pi^-\overline{K}^0\pi^0+$ c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33\pm0.14\pm0.61)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\rho^-K^+\overline{K}^0+\text{c.c.})/\Gamma_{total}$ — Γ_8/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.41±0.12±0.01	62.9	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports 0.42 ± 0.11 ± 0.06 ± 0.03 % from a measurement of $[\Gamma(\chi_{c2}(1P) \to \rho^-K^+\overline{K}^0+$ c.c.$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33\pm0.14\pm0.61)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^0K^-\pi^+ \to K^-\pi^+K^0\pi^0+\text{c.c.})/\Gamma_{total}$ — Γ_9/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.29±0.08±0.01	38.7	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports 0.30 ± 0.07 ± 0.04 ± 0.02 % from a measurement of [$\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0 K^- \pi^+ \rightarrow K^- \pi^+ K^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$] × [$B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$] assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^0 \overline{K}^0 \pi^0 \rightarrow K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{10}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.38±0.09±0.01	63.0	[1] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 0.39 ± 0.07 ± 0.05 ± 0.03 % from a measurement of [$\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0 \overline{K}^0 \pi^0 \rightarrow K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$] × [$B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$] assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^- K^+ \pi^0 \rightarrow K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{11}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.37±0.08±0.01	51.1	[1] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 0.38 ± 0.07 ± 0.04 ± 0.03 % from a measurement of [$\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^- K^+ \pi^0 \rightarrow K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$] × [$B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$] assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^+ \overline{K}^0 \pi^- \rightarrow K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{12}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.29±0.08±0.01	39.3	[1] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 0.30 ± 0.07 ± 0.04 ± 0.02 % from a measurement of [$\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^+ \overline{K}^0 \pi^- \rightarrow K^+ \pi^- \overline{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$] × [$B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$] assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ K^- \eta \pi^0)/\Gamma_{\text{total}}$ — Γ_{13}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.127±0.044±0.003	22.9	[1] HE	08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 0.13 ± 0.04 ± 0.02 ± 0.01 % from a measurement of [$\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \eta \pi^0)/\Gamma_{\text{total}}$] × [$B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$] assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ K^- \pi^+ \pi^-)/\Gamma_{\text{total}}$ — Γ_{14}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
8.4±0.9 OUR FIT	

$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$ — Γ_{15}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
11.69±0.13±1.31	11k	[1] ABLIKIM	13B	BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and B($\psi(2S) \to \chi_{c2}\gamma$) = (8.72 ± 0.34)%.

$\Gamma(K^0_S K^\pm \pi^\mp \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{16}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.30±0.11±0.75	4.5k	[1] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and B($\psi(2S) \to \chi_{c2}\gamma$) = (8.72 ± 0.34)%.

$\Gamma(K^+ \overline{K}^*(892)^0 \pi^- + c.c.)/\Gamma(K^+ K^- \pi^+ \pi^-)$ — Γ_{17}/Γ_{14}

VALUE	DOCUMENT ID		TECN	COMMENT
0.25±0.13 OUR FIT				
0.25±0.13	TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(K^+ \overline{K}^*(892)^0 \pi^- + c.c.)/\Gamma_{total}$ — Γ_{17}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
21±11 OUR FIT	

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{18}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
2.3±0.4 OUR FIT	

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{19}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.6±1.8 OUR EVALUATION	Treating systematic error as correlated.			
8.6±1.8 OUR AVERAGE				
8.6±0.9±1.6	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
8.7±5.9±0.4	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

[1] Rescaled by us using B($\psi(2S) \to \gamma\chi_{c2}$)= (8.3 ± 0.4)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.6 ± 0.5)%. Multiplied by a factor of 2 to convert from $K^0_S K^+ \pi^-$ to $K^0 K^+ \pi^-$ decay.

$\Gamma(\phi\phi)/\Gamma_{total}$ — Γ_{20}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
1.06±0.09 OUR FIT	

$\Gamma(\phi\phi\eta)/\Gamma_{total}$ — Γ_{21}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.3±0.5±0.4	143.6	[1] ABLIKIM	20B	BES3	$\psi(2S) \to \gamma\phi\phi\eta$

[1] ABLIKIM 20B reports $(5.33 \pm 0.52 \pm 0.39) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \phi\phi\eta)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.52 \pm 0.20) \times 10^{-2}$.

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_{22}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.84±0.10 OUR AVERAGE					
0.82±0.10±0.02	762	[1] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons
1.73±0.57±0.04	27.7 ± 7.4	[2] ABLIKIM	05N	BES2	$\psi(2S) \to \gamma\chi_{c2} \to \gamma 6\pi$

[1] ABLIKIM 11K reports $(8.9 \pm 0.3 \pm 1.1) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \omega\omega)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (8.74 ±

0.35) $\times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.52 ± 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.

[2] ABLIKIM 05N reports [$\Gamma(\chi_{c2}(1P) \to \omega\omega)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = (0.165 ± 0.044 ± 0.032) $\times 10^{-3}$ which we divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.52 ± 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.

$\Gamma(\omega K^+ K^-)/\Gamma_{total}$ — Γ_{23}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.73±0.04±0.08	512	[1] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and B($\psi(2S) \to \chi_{c2}\gamma$) = (8.72 ± 0.34)%.

$\Gamma(\omega\phi)/\Gamma_{total}$ — Γ_{24}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
9.6±2.7±0.2		33	[1] ABLIKIM	19J	BES3	$\psi(2S) \to \gamma$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<18	90		[2,3] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[1] ABLIKIM 19J reports [$\Gamma(\chi_{c2}(1P) \to \omega\phi)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = (0.91 ± 0.23 ± 0.12) $\times 10^{-6}$ which we divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.52 ± 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.

[2] ABLIKIM 11K reports $< 2 \times 10^{-5}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \omega\phi)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (8.74 ± 0.35) $\times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52×10^{-2}.

[3] Superseded by ABLIKIM 19J.

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_{25}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
2.23±0.09 OUR FIT	

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_{26}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
37±16 OUR FIT	

$\Gamma(\pi^+\pi^-\pi^0(\text{non-resonant}))/\Gamma_{total}$ — Γ_{27}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.01±0.42±0.04	64	[1] ABLIKIM	17AG	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\pi^0$

[1] ABLIKIM 17AG reports (2.1 ± 0.4 ± 0.2) $\times 10^{-5}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\pi^0(\text{non-resonant}))/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.11 ± 0.31) $\times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.52 ± 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.

$\Gamma(\rho(770)^\pm\pi^\mp)/\Gamma_{total}$ — Γ_{28}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.61±0.38±0.01	15	[1] ABLIKIM	17AG	BES3	$\psi(2S) \to \gamma\pi^+\pi^-\pi^0$

[1] ABLIKIM 17AG reports $(0.64 \pm 0.39 \pm 0.07) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \rho(770)^{\pm}\pi^{\mp})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^+\pi^-\eta)/\Gamma_{total}$ — Γ_{29}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
0.48±0.13±0.01		[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.4	90	[2] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c2}$

[1] ATHAR 07 reports $(0.49 \pm 0.12 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 06R reports $< 1.7 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\pi^+\pi^-\eta')/\Gamma_{total}$ — Γ_{30}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.50±0.18±0.01	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $(0.51 \pm 0.18 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \pi^+\pi^-\eta')/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\eta\eta)/\Gamma_{total}$ — Γ_{31}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
5.4±0.4 OUR FIT	

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_{32}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
1.01±0.06 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ — Γ_{33}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
0.52±0.04 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma(\pi\pi)$ — Γ_{33}/Γ_{25}

VALUE	DOCUMENT ID		TECN	COMMENT
0.235±0.019 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.27 ±0.07 ±0.04	[1,2] CHEN	07B	BELL	$e^+e^- \to e^+e^-\chi_{c2}$

[1] Using $\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ from the $\pi^+\pi^-$ measurement of NAKAZAWA 05 rescaled by 3/2 to convert to $\pi\pi$.

[2] Not independent from other measurements.

$\Gamma(K^0_S K^0_S)/\Gamma(K^+ K^-)$ — Γ_{33}/Γ_{32}

VALUE	DOCUMENT ID	TECN	COMMENT
0.52±0.05 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.70±0.21±0.12	[1,2] CHEN 07B	BELL	$e^+ e^- \to e^+ e^- \chi_{c2}$

[1] Using $\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ from NAKAZAWA 05.
[2] Not independent from other measurements.

$\Gamma(K^*(892)^\pm K^\mp)/\Gamma_{total}$ — Γ_{34}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.44±0.21±0.03	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K \overline{K} \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.72±0.26±0.04	[2] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^+ K^- \pi^0$
1.34±0.27±0.03	[3] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^0_S K^\pm \pi^\mp$

[1] ABLIKIM 17AG reports $(1.5 \pm 0.1 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^\pm K^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[2] ABLIKIM 17AG reports $(1.8 \pm 0.2 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^\pm K^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[3] ABLIKIM 17AG reports $(1.4 \pm 0.2 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^\pm K^\mp)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^0 \overline{K}^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{35}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.24±0.27±0.03	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^0_S K^\pm \pi^\mp$

[1] ABLIKIM 17AG reports $(1.3 \pm 0.2 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^*(892)^0 \overline{K}^0 + \text{ c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*_2(1430)^\pm K^\mp)/\Gamma_{total}$ — Γ_{36}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
14.8±1.2±0.3	[1] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K \overline{K} \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
17.4±1.6±0.4	[2] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^+ K^- \pi^0$
13.0±1.5±0.3	[3] ABLIKIM 17AG	BES3	$\psi(2S) \to \gamma K^0_S K^\pm \pi^\mp$

[1] ABLIKIM 17AG reports $(15.5 \pm 0.6 \pm 1.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^{\pm} K^{\mp})/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 17AG reports $(18.2 \pm 0.8 \pm 1.6) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^{\pm} K^{\mp})/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] ABLIKIM 17AG reports $(13.6 \pm 0.8 \pm 1.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^{\pm} K^{\mp})/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_2^*(1430)^0 \overline{K}^0 + \text{c.c.})/\Gamma_{\rm total}$ $\quad\Gamma_{37}/\Gamma$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
12.4±1.7±0.3	[1] ABLIKIM	17AG	BES3	$\psi(2S) \rightarrow \gamma K_S^0 K^{\pm}\pi^{\mp}$

[1] ABLIKIM 17AG reports $(13.0 \pm 1.0 \pm 1.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^0 \overline{K}^0 + \text{ c.c.})/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_3^*(1780)^{\pm} K^{\mp})/\Gamma_{\rm total}$ $\quad\Gamma_{38}/\Gamma$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
5.2±0.8±0.1	[1] ABLIKIM	17AG	BES3	$\psi(2S) \rightarrow \gamma K \overline{K} \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.1±1.0±0.1	[2] ABLIKIM	17AG	BES3	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$
5.6±1.8±0.1	[3] ABLIKIM	17AG	BES3	$\psi(2S) \rightarrow \gamma K_S^0 K^{\pm}\pi^{\mp}$

[1] ABLIKIM 17AG reports $(5.4 \pm 0.5 \pm 0.7) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^{\pm} K^{\mp})/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 17AG reports $(5.3 \pm 0.5 \pm 0.9) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^{\pm} K^{\mp})/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] ABLIKIM 17AG reports $(5.9 \pm 1.1 \pm 1.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^{\pm} K^{\mp})/\Gamma_{\rm total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_3^*(1780)^0\overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{39}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
5.6±2.1±0.1	[1] ABLIKIM	17AG	BES3	$\psi(2S) \to \gamma K_S^0 K^\pm \pi^\mp$

[1] ABLIKIM 17AG reports $(5.9 \pm 1.6 \pm 1.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K_3^*(1780)^0\overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(a_2(1320)^0\pi^0)/\Gamma_{\text{total}}$ Γ_{40}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
12.9±3.4±0.3	[1] ABLIKIM	17AG	BES3	$\psi(2S) \to \gamma K^+ K^- \pi^0$

[1] ABLIKIM 17AG reports $(13.5 \pm 1.6 \pm 3.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to a_2(1320)^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(a_2(1320)^\pm\pi^\mp)/\Gamma_{\text{total}}$ Γ_{41}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
17.6±6.1±0.4	[1] ABLIKIM	17AG	BES3	$\psi(2S) \to \gamma K_S^0 K^\pm \pi^\mp$

[1] ABLIKIM 17AG reports $(18.4 \pm 3.3 \pm 5.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to a_2(1320)^\pm\pi^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.30±0.08±0.01	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $(0.31 \pm 0.07 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.32	90	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $< 0.33 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(K^+K^-\eta'(958))/\Gamma_{\text{total}}$ Γ_{45}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.94±0.34	107	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+ K^- \eta'(958)$

[1] Derived using B($\psi(2S) \to \gamma\chi_{c2}$) = (8.72±0.34)%. Uncertainty includes both statistical and systematic contributions combined in quadrature.

$\Gamma(\eta\eta')/\Gamma_{total}$ — Γ_{46}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.17±0.47±0.05		20	[1] ABLIKIM	17AI	BES3	$\psi(2S) \to \gamma\eta'\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$ 6	90	3.3 ± 8.0	[2] ASNER	09	CLEO	$\psi(2S) \to \gamma\eta\eta'$
$<$23	90		[3] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c2}$

[1] ABLIKIM 17AI reports (2.27±0.43±0.25)×10^{-5} from a measurement of [$\Gamma(\chi_{c2}(1P) \to \eta\eta')/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.11 ± 0.31) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.52 ± 0.20) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ASNER 09 reports $< 0.6 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \eta\eta')/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.33 ± 0.14 ± 0.61) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52 × 10^{-2}.

[3] Superseded by ASNER 09. ADAMS 07 reports $< 2.3 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \eta\eta')/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 0.0933 ± 0.0014 ± 0.0061, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52 × 10^{-2}.

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

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.6±0.6±0.1		60	[1] ABLIKIM	17AI	BES3	$\psi(2S) \to \gamma\eta'\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$10	90	12 ± 7	[2] ASNER	09	CLEO	$\psi(2S) \to \gamma\eta'\eta'$
$<$30	90		[3] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c2}$

[1] ABLIKIM 17AI reports (4.76±0.56±0.38)×10^{-5} from a measurement of [$\Gamma(\chi_{c2}(1P) \to \eta'\eta')/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.11 ± 0.31) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.52 ± 0.20) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ASNER 09 reports $< 1.0 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \eta'\eta')/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.33 ± 0.14 ± 0.61) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52 × 10^{-2}.

[3] Superseded by ASNER 09. ADAMS 07 reports $< 3.1 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to \eta'\eta')/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 0.0933 ± 0.0014 ± 0.0061, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 9.52 × 10^{-2}.

$\Gamma(\pi^+\pi^- K^0_S K^0_S)/\Gamma_{total}$ — Γ_{48}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.17±0.54±0.05	57 ± 11	[1] ABLIKIM	05O	BES2	$\psi(2S) \to \gamma\chi_{c2}$

[1] ABLIKIM 05O reports [$\Gamma(\chi_{c2}(1P) \to \pi^+\pi^- K^0_S K^0_S)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = (0.207 ± 0.039 ± 0.033) × 10^{-3} which we divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (9.52 ± 0.20) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+K^-K^0_SK^0_S)/\Gamma_{total}$ — Γ_{49}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<4	90	2.3 ± 2.2	[1] ABLIKIM	05O	BES2	$e^+e^- \to \chi_{c2}\gamma$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c2}(1P) \to K^+K^-K^0_SK^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] < 3.5 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(K^0_SK^0_SK^0_SK^0_S)/\Gamma_{total}$ — Γ_{50}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.13±0.18±0.02	68	[1] ABLIKIM	19AA	BES3	$\psi(2S) \to \gamma 4K^0_S$

[1] Using $B(K^0_S \to \pi^+\pi^-) = (69.20 \pm 0.05)\%$. ABLIKIM 19AA reports $[\Gamma(\chi_{c2}(1P) \to K^0_SK^0_SK^0_SK^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (10.8 \pm 1.5 \pm 0.8) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value..

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

VALUE (units 10^{-3})	DOCUMENT ID
1.65±0.20 OUR FIT	

$\Gamma(K^+K^-\phi)/\Gamma_{total}$ — Γ_{52}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.42±0.29±0.03	52	[1] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+2K^-$

[1] ABLIKIM 06T reports $(1.67 \pm 0.26 \pm 0.24) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+K^-\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{K}^0K^+\pi^-\phi + c.c.)/\Gamma_{total}$ — Γ_{53}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
4.83±0.32±0.66	ABLIKIM	15M	BES3	$\psi(2S) \to \gamma\chi_{c2}$

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.74±0.16±0.44	ABLIKIM	15M	BES3	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(\phi\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{55}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.93±0.06±0.10	408	[1] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c2}\gamma) = (8.72 \pm 0.34)\%$.

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_{56}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
0.733±0.033 OUR FIT	

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ — Γ_{57}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.47±0.04 OUR AVERAGE				
0.47±0.04±0.01	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.43±0.09±0.01	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ONYISI 10 reports $(4.83 \pm 0.25 \pm 0.35 \pm 0.31) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ATHAR 07 reports $(0.44 \pm 0.08 \pm 0.05) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p}\eta)/\Gamma_{total}$ — Γ_{58}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.174±0.025 OUR AVERAGE				
0.172±0.026±0.004	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.186±0.070±0.004	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ONYISI 10 reports $(1.76 \pm 0.23 \pm 0.14 \pm 0.11) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ATHAR 07 reports $(0.19 \pm 0.07 \pm 0.02) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ — Γ_{59}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.36±0.04±0.01	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$

[1] ONYISI 10 reports $(3.68 \pm 0.35 \pm 0.26 \pm 0.24) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ — Γ_{60}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.9±0.1	24 ± 7	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(3.04 \pm 0.85 \pm 0.43) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to p\overline{p}\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{61}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.32±0.34 OUR EVALUATION	Treating systematic error as correlated.			
1.3 ±0.4 OUR AVERAGE	Error includes scale factor of 1.3.			
1.17±0.19±0.30	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
2.64±1.03±0.14	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

[1] Rescaled by us using B($\psi(2S) \to \gamma\chi_{c2}$)= (8.3 ± 0.4)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.6 ± 0.5)%. Multiplied by a factor of 2 to convert from $K^0_S K^+\pi^-$ to $K^0 K^+\pi^-$ decay.

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.078±0.023±0.002	29.2	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports 0.08 ± 0.02 ± 0.01 ± 0.01 % from a measurement of [$\Gamma(\chi_{c2}(1P) \to p\overline{p}\pi^0\pi^0)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p}K^+K^-\text{(non-resonant)})/\Gamma_{total}$ — Γ_{63}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.91±0.32±0.04	131 ± 12	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(2.08 \pm 0.19 \pm 0.30) \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c2}(1P) \to p\overline{p}K^+K^-\text{(non-resonant)})/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p}K^0_S K^0_S)/\Gamma_{total}$ — Γ_{64}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7.9	90	[1] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2}\gamma$

[1] Using B($\psi(2S) \to \chi_{c2}\gamma$) = (9.3 ± 0.6)%.

$\Gamma(p\overline{n}\pi^-)/\Gamma_{total}$ — Γ_{65}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.5±0.9 OUR AVERAGE					
8.4±1.0±0.2	3309	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p\overline{n}\pi^-$
10.2±3.4±0.2		[2] ABLIKIM	06I	BES2	$\psi(2S) \to \gamma p\pi^- X$

[1] ABLIKIM 12J reports [$\Gamma(\chi_{c2}(1P) \to p\overline{n}\pi^-)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = $(0.80 \pm 0.02 \pm 0.09) \times 10^{-4}$ which we divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 06I reports [$\Gamma(\chi_{c2}(1P) \to p\overline{n}\pi^-)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = $(0.97 \pm 0.20 \pm 0.26) \times 10^{-4}$ which we divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = $(9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{p} n \pi^+)/\Gamma_{total}$ — Γ_{66}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.9±0.8±0.2	3732	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma \overline{p} n \pi^+$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \to \overline{p} n \pi^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] = (0.85 \pm 0.02 \pm 0.07) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p \overline{n} \pi^- \pi^0)/\Gamma_{total}$ — Γ_{67}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
21.7±1.7±0.5	2128	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p \overline{n} \pi^- \pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \to p \overline{n} \pi^- \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] = (2.07 \pm 0.06 \pm 0.15) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{p} n \pi^+ \pi^0)/\Gamma_{total}$ — Γ_{68}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
21.1±1.8±0.4	2352	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma \overline{p} n \pi^+ \pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \to \overline{p} n \pi^+ \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] = (2.01 \pm 0.06 \pm 0.16) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda \overline{\Lambda})/\Gamma_{total}$ — Γ_{69}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
1.84±0.15 OUR FIT	

$\Gamma(\Lambda \overline{\Lambda} \pi^+ \pi^-)/\Gamma_{total}$ — Γ_{70}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
125±15±3		371	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Lambda \overline{\Lambda} \pi^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<350	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2} \gamma$

[1] ABLIKIM 12I reports $(137.0 \pm 7.6 \pm 15.7) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Lambda \overline{\Lambda} \pi^+ \pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Using $B(\psi(2S) \to \chi_{c2} \gamma) = (9.3 \pm 0.6)\%$.

$\Gamma(\Lambda \overline{\Lambda} \pi^+ \pi^-$ (non-resonant)$)/\Gamma_{total}$ — Γ_{71}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
66±15±1	36	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Lambda \overline{\Lambda} \pi^+ \pi^-$

[1] ABLIKIM 12I reports $(71.8 \pm 14.5 \pm 8.2) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Lambda \overline{\Lambda} \pi^+ \pi^-$ (non-resonant)$)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Sigma(1385)^+ \overline{\Lambda} \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{72}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<40	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Sigma(1385)^+ \overline{\Lambda} \pi^-$

[1] ABLIKIM 12I reports $< 42 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma(1385)^+ \overline{\Lambda} \pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^- \overline{\Lambda} \pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{73}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<60	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Sigma(1385)^- \overline{\Lambda} \pi^+$

[1] ABLIKIM 12I reports $< 61 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma(1385)^- \overline{\Lambda} \pi^+ + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(K^+ \overline{p} \Lambda + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{74}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.8±0.5 OUR AVERAGE					
7.7±0.5±0.2	5k	[1,2] ABLIKIM	13D	BES3	$\psi(2S) \to \gamma \Lambda \overline{p} K^+$
8.3±1.6±0.2		[3] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ABLIKIM 13D reports $(8.4 \pm 0.3 \pm 0.6) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+ \overline{p} \Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

[3] ATHAR 07 reports $(8.5 \pm 1.4 \pm 1.0) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+ \overline{p} \Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^+ \overline{p} \Lambda + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{75}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.2±1.1±0.2	476	[1] ABLIKIM	19AU	BES3	$\psi(2S) \to \gamma K^{*+} \overline{p} \Lambda$

[1] ABLIKIM 19AU reports $[\Gamma(\chi_{c2}(1P) \to K^*(892)^+ \overline{p} \Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] = (7.8 \pm 0.9 \pm 0.6) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ \overline{p} \Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{76}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.7±0.1	79 ± 13	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p \overline{p} K^+ K^-$

[1] ABLIKIM 11F reports $(3.06 \pm 0.50 \pm 0.54) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to K^+ \overline{p} \Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to$

$\gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}$ Γ_{77}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.6±1.4±0.1	29 ± 7	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(5.05 \pm 1.29 \pm 0.93) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{78}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.7±0.6±0.1		91	[1] ABLIKIM	18V	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6	90		[2] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$
<7	90	7.5 ± 3.4	[3] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c2}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (0.35 \pm 0.05 \pm 0.02) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 13H reports $< 0.65 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

[3] NAIK 08 reports $< 0.75 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ Γ_{81}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.4±0.7±0.1		55	[1] ABLIKIM	18V	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8	90		[2] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$
<7	90	4.0 ± 3.5	[3] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c2}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))] = (0.32 \pm 0.06 \pm 0.03) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 13H reports $< 0.88 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

[3] NAIK 08 reports $< 0.67 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\Sigma^- \overline{\Sigma}^+)/\Gamma_{total}$ Γ_{82}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±1.7±0.5	131	[1] ABLIKIM	20I	BES3	$\psi(2S) \to \gamma \Sigma^- \overline{\Sigma}^+$

[1] ABLIKIM 20I reports $(4.4 \pm 1.7 \pm 0.5) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma^- \overline{\Sigma}^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$.

$\Gamma(\Sigma(1385)^+ \overline{\Sigma}(1385)^-)/\Gamma_{total}$ Γ_{83}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<16	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Sigma(1385)^+ \overline{\Sigma}(1385)^-$

[1] ABLIKIM 12I reports $< 17 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma(1385)^+ \overline{\Sigma}(1385)^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^- \overline{\Sigma}(1385)^+)/\Gamma_{total}$ Γ_{84}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma \Sigma(1385)^- \overline{\Sigma}(1385)^+$

[1] ABLIKIM 12I reports $< 8.5 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Sigma(1385)^- \overline{\Sigma}(1385)^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(K^- \Lambda \overline{\Xi}^+ + c.c.)/\Gamma_{total}$ Γ_{85}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.76±0.32±0.04	51	[1] ABLIKIM	15I	BES3	$\psi(2S) \to \gamma K^- \Lambda \overline{\Xi}^+ +$ c.c.

[1] ABLIKIM 15I reports $[\Gamma(\chi_{c2}(1P) \to K^- \Lambda \overline{\Xi}^+ + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))] = (1.68 \pm 0.26 \pm 0.15) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Xi^0 \overline{\Xi}^0)/\Gamma_{total}$ Γ_{86}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<1.0	90	2.9 ± 1.7	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^0 \overline{\Xi}^0$

[1] NAIK 08 reports $< 1.06 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Xi^0 \overline{\Xi}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\Xi^- \overline{\Xi}^+)/\Gamma_{total}$ Γ_{87}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.42±0.31±0.03		29 ± 5	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^+ \overline{\Xi}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 3.7	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2} \gamma$

[1] NAIK 08 reports $(1.45 \pm 0.30 \pm 0.15) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \Xi^- \overline{\Xi}^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c2}(1P)) =$

$(9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Using $B(\psi(2S) \to \chi_{c2}\gamma) = (9.3 \pm 0.6)\%$.

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{88}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.015	90	BARATE	81	SPEC	190 GeV π^- Be $\to 2\pi 2\mu$

$\Gamma(\pi^0\eta_c)/\Gamma_{total}$ — Γ_{89}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.2 × 10⁻³	90	[1] ABLIKIM	15N	BES3	$\psi(2S) e^+e^- \to \gamma\pi^0\eta_c$

[1] Using $B(\eta_c \to K^0_S K^\pm\pi^\mp) \times B(K^0_S \to \pi^+\pi^-) \times B(\pi^0 \to \gamma\gamma) = (1.66 \pm 0.11) \times 10^{-2}$.

$\Gamma(\eta_c(1S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_{90}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.54 \times 10^{-2}$	90	[1,2] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.2 \times 10^{-2}$	90	[1,3] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c2}\gamma) = (8.72 \pm 0.34)\%$.

[2] From the $\eta_c \to K^0_S K^\pm\pi^\mp$ decays.

[3] From the $\eta_c \to K^+K^-\pi^0$ decays.

$\Gamma(\eta_c(1S)\pi^+\pi^-)/\Gamma(\overline{K}^0 K^+\pi^- + \text{c.c.})$ — Γ_{90}/Γ_{42}

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<16.4	90	[1] LEES	12AE	BABR	$e^+e^- \to e^+e^-\pi^+\pi^-\eta_c$

[1] We divided the reported limit by 2 to take into account the $K^0_L K^+\pi^-$ mode.

RADIATIVE DECAYS

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — Γ_{91}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
19.0 ±0.5 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$18.64 \pm 0.08 \pm 1.69$	1.0M	[1] ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
$19.9 \pm 0.5 \pm 1.2$		[2] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

[1] Not independent from $B(\psi(2S) \to \gamma\chi_{c2}(1P))$ and the product $B(\psi(2S) \to \gamma\chi_{c2}(1P)) \times B(\chi_{c2}(1P) \to \gamma J/\psi(1S))$ also measured in ABLIKIM 17U.

[2] Uses $B(\psi(2S) \to \gamma\chi_{c2} \to \gamma\gamma J/\psi)$ from ADAM 05A and $B(\psi(2S) \to \gamma\chi_{c2})$ from ATHAR 04.

$\Gamma(\gamma\rho^0)/\Gamma_{total}$ — Γ_{92}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<19	90	13 ± 11	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\rho^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<40	90	17.2 ± 6.8	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\rho^0$

[1] ABLIKIM 11E reports $< 20.8 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \gamma\rho^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

[2] BENNETT 08A reports $< 50 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \gamma\rho^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

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

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<6	90	1 ± 6	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\omega$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6	90	0.0 ± 1.8	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\omega$

[1] ABLIKIM 11E reports $< 6.1 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \gamma\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

[2] BENNETT 08A reports $< 7.0 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \gamma\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\gamma\phi)/\Gamma_{total}$ Γ_{94}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 7	90	5 ± 5	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<11	90	1.3 ± 2.5	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\phi$

[1] ABLIKIM 11E reports $< 8.1 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \gamma\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

[2] BENNETT 08A reports $< 13 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to \gamma\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_{95}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
2.85±0.10 OUR FIT	

$\Gamma(e^+e^- J/\psi(1S))/\Gamma_{total}$ Γ_{96}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.37 \pm 0.15 \pm 0.05$	1.3k	[1,2] ABLIKIM	17I	BES3	$\psi(2S) \to \gamma e^+ e^- J/\psi$

[1] ABLIKIM 17I reports $(2.48 \pm 0.08 \pm 0.16) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \to e^+e^- J/\psi(1S))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Not independent from other measurements reported by ABLIKIM 17I

$\Gamma(e^+e^- J/\psi(1S))/\Gamma(\gamma J/\psi(1S))$ — Γ_{96}/Γ_{91}

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
11.3±0.4±0.5	1.3k	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+e^-\gamma J/\psi$

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

$\Gamma(\mu^+\mu^- J/\psi(1S))/\Gamma(e^+e^- J/\psi(1S))$ — Γ_{97}/Γ_{96}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.40±0.79±1.15	219	ABLIKIM	19Z	BES3	$\psi(2S) \to \gamma\chi_c \to \gamma(\mu^+\mu^- J/\psi)$

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ — Γ_{95}/Γ_{91}

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.50±0.05 OUR FIT				
0.99±0.18	[1] AMBROGIANI	00B	E835	$\overline{p}p \to \chi_{c2} \to \gamma\gamma, \gamma J/\psi$

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

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}} \times \Gamma(p\overline{p})/\Gamma_{\text{total}}$ — $\Gamma_{95}/\Gamma \times \Gamma_{56}/\Gamma$

VALUE (units 10^{-8})	DOCUMENT ID		TECN	COMMENT
2.09±0.13 OUR FIT				
1.7 ±0.4 OUR AVERAGE				
1.60±0.42	ARMSTRONG	93	E760	$\overline{p}p \to \gamma\gamma X$
9.9 ±4.5	BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma X$

$\chi_{c2}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

$\Gamma(\chi_{c2}(1P) \to K^+K^-\pi^+\pi^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{14}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.31±0.26 OUR FIT				
2.5 ±0.9 OUR AVERAGE Error includes scale factor of 2.3.				
1.90±0.14±0.44	BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
3.8 ±0.67	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

[1] The reported value is derived using B($\psi(2S) \to \pi^+\pi^- J/\psi$) × B($J/\psi \to \ell^+\ell^-$) = (4.6 ± 0.7)%. Calculated by us using B($J/\psi \to \ell^+\ell^-$) = 0.1181 ± 0.0020.

$\Gamma(\chi_{c2}(1P) \to K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{\text{total}}$ — $\Gamma_{18}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.1 ±0.4 OUR FIT				
3.11±0.36±0.48	ABLIKIM	04H	BES2	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(\chi_{c2}(1P) \to p\overline{p})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{56}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.01±0.09 OUR FIT				
1.4 ±1.1	[1] BAI	98I	BES	$\psi(2S) \to \gamma\chi_{c2} \to \gamma\overline{p}p$

[1] Calculated by us. The value for $B(\chi_{c2} \to p\overline{p})$ reported in BAI 98I is derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

$\Gamma(\chi_{c2}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{56}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.98±0.32 OUR FIT				
7.1 ±0.5 OUR AVERAGE Error includes scale factor of 1.2.				
7.3 ±0.4 ±0.3	405	ABLIKIM 13V	BES3	$\psi(2S) \to \gamma p\overline{p}$
7.2 ±0.7 ±0.4	121 ± 12	[1] NAIK 08	CLEO	$\psi(2S) \to \gamma p\overline{p}$
$4.4 ^{+1.6}_{-1.4} \pm 0.6$	$14.3^{+5.2}_{-4.7}$	BAI 04F	BES	$\psi(2S) \to \gamma\chi_{c2}(1P) \to \gamma\overline{p}p$

[1] Calculated by us. NAIK 08 reports $B(\chi_{c2} \to p\overline{p}) = (7.7 \pm 0.8 \pm 0.4 \pm 0.5) \times 10^{-5}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

$\Gamma(\chi_{c2}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{69}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
17.5±1.3 OUR FIT				
17.4±1.4 OUR AVERAGE				
18.2±1.4±0.9	207	[1] ABLIKIM 13H	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$
15.9±2.1±1.0	71 ± 9	[2] NAIK 08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[1] Calculated by us. ABLIKIM 13H reports $B(\chi_{c2} \to \Lambda\overline{\Lambda}) = (20.8 \pm 1.6 \pm 2.3) \times 10^{-5}$ from a measurement of $B(\chi_{c2} \to \Lambda\overline{\Lambda}) \times B(\psi(2S) \to \gamma\chi_{c2})$ assuming $B(\psi(2S) \to \gamma\chi_{c2}) = (8.74 \pm 0.35)\%$.

[2] Calculated by us. NAIK 08 reports $B(\chi_{c2} \to \Lambda\overline{\Lambda}) = (17.0 \pm 2.2 \pm 1.1 \pm 1.1) \times 10^{-5}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

$\Gamma(\chi_{c2}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{69}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
5.1±0.4 OUR FIT				
$\mathbf{7.1^{+3.1}_{-2.9} \pm 1.3}$	$8.3^{+3.7}_{-3.4}$	[1] BAI 03E	BES	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[1] BAI 03E reports $[B(\chi_{c2} \to \Lambda\overline{\Lambda})\, B(\psi(2S) \to \gamma\chi_{c2}) / B(\psi(2S) \to J/\psi\pi^+\pi^-)] \times [B^2(\Lambda \to \pi^- p) / B(J/\psi \to p\overline{p})] = (1.33^{+0.59}_{-0.55} \pm 0.25)\%$. We calculate from this measurement the presented value using $B(\Lambda \to \pi^- p) = (63.9 \pm 0.5)\%$ and $B(J/\psi \to p\overline{p}) = (2.17 \pm 0.07) \times 10^{-3}$.

$\Gamma(\chi_{c2}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{25}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.12±0.08 OUR FIT				
2.17±0.09 OUR AVERAGE				
2.19±0.05±0.15	4.5k	[1] ABLIKIM 10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$
2.23±0.06±0.10	2.5k	[2] ASNER 09	CLEO	$\psi(2S) \to \gamma\pi^+\pi^-$
1.90±0.08±0.20	0.8k	[3] ASNER 09	CLEO	$\psi(2S) \to \gamma\pi^0\pi^0$

[1] Calculated by us. ABLIKIM 10A reports $B(\chi_{c2} \to \pi^0\pi^0) = (0.88 \pm 0.02 \pm 0.06 \pm 0.04) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (8.3 \pm 0.4)\%$. We have multiplied the $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$.

[2] Calculated by us. ASNER 09 reports $B(\chi_{c2} \to \pi^+\pi^-) = (1.59 \pm 0.04 \pm 0.07 \pm 0.10) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$. We have multiplied the $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$.

[3] Calculated by us. ASNER 09 reports $B(\chi_{c2} \to \pi^0\pi^0) = (0.68 \pm 0.03 \pm 0.07 \pm 0.04) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$. We have multiplied the $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$.

$\Gamma(\chi_{c2}(1P) \to \pi\pi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{25}/\Gamma \times \Gamma_{153}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.612±0.023 OUR FIT					
0.54 ±0.06 OUR AVERAGE					
0.66 ±0.18 ±0.37	21 ± 6	[1] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$
0.54 ±0.05 ±0.04	185 ± 16	[2] BAI	98I	BES	$\psi(2S) \to \gamma\pi^+\pi^-$

[1] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$.

[2] Calculated by us. The value for $B(\chi_{c2} \to \pi^+\pi^-)$ reported by BAI 98I is derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$.

$\Gamma(\chi_{c2}(1P) \to \eta\eta)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{31}/\Gamma \times \Gamma_{153}^{\psi(2S)}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.52±0.04 OUR FIT						
0.52±0.04 OUR AVERAGE						
0.54±0.03±0.04		386	[1] ABLIKIM	10A	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$
0.47±0.05±0.05		156	ASNER	09	CLEO	$\psi(2S) \to \gamma\eta\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 0.44	90		[2] ADAMS	07	CLEO	$\psi(2S) \to \gamma\chi_{c2}$
< 3	90		BAI	03C	BES	$\psi(2S) \to \gamma\eta\eta \to 5\gamma$
0.62±0.31±0.19			LEE	85	CBAL	$\psi(2S) \to$ photons

[1] Calculated by us. ABLIKIM 10A reports $B(\chi_{c2} \to \eta\eta) = (0.65 \pm 0.04 \pm 0.05 \pm 0.03) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (8.3 \pm 0.4)\%$.

[2] Superseded by ASNER 09.

$\Gamma(\chi_{c2}(1P) \to K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{32}/\Gamma \times \Gamma_{153}^{\psi(2S)}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
9.6±0.6 OUR FIT					
10.5±0.3±0.6	1.6k	[1] ASNER	09	CLEO	$\psi(2S) \to \gamma K^+K^-$

[1] Calculated by us. ASNER 09 reports $B(\chi_{c2} \to K^+K^-) = (1.13 \pm 0.03 \pm 0.06 \pm 0.07) \times 10^{-3}$ using $B(\psi(2S) \to \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

$\Gamma(\chi_{c2}(1P) \to K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{32}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.276±0.017 OUR FIT					
0.190±0.034±0.019	115 ± 13	[1] BAI	98I	BES	$\psi(2S) \to \gamma K^+K^-$

[1] Calculated by us. The value for B($\chi_{c2} \to K^+K^-$) reported by BAI 98I is derived using B($\psi(2S) \to \gamma\chi_{c2}$) = (7.8 ± 0.8)% and B($\psi(2S) \to J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

$\Gamma(\chi_{c2}(1P) \to K^0_S K^0_S)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{33}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.0 ±0.4 OUR FIT					
5.0 ±0.4 OUR AVERAGE					
4.9 ±0.3 ±0.3	373 ± 20	[1] ASNER	09	CLEO	$\psi(2S) \to \gamma K^0_S K^0_S$
5.72±0.76±0.63	65	ABLIKIM	05O	BES2	$\psi(2S) \to \gamma K^0_S K^0_S$

[1] Calculated by us. ASNER 09 reports B($\chi_{c2} \to K^0_S K^0_S$) = (0.53 ± 0.03 ± 0.03 ± 0.03) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.33 ± 0.14 ± 0.61)%.

$\Gamma(\chi_{c2}(1P) \to K^0_S K^0_S)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{33}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
14.4±1.1 OUR FIT				
14.7±4.1±3.3	[1] BAI	99B	BES	$\psi(2S) \to \gamma K^0_S K^0_S$

[1] Calculated by us. The value of B($\chi_{c2} \to K^0_S K^0_S$) reported by BAI 99B was derived using B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (7.8 ± 0.8)% and B($\psi(2S) \to J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

$\Gamma(\chi_{c2}(1P) \to \overline{K}^0 K^+\pi^- + c.c.)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{42}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.22±0.17 OUR FIT					
1.15±0.18 OUR AVERAGE					
1.21±0.19±0.09	37	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma K^0_S K^\pm\pi^\mp$
0.97±0.32±0.13	28	[2] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma K^0_S K^\pm\pi^\mp$

[1] Calculated by us. ATHAR 07 reports B($\chi_{c2} \to \overline{K}^0 K^+\pi^- +$ c.c.) = (1.3 ± 0.2 ± 0.1 ± 0.1) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.33 ± 0.14 ± 0.61)%.

[2] Calculated by us. ABLIKIM 06R reports B($\chi_{c2} \to K^0_S K^\pm\pi^\mp$) = (0.6 ± 0.2 ± 0.1) × 10^{-3} using B($\psi(2S) \to \gamma\chi_{c2}$) = (8.1 ± 0.6)%. We have multiplied by 2 to obtain $\overline{K}^0 K^+\pi^-$ + c.c. from $K^0_S K^\pm\pi^\mp$.

$\Gamma(\chi_{c2}(1P) \to 2(\pi^+\pi^-))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_1/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.79±0.26 OUR FIT				
3.1 ±1.0 OUR AVERAGE Error includes scale factor of 2.5.				
2.3 ±0.1 ±0.5	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
4.3 ±0.6	[2] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

[1] Calculated by us. The value for $B(\chi_{c2} \to 2\pi^+2\pi^-)$ reported in BAI 99B is derived using $B(\psi(2S) \to \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

[2] The value for $B(\psi(2S) \to \gamma\chi_{c2}) \times B(\chi_{c2} \to 2\pi^+\pi^-)$ reported in TANENBAUM 78 is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) \times B(J/\psi(1S)\ell^+\ell^-) = (4.6 \pm 0.7)\%$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$.

$\Gamma(\chi_{c2}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{51}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.57±0.19 OUR FIT					
1.76±0.16±0.24	160	[1] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+2K^-$

[1] Calculated by us. The value of $B(\chi_{c2} \to 2K^+2K^-)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4)\%$.

$\Gamma(\chi_{c2}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{51}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.5±0.5 OUR FIT				
3.6±0.6±0.6	[1] BAI	99B	BES	$\psi(2S) \to \gamma 2K^+2K^-$

[1] Calculated by us. The value of $B(\chi_{c2} \to 2K^+2K^-)$ reported by BAI 99B was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (7.8 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

$\Gamma(\chi_{c2}(1P) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{20}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.01±0.08 OUR FIT					
0.98±0.13 OUR AVERAGE Error includes scale factor of 1.3.					
0.94±0.03±0.10	849	[1] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons
1.38±0.24±0.23	41	[2] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+2K^-$

[1] Calculated by us. The value of $B(\chi_{c2} \to \phi\phi)$ reported by ABLIKIM 11K was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35)\%$.

[2] Calculated by us. The value of $B(\chi_{c2} \to \phi\phi)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \to \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4)\%$.

$\Gamma(\chi_{c2}(1P) \to \phi\phi)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{20}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
2.92±0.24 OUR FIT				
4.8 ±1.3 ±1.3	[1] BAI	99B	BES	$\psi(2S) \to \gamma 2K^+2K^-$

[1] Calculated by us. The value of B($\chi_{c2} \to \phi\phi$) reported by BAI 99B was derived using B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (7.8 ± 0.8)% and B($\psi(2S) \to J/\psi\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

$\Gamma(\chi_{c2}(1P) \to \Sigma^+ \overline{p} K^0_S + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{79}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
7.85±0.77±0.44	129	[1] ABLIKIM	19BB	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{p}K^0_S$ + c.c.

[1] Calculated by us. ABLIKIM 19BB reports B($\chi_{c2} \to \Sigma^+\overline{p}K^0_S$ + c.c.) = (8.25 ± 0.83 ± 0.49) × 10^{-5} using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.52 ± 0.20)% and other branching fractions from PDG 18.

$\Gamma(\chi_{c2}(1P) \to \Sigma^0 \overline{p} K^+ + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{80}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

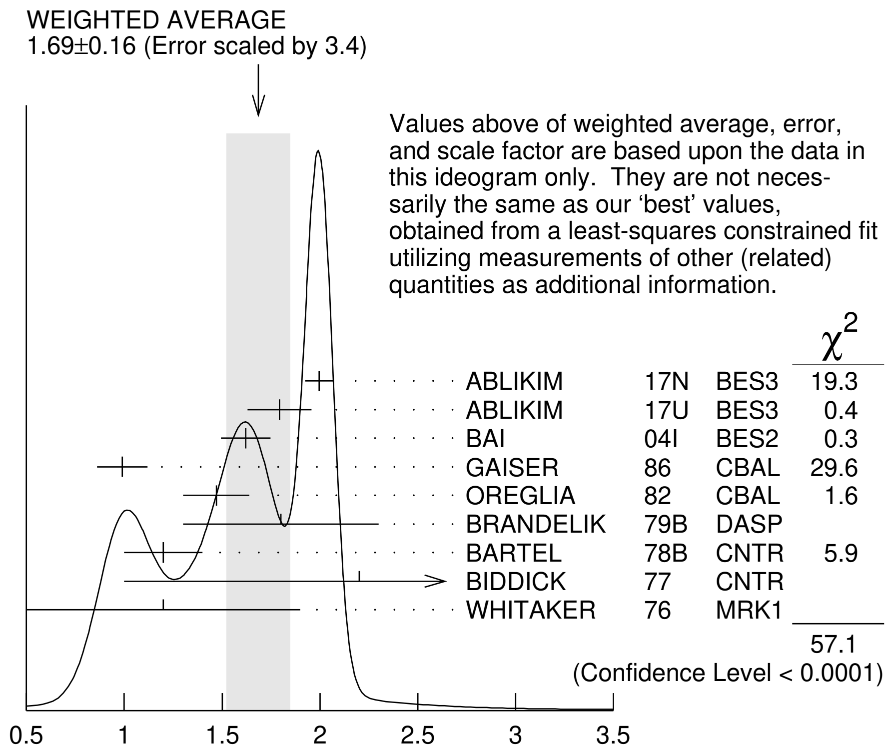
VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
0.87±0.06±0.04	271	[1] ABLIKIM	20AE	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{p}K^+$ + c.c.

[1] Calculated by us. ABLIKIM 20AE reports B($\chi_{c2} \to \Sigma^0\overline{p}K^+$ + c.c.) = (0.91 ± 0.06 ± 0.05) × 10^{-4} using B($\psi(2S) \to \gamma\chi_{c2}$) = (9.52 ± 0.20)% and other branching fractions from PDG 20.

$\Gamma(\chi_{c2}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ — $\Gamma_{91}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.81 ±0.04 OUR FIT					
1.69 ±0.16 OUR AVERAGE		Error includes scale factor of 3.4. See the ideogram below.			
1.996±0.008±0.070	81k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma J/\psi$
1.793±0.008±0.163	1.0M	ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
1.62 ±0.04 ±0.12	5.8k	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
0.99 ±0.10 ±0.08		GAISER	86	CBAL	$\psi(2S) \to \gamma X$
1.47 ±0.17		[2] OREGLIA	82	CBAL	$\psi(2S) \to \gamma\chi_{c2}$
1.8 ±0.5		[3] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c2}$
1.2 ±0.2		[3] BARTEL	78B	CNTR	$\psi(2S) \to \gamma\chi_{c2}$
2.2 ±1.2		[4] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
1.2 ±0.7		[2] WHITAKER	76	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.874±0.007±0.102	76k	[5] ABLIKIM	12O	BES3	$\psi(2S) \to \gamma\chi_{c2}$
1.95 ±0.02 ±0.07	12.4k	[6] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c2}$
1.85 ±0.04 ±0.07	1.9k	[7] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Uses B($J/\psi \to e^+e^-$) = (5.971 ± 0.032)% and B($J/\psi \to \mu^+\mu^-$) = (5.961 ± 0.033)%.
[2] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020.
[3] Recalculated by us using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010.
[4] Assumes isotropic gamma distribution.
[5] Superseded by ABLIKIM 17N.
[6] Not independent from other measurements of MENDEZ 08.
[7] Not independent from other values reported by ADAM 05A.



$\Gamma\big(\chi_{c2}(1P) \to \gamma J/\psi(1S)\big)/\Gamma_{\text{total}} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c2}(1P)\big)/\Gamma_{\text{total}}$ (units 10^{-2})

$\Gamma\big(\chi_{c2}(1P) \to \gamma J/\psi(1S)\big)/\Gamma_{\text{total}} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c2}(1P)\big)/\Gamma\big(\psi(2S) \to J/\psi(1S)\,\text{anything}\big)$ $\quad \Gamma_{91}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{9}$

$\Gamma_{91}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{9} = \Gamma_{91}/\Gamma \times \Gamma^{\psi(2S)}_{153}/(\Gamma^{\psi(2S)}_{11}+\Gamma^{\psi(2S)}_{12}+\Gamma^{\psi(2S)}_{13}+ 0.343\Gamma^{\psi(2S)}_{152}+0.190\Gamma^{\psi(2S)}_{153})$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.95±0.06 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.12±0.03±0.09	12.4k	[1] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c2}$
3.11±0.07±0.07	1.9k	ADAM	05A	CLEO	Repl. by MENDEZ 08

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

$\Gamma\big(\chi_{c2}(1P) \to \gamma J/\psi(1S)\big)/\Gamma_{\text{total}} \times \Gamma\big(\psi(2S) \to \gamma\chi_{c2}(1P)\big)/\Gamma\big(\psi(2S) \to J/\psi(1S)\pi^+\pi^-\big)$ $\quad \Gamma_{91}/\Gamma \times \Gamma^{\psi(2S)}_{153}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.22±0.11 OUR FIT					
5.53±0.17 OUR AVERAGE					
5.56±0.05±0.16	12.4k	MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c2}$
6.0 ±2.8	1.3k	[1] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
3.9 ±1.2		[2] HIMEL	80	MRK2	$\psi(2S) \to \gamma\chi_{c2}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.52±0.13±0.13	1.9k	[3] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] From a fit to the J/ψ recoil mass spectra.
[2] The value for B($\psi(2S) \to \gamma\chi_{c2}$)×B($\chi_{c2} \to \gamma J/\psi(1S)$) reported in HIMEL 80 is derived using B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (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).
[3] Not independent from other values reported by ADAM 05A.

$\Gamma(\chi_{c2}(1P) \to \gamma\gamma)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))/\Gamma_{total}$ $\Gamma_{95}/\Gamma \times \Gamma_{153}^{\psi(2S)}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
2.71±0.08 OUR FIT					
2.82±0.10 OUR AVERAGE					
2.83±0.08±0.06	5k	[1] ABLIKIM	17AE	BES3	$\psi(2S) \to \gamma\chi_{c2} \to 3\gamma$
2.68±0.28±0.15	0.3k	ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{c2} \to 3\gamma$
7.0 ±2.1 ±2.0		LEE	85	CBAL	$\psi(2S) \to \gamma\chi_{c2}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.81±0.17±0.15	1.1k	[2] ABLIKIM	12A	BES3	$\psi(2S) \to \gamma\chi_{c2} \to 3\gamma$

[1] ABLIKIM 17AE measures the ratio of two-photon partial widths for the helicity $\lambda = 0$ and helicity $\lambda = 2$ components to be $f_{0/2} = \Gamma_{\gamma\gamma}^{\lambda=0} / \Gamma_{\gamma\gamma}^{\lambda=2} = 0.000 \pm 0.006 \pm 0.012$.
[2] ABLIKIM 12A measures the ratio of two-photon partial widths for the helicity $\lambda = 0$ and helicity $\lambda = 2$ components to be $f_{0/2} = \Gamma_{\gamma\gamma}^{\lambda=0}/\Gamma_{\gamma\gamma}^{\lambda=2} = 0.00 \pm 0.02 \pm 0.02$. Superseded by ABLIKIM 17AE.

$\Gamma(\chi_{c2}(1P) \to \gamma\gamma)/\Gamma(\chi_{c0}(1P) \to \gamma\gamma)$ $\Gamma_{95}/\Gamma_{95}^{\chi_{c0}(1P)}$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.292±0.028 OUR AVERAGE					
0.295±0.014±0.028	8k	[1] ABLIKIM	17AE	BES3	$\psi(2S) \to \gamma\chi_{cJ} \to 3\gamma$
0.278±0.050±0.036	0.5k	[1] ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{cJ} \to 3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.271±0.029±0.030	1.9k	[1,2] ABLIKIM	12A	BES3	$\psi(2S) \to \gamma\chi_{cJ} \to 3\gamma$

[1] Not independent from the values of Γ(χ_{c0}, χ_{c2}) and B($\psi(2S) \to \chi_{c0}, \chi_{c2}$).
[2] Superseded by ABLIKIM 17AE.

MULTIPOLE AMPLITUDES IN $\chi_{c2}(1P) \to \gamma J/\psi(1S)$ RADIATIVE DECAY

$a_2 = M2/\sqrt{E1^2 + M2^2 + E3^2}$ Magnetic quadrupole fractional transition amplitude

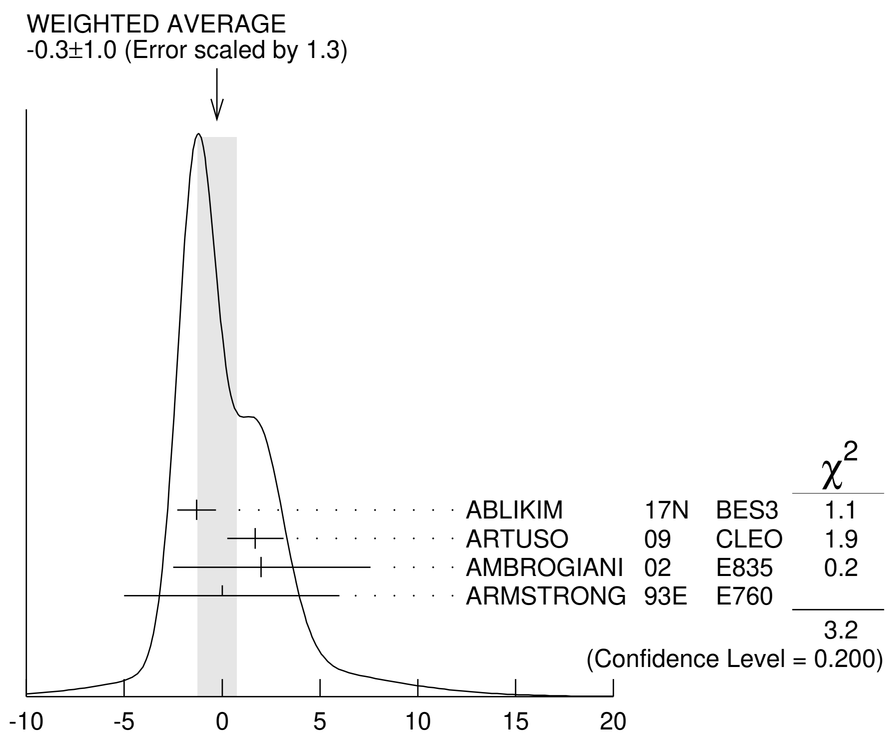
VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
−11.0± 1.0 OUR AVERAGE					
−12.0± 1.3±0.4	89k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
− 9.3± 1.6±0.3	19.8k	[2] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-9.3^{+3.9}_{-4.1}\pm0.6$	5.9k	[3] AMBROGIANI	02	E835	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
−14 ± 6	1.9k	[3] ARMSTRONG	93E	E760	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
$-33.3^{+11.6}_{-29.2}$	441	[3] OREGLIA	82	CBAL	$\psi(2S) \to \chi_{c1}\gamma \to J/\psi\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
− 7.9± 1.9±0.3	19.8k	[4] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

[1] Correlated with a_3, b_2, and b_3 with correlation coefficients $\rho_{a_2 a_3} = 0.733$, $\rho_{a_2 b_2} = -0.605$, and $\rho_{a_2 b_3} = -0.095$.
[2] From a fit with floating $M2$ amplitudes a_2 and b_2, and fixed $E3$ amplitudes a_3=b_3=0.
[3] Assuming a_3=0.
[4] From a fit with floating $M2$ and $E3$ amplitudes a_2, b_2, and a_3, and b_3.

$a_3 = E3/\sqrt{E1^2 + M2^2 + E3^2}$ Electric octupole fractional transition amplitude

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
−0.3±1.0 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
$-1.3\pm0.9\pm0.4$	89k	[1] ABLIKIM 17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$1.7\pm1.4\pm0.3$	19.8k	[2] ARTUSO 09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$2.0^{+5.5}_{-4.4}\pm0.9$	5908	AMBROGIANI 02	E835	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
$0\ ^{+6}_{-5}$	1904	ARMSTRONG 93E	E760	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$

[1] Correlated with a_2, b_2, and b_3 with correlation coefficients $\rho_{a_2 a_3} = 0.733$, $\rho_{a_3 b_2} = -0.422$, and $\rho_{a_3 b_3} = -0.024$.
[2] From a fit with floating $M2$ and $E3$ amplitudes a_2, b_2, and a_3, and b_3.



$a_3 = E3/\sqrt{E1^2 + M2^2 + E3^2}$ Electric octupole fractional transition amplitude (units 10^{-2})

MULTIPOLE AMPLITUDES IN $\psi(2S) \to \gamma\chi_{c2}(1P)$ RADIATIVE DECAY

$b_2 = M2/\sqrt{E1^2 + M2^2 + E3^2}$ Magnetic quadrupole fractional transition amplitude

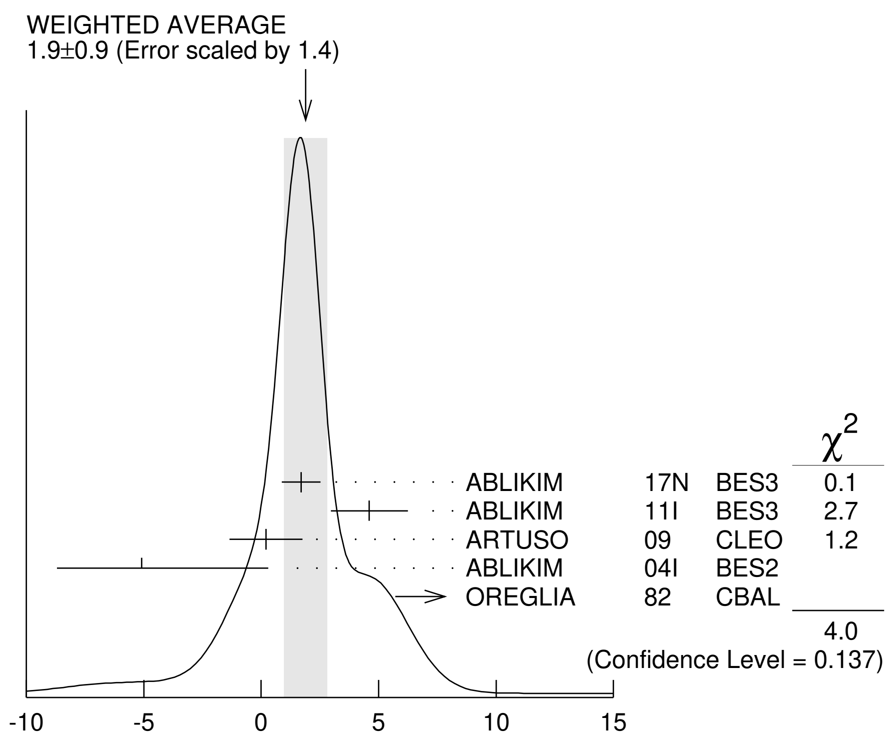
VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.9±0.9 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.			
$1.7 \pm 0.8 \pm 0.2$	89k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$4.6 \pm 1.0 \pm 1.3$	13.8k	[2] ABLIKIM	11I	BES3	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$
$0.2 \pm 1.5 \pm 0.4$	19.8k	[3] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-5.1^{+5.4}_{-3.6}$	721	[2] ABLIKIM	04I	BES2	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$
$13.2^{+9.8}_{-7.5}$	441	[4] OREGLIA	82	CBAL	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.0 \pm 1.3 \pm 0.3$	19.8k	[4] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

[1] Correlated with a_2, a_3, and b_3 with correlation coefficients $\rho_{a_2 b_2} = -0.605$, $\rho_{a_3 b_2} = -0.422$, and $\rho_{b_2 b_3} = 0.384$.

[2] From a fit with floating $M2$ and $E3$ amplitudes b_2 and b_3.

[3] From a fit with floating $M2$ and $E3$ amplitudes a_2, b_2, and a_3, and b_3.

[4] From a fit with floating $M2$ amplitudes a_2 and b_2, and fixed $E3$ amplitudes $a_3 = b_3 = 0$.



$b_2 = M2/\sqrt{E1^2 + M2^2 + E3^2}$ Magnetic quadrupole fractional transition amplitude (units 10^{-2})

$b_3 = E3/\sqrt{E1^2 + M2^2 + E3^2}$ Electric octupole fractional transition amplitude

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
−1.0±0.6 OUR AVERAGE					
$-1.4\pm0.7\pm0.4$	89k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$1.5\pm0.8\pm1.8$	13.8k	[2] ABLIKIM	11I	BES3	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$
$-0.8\pm1.2\pm0.2$	19.8k	ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-2.7^{+4.3}_{-2.9}$	721	[2] ABLIKIM	04I	BES2	$\psi(2S) \to \gamma\pi^+\pi^-, \gamma K^+K^-$

[1] Correlated with a_2, a_3, and b_2 with correlation coefficients $\rho_{a_2 b_3} = -0.095$, $\rho_{a_3 b_3} = -0.024$, and $\rho_{b_2 b_3} = 0.384$.

[2] From a fit with floating $M2$ and $E3$ amplitudes b_2 and b_3.

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS $\psi(2S) \to \gamma\chi_{c2}(1P)$ and $\chi_{c2} \to \gamma J/\psi(1S)$

b_2/a_2 Magnetic quadrupole transition amplitude ratio

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{-11^{+14}_{-15}}$	19.8k	[1] ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

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

$\chi_{c2}(1P)$ REFERENCES

ABLIKIM	20AE	PR D102 092006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	20B	PR D101 012012	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	20I	PR D101 092002	M. Ablikim *et al.*	(BESIII Collab.)
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)
ABLIKIM	19AA	PR D99 052008	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19AU	PR D100 052010	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19BB	PR D100 092006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19J	PR D99 012015	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19Z	PR D99 051101	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	18V	PR D97 052011	M. Ablikim *et al.*	(BESIII Collab.)
PDG	18	PR D98 030001	M. Tanabashi *et al.*	(PDG Collab.)
AAIJ	17BB	EPJ C77 609	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17BI	PRL 119 221801	R. Aaij *et al.*	(LHCb Collab.)
ABLIKIM	17AE	PR D96 092007	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17AG	PR D96 111102	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17AI	PR D96 112006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17I	PRL 118 221802	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17N	PR D95 072004	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17U	PR D96 032001	M. Ablikim *et al.*	(BESIII Collab.)
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)
ABLIKIM	15I	PR D91 092006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	15M	PR D91 112008	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	15N	PR D91 112018	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	14J	PR D89 074030	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	13B	PR D87 012002	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	13D	PR D87 012007	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	13H	PR D87 032007	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	13V	PR D88 112001	M. Ablikim *et al.*	(BESIII Collab.)
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)
ABLIKIM	12A	PR D85 112008	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	12I	PR D86 052004	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	12J	PR D86 052011	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	12O	PRL 109 172002	M. Ablikim *et al.*	(BESIII Collab.)

LEES	12AE	PR D86 092005	J.P. Lees *et al.*	(BABAR Collab.)
LIU	12B	PRL 108 232001	Z.Q. Liu *et al.*	(BELLE Collab.)
ABLIKIM	11A	PR D83 012006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	11E	PR D83 112005	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	11F	PR D83 112009	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	11I	PR D84 092006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	11K	PRL 107 092001	M. Ablikim *et al.*	(BESIII Collab.)
DEL-AMO-SA...	11M	PR D84 012004	P. del Amo Sanchez *et al.*	(BABAR Collab.)
ABLIKIM	10A	PR D81 052005	M. Ablikim *et al.*	(BESIII Collab.)
ONYISI	10	PR D82 011103	P.U.E. Onyisi *et al.*	(CLEO Collab.)
UEHARA	10A	PR D82 114031	S. Uehara *et al.*	(BELLE Collab.)
ARTUSO	09	PR D80 112003	M. Artuso *et al.*	(CLEO Collab.)
ASNER	09	PR D79 072007	D.M. Asner *et al.*	(CLEO Collab.)
UEHARA	09	PR D79 052009	S. Uehara *et al.*	(BELLE Collab.)
BENNETT	08A	PRL 101 151801	J.V. Bennett *et al.*	(CLEO Collab.)
ECKLUND	08A	PR D78 091501	K.M. Ecklund *et al.*	(CLEO Collab.)
HE	08B	PR D78 092004	Q. He *et al.*	(CLEO Collab.)
MENDEZ	08	PR D78 011102	H. Mendez *et al.*	(CLEO Collab.)
NAIK	08	PR D78 031101	P. Naik *et al.*	(CLEO Collab.)
UEHARA	08	EPJ C53 1	S. Uehara *et al.*	(BELLE Collab.)
ADAMS	07	PR D75 071101	G.S. Adams *et al.*	(CLEO Collab.)
ATHAR	07	PR D75 032002	S.B. Athar *et al.*	(CLEO Collab.)
CHEN	07B	PL B651 15	W.T. Chen *et al.*	(BELLE Collab.)
ABLIKIM	06D	PR D73 052006	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06I	PR D74 012004	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06R	PR D74 072001	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06T	PL B642 197	M. Ablikim *et al.*	(BES Collab.)
DOBBS	06	PR D73 071101	S. Dobbs *et al.*	(CLEO Collab.)
ABLIKIM	05G	PR D71 092002	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05N	PL B630 7	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05O	PL B630 21	M. Ablikim *et al.*	(BES Collab.)
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)
ANDREOTTI	05A	NP B717 34	M. Andreotti *et al.*	(FNAL E835 Collab.)
NAKAZAWA	05	PL B615 39	H. Nakazawa *et al.*	(BELLE Collab.)
ABLIKIM	04B	PR D70 012003	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	04H	PR D70 092003	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	04I	PR D70 092004	M. Ablikim *et al.*	(BES Collab.)
ATHAR	04	PR D70 112002	S.B. Athar *et al.*	(CLEO Collab.)
BAI	04F	PR D69 092001	J.Z. Bai *et al.*	(BES Collab.)
BAI	04I	PR D70 012006	J.Z. Bai *et al.*	(BES Collab.)
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)
BAI	03C	PR D67 032004	J.Z. Bai *et al.*	(BES Collab.)
BAI	03E	PR D67 112001	J.Z. Bai *et al.*	(BES Collab.)
ABE	02T	PL B540 33	K. Abe *et al.*	(BELLE Collab.)
AMBROGIANI	02	PR D65 052002	M. Ambrogiani *et al.*	(FNAL E835 Collab.)
EISENSTEIN	01	PRL 87 061801	B.I. Eisenstein *et al.*	(CLEO Collab.)
AMBROGIANI	00B	PR D62 052002	M. Ambrogiani *et al.*	(FNAL E835 Collab.)
ACCIARRI	99E	PL B453 73	M. Acciarri *et al.*	(L3 Collab.)
BAI	99B	PR D60 072001	J.Z. Bai *et al.*	(BES Collab.)
ACKER..,K...	98	PL B439 197	K. Ackerstaff *et al.*	(OPAL Collab.)
BAI	98D	PR D58 092006	J.Z. Bai *et al.*	(BES Collab.)
BAI	98I	PRL 81 3091	J.Z. Bai *et al.*	(BES Collab.)
DOMINICK	94	PR D50 4265	J. Dominick *et al.*	(CLEO Collab.)
ARMSTRONG	93	PRL 70 2988	T.A. Armstrong *et al.*	(FNAL E760 Collab.)
ARMSTRONG	93E	PR D48 3037	T.A. Armstrong *et al.*	(FNAL-E760 Collab.)
BAUER	93	PL B302 345	D.A. Bauer *et al.*	(TPC Collab.)
ARMSTRONG	92	NP B373 35	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)
Also		PRL 68 1468	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)
BAGLIN	87B	PL B187 191	C. Baglin *et al.*	(R704 Collab.)
BAGLIN	86B	PL B172 455	C. Baglin	(LAPP, CERN, GENO, LYON, OSLO+)
GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)
LEE	85	SLAC 282	R.A. Lee	(SLAC)
LEMOIGNE	82	PL 113B 509	Y. Lemoigne *et al.*	(SACL, LOIC, SHMP+)
OREGLIA	82	PR D25 2259	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)
Also		Private Comm.	M.J. Oreglia	(EFI)
BARATE	81	PR D24 2994	R. Barate *et al.*	(SACL, LOIC, SHMP, CERN+)
HIMEL	80	PRL 44 920	T. Himel *et al.*	(LBL, SLAC)
Also		Private Comm.	G. Trilling	(LBL, UCB)
BRANDELIK	79B	NP B160 426	R. Brandelik *et al.*	(DASP Collab.)
BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)

TANENBAUM	78	PR D17 1731	W.M. Tanenbaum *et al.*	(SLAC, LBL)
Also		Private Comm.	G. Trilling	(LBL, UCB)
BIDDICK	77	PRL 38 1324	C.J. Biddick *et al.*	(UCSD, UMD, PAVI+)
WHITAKER	76	PRL 37 1596	J.S. Whitaker *et al.*	(SLAC, LBL)