

$\chi_{c2}(1P)$

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

See the Review on “Branching Ratios of $\psi(2S)$, $\chi_{c0,1,2}$ and $\eta_c(1S)$ ”
before the $\chi_{c0}(1P)$ Listings.

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

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

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	Error includes scale factor of 1.1.			
2.00 ± 0.11 OUR AVERAGE				
2.10 $\pm 0.20 \pm 0.02$	4.0k	AAIJ	17BI LHCb	$\chi_{c2} \rightarrow J/\psi \mu^+ \mu^-$
1.915 $\pm 0.188 \pm 0.013$		ANDREOTTI	05A E835	$p\bar{p} \rightarrow e^+ e^- \gamma$
1.96 $\pm 0.17 \pm 0.07$	585	¹ ARMSTRONG	92 E760	$\bar{p}p \rightarrow e^+ e^- \gamma$
2.6 $+1.4$ -1.0	50	BAGLIN	86B SPEC	$\bar{p}p \rightarrow e^+ e^- X$
2.8 $+2.1$ -2.0		² GAISER	86 CBAL	$\psi(2S) \rightarrow \gamma X$

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)	Scale factor/ Confidence level
Hadronic decays		
Γ_1 $2(\pi^+ \pi^-)$	(1.12 $\pm$ 0.08) %	S=1.5
Γ_2 $\rho \rho$		
Γ_3 $\pi^+ \pi^- \pi^0 \pi^0$	(1.86 $\pm$ 0.24) %	
Γ_4 $\rho^+ \pi^- \pi^0 + \text{c.c.}$	(2.22 $\pm$ 0.35) %	
Γ_5 $4\pi^0$	(1.13 $\pm$ 0.15) $\times 10^{-3}$	
Γ_6 $K^+ K^- \pi^0 \pi^0$	(2.1 $\pm$ 0.4) $\times 10^{-3}$	
Γ_7 $K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(1.40 $\pm$ 0.20) %	
Γ_8 $\rho^- K^+ \bar{K}^0 + \text{c.c.}$	(4.2 $\pm$ 1.3) $\times 10^{-3}$	
Γ_9 $K^*(892)^0 K^- \pi^+ \rightarrow$ $K^- \pi^+ K^0 \pi^0 + \text{c.c.}$	(3.0 $\pm$ 0.8) $\times 10^{-3}$	
Γ_{10} $K^*(892)^0 \bar{K}^0 \pi^0 \rightarrow$ $K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(3.9 $\pm$ 0.9) $\times 10^{-3}$	
Γ_{11} $K^*(892)^- K^+ \pi^0 \rightarrow$ $K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(3.8 $\pm$ 0.8) $\times 10^{-3}$	
Γ_{12} $K^*(892)^+ \bar{K}^0 \pi^- \rightarrow$ $K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(3.0 $\pm$ 0.8) $\times 10^{-3}$	
Γ_{13} $K^+ K^- \eta \pi^0$	(1.3 $\pm$ 0.4) $\times 10^{-3}$	
Γ_{14} $K^+ K^- \pi^+ \pi^-$	(8.4 $\pm$ 1.1) $\times 10^{-3}$	S=1.2
Γ_{15} $K^+ K^- \pi^+ \pi^- \pi^0$	(1.17 $\pm$ 0.13) %	
Γ_{16} $K_S^0 K^\pm \pi^\mp \pi^+ \pi^-$	(7.3 $\pm$ 0.8) $\times 10^{-3}$	
Γ_{17} $K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.}$	(2.1 $\pm$ 1.0) $\times 10^{-3}$	
Γ_{18} $K^*(892)^0 \bar{K}^*(892)^0$	(2.2 $\pm$ 0.9) $\times 10^{-3}$	S=2.2
Γ_{19} $3(\pi^+ \pi^-)$	(1.53 $\pm$ 0.19) %	S=3.8
Γ_{20} $\phi \phi$	(1.23 $\pm$ 0.07) $\times 10^{-3}$	S=1.9
Γ_{21} $\phi \phi \eta$	(5.4 $\pm$ 0.7) $\times 10^{-4}$	
Γ_{22} $\omega \omega$	(8.6 $\pm$ 1.0) $\times 10^{-4}$	
Γ_{23} $\omega K^+ K^-$	(7.3 $\pm$ 0.9) $\times 10^{-4}$	

Γ_{24}	$\omega\phi$	$(9.7 \pm 2.8) \times 10^{-6}$	
Γ_{25}	$\pi\pi$	$(2.26 \pm 0.10) \times 10^{-3}$	
Γ_{26}	$\rho^0\pi^+\pi^-$	$(4.0 \pm 1.7) \times 10^{-3}$	
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}	$\pi^+\pi^-\eta$	$(4.9 \pm 1.3) \times 10^{-4}$	
Γ_{30}	$\pi^+\pi^-\eta'$	$(5.1 \pm 1.9) \times 10^{-4}$	
Γ_{31}	$\eta\eta$	$(5.5 \pm 0.4) \times 10^{-4}$	
Γ_{32}	K^+K^-	$(1.02 \pm 0.15) \times 10^{-3}$	S=2.2
Γ_{33}	$K_S^0K_S^0$	$(5.3 \pm 0.4) \times 10^{-4}$	
Γ_{34}	$K^*(892)^\pm K^\mp$	$(1.46 \pm 0.21) \times 10^{-4}$	
Γ_{35}	$K^*(892)^0\bar{K}^0 + \text{c.c.}$	$(1.26 \pm 0.27) \times 10^{-4}$	
Γ_{36}	$K_2^*(1430)^\pm K^\mp$	$(1.51 \pm 0.13) \times 10^{-3}$	
Γ_{37}	$K_2^*(1430)^0\bar{K}^0 + \text{c.c.}$	$(1.26 \pm 0.17) \times 10^{-3}$	
Γ_{38}	$K_3^*(1780)^\pm K^\mp$	$(5.2 \pm 0.8) \times 10^{-4}$	
Γ_{39}	$K_3^*(1780)^0\bar{K}^0 + \text{c.c.}$	$(5.7 \pm 2.1) \times 10^{-4}$	
Γ_{40}	$a_2(1320)^0\pi^0$	$(1.31 \pm 0.35) \times 10^{-3}$	
Γ_{41}	$a_2(1320)^\pm\pi^\mp$	$(1.8 \pm 0.6) \times 10^{-3}$	
Γ_{42}	$\bar{K}^0K^+\pi^- + \text{c.c.}$	$(1.30 \pm 0.19) \times 10^{-3}$	
Γ_{43}	$K^+K^-\pi^0$	$(3.1 \pm 0.8) \times 10^{-4}$	
Γ_{44}	$K^+K^-\eta$	$< 3.3 \times 10^{-4}$	CL=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}	$\pi^+\pi^-K_S^0K_S^0$	$(2.2 \pm 0.5) \times 10^{-3}$	
Γ_{49}	$K^+K^-K_S^0K_S^0$	$< 4 \times 10^{-4}$	CL=90%
Γ_{50}	$K_S^0K_S^0K_S^0K_S^0$	$(1.15 \pm 0.18) \times 10^{-4}$	
Γ_{51}	$K^+K^-K^+K^-$	$(1.67 \pm 0.22) \times 10^{-3}$	S=1.1
Γ_{52}	$K^+K^-\phi$	$(1.44 \pm 0.30) \times 10^{-3}$	
Γ_{53}	$\bar{K}^0K^+\pi^-\phi + \text{c.c.}$	$(4.8 \pm 0.7) \times 10^{-3}$	
Γ_{54}	$K^+K^-\pi^0\phi$	$(2.7 \pm 0.5) \times 10^{-3}$	
Γ_{55}	$3(K^+K^-)$	$(7.2 \pm 1.5) \times 10^{-6}$	
Γ_{56}	$\phi\pi^+\pi^-\pi^0$	$(9.3 \pm 1.2) \times 10^{-4}$	
Γ_{57}	$p\bar{p}$	$(7.3 \pm 0.4) \times 10^{-5}$	S=1.1
Γ_{58}	$p\bar{p}\pi^0$	$(4.7 \pm 0.4) \times 10^{-4}$	
Γ_{59}	$p\bar{p}\eta$	$(1.77 \pm 0.25) \times 10^{-4}$	
Γ_{60}	$p\bar{p}\omega$	$(3.7 \pm 0.4) \times 10^{-4}$	
Γ_{61}	$p\bar{p}\phi$	$(2.8 \pm 0.9) \times 10^{-5}$	
Γ_{62}	$p\bar{p}\pi^+\pi^-$	$(1.32 \pm 0.34) \times 10^{-3}$	
Γ_{63}	$p\bar{p}\pi^0\pi^0$	$(8.0 \pm 2.4) \times 10^{-4}$	
Γ_{64}	$p\bar{p}K^+K^-$ (non-resonant)	$(1.94 \pm 0.32) \times 10^{-4}$	
Γ_{65}	$p\bar{p}K_S^0K_S^0$	$< 7.9 \times 10^{-4}$	CL=90%
Γ_{66}	$p\bar{p}K_S^0K^- + \text{c.c.}$	$(5.7 \pm 0.6) \times 10^{-5}$	

Γ_{67}	$p\bar{n}\pi^-$	$(8.7 \pm 1.0) \times 10^{-4}$	
Γ_{68}	$\bar{p}n\pi^+$	$(9.1 \pm 0.8) \times 10^{-4}$	
Γ_{69}	$p\bar{n}\pi^-\pi^0$	$(2.21 \pm 0.18) \times 10^{-3}$	
Γ_{70}	$\bar{p}n\pi^+\pi^0$	$(2.14 \pm 0.19) \times 10^{-3}$	
Γ_{71}	$\Lambda\bar{\Lambda}$	$(1.86 \pm 0.16) \times 10^{-4}$	
Γ_{72}	$\Lambda\bar{\Lambda}\pi^+\pi^-$	$(1.27 \pm 0.16) \times 10^{-3}$	
Γ_{73}	$\Lambda\bar{\Lambda}\pi^+\pi^-$ (non-resonant)	$(6.7 \pm 1.5) \times 10^{-4}$	
Γ_{74}	$\Sigma(1385)^+\bar{\Lambda}\pi^- + \text{c.c.}$	$< 4 \times 10^{-4}$	CL=90%
Γ_{75}	$\Sigma(1385)^-\bar{\Lambda}\pi^+ + \text{c.c.}$	$< 6 \times 10^{-4}$	CL=90%
Γ_{76}	$\Lambda\bar{\Lambda}\eta$	$(1.07 \pm 0.26) \times 10^{-4}$	
Γ_{77}	$\Lambda\bar{\Lambda}\omega$	$(1.42 \pm 0.22) \times 10^{-4}$	
Γ_{78}	$\Lambda\bar{\Lambda}\phi$	$(7.2 \pm 0.9) \times 10^{-5}$	
Γ_{79}	$K^+\bar{p}\Lambda + \text{c.c.}$	$(7.9 \pm 0.5) \times 10^{-4}$	
Γ_{80}	$nK_S^0\bar{\Lambda} + \text{c.c.}$	$(3.63 \pm 0.29) \times 10^{-4}$	
Γ_{81}	$K^*(892)^+\bar{p}\Lambda + \text{c.c.}$	$(8.3 \pm 1.2) \times 10^{-4}$	
Γ_{82}	$K^+\bar{p}\Lambda(1520) + \text{c.c.}$	$(2.9 \pm 0.7) \times 10^{-4}$	
Γ_{83}	$\bar{p}\Lambda(1520)K_S^0\pi^+ + \text{c.c.}$	$(4.1 \pm 1.0) \times 10^{-5}$	
Γ_{84}	$\Lambda(1520)\bar{\Lambda}(1520)$	$(4.7 \pm 1.5) \times 10^{-4}$	
Γ_{85}	$\Sigma^0\bar{\Sigma}^0$	$(3.7 \pm 0.6) \times 10^{-5}$	
Γ_{86}	$\Sigma^+\bar{p}K_S^0 + \text{c.c.}$	$(8.4 \pm 1.0) \times 10^{-5}$	
Γ_{87}	$\Sigma^0\bar{p}K^+ + \text{c.c.}$	$(9.3 \pm 0.8) \times 10^{-5}$	
Γ_{88}	$\Sigma^+\bar{\Sigma}^-$	$(3.4 \pm 0.7) \times 10^{-5}$	
Γ_{89}	$\Sigma^+\bar{\Sigma}^-\eta$	$(5.5 \pm 1.3) \times 10^{-5}$	
Γ_{90}	$\Sigma^-\bar{\Sigma}^+$	$(4.5 \pm 1.8) \times 10^{-5}$	
Γ_{91}	$\Sigma(1385)^+\bar{\Sigma}(1385)^-$	$< 1.6 \times 10^{-4}$	CL=90%
Γ_{92}	$\Sigma(1385)^-\bar{\Sigma}(1385)^+$	$< 8 \times 10^{-5}$	CL=90%
Γ_{93}	$K^-\Lambda\Xi^+ + \text{c.c.}$	$(1.79 \pm 0.32) \times 10^{-4}$	
Γ_{94}	$\Xi^0\Xi^0$	$(1.86 \pm 0.22) \times 10^{-4}$	
Γ_{95}	$\Xi^-\Xi^+$	$(1.46 \pm 0.12) \times 10^{-4}$	
Γ_{96}	$\Omega^-\bar{\Omega}^+$	$(4.52 \pm 0.30) \times 10^{-5}$	
Γ_{97}	$J/\psi(1S)\pi^+\pi^-\pi^0$	$< 1.5 \%$	CL=90%
Γ_{98}	$\pi^0\eta_c$	$< 3.2 \times 10^{-3}$	CL=90%
Γ_{99}	$\eta_c(1S)\pi^+\pi^-$	$< 5.4 \times 10^{-3}$	CL=90%

Radiative decays

Γ_{100}	$\gamma J/\psi(1S)$	$(19.5 \pm 0.7) \%$	S=1.5
Γ_{101}	$\gamma\rho^0$	$< 1.9 \times 10^{-5}$	CL=90%
Γ_{102}	$\gamma\omega$	$< 6 \times 10^{-6}$	CL=90%
Γ_{103}	$\gamma\phi$	$< 8 \times 10^{-6}$	CL=90%
Γ_{104}	$\gamma\gamma$	$(2.91 \pm 0.12) \times 10^{-4}$	S=1.3
Γ_{105}	$e^+e^- J/\psi(1S)$	$(2.20 \pm 0.15) \times 10^{-3}$	
Γ_{106}	$\mu^+\mu^- J/\psi(1S)$	$(2.07 \pm 0.34) \times 10^{-4}$	

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

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

x14	5									
x17	1	26								
x18	2	2	0							
x20	4	5	1	1						
x25	16	4	1	2	6					
x26	13	1	0	0	1	2				
x31	8	2	0	1	3	15	1			
x32	4	3	1	1	2	7	1	3		
x33	9	3	1	1	4	16	1	8	4	
x42	5	1	0	1	2	8	1	4	2	5
x51	5	3	1	1	3	8	1	4	3	5
x57	8	6	1	2	5	12	2	6	4	7
x71	8	2	0	1	3	15	1	8	3	8
x100	16	11	3	3	9	25	3	13	8	15
x104	6	-10	-3	-2	-4	18	0	11	0	8
Γ	-19	-17	-4	-5	-13	-26	-4	-13	-10	-16
	x1	x14	x17	x18	x20	x25	x26	x31	x32	x33

x51	2					
x57	4	5				
x71	4	4	6			
x100	7	10	-12	12		
x104	5	2	26	10	12	
Γ	-8	-11	-42	-13	-47	-48
	x42	x51	x57	x71	x100	x104

$\chi_{c2}(1P)$ PARTIAL WIDTHS **$\chi_{c2}(1P) \Gamma(i) \Gamma(\gamma J/\psi(1S)) / \Gamma(\text{total})$** **$\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S)) / \Gamma_{\text{total}}$** **$\Gamma_{57} \Gamma_{100} / \Gamma$**

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
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27.9 ± 1.3 OUR FIT Error includes scale factor of 1.1.**27.5 ± 1.5 OUR AVERAGE**

27.0 ± 1.5 ± 1.1	¹ ANDREOTTI 05A	E835	$p\bar{p} \rightarrow e^+ e^- \gamma$
27.7 ± 1.5 ± 2.0	^{1,2} ARMSTRONG 92	E760	$\bar{p}p \rightarrow e^+ e^- \gamma$
36 ± 8	¹ BAGLIN 86B	SPEC	$\bar{p}p \rightarrow e^+ e^- X$

¹ Calculated by us using $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0593 \pm 0.0010$.² Recalculated by ANDREOTTI 05A. **$\Gamma(\gamma\gamma) \times \Gamma(\gamma J/\psi(1S)) / \Gamma_{\text{total}}$** **$\Gamma_{104} \Gamma_{100} / \Gamma$**

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
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111 ± 5 OUR FIT Error includes scale factor of 1.3.**123 ± 6 OUR AVERAGE**

124.1 ± 2.5 ± 5.9	4960	¹ SEINO 23	BELL	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
111 ± 12 ± 9	147	² DOBBS 06	CLE3	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
139 ± 55 ± 21		^{2,3} ACCIARRI 99E	L3	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
242 ± 65 ± 51		^{2,4} ACKERSTAFF, K 98	OPAL	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
150 ± 42 ± 36		^{2,5} DOMINICK 94	CLE2	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
470 ± 240 ± 120		^{2,6} BAUER 93	TPC	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$

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

114 ± 11 ± 9	136	^{2,7} ABE 02T	BELL	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
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¹ Calculated from the measured $\Gamma_{\gamma\gamma} \times B(\chi_{c2}(1S) \rightarrow \gamma J/\psi(1S)) \times B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 14.8 \pm 0.3 \pm 0.7$ eV, using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 11.93 \pm 0.05\%$.² Calculated by us using $B(J/\psi \rightarrow \ell^+ \ell^-) = 0.1187 \pm 0.0008$.³ The value for $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$ reported in ACCIARRI 99E is derived using $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) \times B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.0162 \pm 0.0014$.⁴ The value for $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$ reported in ACKERSTAFF, K 98 is derived using $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$ and $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1203 \pm 0.0038$.⁵ The value for $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$ reported in DOMINICK 94 is derived using $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$, $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0627 \pm 0.0020$, and $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = 0.0597 \pm 0.0025$.⁶ The value for $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$ reported in BAUER 93 is derived using $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$, $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0627 \pm 0.0020$, and $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = 0.0597 \pm 0.0025$.⁷ All systematic errors added in quadrature. Superseded by SEINO 23. **$\chi_{c2}(1P) \Gamma(i) \Gamma(\gamma\gamma) / \Gamma(\text{total})$** **$\Gamma(2(\pi^+ \pi^-)) \times \Gamma(\gamma\gamma) / \Gamma_{\text{total}}$** **$\Gamma_1 \Gamma_{104} / \Gamma$**

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
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6.4 ± 0.5 OUR FIT Error includes scale factor of 1.5.**5.2 ± 0.7 OUR AVERAGE**

5.01 ± 0.44 ± 0.55	1597 ± 138	UEHARA 08	BELL	$\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(\pi^+ \pi^-)$
6.4 ± 1.8 ± 0.8		EISENSTEIN 01	CLE2	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$

$\Gamma(\rho\rho) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_{104}/\Gamma$

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

<7.8	90	<598	UEHARA	08	BELL $\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(\pi^+\pi^-)$
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 $\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{14}\Gamma_{104}/\Gamma$

VALUE (eV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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4.8 ± 0.6 OUR FIT Error includes scale factor of 1.2.

4.42 ± 0.42 ± 0.53		780 ± 74	UEHARA	08	BELL $\gamma\gamma \rightarrow \chi_{c2} \rightarrow K^+K^-\pi^+\pi^-$
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 $\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{15}\Gamma_{104}/\Gamma$

VALUE (eV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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6.5 ± 0.9 ± 1.5		1250	DEL-AMO-SA..11M	BABR	$\gamma\gamma \rightarrow K^+K^-\pi^+\pi^-\pi^0$
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 $\Gamma(K^*(892)^0\bar{K}^*(892)^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{18}\Gamma_{104}/\Gamma$

VALUE (eV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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1.3 ± 0.5 OUR FIT Error includes scale factor of 2.3.

0.8 ± 0.17 ± 0.27		151 ± 30	UEHARA	08	BELL $\gamma\gamma \rightarrow \chi_{c2} \rightarrow K^+K^-\pi^+\pi^-$
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 $\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{20}\Gamma_{104}/\Gamma$

VALUE (eV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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0.70 ± 0.05 OUR FIT Error includes scale factor of 1.5.

0.62 ± 0.07 ± 0.05		89 ± 11	¹ LIU	12B	BELL $\gamma\gamma \rightarrow 2(K^+K^-)$
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• • • 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 $\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(K^+K^-)$
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¹Supersedes UEHARA 08. Using $B(\phi \rightarrow K^+K^-) = (48.9 \pm 0.5)\%$.

 $\Gamma(\omega\omega) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{22}\Gamma_{104}/\Gamma$

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

<0.64		90	¹ LIU	12B	BELL $\gamma\gamma \rightarrow 2(\pi^+\pi^-\pi^0)$
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¹Using $B(\omega \rightarrow \pi^+\pi^-\pi^0) = (89.2 \pm 0.7)\%$.

 $\Gamma(\omega\phi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{24}\Gamma_{104}/\Gamma$

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

<0.04		90	¹ LIU	12B	BELL $\gamma\gamma \rightarrow K^+K^-\pi^+\pi^-\pi^0$
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¹Using $B(\phi \rightarrow K^+K^-) = (48.9 \pm 0.5)\%$ and $B(\omega \rightarrow \pi^+\pi^-\pi^0) = (89.2 \pm 0.7)\%$.

 $\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{25}\Gamma_{104}/\Gamma$

VALUE (eV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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1.29 ± 0.08 OUR FIT Error includes scale factor of 1.2.

1.18 ± 0.25 OUR AVERAGE

1.44 ± 0.54 ± 0.47		34 ± 13	¹ UEHARA	09	BELL $10.6 e^+e^- \rightarrow e^+e^-\pi^0\pi^0$
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1.14 ± 0.21 ± 0.17		54 ± 10	² NAKAZAWA	05	BELL $10.6 e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
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¹We multiplied the measurement by 3 to convert from $\pi^0\pi^0$ to $\pi\pi$. Interference with the continuum included.

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

$$\Gamma(\rho^0 \pi^+ \pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{26}\Gamma_{104}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.3±0.9 OUR FIT				
3.2±1.9±0.5	986 ± 578	UEHARA	08 BELL	$\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(\pi^+ \pi^-)$

$$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{31}\Gamma_{104}/\Gamma$$

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

¹Interference with the continuum not included.
$$\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{32}\Gamma_{104}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.58±0.08 OUR FIT	Error includes scale factor of 2.1.			
0.44±0.11±0.07	33 ± 8	NAKAZAWA	05 BELL	10.6 $e^+ e^- \rightarrow e^+ e^- K^+ K^-$

$$\Gamma(K_S^0 K_S^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{33}\Gamma_{104}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.303±0.025 OUR FIT				
0.27 $^{+0.07}_{-0.06}$ ±0.03	53	¹ UEHARA	13 BELL	$\gamma\gamma \rightarrow K_S^0 K_S^0$

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

0.31 ±0.05 ±0.03	38 ± 7	CHEN	07B BELL	$e^+ e^- \rightarrow e^+ e^- \chi_{c2}$
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¹Supersedes CHEN 07B.
$$\Gamma(\bar{K}^0 K^+ \pi^- + \text{c.c.}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{42}\Gamma_{104}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.74±0.11 OUR FIT				
1.20±0.33±0.13	126	¹ DEL-AMO-SA...11M	BABR	$\gamma\gamma \rightarrow K_S^0 K^\pm \pi^\mp$

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

$$\Gamma(K^+ K^- K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{51}\Gamma_{104}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.95±0.13 OUR FIT	Error includes scale factor of 1.1.			
1.10±0.21±0.15	126 ± 24	UEHARA	08 BELL	$\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(K^+ K^-)$

$$\Gamma(\eta_c(1S) \pi^+ \pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{99}\Gamma_{104}/\Gamma$$

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

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

HADRONIC DECAYS

$$\Gamma(\rho^0 \pi^+ \pi^-)/\Gamma(2(\pi^+ \pi^-)) \quad \Gamma_{26}/\Gamma_1$$

VALUE	DOCUMENT ID	TECN	COMMENT
0.35±0.15 OUR FIT			
0.31±0.17	TANENBAUM	78 MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

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

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

$1.17 \pm 0.06 \pm 0.03$	1042	¹ ABLIKIM	24BT BES3	$\psi(2S) \rightarrow \gamma \chi_{c2}$
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¹ ABLIKIM 24BT reports $1.153 \pm 0.001 \pm 0.063$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow 2(\pi^+\pi^-))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
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$1.86 \pm 0.23 \pm 0.05$	903.5	¹ HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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¹ HE 08B reports $1.87 \pm 0.07 \pm 0.22 \pm 0.13$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+\pi^-\pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
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$2.22 \pm 0.34 \pm 0.05$	1031.9	^{1,2} HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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¹ HE 08B reports $2.23 \pm 0.11 \pm 0.32 \pm 0.16$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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.

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
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$1.13 \pm 0.15 \pm 0.03$	1164	¹ ABLIKIM	11A BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$
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¹ ABLIKIM 11A reports $(1.21 \pm 0.05 \pm 0.16) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow 4\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
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$0.21 \pm 0.04 \pm 0.01$	76.9	¹ HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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¹ HE 08B reports $0.21 \pm 0.03 \pm 0.03 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-\pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_7/\Gamma$$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
1.40±0.20±0.03	211.6	¹ HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹ HE 08B reports $1.41 \pm 0.11 \pm 0.16 \pm 0.10$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(\rho^-K^+\bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_8/\Gamma$$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.42±0.13±0.01	62.9	¹ HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹ HE 08B reports $0.42 \pm 0.11 \pm 0.06 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \rho^-K^+\bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(K^*(892)^0K^-\pi^+ \rightarrow K^-\pi^+K^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_9/\Gamma$$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.30±0.08±0.01	38.7	¹ HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹ HE 08B reports $0.30 \pm 0.07 \pm 0.04 \pm 0.02$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0K^-\pi^+ \rightarrow K^-\pi^+K^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(K^*(892)^0\bar{K}^0\pi^0 \rightarrow K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{10}/\Gamma$$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.39±0.09±0.01	63.0	¹ HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹ HE 08B reports $0.39 \pm 0.07 \pm 0.05 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0\bar{K}^0\pi^0 \rightarrow K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(K^*(892)^-K^+\pi^0 \rightarrow K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{11}/\Gamma$$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.38±0.08±0.01	51.1	¹ HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹ HE 08B reports $0.38 \pm 0.07 \pm 0.04 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^-K^+\pi^0 \rightarrow K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(K^*(892)^+ \bar{K}^0 \pi^- \rightarrow K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{12}/\Gamma$$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.30±0.08±0.01	39.3	¹ HE	08B CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹ HE 08B reports $0.30 \pm 0.07 \pm 0.04 \pm 0.02$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^+ \bar{K}^0 \pi^- \rightarrow K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.129±0.045±0.003	22.9	¹ HE	08B CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹ HE 08B reports $0.13 \pm 0.04 \pm 0.02 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \eta \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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 $B(\psi(2S) \rightarrow \chi_{c2} \gamma) = (8.72 \pm 0.34)\%$.

$$\Gamma(K_S^0 K^\pm \pi^\mp \pi^+ \pi^-)/\Gamma_{\text{total}} \quad \Gamma_{16}/\Gamma$$

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

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

$$\Gamma(K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma(K^+ K^- \pi^+ \pi^-) \quad \Gamma_{17}/\Gamma_{14}$$

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

$$\Gamma(3(\pi^+ \pi^-))/\Gamma_{\text{total}} \quad \Gamma_{19}/\Gamma$$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
15.3±1.9 OUR AVERAGE	Error includes scale factor of 3.8.			

15.9±0.4±0.4	112K	¹ ABLIKIM	22Q BES3	$\psi(2S) \rightarrow \gamma 3(\pi^+ \pi^-)$
8.6±0.9±1.6		² BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c2}$
8.7±5.9±0.4		² TANENBAUM	78 MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

¹ ABLIKIM 22Q reports $(1.565 \pm 0.005 \pm 0.048) \times 10^{-2}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow 3(\pi^+ \pi^-))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.23 ± 0.07 OUR FIT		Error includes scale factor of 1.9.		
$1.267 \pm 0.028 \pm 0.033$	4247	¹ ABLIKIM	23N BES3	$\psi(2S) \rightarrow \gamma$ hadrons
¹ Measured using $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$ and $B(\phi \rightarrow K^+ K^-) = (49.2 \pm 0.5) \times 10^{-2}$ from PDG 22.				

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$5.4 \pm 0.6 \pm 0.1$	143.6	¹ ABLIKIM	20B BES3	$\psi(2S) \rightarrow \gamma\phi\phi\eta$
¹ ABLIKIM 20B reports $(5.33 \pm 0.52 \pm 0.39) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \phi\phi\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.				

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.86 ± 0.10 OUR AVERAGE				
$0.83 \pm 0.10 \pm 0.02$	762	¹ ABLIKIM	11K BES3	$\psi(2S) \rightarrow \gamma$ hadrons
$1.76 \pm 0.58 \pm 0.04$	27.7 ± 7.4	² ABLIKIM	05N BES2	$\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma 6\pi$
¹ ABLIKIM 11K reports $(8.9 \pm 0.3 \pm 1.1) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \omega\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow \omega\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ = $(0.165 \pm 0.044 \pm 0.032) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.				

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$0.73 \pm 0.04 \pm 0.08$	512	¹ ABLIKIM	13B BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$
¹ Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \rightarrow \chi_{c2}\gamma) = (8.72 \pm 0.34)\%$.				

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

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$9.7 \pm 2.8 \pm 0.2$	33		¹ ABLIKIM	19J BES3	$\psi(2S) \rightarrow \gamma$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<19	90		^{2,3} ABLIKIM	11K BES3	$\psi(2S) \rightarrow \gamma$ hadrons
¹ ABLIKIM 19J reports $[\Gamma(\chi_{c2}(1P) \rightarrow \omega\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ = $(0.91 \pm 0.23 \pm 0.12) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow \omega\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.					
³ Superseded by ABLIKIM 19J.					

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

VALUE (units 10^{-5})	EVT5	DOCUMENT ID	TECN	COMMENT
$2.04 \pm 0.43 \pm 0.05$	64	¹ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- \pi^0$

¹ ABLIKIM 17AG reports $(2.1 \pm 0.4 \pm 0.2) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- \pi^0(\text{non-resonant}))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-5})	EVT5	DOCUMENT ID	TECN	COMMENT
$0.62 \pm 0.38 \pm 0.02$	15	¹ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- \pi^0$

¹ ABLIKIM 17AG reports $(0.64 \pm 0.39 \pm 0.07) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \rho(770)^\pm \pi^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
$0.49 \pm 0.13 \pm 0.01$		¹ ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

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

<1.5	90	² ABLIKIM	06R BES2	$\psi(2S) \rightarrow \gamma \chi_{c2}$
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¹ ATHAR 07 reports $(0.49 \pm 0.12 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- \eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- \eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

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

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
$0.51 \pm 0.19 \pm 0.01$	¹ ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

¹ ATHAR 07 reports $(0.51 \pm 0.18 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- \eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
$1.46 \pm 0.21 \pm 0.04$	¹ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K \bar{K} \pi$

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

$1.75 \pm 0.27 \pm 0.04$	² ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$
$1.36 \pm 0.27 \pm 0.03$	³ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$

¹ ABLIKIM 17AG reports $(1.5 \pm 0.1 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.26 ± 0.27 ± 0.03	¹ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$

¹ ABLIKIM 17AG reports $(1.3 \pm 0.2 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_2^*(1430)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{36}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
15.1 ± 1.2 ± 0.4	¹ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K \bar{K} \pi$

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

17.7 ± 1.6 ± 0.4	² ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$
13.2 ± 1.5 ± 0.3	³ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$

¹ ABLIKIM 17AG reports $(15.5 \pm 0.6 \pm 1.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_2^*(1430)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{37}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
$12.6 \pm 1.7 \pm 0.3$	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 $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{38}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
$5.2 \pm 0.8 \pm 0.1$	¹ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K \bar{K} \pi$

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

$5.1 \pm 1.0 \pm 0.1$	² ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$
$5.7 \pm 1.8 \pm 0.1$	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 $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
$5.7 \pm 2.1 \pm 0.1$	¹ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$

¹ ABLIKIM 17AG reports $(5.9 \pm 1.6 \pm 1.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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
$13.1 \pm 3.4 \pm 0.3$	¹ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$

¹ ABLIKIM 17AG reports $(13.5 \pm 1.6 \pm 3.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow a_2(1320)^0 \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))$

$= (9.38 \pm 0.23) \times 10^{-2}$. 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
17.9$\pm$6.2$\pm$0.4	¹ ABLIKIM	17AG BES3	$\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$

¹ ABLIKIM 17AG reports $(18.4 \pm 3.3 \pm 5.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow a_2(1320)^\pm \pi^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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
0.31$\pm$0.08$\pm$0.01	¹ ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

¹ ATHAR 07 reports $(0.31 \pm 0.07 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.33	90		¹ ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

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

0.181 $\pm$ 0.004 3693 ² ABLIKIM 24BWBES3 $\psi(2S) \rightarrow \gamma \chi_{c2}$

¹ ATHAR 07 reports $< 0.33 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

² No systematic error reported.

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

Γ_{45}/Γ

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

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

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

Γ_{46}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
2.2$\pm$0.5$\pm$0.1		20	¹ ABLIKIM	17AI BES3	$\psi(2S) \rightarrow \gamma \eta' \eta$

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

< 6 90 3.3 $\pm$ 8.0 ² ASNER 09 CLEO $\psi(2S) \rightarrow \gamma \eta \eta'$
 < 23 90 ³ ADAMS 07 CLEO $\psi(2S) \rightarrow \gamma \chi_{c2}$

¹ ABLIKIM 17AI reports $(2.27 \pm 0.43 \pm 0.25) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \eta \eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm$

$0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² ASNER 09 reports $< 0.6 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \eta \eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

³ Superseded by ASNER 09. ADAMS 07 reports $< 2.3 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \eta \eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

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

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$4.6 \pm 0.6 \pm 0.1$		60	¹ ABLIKIM	17AI BES3	$\psi(2S) \rightarrow \gamma \eta' \eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<10	90	12 ± 7	² ASNER	09 CLEO	$\psi(2S) \rightarrow \gamma \eta' \eta'$
<31	90		³ ADAMS	07 CLEO	$\psi(2S) \rightarrow \gamma \chi_{c2}$

¹ ABLIKIM 17AI reports $(4.76 \pm 0.56 \pm 0.38) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \eta' \eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² ASNER 09 reports $< 1.0 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \eta' \eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

³ Superseded by ASNER 09. ADAMS 07 reports $< 3.1 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \eta' \eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

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

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$2.2 \pm 0.5 \pm 0.1$		57 ± 11	¹ ABLIKIM	05O BES2	$\psi(2S) \rightarrow \gamma \chi_{c2}$

¹ ABLIKIM 05O reports $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- K_S^0 K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ $= (0.207 \pm 0.039 \pm 0.033) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ K^- K_S^0 K_S^0)/\Gamma_{\text{total}}$ Γ_{49}/Γ

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

¹ ABLIKIM 05O reports $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- K_S^0 K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ $< 3.5 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.15 \pm 0.18 \pm 0.03$	68	¹ ABLIKIM	19AA BES3	$\psi(2S) \rightarrow \gamma 4K_S^0$

¹ Using $B(K_S^0 \rightarrow \pi^+ \pi^-) = (69.20 \pm 0.05)\%$. ABLIKIM 19AA reports $[\Gamma(\chi_{c2}(1P) \rightarrow K_S^0 K_S^0 K_S^0 K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))] = (10.8 \pm 1.5 \pm 0.8) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value..

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.44 \pm 0.30 \pm 0.03$	52	¹ ABLIKIM	06T BES2	$\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

¹ ABLIKIM 06T reports $(1.67 \pm 0.26 \pm 0.24) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

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

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

$\Gamma(\phi \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$ Γ_{56}/Γ

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

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

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

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.47 ± 0.04 OUR AVERAGE			
$0.48 \pm 0.04 \pm 0.01$	¹ ONYISI	10 CLE3	$\psi(2S) \rightarrow \gamma p \bar{p} X$
$0.44 \pm 0.09 \pm 0.01$	² ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

¹ ONYISI 10 reports $(4.83 \pm 0.25 \pm 0.35 \pm 0.31) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow p \bar{p} \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow p \bar{p} \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\bar{p}\eta)/\Gamma_{\text{total}}$ Γ_{59}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.177 ± 0.025 OUR AVERAGE			
$0.175 \pm 0.026 \pm 0.004$	¹ ONYISI 10	CLE3	$\psi(2S) \rightarrow \gamma p \bar{p} X$
$0.189 \pm 0.071 \pm 0.005$	² ATHAR 07	CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

¹ ONYISI 10 reports $(1.76 \pm 0.23 \pm 0.14 \pm 0.11) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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 $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(p\bar{p}\omega)/\Gamma_{\text{total}}$ Γ_{60}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
$0.37 \pm 0.04 \pm 0.01$	¹ ONYISI 10	CLE3	$\psi(2S) \rightarrow \gamma p \bar{p} X$

¹ ONYISI 10 reports $(3.68 \pm 0.35 \pm 0.26 \pm 0.24) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(p\bar{p}\phi)/\Gamma_{\text{total}}$ Γ_{61}/Γ

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

¹ ABLIKIM 11F reports $(3.04 \pm 0.85 \pm 0.43) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(p\bar{p}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{62}/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.		
$1.17 \pm 0.19 \pm 0.30$	¹ BAI 99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$
$2.64 \pm 1.03 \pm 0.14$	¹ TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

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

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
$0.080 \pm 0.024 \pm 0.002$	29.2	¹ HE 08B	CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹HE 08B reports $0.08 \pm 0.02 \pm 0.01 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\bar{p}K^+K^- \text{ (non-resonant)})/\Gamma_{\text{total}}$ Γ_{64}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.94±0.32±0.05	131 ± 12	¹ ABLIKIM	11F	BES3 $\psi(2S) \rightarrow \gamma p\bar{p}K^+K^-$

¹ABLIKIM 11F reports $(2.08 \pm 0.19 \pm 0.30) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}K^+K^- \text{ (non-resonant)})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\bar{p}K_S^0K_S^0)/\Gamma_{\text{total}}$ Γ_{65}/Γ

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

¹Using $B(\psi(2S) \rightarrow \chi_{c2}\gamma) = (9.3 \pm 0.6)\%$.

$\Gamma(p\bar{n}\pi^-)/\Gamma_{\text{total}}$ Γ_{67}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
8.7±1.0 OUR AVERAGE				
8.5±1.0±0.2	3309	¹ ABLIKIM	12J	BES3 $\psi(2S) \rightarrow \gamma p\bar{n}\pi^-$
10.3±3.5±0.3		² ABLIKIM	06I	BES2 $\psi(2S) \rightarrow \gamma p\pi^-X$

¹ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{n}\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ = $(0.80 \pm 0.02 \pm 0.09) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

²ABLIKIM 06I reports $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{n}\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ = $(0.97 \pm 0.20 \pm 0.26) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\bar{p}n\pi^+)/\Gamma_{\text{total}}$ Γ_{68}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
9.1±0.8±0.2	3732	¹ ABLIKIM	12J	BES3 $\psi(2S) \rightarrow \gamma \bar{p}n\pi^+$

¹ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \rightarrow \bar{p}n\pi^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ = $(0.85 \pm 0.02 \pm 0.07) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\bar{n}\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{69}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
22.1±1.7±0.5	2128	¹ ABLIKIM	12J	BES3 $\psi(2S) \rightarrow \gamma p\bar{n}\pi^-\pi^0$

¹ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{n}\pi^-\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ = $(2.07 \pm 0.06 \pm 0.15) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\bar{p}n\pi^+\pi^0)/\Gamma_{\text{total}}$ Γ_{70}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$21.4 \pm 1.8 \pm 0.5$	2352	¹ ABLIKIM	12J BES3	$\psi(2S) \rightarrow \gamma \bar{p}n\pi^+\pi^0$

¹ ABLIKIM 12J reports $[\Gamma(\chi_{c2}(1P) \rightarrow \bar{p}n\pi^+\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))] = (2.01 \pm 0.06 \pm 0.16) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$127 \pm 15 \pm 3$		371	¹ ABLIKIM	12I BES3	$\psi(2S) \rightarrow \gamma \Lambda \bar{\Lambda} \pi^+ \pi^-$

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

<350 90 ² ABLIKIM 06D BES2 $\psi(2S) \rightarrow \chi_{c2} \gamma$

¹ ABLIKIM 12I reports $(137.0 \pm 7.6 \pm 15.7) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Lambda \bar{\Lambda} \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(\Lambda \bar{\Lambda} \pi^+ \pi^- (\text{non-resonant}))/\Gamma_{\text{total}}$ Γ_{73}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$67 \pm 15 \pm 2$	36	¹ ABLIKIM	12I BES3	$\psi(2S) \rightarrow \gamma \Lambda \bar{\Lambda} \pi^+ \pi^-$

¹ ABLIKIM 12I reports $(71.8 \pm 14.5 \pm 8.2) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Lambda \bar{\Lambda} \pi^+ \pi^- (\text{non-resonant}))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Sigma(1385)^+ \bar{\Lambda} \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{74}/Γ

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

¹ ABLIKIM 12I reports $< 42 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma(1385)^+ \bar{\Lambda} \pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^- \bar{\Lambda} \pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{75}/Γ

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

¹ ABLIKIM 12I reports $< 61 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma(1385)^- \bar{\Lambda} \pi^+ + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(K^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{79}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
7.9 ± 0.5	OUR AVERAGE			
$7.8 \pm 0.5 \pm 0.2$	5k	^{1,2} ABLIKIM	13D BES3	$\psi(2S) \rightarrow \gamma \Lambda \bar{p} K^+$
$8.5 \pm 1.6 \pm 0.2$		³ ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

¹ ABLIKIM 13D reports $(8.4 \pm 0.3 \pm 0.6) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² Using $\text{B}(\Lambda \rightarrow p\pi^-) = 63.9\%$.

³ ATHAR 07 reports $(8.5 \pm 1.4 \pm 1.0) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(nK_S^0\bar{\Lambda} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{80}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$3.63 \pm 0.27 \pm 0.09$	879	¹ ABLIKIM	21AV BES3	$\psi(2S) \rightarrow \gamma n K_S^0 \bar{\Lambda} + \text{c.c.}$

¹ ABLIKIM 21AV reports $(3.58 \pm 0.16 \pm 0.23) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow nK_S^0\bar{\Lambda} + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.0952 \pm 0.0020$, which we rescale to our best value $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Also uses $\text{B}(\bar{\Lambda} \rightarrow \bar{p}\pi^+) = (63.9 \pm 0.5)\%$ and $\text{B}(K_S^0 \rightarrow \pi^+\pi^-) = (69.20 \pm 0.05)\%$.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$8.3 \pm 1.2 \pm 0.2$	476	¹ ABLIKIM	19AU BES3	$\psi(2S) \rightarrow \gamma K^{*+} \bar{p} \Lambda$

¹ ABLIKIM 19AU reports $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))] = (7.8 \pm 0.9 \pm 0.6) \times 10^{-5}$ which we divide by our best value $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+\bar{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{82}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$2.9 \pm 0.7 \pm 0.1$	79 ± 13	¹ ABLIKIM	11F BES3	$\psi(2S) \rightarrow \gamma p \bar{p} K^+ K^-$

¹ ABLIKIM 11F reports $(3.06 \pm 0.50 \pm 0.54) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^+\bar{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda(1520)\bar{\Lambda}(1520))/\Gamma_{\text{total}}$ Γ_{84}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$4.7 \pm 1.5 \pm 0.1$	29 ± 7	¹ ABLIKIM	11F BES3	$\psi(2S) \rightarrow \gamma p \bar{p} K^+ K^-$

¹ABLIKIM 11F reports $(5.05 \pm 1.29 \pm 0.93) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Lambda(1520)\bar{\Lambda}(1520))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{85}/Γ

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

¹ABLIKIM 18V reports $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ = $(0.35 \pm 0.05 \pm 0.02) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

²ABLIKIM 13H reports $< 0.65 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

³NAIK 08 reports $< 0.75 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(\Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}$ Γ_{88}/Γ

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

¹ABLIKIM 18V reports $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ = $(0.32 \pm 0.06 \pm 0.03) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

²ABLIKIM 13H reports $< 0.88 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

³NAIK 08 reports $< 0.67 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(\Sigma^+\bar{\Sigma}^-\eta)/\Gamma_{\text{total}}$ Γ_{89}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$5.5 \pm 1.3 \pm 0.1$		35	¹ ABLIKIM 24CA BES3		$\psi(2S) \rightarrow \gamma\chi_{c2}(1P)$

¹ABLIKIM 24CA reports $(5.46 \pm 1.18 \pm 0.50) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^+\bar{\Sigma}^-\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$4.5 \pm 1.8 \pm 0.1$	131	¹ ABLIKIM	20i	BES3 $\psi(2S) \rightarrow \gamma \Sigma^-\bar{\Sigma}^+$

¹ ABLIKIM 20i reports $(4.4 \pm 1.7 \pm 0.5) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^-\bar{\Sigma}^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Sigma(1385)^+\bar{\Sigma}(1385)^-)/\Gamma_{\text{total}}$ Γ_{91}/Γ

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

¹ ABLIKIM 12i reports $< 17 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma(1385)^+\bar{\Sigma}(1385)^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^-\bar{\Sigma}(1385)^+)/\Gamma_{\text{total}}$ Γ_{92}/Γ

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

¹ ABLIKIM 12i reports $< 8.5 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma(1385)^-\bar{\Sigma}(1385)^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(K^-\Lambda\bar{\Xi}^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{93}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.79 \pm 0.32 \pm 0.04$	51	¹ ABLIKIM	15i	BES3 $\psi(2S) \rightarrow \gamma K^-\Lambda\bar{\Xi}^+ + \text{c.c.}$

¹ ABLIKIM 15i reports $[\Gamma(\chi_{c2}(1P) \rightarrow K^-\Lambda\bar{\Xi}^+ + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ $= (1.68 \pm 0.26 \pm 0.15) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Xi^0\bar{\Xi}^0)/\Gamma_{\text{total}}$ Γ_{94}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$1.86 \pm 0.22 \pm 0.04$		804	¹ ABLIKIM	220	BES3 $\psi(2S) \rightarrow \gamma \Xi^0\bar{\Xi}^0$

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

<1.1	90	3	² NAIK	08	CLEO $\psi(2S) \rightarrow \gamma \Xi^0\bar{\Xi}^0$
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¹ ABLIKIM 220 reports $(1.83 \pm 0.15 \pm 0.16) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Xi^0\bar{\Xi}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² NAIK 08 reports $< 1.06 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Xi^0\bar{\Xi}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(\Xi^- \Xi^+)/\Gamma_{\text{total}}$ Γ_{95}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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1.46±0.12 OUR AVERAGE

1.46±0.12±0.04		1691	¹ ABLIKIM	220	BES3 $\psi(2S) \rightarrow \gamma \Xi^- \Xi^+$
1.44±0.32±0.03		29 ± 5	² NAIK	08	CLEO $\psi(2S) \rightarrow \gamma \Xi^+ \Xi^-$

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

< 3.7		90	³ ABLIKIM	06D	BES2 $\psi(2S) \rightarrow \chi_{c2} \gamma$
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¹ ABLIKIM 220 reports $(1.44 \pm 0.06 \pm 0.11) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Xi^- \Xi^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² NAIK 08 reports $(1.45 \pm 0.30 \pm 0.15) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Xi^- \Xi^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

³ Using $B(\psi(2S) \rightarrow \chi_{c2} \gamma) = (9.3 \pm 0.6)\%$.

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

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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4.52±0.24±0.18		1038	ABLIKIM	23T	BES3 $\chi_{cJ} \rightarrow \Omega^- \bar{\Omega}^+$
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 $\Gamma(J/\psi(1S) \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$ Γ_{97}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<0.015		90	BARATE	81	SPEC 190 GeV $\pi^- \text{Be} \rightarrow 2\pi 2\mu$
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 $\Gamma(\pi^0 \eta_c)/\Gamma_{\text{total}}$ Γ_{98}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<3.2 × 10⁻³		90	¹ ABLIKIM	15N	BES3 $\psi(2S) e^+ e^- \rightarrow \gamma \pi^0 \eta_c$
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¹ Using $B(\eta_c \rightarrow K_S^0 K^\pm \pi^\mp) \times B(K_S^0 \rightarrow \pi^+ \pi^-) \times B(\pi^0 \rightarrow \gamma \gamma) = (1.66 \pm 0.11) \times 10^{-2}$.

 $\Gamma(\eta_c(1S) \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{99}/Γ

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

<1.2 × 10 ⁻²		90	^{1,3} ABLIKIM	13B	BES3 $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$
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¹ Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \rightarrow \chi_{c2} \gamma) = (8.72 \pm 0.34)\%$.

² From the $\eta_c \rightarrow K_S^0 K^\pm \pi^\mp$ decays.

³ From the $\eta_c \rightarrow K^+ K^- \pi^0$ decays.

 $\Gamma(\eta_c(1S) \pi^+ \pi^-)/\Gamma(\bar{K}^0 K^+ \pi^- + \text{c.c.})$ Γ_{99}/Γ_{42}

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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<16.4		90	¹ LEES	12AE BABR	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^- \eta_c$
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¹ We divided the reported limit by 2 to take into account the $K_L^0 K^+ \pi^-$ mode.

RADIATIVE DECAYS

$\Gamma(\gamma\rho^0)/\Gamma_{\text{total}}$ Γ_{101}/Γ

<u>VALUE (units 10^{-6})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<19	90	13 $\pm$ 11	¹ ABLIKIM	11E BES3	$\psi(2S) \rightarrow \gamma\gamma\rho^0$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<40	90	17.2 $\pm$ 6.8	² BENNETT	08A CLEO	$\psi(2S) \rightarrow \gamma\gamma\rho^0$
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¹ ABLIKIM 11E reports $< 20.8 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\rho^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

² BENNETT 08A reports $< 50 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\rho^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(\gamma\omega)/\Gamma_{\text{total}}$ Γ_{102}/Γ

<u>VALUE (units 10^{-6})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<6	90	1 $\pm$ 6	¹ ABLIKIM	11E BES3	$\psi(2S) \rightarrow \gamma\gamma\omega$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<6	90	0.0 $\pm$ 1.8	² BENNETT	08A CLEO	$\psi(2S) \rightarrow \gamma\gamma\omega$
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¹ ABLIKIM 11E reports $< 6.1 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

² BENNETT 08A reports $< 7.0 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(\gamma\phi)/\Gamma_{\text{total}}$ Γ_{103}/Γ

<u>VALUE (units 10^{-6})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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< 8	90	5 $\pm$ 5	¹ ABLIKIM	11E BES3	$\psi(2S) \rightarrow \gamma\gamma\phi$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<11	90	1.3 $\pm$ 2.5	² BENNETT	08A CLEO	$\psi(2S) \rightarrow \gamma\gamma\phi$
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¹ ABLIKIM 11E reports $< 8.1 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

² BENNETT 08A reports $< 13 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.38 \times 10^{-2}$.

$\Gamma(e^+e^-J/\psi(1S))/\Gamma_{\text{total}}$ Γ_{105}/Γ

<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

2.41 $\pm$ 0.15 $\pm$ 0.06	1.3k	^{1,2} ABLIKIM	17I BES3	$\psi(2S) \rightarrow \gamma e^+e^-J/\psi$
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¹ ABLIKIM 17I reports $(2.48 \pm 0.08 \pm 0.16) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow e^+e^-J/\psi(1S))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.38 \pm 0.23) \times 10^{-2}$. 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

$$\Gamma(e^+e^- J/\psi(1S))/\Gamma(\gamma J/\psi(1S)) \quad \Gamma_{105}/\Gamma_{100}$$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
11.3±0.4±0.5	1.3k	¹ ABLIKIM	17I BES3	$\psi(2S) \rightarrow e^+e^- \gamma J/\psi$
¹ Uses $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) \times B(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) = (199.6 \pm 0.8 \pm 7.0) \times 10^{-4}$ from ABLIKIM 17N and accounts for common systematic errors.				

$$\Gamma(\mu^+\mu^- J/\psi(1S))/\Gamma(e^+e^- J/\psi(1S)) \quad \Gamma_{106}/\Gamma_{105}$$

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

$$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S)) \quad \Gamma_{104}/\Gamma_{100}$$

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
1.49±0.08 OUR FIT	Error includes scale factor of 1.5.		
0.99±0.18	¹ AMBROGIANI 00B	E835	$\bar{p}p \rightarrow \chi_{c2} \rightarrow \gamma\gamma, \gamma J/\psi$
¹ Calculated by us using $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0593 \pm 0.0010$.			

$$\Gamma(\gamma\gamma)/\Gamma_{\text{total}} \times \Gamma(p\bar{p})/\Gamma_{\text{total}} \quad \Gamma_{104}/\Gamma \times \Gamma_{57}/\Gamma$$

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
2.12±0.15 OUR FIT	Error includes scale factor of 1.2.		
1.7 ±0.4 OUR AVERAGE			
1.60±0.42	ARMSTRONG 93	E760	$\bar{p}p \rightarrow \gamma\gamma X$
9.9 ±4.5	BAGLIN 87B	SPEC	$\bar{p}p \rightarrow \gamma\gamma X$

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

$$\Gamma(\chi_{c2}(1P) \rightarrow 2(\pi^+\pi^-))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \quad \Gamma_1/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$$

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
3.04±0.21 OUR FIT	Error includes scale factor of 1.6.		
3.1 ±1.0 OUR AVERAGE	Error includes scale factor of 2.5.		
2.3 ±0.1 ±0.5	¹ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c2}$
4.3 ±0.6	² TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma \chi_{c2}$

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

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

$$\Gamma(\chi_{c2}(1P) \rightarrow 2(\pi^+\pi^-))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}} \quad \Gamma_1/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{\psi(2S)}$$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.05 ±0.07 OUR FIT	Error includes scale factor of 1.6.			
1.098±0.001±0.055	1042	¹ ABLIKIM	24BT BES3	$\psi(2S) \rightarrow \gamma \chi_{c2}$

¹ Calculated by us. The value given here is derived from the value of $B(\chi_{c2} \rightarrow 2(\pi^+\pi^-))$ reported in ABLIKIM 24BT using $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.52 \pm 0.20)\%$ [PDG 22].

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \pi^+ \pi^-)}{\Gamma_{\text{total}}} \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)} \times \frac{\Gamma_{14}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}{\Gamma_{14}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.27±0.31 OUR FIT	Error includes scale factor of 1.2.		
2.5 ±0.9 OUR AVERAGE	Error includes scale factor of 2.3.		
1.90±0.14±0.44	BAI	99B	BES $\psi(2S) \rightarrow \gamma \chi_{c2}$
3.8 ±0.67	¹ TANENBAUM	78	MRK1 $\psi(2S) \rightarrow \gamma \chi_{c2}$

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0 \bar{K}^*(892)^0)}{\Gamma_{\text{total}}} \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))}{\Gamma_{\text{total}}} \times \frac{\Gamma_{18}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}{\Gamma_{18}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
2.1 ±0.9 OUR FIT	Error includes scale factor of 2.3.		
3.11±0.36±0.48	ABLIKIM	04H	BES2 $\psi(2S) \rightarrow \gamma \chi_{c2}$

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \phi \phi)}{\Gamma_{\text{total}}} \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))}{\Gamma_{\text{total}}} \times \frac{\Gamma_{20}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}{\Gamma_{20}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.15±0.07 OUR FIT	Error includes scale factor of 1.7.			
0.98±0.13 OUR AVERAGE	Error includes scale factor of 1.3.			
0.94±0.03±0.10	849	¹ ABLIKIM	11K	BES3 $\psi(2S) \rightarrow \gamma$ hadrons
1.38±0.24±0.23	41	² ABLIKIM	06T	BES2 $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

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

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \phi \phi)}{\Gamma_{\text{total}}} \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)} \times \frac{\Gamma_{20}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}{\Gamma_{20}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
3.32±0.21 OUR FIT	Error includes scale factor of 1.7.		
4.8 ±1.3 ±1.3	¹ BAI	99B	BES $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \pi \pi)}{\Gamma_{\text{total}}} \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))}{\Gamma_{\text{total}}} \times \frac{\Gamma_{25}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}{\Gamma_{25}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

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 $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$
2.23±0.06±0.10	2.5k	² ASNER	09	CLEO $\psi(2S) \rightarrow \gamma \pi^+ \pi^-$
1.90±0.08±0.20	0.8k	³ ASNER	09	CLEO $\psi(2S) \rightarrow \gamma \pi^0 \pi^0$

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

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

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \pi\pi)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}{\Gamma_{25}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.611±0.023 OUR FIT				
0.54 ±0.06 OUR AVERAGE				
0.66 ±0.18 ±0.37	21 ± 6	¹ BAI	03C BES	$\psi(2S) \rightarrow \gamma \pi^0 \pi^0$
0.54 ±0.05 ±0.04	185 ± 16	² BAI	98I BES	$\psi(2S) \rightarrow \gamma \pi^+ \pi^-$

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

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \eta\eta)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{31}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

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	$e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$
0.47±0.05±0.05		156	ASNER	09 CLEO	$\psi(2S) \rightarrow \gamma \eta \eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 0.44	90		² ADAMS	07 CLEO	$\psi(2S) \rightarrow \gamma \chi_{c2}$
< 3	90		BAI	03C BES	$\psi(2S) \rightarrow \gamma \eta \eta \rightarrow 5\gamma$
0.62±0.31±0.19			LEE	85 CBAL	$\psi(2S) \rightarrow \text{photons}$

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

² Superseded by ASNER 09.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{32}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
9.5±1.4 OUR FIT	Error includes scale factor of 2.4.			
10.5±0.3±0.6	1.6k	¹ ASNER	09 CLEO	$\psi(2S) \rightarrow \gamma K^+ K^-$

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}{\Gamma_{32}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
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0.28 ± 0.04 OUR FIT Error includes scale factor of 2.3.

0.190 ± 0.034 ± 0.019 115 ± 13 ¹ BAI 98I BES $\psi(2S) \rightarrow \gamma K^+ K^-$

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K_S^0 K_S^0)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{33}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
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5.0 ± 0.4 OUR FIT

5.0 ± 0.4 OUR AVERAGE

4.9 ± 0.3 ± 0.3 373 ± 20 ¹ ASNER 09 CLEO $\psi(2S) \rightarrow \gamma K_S^0 K_S^0$

5.72 ± 0.76 ± 0.63 65 ABLIKIM 05O BES2 $\psi(2S) \rightarrow \gamma K_S^0 K_S^0$

¹ Calculated by us. ASNER 09 reports $B(\chi_{c2} \rightarrow K_S^0 K_S^0) = (0.53 \pm 0.03 \pm 0.03 \pm 0.03) \times 10^{-3}$ using $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K_S^0 K_S^0)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}{\Gamma_{33}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
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14.3 ± 1.1 OUR FIT

14.7 ± 4.1 ± 3.3 ¹ BAI 99B BES $\psi(2S) \rightarrow \gamma K_S^0 K_S^0$

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \bar{K}^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{42}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
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1.22 ± 0.18 OUR FIT

1.15 ± 0.18 OUR AVERAGE

1.21 ± 0.19 ± 0.09 37 ¹ ATHAR 07 CLEO $\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$

0.97 ± 0.32 ± 0.13 28 ² ABLIKIM 06R BES2 $\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$

¹ Calculated by us. ATHAR 07 reports $B(\chi_{c2} \rightarrow \bar{K}^0 K^+ \pi^- + \text{c.c.}) = (1.3 \pm 0.2 \pm 0.1 \pm 0.1) \times 10^{-3}$ using $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{51}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
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1.57 ± 0.21 OUR FIT Error includes scale factor of 1.1.

1.76 ± 0.16 ± 0.24 160 ¹ ABLIKIM 06T BES2 $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- K^+ K^-) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}}}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)} \times \frac{\Gamma_{51} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma_{12}^{\psi(2S)}}{\Gamma_{183}^{\psi(2S)} / \Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
4.5 ± 0.6 OUR FIT	Error includes scale factor of 1.1.		
3.6 ± 0.6 ± 0.6	¹ BAI	99B BES	$\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow 3(K^+ K^-)) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}}}{\Gamma_{55} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-7})	EVTS	DOCUMENT ID	TECN	COMMENT
6.8 ± 1.1 ± 0.8	46.4 ± 7.0	¹ ABLIKIM	24P BES3	$e^+ e^- \rightarrow \psi(2S)$

¹ Systematic error derived by us, based on the text.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow p \bar{p}) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}}}{\Gamma_{57} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
1.97 ± 0.10 OUR FIT	Error includes scale factor of 1.1.		
1.4 ± 1.1	¹ BAI	98I BES	$\psi(2S) \rightarrow \gamma \chi_{c2} \rightarrow \gamma p \bar{p}$

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow p \bar{p}) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}}}{\Gamma_{57} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.83 ± 0.34 OUR FIT	Error includes scale factor of 1.1.			
7.1 ± 0.5 OUR AVERAGE	Error includes scale factor of 1.2.			

7.3 ± 0.4 ± 0.3	405	ABLIKIM	13V BES3	$\psi(2S) \rightarrow \gamma p \bar{p}$
7.2 ± 0.7 ± 0.4	121 ± 12	¹ NAIK	08 CLEO	$\psi(2S) \rightarrow \gamma p \bar{p}$
4.4 $^{+1.6}_{-1.4}$ ± 0.6	14.3 $^{+5.2}_{-4.7}$	BAI	04F BES	$\psi(2S) \rightarrow \gamma \chi_{c2}(1P) \rightarrow \gamma p \bar{p}$

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow p \bar{p} K_S^0 K^- \pi^+ + \text{c.c.}) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}}}{\Gamma_{66} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma_{12}^{\psi(2S)}}$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
5.36 ± 0.26 ± 0.43	574	ABLIKIM	24BX BES3	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$$\Gamma(\chi_{c2}(1P) \rightarrow \bar{p}\Lambda(1520)K_S^0\pi^+ + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}} \times \Gamma_{83}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma^{\psi(2S)}$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
$3.89^{+0.83}_{-0.80} \pm 0.39$	94	ABLIKIM	24BX BES3	$\psi(2S) \rightarrow \gamma\chi_{c2}$

$$\Gamma(\chi_{c2}(1P) \rightarrow \Lambda\bar{\Lambda})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}} \times \Gamma_{71}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma^{\psi(2S)}$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
17.4 ± 1.4 OUR FIT				
17.3 ± 1.5 OUR AVERAGE				

18.2 ± 0.8 ± 1.7	670	ABLIKIM	21L BES3	$\psi(2S) \rightarrow \gamma p \pi^- \bar{p} \pi^+$
15.9 ± 2.1 ± 1.0	71	¹ NAIK	08 CLEO	$\psi(2S) \rightarrow \gamma \Lambda \bar{\Lambda}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
18.2 ± 1.4 ± 0.9	207	^{2,3} ABLIKIM	13H BES3	$\psi(2S) \rightarrow \gamma \Lambda \bar{\Lambda}$

¹ Calculated by us. NAIK 08 reports $B(\chi_{c2} \rightarrow \Lambda \bar{\Lambda}) = (17.0 \pm 2.2 \pm 1.1 \pm 1.1) \times 10^{-5}$ using $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

² Superseded by ABLIKIM 21L

³ Calculated by us. ABLIKIM 13H reports $B(\chi_{c2} \rightarrow \Lambda \bar{\Lambda}) = (20.8 \pm 1.6 \pm 2.3) \times 10^{-5}$ from a measurement of $B(\chi_{c2} \rightarrow \Lambda \bar{\Lambda}) \times B(\psi(2S) \rightarrow \gamma\chi_{c2})$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (8.74 \pm 0.35)\%$.

$$\Gamma(\chi_{c2}(1P) \rightarrow \Lambda\bar{\Lambda})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma_{71}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
5.0 ± 0.4 OUR FIT				
$7.1^{+3.1}_{-2.9} \pm 1.3$	$8.3^{+3.7}_{-3.4}$	¹ BAI	03E BES	$\psi(2S) \rightarrow \gamma \Lambda \bar{\Lambda}$

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

$$\Gamma(\chi_{c2}(1P) \rightarrow \Lambda\bar{\Lambda}\eta)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}} \times \Gamma_{76}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma^{\psi(2S)}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
1.00 ± 0.20 ± 0.14	32	ABLIKIM	22AO BES3	$\psi(2S) \rightarrow \gamma p \pi^- \bar{p} \pi^+ \gamma \gamma$

$$\Gamma(\chi_{c2}(1P) \rightarrow \Lambda\bar{\Lambda}\omega)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}} \times \Gamma_{77}/\Gamma \times \Gamma_{183}^{\psi(2S)}/\Gamma^{\psi(2S)}$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
13.3 ± 1.2 ± 1.6	251 ± 23	¹ ABLIKIM	24BE BES3	$e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$

¹ Calculated by us. The authors report $B(\chi_{c2} \rightarrow \Lambda\bar{\Lambda}\omega)$ obtained from a product using PDG 22 value of $B(\psi(2S) \rightarrow \gamma\chi_{c2})$.

$$\Gamma(\chi_{c2}(1P) \rightarrow \Lambda \bar{\Lambda} \phi) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}} \times \Gamma_{78} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
$6.79 \pm 0.77 \pm 0.35$	94.4	ABLIKIM	24AC BES3	$\psi(2S) \rightarrow \gamma \chi_{c2}$

$$\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^+ \bar{p} K_S^0 + \text{c.c.}) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}} \times \Gamma_{86} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
$7.85 \pm 0.77 \pm 0.44$	129	¹ ABLIKIM	19BB BES3	$\psi(2S) \rightarrow \gamma \Sigma^+ \bar{p} K_S^0 + \text{c.c.}$

¹ Calculated by us. ABLIKIM 19BB reports $B(\chi_{c2} \rightarrow \Sigma^+ \bar{p} K_S^0 + \text{c.c.}) = (8.25 \pm 0.83 \pm 0.49) \times 10^{-5}$ using $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.52 \pm 0.20)\%$ and other branching fractions from PDG 18.

$$\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^0 \bar{p} K^+ + \text{c.c.}) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}} \times \Gamma_{87} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

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

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

$$\Gamma(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}} \times \Gamma_{100} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.83 ± 0.06 OUR FIT	Error includes scale factor of 1.8.			
1.69 ± 0.16 OUR AVERAGE	Error includes scale factor of 3.4. See the ideogram below.			
$1.996 \pm 0.008 \pm 0.070$	81k	¹ ABLIKIM	17N BES3	$\psi(2S) \rightarrow \gamma \gamma J/\psi$
$1.793 \pm 0.008 \pm 0.163$	1.0M	ABLIKIM	17U BES3	$e^+ e^- \rightarrow \gamma X$
$1.62 \pm 0.04 \pm 0.12$	5.8k	BAI	04I BES2	$\psi(2S) \rightarrow J/\psi \gamma \gamma$
$0.99 \pm 0.10 \pm 0.08$		GAISER	86 CBAL	$\psi(2S) \rightarrow \gamma X$
1.47 ± 0.17		² OREGLIA	82 CBAL	$\psi(2S) \rightarrow \gamma \chi_{c2}$
1.8 ± 0.5		³ BRANDELIK	79B DASP	$\psi(2S) \rightarrow \gamma \chi_{c2}$
1.2 ± 0.2		³ BARTEL	78B CNTR	$\psi(2S) \rightarrow \gamma \chi_{c2}$
2.2 ± 1.2		⁴ BIDDICK	77 CNTR	$e^+ e^- \rightarrow \gamma X$
1.2 ± 0.7		² WHITAKER	76 MRK1	$e^+ e^-$

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

$1.874 \pm 0.007 \pm 0.102$	76k	⁵ ABLIKIM	120 BES3	$\psi(2S) \rightarrow \gamma \chi_{c2}$
$1.95 \pm 0.02 \pm 0.07$	12.4k	⁶ MENDEZ	08 CLEO	$\psi(2S) \rightarrow \gamma \chi_{c2}$
$1.85 \pm 0.04 \pm 0.07$	1.9k	⁷ ADAM	05A CLEO	Repl. by MENDEZ 08

¹ Uses $B(J/\psi \rightarrow e^+ e^-) = (5.971 \pm 0.032)\%$ and $B(J/\psi \rightarrow \mu^+ \mu^-) = (5.961 \pm 0.033)\%$.

² Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1181 \pm 0.0020$.

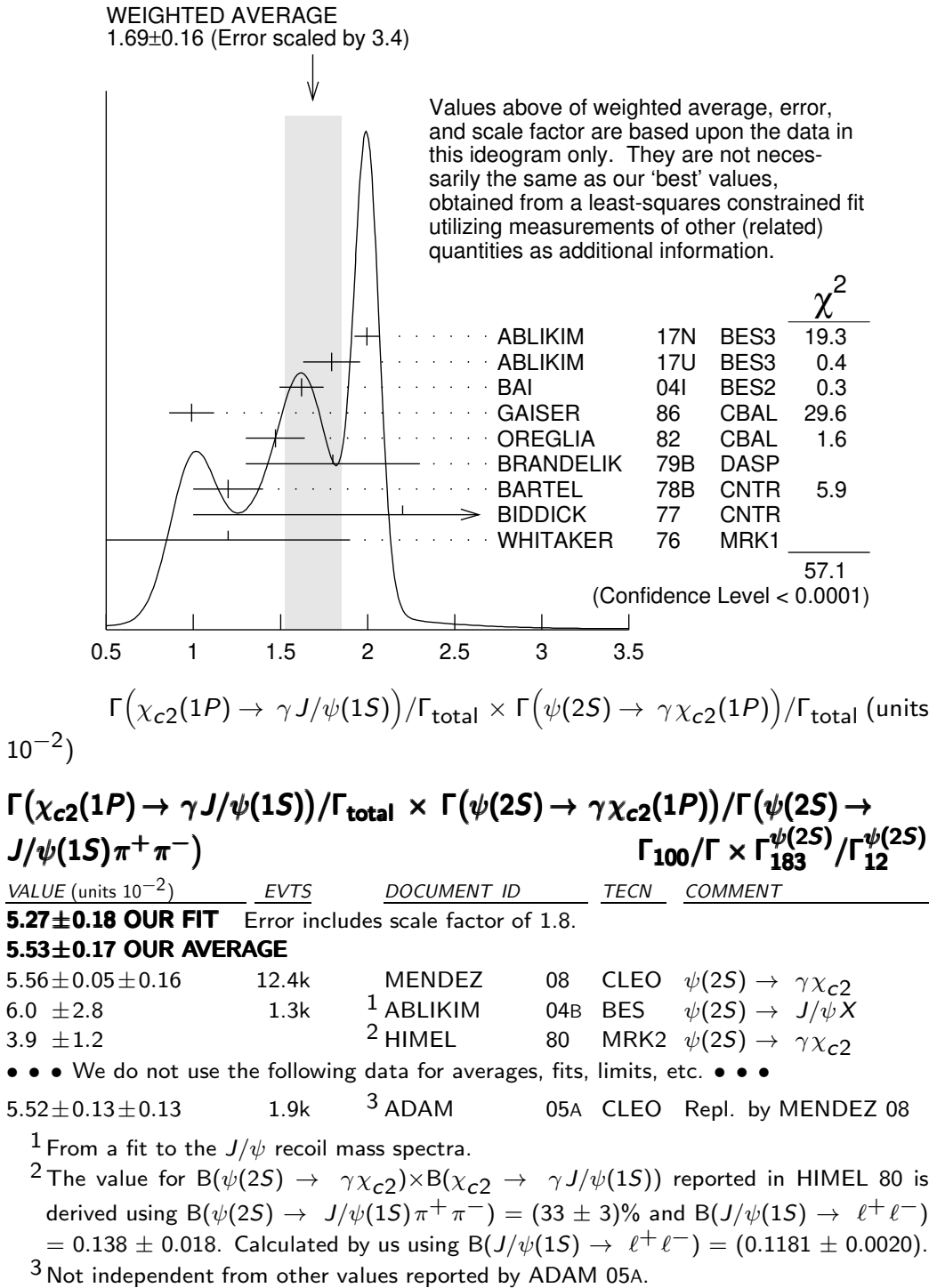
³ Recalculated by us using $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = 0.0588 \pm 0.0010$.

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.



$$\Gamma(\chi_{c2}(1P) \rightarrow \gamma\gamma) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) / \Gamma_{\text{total}} \times \Gamma_{104} / \Gamma \times \Gamma_{183}^{\psi(2S)} / \Gamma^{\psi(2S)}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
2.73±0.11 OUR FIT	Error includes scale factor of 1.3.			
2.82±0.10 OUR AVERAGE				
2.83±0.08±0.06	5k	¹ ABLIKIM	17AE BES3	$\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow 3\gamma$
2.68±0.28±0.15	0.3k	ECKLUND	08A CLEO	$\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow 3\gamma$
7.0 ±2.1 ±2.0		LEE	85 CBAL	$\psi(2S) \rightarrow \gamma\chi_{c2}$

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

2.81±0.17±0.15	1.1k	² ABLIKIM	12A BES3	$\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow 3\gamma$
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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.

$$\Gamma(\chi_{c2}(1P) \rightarrow \gamma\gamma) / \Gamma(\chi_{c0}(1P) \rightarrow \gamma\gamma) \times \Gamma_{104} / \Gamma_{104}^{\chi_{c0}(1P)}$$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.292±0.028 OUR AVERAGE				
0.295±0.014±0.028	8k	¹ ABLIKIM	17AE BES3	$\psi(2S) \rightarrow \gamma\chi_{cJ} \rightarrow 3\gamma$
0.278±0.050±0.036	0.5k	¹ ECKLUND	08A CLEO	$\psi(2S) \rightarrow \gamma\chi_{cJ} \rightarrow 3\gamma$

• • • 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	$\psi(2S) \rightarrow \gamma\chi_{cJ} \rightarrow 3\gamma$
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¹ Not independent from the values of $\Gamma(\chi_{c0}, \chi_{c2})$ and $B(\psi(2S) \rightarrow \chi_{c0}, \chi_{c2})$.

² Superseded by ABLIKIM 17AE.

MULTIPOLE AMPLITUDES IN $\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)$ 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	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
- 9.3± 1.6±0.3	19.8k	² ARTUSO	09 CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
- 9.3 ⁺ ₋ 3.9 ⁺ _{4.1} ±0.6	5.9k	³ AMBROGIANI	02 E835	$p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$
-14 ± 6	1.9k	³ ARMSTRONG	93E E760	$p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$
-33.3 ⁺ _{-29.2} ±11.6	441	³ OREGLIA	82 CBAL	$\psi(2S) \rightarrow \chi_{c1}\gamma \rightarrow J/\psi\gamma\gamma$

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

- 7.9± 1.9±0.3	19.8k	⁴ ARTUSO	09 CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
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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 $\rho_{a_2 b_3} = -0.095$.

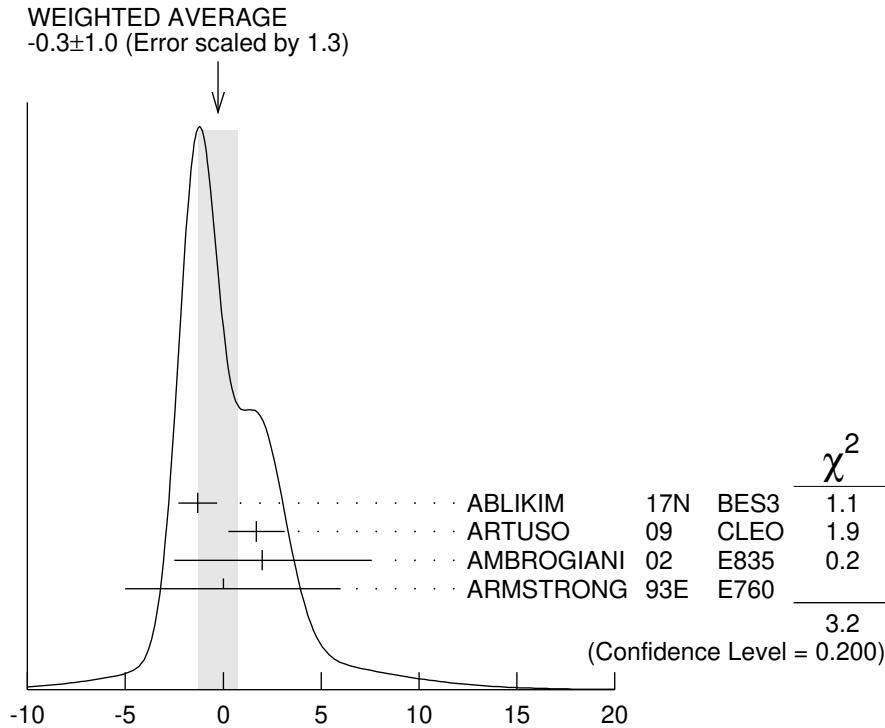
² From a fit with floating $M2$ amplitudes a_2 and b_2 , and fixed $E3$ amplitudes $a_3=b_3=0$.

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.			
$-1.3 \pm 0.9 \pm 0.4$	89k	¹ ABLIKIM 17N	BES3	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$1.7 \pm 1.4 \pm 0.3$	19.8k	² ARTUSO 09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$2.0^{+5.5}_{-4.4} \pm 0.9$	5908	AMBROGIANI 02	E835	$p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$
0^{+6}_{-5}	1904	ARMSTRONG 93E	E760	$p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$
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 .				



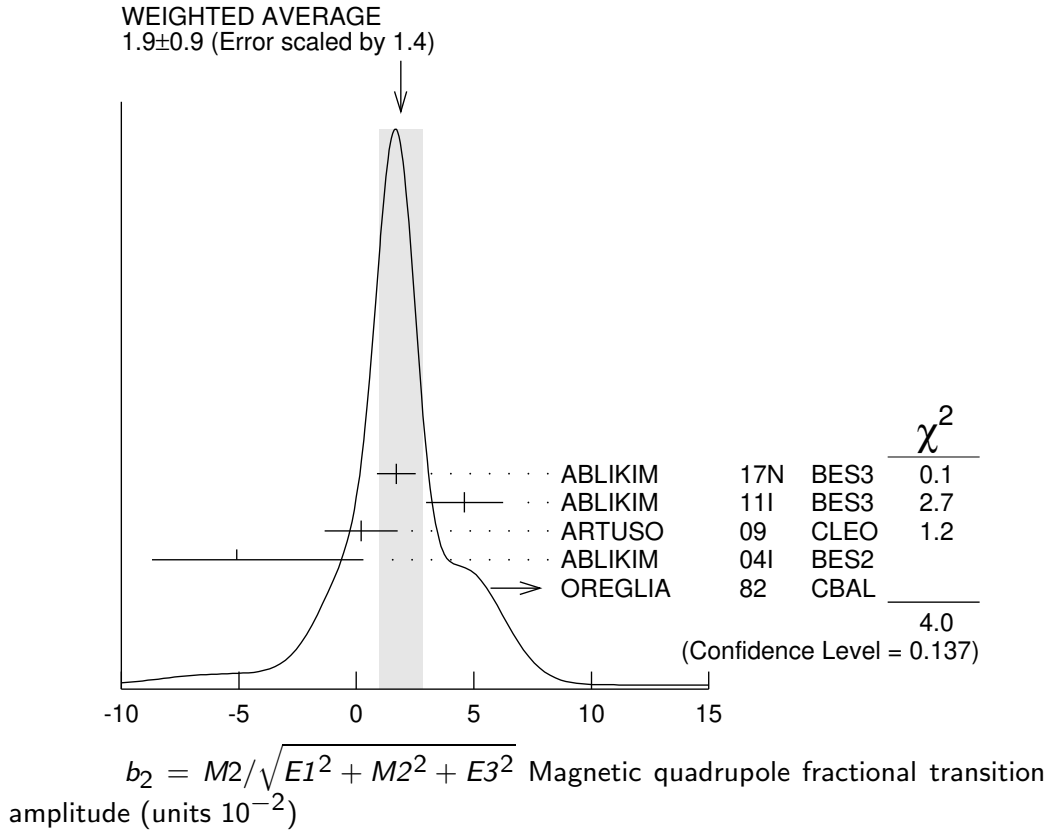
$a_3 = E3/\sqrt{E1^2 + M2^2 + E3^2}$ Electric octupole fractional transition amplitude (units 10^{-2})

MULTIPOLE AMPLITUDES IN $\psi(2S) \rightarrow \gamma\chi_{c2}(1P)$ 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	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$4.6 \pm 1.0 \pm 1.3$	13.8k	² ABLIKIM 11I	BES3	$\psi(2S) \rightarrow \gamma\pi^+\pi^-, \gamma K^+K^-$
$0.2 \pm 1.5 \pm 0.4$	19.8k	³ ARTUSO 09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

- $-5.1^{+5.4}_{-3.6}$ 721 ² ABLIKIM 04I BES2 $\psi(2S) \rightarrow \gamma\pi^+\pi^-, \gamma K^+K^-$
 $13.2^{+9.8}_{-7.5}$ 441 ⁴ OREGLIA 82 CBAL $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
 • • • 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 $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
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 $a_3=b_3=0$.



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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
-1.0 ± 0.6 OUR AVERAGE				
$-1.4 \pm 0.7 \pm 0.4$	89k	¹ ABLIKIM	17N BES3	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$1.5 \pm 0.8 \pm 1.8$	13.8k	² ABLIKIM	11I BES3	$\psi(2S) \rightarrow \gamma\pi^+\pi^-, \gamma K^+K^-$
$-0.8 \pm 1.2 \pm 0.2$	19.8k	ARTUSO	09 CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$-2.7^{+4.3}_{-2.9}$	721	² ABLIKIM	04I BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-, \gamma K^+K^-$
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

$$\psi(2S) \rightarrow \gamma \chi_{c2}(1P) \text{ and } \chi_{c2} \rightarrow \gamma J/\psi(1S)$$

 b_2/a_2 Magnetic quadrupole transition amplitude ratio

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

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	24AC	PR D110 032016	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24BE	PR D110 032022	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24BT	PR D110 072009	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24BW	PR D110 092003	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24BX	PR D110 112009	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24CA	PR D110 112013	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	24P	PR D109 072016	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	23N	JHEP 2305 069	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	23T	PR D107 092004	M. Ablikim <i>et al.</i>	(BESIII Collab.)
SEINO	23	JHEP 2301 160	Y. Seino <i>et al.</i>	(BELLE Collab.)
ABLIKIM	22AO	PR D106 072004	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	22O	JHEP 2206 074	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	22Q	PR D106 032014	M. Ablikim <i>et al.</i>	(BESIII Collab.)
PDG	22	PTEP 2022 083C01	R.L. Workman <i>et al.</i>	(PDG Collab.)
ABLIKIM	21AV	JHEP 2111 217	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	21L	PR D103 112004	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	20AE	PR D102 092006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	20B	PR D101 012012	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	20I	PR D101 092002	M. Ablikim <i>et al.</i>	(BESIII Collab.)
PDG	20	PTEP 2020 083C01	P.A. Zyla <i>et al.</i>	(PDG Collab.)
ABLIKIM	19AA	PR D99 052008	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	19AU	PR D100 052010	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	19BB	PR D100 092006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	19J	PR D99 012015	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	19Z	PR D99 051101	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	18V	PR D97 052011	M. Ablikim <i>et al.</i>	(BESIII Collab.)
PDG	18	PR D98 030001	M. Tanabashi <i>et al.</i>	(PDG Collab.)
AAIJ	17BB	EPJ C77 609	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	17BI	PRL 119 221801	R. Aaij <i>et al.</i>	(LHCb Collab.)
ABLIKIM	17AE	PR D96 092007	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	17AG	PR D96 111102	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	17AI	PR D96 112006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	17I	PRL 118 221802	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	17N	PR D95 072004	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	17U	PR D96 032001	M. Ablikim <i>et al.</i>	(BESIII Collab.)
PDG	16	CP C40 100001	C. Patrignani <i>et al.</i>	(PDG Collab.)
ABLIKIM	15I	PR D91 092006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	15M	PR D91 112008	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	15N	PR D91 112018	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	14J	PR D89 074030	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	13B	PR D87 012002	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	13D	PR D87 012007	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	13H	PR D87 032007	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	13V	PR D88 112001	M. Ablikim <i>et al.</i>	(BESIII Collab.)
UEHARA	13	PTEP 2013 123C01	S. Uehara <i>et al.</i>	(BELLE Collab.)
ABLIKIM	12A	PR D85 112008	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	12I	PR D86 052004	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	12J	PR D86 052011	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	12O	PRL 109 172002	M. Ablikim <i>et al.</i>	(BESIII Collab.)
LEES	12AE	PR D86 092005	J.P. Lees <i>et al.</i>	(BABAR Collab.)
LIU	12B	PRL 108 232001	Z.Q. Liu <i>et al.</i>	(BELLE Collab.)
ABLIKIM	11A	PR D83 012006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	11E	PR D83 112005	M. Ablikim <i>et al.</i>	(BESIII Collab.)

ABLIKIM	11F	PR D83 112009	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	11I	PR D84 092006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	11K	PRL 107 092001	M. Ablikim <i>et al.</i>	(BESIII Collab.)
DEL-AMO-SA...	11M	PR D84 012004	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
ABLIKIM	10A	PR D81 052005	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ONYISI	10	PR D82 011103	P.U.E. Onyisi <i>et al.</i>	(CLEO Collab.)
UEHARA	10A	PR D82 114031	S. Uehara <i>et al.</i>	(BELLE Collab.)
ARTUSO	09	PR D80 112003	M. Artuso <i>et al.</i>	(CLEO Collab.)
ASNER	09	PR D79 072007	D.M. Asner <i>et al.</i>	(CLEO Collab.)
UEHARA	09	PR D79 052009	S. Uehara <i>et al.</i>	(BELLE Collab.)
BENNETT	08A	PRL 101 151801	J.V. Bennett <i>et al.</i>	(CLEO Collab.)
ECKLUND	08A	PR D78 091501	K.M. Ecklund <i>et al.</i>	(CLEO Collab.)
HE	08B	PR D78 092004	Q. He <i>et al.</i>	(CLEO Collab.)
MENDEZ	08	PR D78 011102	H. Mendez <i>et al.</i>	(CLEO Collab.)
NAIK	08	PR D78 031101	P. Naik <i>et al.</i>	(CLEO Collab.)
UEHARA	08	EPJ C53 1	S. Uehara <i>et al.</i>	(BELLE Collab.)
ADAMS	07	PR D75 071101	G.S. Adams <i>et al.</i>	(CLEO Collab.)
ATHAR	07	PR D75 032002	S.B. Athar <i>et al.</i>	(CLEO Collab.)
CHEN	07B	PL B651 15	W.T. Chen <i>et al.</i>	(BELLE Collab.)
ABLIKIM	06D	PR D73 052006	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06I	PR D74 012004	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06R	PR D74 072001	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06T	PL B642 197	M. Ablikim <i>et al.</i>	(BES Collab.)
DOBBS	06	PR D73 071101	S. Dobbs <i>et al.</i>	(CLEO Collab.)
ABLIKIM	05G	PR D71 092002	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05N	PL B630 7	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05O	PL B630 21	M. Ablikim <i>et al.</i>	(BES Collab.)
ADAM	05A	PRL 94 232002	N.E. Adam <i>et al.</i>	(CLEO Collab.)
ANDREOTTI	05A	NP B717 34	M. Andreotti <i>et al.</i>	(FNAL E835 Collab.)
NAKAZAWA	05	PL B615 39	H. Nakazawa <i>et al.</i>	(BELLE Collab.)
ABLIKIM	04B	PR D70 012003	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	04H	PR D70 092003	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	04I	PR D70 092004	M. Ablikim <i>et al.</i>	(BES Collab.)
BAI	04F	PR D69 092001	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	04I	PR D70 012006	J.Z. Bai <i>et al.</i>	(BES Collab.)
AULCHENKO	03	PL B573 63	V.M. Aulchenko <i>et al.</i>	(KEDR Collab.)
BAI	03C	PR D67 032004	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	03E	PR D67 112001	J.Z. Bai <i>et al.</i>	(BES Collab.)
ABE	02T	PL B540 33	K. Abe <i>et al.</i>	(BELLE Collab.)
AMBROGIANI	02	PR D65 052002	M. Ambrogiani <i>et al.</i>	(FNAL E835 Collab.)
EISENSTEIN	01	PRL 87 061801	B.I. Eisenstein <i>et al.</i>	(CLEO Collab.)
AMBROGIANI	00B	PR D62 052002	M. Ambrogiani <i>et al.</i>	(FNAL E835 Collab.)
ACCIARRI	99E	PL B453 73	M. Acciarri <i>et al.</i>	(L3 Collab.)
BAI	99B	PR D60 072001	J.Z. Bai <i>et al.</i>	(BES Collab.)
ACKER...,K...	98	PL B439 197	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
BAI	98D	PR D58 092006	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98I	PRL 81 3091	J.Z. Bai <i>et al.</i>	(BES Collab.)
DOMINICK	94	PR D50 4265	J. Dominick <i>et al.</i>	(CLEO Collab.)
ARMSTRONG	93	PRL 70 2988	T.A. Armstrong <i>et al.</i>	(FNAL E760 Collab.)
ARMSTRONG	93E	PR D48 3037	T.A. Armstrong <i>et al.</i>	(FNAL-E760 Collab.)
BAUER	93	PL B302 345	D.A. Bauer <i>et al.</i>	(TPC Collab.)
ARMSTRONG	92	NP B373 35	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
Also		PRL 68 1468	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
BAGLIN	87B	PL B187 191	C. Baglin <i>et al.</i>	(R704 Collab.)
BAGLIN	86B	PL B172 455	C. Baglin	(LAPP, CERN, GENO, LYON, OSLO+)
GAISER	86	PR D34 711	J. Gaiser <i>et al.</i>	(Crystal Ball Collab.)
LEE	85	SLAC 282	R.A. Lee	(SLAC)
LEMOIGNE	82	PL 113B 509	Y. Lemoigne <i>et al.</i>	(SACL, LOIC, SHMP+)
OREGLIA	82	PR D25 2259	M.J. Oreglia <i>et al.</i>	(SLAC, CIT, HARV+)
Also		Private Comm.	M.J. Oreglia	(EFI)
BARATE	81	PR D24 2994	R. Barate <i>et al.</i>	(SACL, LOIC, SHMP, CERN+)
HIMEL	80	PRL 44 920	T. Himel <i>et al.</i>	(LBL, SLAC)
Also		Private Comm.	G. Trilling	(LBL, UCB)
BRANDELIK	79B	NP B160 426	R. Brandelik <i>et al.</i>	(DASP Collab.)
BARTEL	78B	PL 79B 492	W. Bartel <i>et al.</i>	(DESY, HEIDP)
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum <i>et al.</i>	(SLAC, LBL)
Also		Private Comm.	G. Trilling	(LBL, UCB)
BIDDICK	77	PRL 38 1324	C.J. Biddick <i>et al.</i>	(UCSD, UMD, PAVI+)
WHITAKER	76	PRL 37 1596	J.S. Whitaker <i>et al.</i>	(SLAC, LBL)