

$\chi_{c2}(1P)$

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

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

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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
3556.17 ± 0.07 OUR AVERAGE				
3557.3 ± 1.7 ± 0.7	611	¹ AAIJ	17BB LHCb	$p\bar{p} \rightarrow b\bar{b}X \rightarrow 2(K^+K^-)X$
3556.10 ± 0.06 ± 0.11	4.0k	² AAIJ	17BI LHCb	$\chi_{c2} \rightarrow J/\psi\mu^+\mu^-$
3555.3 ± 0.6 ± 2.2	2.5k	UEHARA	08 BELL	$\gamma\gamma \rightarrow \text{hadrons}$
3555.70 ± 0.59 ± 0.39		ABLIKIM	05G BES2	$\psi(2S) \rightarrow \gamma\chi_{c2}$
3556.173 ± 0.123 ± 0.020		ANDREOTTI	05A E835	$p\bar{p} \rightarrow e^+e^-\gamma$
3559.9 ± 2.9		EISENSTEIN	01 CLE2	$e^+e^- \rightarrow e^+e^-\chi_{c2}$
3556.4 ± 0.7		BAI	99B BES	$\psi(2S) \rightarrow \gamma X$
3556.22 ± 0.131 ± 0.020	585	³ ARMSTRONG	92 E760	$\bar{p}p \rightarrow e^+e^-\gamma$
3556.9 ± 0.4 ± 0.5	50	BAGLIN	86B SPEC	$\bar{p}p \rightarrow e^+e^-\gamma$
3557.8 ± 0.2 ± 4		⁴ GAISER	86 CBAL	$\psi(2S) \rightarrow \gamma X$
3553.4 ± 2.2	66	⁵ LEMOIGNE	82 GOLI	$185\pi^-\text{Be} \rightarrow \gamma\mu^+\mu^-A$
3555.9 ± 0.7		⁶ OREGLIA	82 CBAL	$e^+e^- \rightarrow J/\psi 2\gamma$
3557 ± 1.5	69	⁷ HIMEL	80 MRK2	$e^+e^- \rightarrow J/\psi 2\gamma$
3551 ± 11	15	BRANDELIK	79B DASP	$e^+e^- \rightarrow J/\psi 2\gamma$
3553 ± 4		⁷ BARTEL	78B CNTR	$e^+e^- \rightarrow J/\psi 2\gamma$
3553 ± 4 ± 4		^{7,8} TANENBAUM	78 MRK1	e^+e^-
3563 ± 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 ± 1.3	53	UEHARA	13 BELL	$\gamma\gamma \rightarrow K_S^0 K_S^0$
3543 ± 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			
2.00 ± 0.11	OUR AVERAGE			
2.10 ± 0.20 ± 0.02	4.0k	AAIJ	17BI LHCb	$\chi_{c2} \rightarrow J/\psi \mu^+ \mu^-$
1.915 ± 0.188 ± 0.013		ANDREOTTI	05A E835	$\rho \bar{p} \rightarrow e^+ e^- \gamma$
1.96 ± 0.17 ± 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)	Confidence level
Hadronic decays		
Γ_1 $2(\pi^+ \pi^-)$	(1.02 ± 0.09) %	
Γ_2 $\rho \rho$		
Γ_3 $\pi^+ \pi^- \pi^0 \pi^0$	(1.83 ± 0.23) %	
Γ_4 $\rho^+ \pi^- \pi^0 + \text{c.c.}$	(2.19 ± 0.34) %	
Γ_5 $4\pi^0$	(1.11 ± 0.15) × 10 ⁻³	
Γ_6 $K^+ K^- \pi^0 \pi^0$	(2.1 ± 0.4) × 10 ⁻³	
Γ_7 $K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(1.38 ± 0.20) %	
Γ_8 $\rho^- K^+ \bar{K}^0 + \text{c.c.}$	(4.1 ± 1.2) × 10 ⁻³	
Γ_9 $K^*(892)^0 K^- \pi^+ \rightarrow$ $K^- \pi^+ K^0 \pi^0 + \text{c.c.}$	(2.9 ± 0.8) × 10 ⁻³	
Γ_{10} $K^*(892)^0 \bar{K}^0 \pi^0 \rightarrow$ $K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(3.8 ± 0.9) × 10 ⁻³	
Γ_{11} $K^*(892)^- K^+ \pi^0 \rightarrow$ $K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(3.7 ± 0.8) × 10 ⁻³	
Γ_{12} $K^*(892)^+ \bar{K}^0 \pi^- \rightarrow$ $K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}$	(2.9 ± 0.8) × 10 ⁻³	
Γ_{13} $K^+ K^- \eta \pi^0$	(1.3 ± 0.4) × 10 ⁻³	
Γ_{14} $K^+ K^- \pi^+ \pi^-$	(8.4 ± 0.9) × 10 ⁻³	
Γ_{15} $K^+ K^- \pi^+ \pi^- \pi^0$	(1.17 ± 0.13) %	
Γ_{16} $K_S^0 K^\pm \pi^\mp \pi^+ \pi^-$	(7.3 ± 0.8) × 10 ⁻³	
Γ_{17} $K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.}$	(2.1 ± 1.1) × 10 ⁻³	
Γ_{18} $K^*(892)^0 \bar{K}^*(892)^0$	(2.3 ± 0.4) × 10 ⁻³	
Γ_{19} $3(\pi^+ \pi^-)$	(8.6 ± 1.8) × 10 ⁻³	
Γ_{20} $\phi \phi$	(1.06 ± 0.09) × 10 ⁻³	
Γ_{21} $\omega \omega$	(8.4 ± 1.0) × 10 ⁻⁴	
Γ_{22} $\omega K^+ K^-$	(7.3 ± 0.9) × 10 ⁻⁴	
Γ_{23} $\omega \phi$		

Γ_{24}	$\pi\pi$	$(2.23 \pm 0.09) \times 10^{-3}$	
Γ_{25}	$\rho^0\pi^+\pi^-$	$(3.7 \pm 1.6) \times 10^{-3}$	
Γ_{26}	$\pi^+\pi^-\pi^0$ (non-resonant)	$(2.0 \pm 0.4) \times 10^{-5}$	
Γ_{27}	$\rho(770)^\pm\pi^\mp$	$(6 \pm 4) \times 10^{-6}$	
Γ_{28}	$\pi^+\pi^-\eta$	$(4.8 \pm 1.3) \times 10^{-4}$	
Γ_{29}	$\pi^+\pi^-\eta'$	$(5.0 \pm 1.8) \times 10^{-4}$	
Γ_{30}	$\eta\eta$	$(5.4 \pm 0.4) \times 10^{-4}$	
Γ_{31}	K^+K^-	$(1.01 \pm 0.06) \times 10^{-3}$	
Γ_{32}	$K_S^0K_S^0$	$(5.2 \pm 0.4) \times 10^{-4}$	
Γ_{33}	$K^*(892)^\pm K^\mp$	$(1.44 \pm 0.21) \times 10^{-4}$	
Γ_{34}	$K^*(892)^0\bar{K}^0 + \text{c.c.}$	$(1.24 \pm 0.27) \times 10^{-4}$	
Γ_{35}	$K_2^*(1430)^\pm K^\mp$	$(1.48 \pm 0.12) \times 10^{-3}$	
Γ_{36}	$K_2^*(1430)^0\bar{K}^0 + \text{c.c.}$	$(1.24 \pm 0.17) \times 10^{-3}$	
Γ_{37}	$K_3^*(1780)^\pm K^\mp$	$(5.2 \pm 0.8) \times 10^{-4}$	
Γ_{38}	$K_3^*(1780)^0\bar{K}^0 + \text{c.c.}$	$(5.6 \pm 2.1) \times 10^{-4}$	
Γ_{39}	$a_2(1320)^0\pi^0$	$(1.29 \pm 0.34) \times 10^{-3}$	
Γ_{40}	$a_2(1320)^\pm\pi^\mp$	$(1.8 \pm 0.6) \times 10^{-3}$	
Γ_{41}	$\bar{K}^0K^+\pi^- + \text{c.c.}$	$(1.28 \pm 0.18) \times 10^{-3}$	
Γ_{42}	$K^+K^-\pi^0$	$(3.0 \pm 0.8) \times 10^{-4}$	
Γ_{43}	$K^+K^-\eta$	$< 3.2 \times 10^{-4}$	90%
Γ_{44}	$K^+K^-\eta'(958)$	$(1.94 \pm 0.34) \times 10^{-4}$	
Γ_{45}	$\eta\eta'$	$(2.2 \pm 0.5) \times 10^{-5}$	
Γ_{46}	$\eta'\eta'$	$(4.6 \pm 0.6) \times 10^{-5}$	
Γ_{47}	$\pi^+\pi^-K_S^0K_S^0$	$(2.2 \pm 0.5) \times 10^{-3}$	
Γ_{48}	$K^+K^-K_S^0K_S^0$	$< 4 \times 10^{-4}$	90%
Γ_{49}	$K^+K^-K^+K^-$	$(1.65 \pm 0.20) \times 10^{-3}$	
Γ_{50}	$K^+K^-\phi$	$(1.42 \pm 0.29) \times 10^{-3}$	
Γ_{51}	$\bar{K}^0K^+\pi^-\phi + \text{c.c.}$	$(4.8 \pm 0.7) \times 10^{-3}$	
Γ_{52}	$K^+K^-\pi^0\phi$	$(2.7 \pm 0.5) \times 10^{-3}$	
Γ_{53}	$\phi\pi^+\pi^-\pi^0$	$(9.3 \pm 1.2) \times 10^{-4}$	
Γ_{54}	$\rho\bar{\rho}$	$(7.33 \pm 0.33) \times 10^{-5}$	
Γ_{55}	$\rho\bar{\rho}\pi^0$	$(4.7 \pm 0.4) \times 10^{-4}$	
Γ_{56}	$\rho\bar{\rho}\eta$	$(1.74 \pm 0.25) \times 10^{-4}$	
Γ_{57}	$\rho\bar{\rho}\omega$	$(3.6 \pm 0.4) \times 10^{-4}$	
Γ_{58}	$\rho\bar{\rho}\phi$	$(2.8 \pm 0.9) \times 10^{-5}$	
Γ_{59}	$\rho\bar{\rho}\pi^+\pi^-$	$(1.32 \pm 0.34) \times 10^{-3}$	
Γ_{60}	$\rho\bar{\rho}\pi^0\pi^0$	$(7.8 \pm 2.3) \times 10^{-4}$	
Γ_{61}	$\rho\bar{\rho}K^+K^-$ (non-resonant)	$(1.91 \pm 0.32) \times 10^{-4}$	
Γ_{62}	$\rho\bar{\rho}K_S^0K_S^0$	$< 7.9 \times 10^{-4}$	90%
Γ_{63}	$\rho\bar{n}\pi^-$	$(8.5 \pm 0.9) \times 10^{-4}$	
Γ_{64}	$\bar{\rho}n\pi^+$	$(8.9 \pm 0.8) \times 10^{-4}$	
Γ_{65}	$\rho\bar{n}\pi^-\pi^0$	$(2.17 \pm 0.18) \times 10^{-3}$	
Γ_{66}	$\bar{\rho}n\pi^+\pi^0$	$(2.11 \pm 0.18) \times 10^{-3}$	
Γ_{67}	$\Lambda\bar{\Lambda}$	$(1.84 \pm 0.15) \times 10^{-4}$	

Γ_{68}	$\Lambda\bar{\Lambda}\pi^+\pi^-$	$(1.25\pm 0.15)\times 10^{-3}$	
Γ_{69}	$\Lambda\bar{\Lambda}\pi^+\pi^-$ (non-resonant)	$(6.6\pm 1.5)\times 10^{-4}$	
Γ_{70}	$\Sigma(1385)^+\bar{\Lambda}\pi^- + \text{c.c.}$	$< 4 \times 10^{-4}$	90%
Γ_{71}	$\Sigma(1385)^-\bar{\Lambda}\pi^+ + \text{c.c.}$	$< 6 \times 10^{-4}$	90%
Γ_{72}	$K^+\bar{p}\Lambda + \text{c.c.}$	$(7.8\pm 0.5)\times 10^{-4}$	
Γ_{73}	$K^+\bar{p}\Lambda(1520) + \text{c.c.}$	$(2.8\pm 0.7)\times 10^{-4}$	
Γ_{74}	$\Lambda(1520)\bar{\Lambda}(1520)$	$(4.6\pm 1.5)\times 10^{-4}$	
Γ_{75}	$\Sigma^0\bar{\Sigma}^0$	$< 6 \times 10^{-5}$	90%
Γ_{76}	$\Sigma^+\bar{\Sigma}^-$	$< 7 \times 10^{-5}$	90%
Γ_{77}	$\Sigma(1385)^+\bar{\Sigma}(1385)^-$	$< 1.6 \times 10^{-4}$	90%
Γ_{78}	$\Sigma(1385)^-\bar{\Sigma}(1385)^+$	$< 8 \times 10^{-5}$	90%
Γ_{79}	$K^-\Lambda\bar{\Xi}^+ + \text{c.c.}$	$(1.76\pm 0.32)\times 10^{-4}$	
Γ_{80}	$\Xi^0\bar{\Xi}^0$	$< 1.0 \times 10^{-4}$	90%
Γ_{81}	$\Xi^-\bar{\Xi}^+$	$(1.42\pm 0.32)\times 10^{-4}$	
Γ_{82}	$J/\psi(1S)\pi^+\pi^-\pi^0$	$< 1.5\%$	90%
Γ_{83}	$\pi^0\eta_c$	$< 3.2 \times 10^{-3}$	90%
Γ_{84}	$\eta_c(1S)\pi^+\pi^-$	$< 5.4 \times 10^{-3}$	90%

Radiative decays

Γ_{85}	$\gamma J/\psi(1S)$	$(19.0\pm 0.5)\%$	
Γ_{86}	$\gamma\rho^0$	$< 1.9 \times 10^{-5}$	90%
Γ_{87}	$\gamma\omega$	$< 6 \times 10^{-6}$	90%
Γ_{88}	$\gamma\phi$	$< 7 \times 10^{-6}$	90%
Γ_{89}	$\gamma\gamma$	$(2.85\pm 0.10)\times 10^{-4}$	
Γ_{90}	$e^+e^- J/\psi(1S)$	$(2.37\pm 0.16)\times 10^{-3}$	

CONSTRAINED FIT INFORMATION

A multiparticle fit to $\chi_{c1}(1P)$, $\chi_{c0}(1P)$, $\chi_{c2}(1P)$, and $\psi(2S)$ with 4 total widths, a partial width, 25 combinations of partial widths obtained from integrated cross section, and 84 branching ratios uses 247 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 376.9$ for 198 degrees of freedom.

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

x ₁₄	7									
x ₁₇	2	21								
x ₁₈	4	3	1							
x ₂₀	7	5	1	3						
x ₂₄	7	6	1	4	10					
x ₂₅	18	2	0	1	1	1				
x ₃₀	3	3	1	2	5	12	1			
x ₃₁	5	4	1	3	7	15	1	8		
x ₃₂	5	4	1	2	6	13	1	7	8	
x ₄₁	2	2	0	1	3	7	0	3	4	4
x ₄₉	4	3	1	2	4	7	1	4	5	4
x ₅₄	10	9	2	5	9	11	2	5	8	7
x ₆₇	3	3	1	2	5	13	1	7	8	7
x ₈₅	12	10	2	6	15	34	2	18	22	18
x ₈₉	-6	-4	-1	-2	2	20	-2	12	12	10
Γ	-23	-19	-4	-11	-19	-25	-5	-12	-18	-15
	x ₁	x ₁₄	x ₁₇	x ₁₈	x ₂₀	x ₂₄	x ₂₅	x ₃₀	x ₃₁	x ₃₂

x ₄₉	2									
x ₅₄	4	5								
x ₆₇	4	4	6							
x ₈₅	10	11	4	18						
x ₈₉	5	4	18	12	34					
Γ	-8	-11	-45	-12	-46	-43				
	x ₄₁	x ₄₉	x ₅₄	x ₆₇	x ₈₅	x ₈₉				

χ_{c2}(1P) PARTIAL WIDTHS

———— χ_{c2}(1P) Γ(i)Γ(γJ/ψ(1S))/Γ(total) ————

Γ(p̄p̄) × Γ(γJ/ψ(1S))/Γ_{total}

Γ₅₄Γ₈₅/Γ

VALUE (eV) DOCUMENT ID TECN COMMENT

27.5±1.2 OUR FIT

27.5±1.5 OUR AVERAGE

27.0±1.5±1.1

¹ ANDREOTTI 05A E835 p̄p̄ → e⁺e⁻γ

27.7±1.5±2.0

^{1,2} ARMSTRONG 92 E760 p̄p̄ → e⁺e⁻γ

36 ±8

¹ BAGLIN 86B SPEC p̄p̄ → e⁺e⁻X

¹ Calculated by us using B(J/ψ(1S) → e⁺e⁻) = 0.0593 ± 0.0010.

² Recalculated by ANDREOTTI 05A.

$\Gamma(\gamma\gamma) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$					$\Gamma_{89}\Gamma_{85}/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
107 ± 5 OUR FIT					
117 ± 10 OUR AVERAGE					
111 ± 12 ± 9	147 ± 15	¹ DOBBS	06 CLE3	10.4 $e^+e^- \rightarrow e^+e^-\chi_{c2}$	
114 ± 11 ± 9	136 ± 13.3	^{1,2} ABE	02T BELL	$e^+e^- \rightarrow e^+e^-\chi_{c2}$	
139 ± 55 ± 21		^{1,3} ACCIARRI	99E L3	$e^+e^- \rightarrow e^+e^-\chi_{c2}$	
242 ± 65 ± 51		^{1,4} ACKER...,K...	98 OPAL	$e^+e^- \rightarrow e^+e^-\chi_{c2}$	
150 ± 42 ± 36		^{1,5} DOMINICK	94 CLE2	$e^+e^- \rightarrow e^+e^-\chi_{c2}$	
470 ± 240 ± 120		^{1,6} BAUER	93 TPC	$e^+e^- \rightarrow e^+e^-\chi_{c2}$	

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

² All systematic errors added in quadrature.

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 $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = 0.0597 \pm 0.0025$.

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

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$					$\Gamma_1\Gamma_{89}/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
5.7 ± 0.5 OUR FIT					
5.2 ± 0.7 OUR AVERAGE					
5.01 ± 0.44 ± 0.55	1597 ± 138	UEHARA	08 BELL	$\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(\pi^+\pi^-)$	
6.4 ± 1.8 ± 0.8		EISENSTEIN	01 CLE2	$e^+e^- \rightarrow e^+e^-\chi_{c2}$	

$\Gamma(\rho\rho) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$					$\Gamma_2\Gamma_{89}/\Gamma$
VALUE (eV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
<7.8	90	<598	UEHARA	08 BELL	$\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(\pi^+\pi^-)$

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$					$\Gamma_{14}\Gamma_{89}/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
4.7 ± 0.5 OUR FIT					
4.42 ± 0.42 ± 0.53	780 ± 74	UEHARA	08 BELL	$\gamma\gamma \rightarrow \chi_{c2} \rightarrow K^+K^-\pi^+\pi^-$	

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$					$\Gamma_{15}\Gamma_{89}/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
6.5 ± 0.9 ± 1.5	1250	DEL-AMO-SA..11M	BABR	$\gamma\gamma \rightarrow K^+K^-\pi^+\pi^-\pi^0$	

$\Gamma(K^*(892)^0 \bar{K}^*(892)^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{18}\Gamma_{89}/\Gamma$

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

$\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{20}\Gamma_{89}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.60±0.05 OUR FIT				
0.62±0.07±0.05	89 ± 11	¹ LIU 12B	BELL	$\gamma\gamma \rightarrow 2(K^+ K^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.58±0.18±0.16	26.5 ± 8.1	UEHARA 08	BELL	$\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(K^+ K^-)$
¹ Supersedes UEHARA 08. Using $B(\phi \rightarrow K^+ K^-) = (48.9 \pm 0.5)\%$.				

$\Gamma(\omega\omega) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{21}\Gamma_{89}/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.64	90	¹ LIU 12B	BELL	$\gamma\gamma \rightarrow 2(\pi^+ \pi^- \pi^0)$
¹ Using $B(\omega \rightarrow \pi^+ \pi^- \pi^0) = (89.2 \pm 0.7)\%$.				

$\Gamma(\omega\phi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{23}\Gamma_{89}/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.04	90	¹ LIU 12B	BELL	$\gamma\gamma \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
¹ Using $B(\phi \rightarrow K^+ K^-) = (48.9 \pm 0.5)\%$ and $B(\omega \rightarrow \pi^+ \pi^- \pi^0) = (89.2 \pm 0.7)\%$.				

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{24}\Gamma_{89}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.25±0.07 OUR FIT				
1.18±0.25 OUR AVERAGE				
1.44±0.54±0.47	34 ± 13	¹ UEHARA 09	BELL	10.6 $e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$
1.14±0.21±0.17	54 ± 10	² NAKAZAWA 05	BELL	10.6 $e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$
¹ We multiplied the measurement by 3 to convert from $\pi^0 \pi^0$ to $\pi\pi$. Interference with the continuum included.				
² We have multiplied $\pi^+ \pi^-$ measurement by 3/2 to obtain $\pi\pi$.				

$\Gamma(\rho^0 \pi^+ \pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{25}\Gamma_{89}/\Gamma$

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

$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{30}\Gamma_{89}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.53±0.22±0.09	8	¹ UEHARA 10A	BELL	10.6 $e^+ e^- \rightarrow e^+ e^- \eta\eta$
¹ Interference with the continuum not included.				

$\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{31}\Gamma_{89}/\Gamma$

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

$$\Gamma(K_S^0 K_S^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{32}\Gamma_{89}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
------------	------	-------------	------	---------

0.294 ± 0.025 OUR FIT

0.27^{+0.07}_{-0.06} ± 0.03 53 ¹UEHARA 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 $e^+e^- \rightarrow e^+e^-\chi_{c2}$

¹Supersedes CHEN 07B.

$$\Gamma(\bar{K}^0 K^+ \pi^- + \text{c.c.}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{41}\Gamma_{89}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
------------	------	-------------	------	---------

0.72 ± 0.11 OUR FIT

1.20 ± 0.33 ± 0.13 126 ¹DEL-AMO-SA..11M BABR $\gamma\gamma \rightarrow K_S^0 K^\pm \pi^\mp$

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

$$\Gamma(K^+ K^- K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{49}\Gamma_{89}/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
------------	------	-------------	------	---------

0.93 ± 0.11 OUR FIT

1.10 ± 0.21 ± 0.15 126 ± 24 UEHARA 08 BELL $\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(K^+ K^-)$

$$\Gamma(\eta_c(1S) \pi^+ \pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{84}\Gamma_{89}/\Gamma$$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
------------	-----	-------------	------	---------

<15.7

χ_{c2}(1P) BRANCHING RATIOS

HADRONIC DECAYS

$$\Gamma(2(\pi^+ \pi^-))/\Gamma_{\text{total}} \quad \Gamma_1/\Gamma$$

VALUE	DOCUMENT ID
-------	-------------

0.0102 ± 0.0009 OUR FIT

$$\Gamma(\rho^0 \pi^+ \pi^-)/\Gamma(2(\pi^+ \pi^-)) \quad \Gamma_{25}/\Gamma_1$$

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

0.36 ± 0.15 OUR FIT

0.31 ± 0.17 TANENBAUM 78 MRK1 $\psi(2S) \rightarrow \gamma\chi_{c2}$

$$\Gamma(\pi^+ \pi^- \pi^0 \pi^0)/\Gamma_{\text{total}} \quad \Gamma_3/\Gamma$$

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
-----------	------	-------------	------	---------

1.83 ± 0.23 ± 0.04 903.5 ¹HE 08B CLEO $e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

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

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

<u>VALUE (%)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.19±0.34±0.05	1031.9	^{1,2} HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

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

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

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

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

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

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

<u>VALUE (%)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.206±0.040±0.004	76.9	¹ HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

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

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

<u>VALUE (%)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.38±0.19±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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

<u>VALUE (%)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.41±0.12±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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.29±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 $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0 K^- \pi^+ \rightarrow K^- \pi^+ K^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

¹ HE 08B reports $0.39 \pm 0.07 \pm 0.05 \pm 0.03$ % 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

¹ HE 08B reports $0.38 \pm 0.07 \pm 0.04 \pm 0.03$ % 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

¹ HE 08B reports $0.30 \pm 0.07 \pm 0.04 \pm 0.02$ % 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

¹ HE 08B reports $0.13 \pm 0.04 \pm 0.02 \pm 0.01$ % 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ K^- \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{14}/Γ VALUE (units 10^{-3}) DOCUMENT ID**8.4±0.9 OUR FIT** $\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$ Γ_{15}/Γ VALUE (units 10^{-3}) EVTS DOCUMENT ID TECN COMMENT**11.69±0.13±1.31** 11k ¹ ABLIKIM 13B BES3 $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$ ¹ Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \rightarrow \chi_{c2} \gamma) = (8.72 \pm 0.34)\%$. $\Gamma(K_S^0 K^\pm \pi^\mp \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{16}/Γ VALUE (units 10^{-3}) EVTS DOCUMENT ID TECN COMMENT**7.30±0.11±0.75** 4.5k ¹ ABLIKIM 13B BES3 $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$ ¹ Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \rightarrow \chi_{c2} \gamma) = (8.72 \pm 0.34)\%$. $\Gamma(K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma(K^+ K^- \pi^+ \pi^-)$ Γ_{17}/Γ_{14} VALUE DOCUMENT ID TECN COMMENT**0.25±0.13 OUR FIT****0.25±0.13**TANENBAUM 78 MRK1 $\psi(2S) \rightarrow \gamma \chi_{c2}$ $\Gamma(K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{17}/Γ VALUE (units 10^{-4}) DOCUMENT ID**21±11 OUR FIT** $\Gamma(K^*(892)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}}$ Γ_{18}/Γ VALUE (units 10^{-3}) DOCUMENT ID**2.3±0.4 OUR FIT** $\Gamma(3(\pi^+ \pi^-))/\Gamma_{\text{total}}$ Γ_{19}/Γ VALUE (units 10^{-3}) DOCUMENT ID TECN COMMENT**8.6±1.8 OUR EVALUATION** Treating systematic error as correlated.**8.6±1.8 OUR AVERAGE**8.6±0.9±1.6 ¹ BAI 99B BES $\psi(2S) \rightarrow \gamma \chi_{c2}$ 8.7±5.9±0.4 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. $\Gamma(\phi\phi)/\Gamma_{\text{total}}$ Γ_{20}/Γ VALUE (units 10^{-3}) DOCUMENT ID**1.06±0.09 OUR FIT** $\Gamma(\omega\omega)/\Gamma_{\text{total}}$ Γ_{21}/Γ VALUE (units 10^{-3}) EVTS DOCUMENT ID TECN COMMENT**0.84±0.10 OUR AVERAGE**0.82±0.10±0.02 762 ¹ ABLIKIM 11k BES3 $\psi(2S) \rightarrow \gamma$ hadrons1.73±0.57±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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(\omega K^+ K^-)/\Gamma_{\text{total}}$ Γ_{22}/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_{23}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
<1.8	90	¹ ABLIKIM	11K BES3	$\psi(2S) \rightarrow \gamma$ hadrons

¹ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

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

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

$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{25}/Γ

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

$\Gamma(\pi^+\pi^-\pi^0(\text{non-resonant}))/\Gamma_{\text{total}}$ Γ_{26}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$2.01 \pm 0.42 \pm 0.04$	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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\rho(770)^\pm\pi^\mp)/\Gamma_{\text{total}}$ Γ_{27}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$0.61 \pm 0.38 \pm 0.01$	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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(\pi^+\pi^-\eta)/\Gamma_{\text{total}} \qquad \Gamma_{28}/\Gamma$$

<u>VALUE (units 10^{-3})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
---	------------	--------------------	-------------	----------------

0.48±0.13±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. • • •

<1.4	90	² ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma \chi_{c2}$
------	----	----------------------	-----	--

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

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

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

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
---	--------------------	-------------	----------------

0.50±0.18±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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(\eta\eta)/\Gamma_{\text{total}} \qquad \Gamma_{30}/\Gamma$$

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>
---	--------------------

5.4±0.4 OUR FIT

$$\Gamma(K^+K^-)/\Gamma_{\text{total}} \qquad \Gamma_{31}/\Gamma$$

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>
---	--------------------

1.01±0.06 OUR FIT

$$\Gamma(K_S^0 K_S^0)/\Gamma_{\text{total}} \qquad \Gamma_{32}/\Gamma$$

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>
---	--------------------

0.52±0.04 OUR FIT

$$\Gamma(K_S^0 K_S^0)/\Gamma(\pi\pi) \qquad \Gamma_{32}/\Gamma_{24}$$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
--------------	--------------------	-------------	----------------

0.235±0.019 OUR FIT

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

$0.27 \pm 0.07 \pm 0.04$	^{1,2} CHEN	07B	BELL $e^+e^- \rightarrow e^+e^-\chi_{c2}$
--------------------------	---------------------	-----	---

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

² Not independent from other measurements.

$\Gamma(K_S^0 K_S^0)/\Gamma(K^+ K^-)$ Γ_{32}/Γ_{31}

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

0.52±0.05 OUR FIT

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

0.70±0.21±0.12 ^{1,2} CHEN 07B BELL $e^+ e^- \rightarrow e^+ e^- \chi_{c2}$ ¹ Using $\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ from NAKAZAWA 05.² Not independent from other measurements. $\Gamma(K^*(892)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{33}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
--------------------------	-------------	------	---------

1.44±0.21±0.03 ¹ ABLIKIM 17AG BES3 $\psi(2S) \rightarrow \gamma K \bar{K} \pi$

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

1.72±0.26±0.04 ² ABLIKIM 17AG BES3 $\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$ 1.34±0.27±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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.² ABLIKIM 17AG reports $(1.8 \pm 0.2 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.³ ABLIKIM 17AG reports $(1.4 \pm 0.2 \pm 0.2) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. $\Gamma(K^*(892)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{34}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
--------------------------	-------------	------	---------

1.24±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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. $\Gamma(K_2^*(1430)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{35}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
--------------------------	-------------	------	---------

14.8±1.2±0.3 ¹ ABLIKIM 17AG BES3 $\psi(2S) \rightarrow \gamma K \bar{K} \pi$

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

17.4±1.6±0.4 ² ABLIKIM 17AG BES3 $\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$ 13.0±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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ² ABLIKIM 17AG reports $(18.2 \pm 0.8 \pm 1.6) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³ ABLIKIM 17AG reports $(13.6 \pm 0.8 \pm 1.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_2^*(1430)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(K_2^*(1430)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{36}/Γ** VALUE (units 10^{-4})DOCUMENT IDTECNCOMMENT**12.4±1.7±0.3**¹ ABLIKIM 17AG BES3 $\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$

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

 $\Gamma(K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}$ **Γ_{37}/Γ** VALUE (units 10^{-4})DOCUMENT IDTECNCOMMENT**5.2±0.8±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±1.0±0.1

² ABLIKIM 17AG BES3 $\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$

5.6±1.8±0.1

³ ABLIKIM 17AG BES3 $\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$

- ¹ ABLIKIM 17AG reports $(5.4 \pm 0.5 \pm 0.7) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ² ABLIKIM 17AG reports $(5.3 \pm 0.5 \pm 0.9) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³ ABLIKIM 17AG reports $(5.9 \pm 1.1 \pm 1.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow K_3^*(1780)^\pm K^\mp)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_3^*(1780)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{38}/Γ

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$5.6 \pm 2.1 \pm 0.1$	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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(a_2(1320)^0 \pi^0)/\Gamma_{\text{total}}$ Γ_{39}/Γ

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$12.9 \pm 3.4 \pm 0.3$	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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$17.6 \pm 6.1 \pm 0.4$	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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(K^+ K^- \pi^0)/\Gamma_{\text{total}}$ Γ_{42}/Γ

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.30 \pm 0.08 \pm 0.01$	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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(K^+ K^- \eta'(958))/\Gamma_{\text{total}}$ Γ_{44}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.94±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_{45}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
2.17±0.47±0.05		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 ± 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

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

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
4.6±0.6±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	$\psi(2S) \rightarrow \gamma \eta' \eta'$
< 30	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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.17±0.54±0.05	57 ± 11	¹ ABLIKIM	050 BES2	$\psi(2S) \rightarrow \gamma\chi_{c2}$

¹ ABLIKIM 050 reports $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+\pi^-K_S^0K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ = $(0.207 \pm 0.039 \pm 0.033) \times 10^{-3}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<4	90	2.3 ± 2.2	¹ ABLIKIM	050 BES2	$e^+e^- \rightarrow \chi_{c2}\gamma$

¹ ABLIKIM 050 reports $[\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-K_S^0K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ < 3.5×10^{-5} which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

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

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

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.42±0.29±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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(\bar{K}^0K^+\pi^-\phi + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{51}/Γ

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

 $\Gamma(K^+K^-\pi^0\phi)/\Gamma_{\text{total}}$ Γ_{52}/Γ

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

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.93±0.06±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 $B(\psi(2S) \rightarrow \chi_{c2}\gamma) = (8.72 \pm 0.34)\%$.

 $\Gamma(p\bar{p})/\Gamma_{\text{total}}$ Γ_{54}/Γ

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

$\Gamma(p\bar{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{55}/Γ

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.47±0.04 OUR AVERAGE			
0.47±0.04±0.01	¹ ONYISI	10 CLE3	$\psi(2S) \rightarrow \gamma p\bar{p}X$
0.43±0.09±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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(p\bar{p}\eta)/\Gamma_{\text{total}}$ Γ_{56}/Γ

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.174±0.025 OUR AVERAGE			
0.172±0.026±0.004	¹ ONYISI	10 CLE3	$\psi(2S) \rightarrow \gamma p\bar{p}X$
0.186±0.070±0.004	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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(p\bar{p}\omega)/\Gamma_{\text{total}}$ Γ_{57}/Γ

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.36±0.04±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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.8±0.9±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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\rho\bar{p}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{59}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
--------------------------	-------------	------	---------

1.32±0.34 OUR EVALUATION Treating systematic error as correlated.**1.3 ±0.4 OUR AVERAGE** Error includes scale factor of 1.3.1.17±0.19±0.30 ¹BAI 99B BES $\psi(2S) \rightarrow \gamma\chi_{c2}$ 2.64±1.03±0.14 ¹TANENBAUM 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.

 $\Gamma(\rho\bar{p}\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_{60}/Γ

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
-----------	------	-------------	------	---------

0.078±0.023±0.002 29.2 ¹HE 08B CLEO $e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹ HE 08B reports $0.08 \pm 0.02 \pm 0.01 \pm 0.01\%$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \rho\bar{p}\pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(\rho\bar{p}K^+K^-(\text{non-resonant}))/\Gamma_{\text{total}}$ Γ_{61}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

1.91±0.32±0.04 131 ± 12 ¹ABLIKIM 11F BES3 $\psi(2S) \rightarrow \gamma\rho\bar{p}K^+K^-$

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

 $\Gamma(\rho\bar{p}K_S^0K_S^0)/\Gamma_{\text{total}}$ Γ_{62}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
--------------------------	-----	-------------	------	---------

<7.9 90 ¹ABLIKIM 06D BES2 $\psi(2S) \rightarrow \chi_{c2}\gamma$

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

 $\Gamma(\rho\bar{n}\pi^-)/\Gamma_{\text{total}}$ Γ_{63}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

8.5±0.9 OUR AVERAGE8.4±1.0±0.2 3309 ¹ABLIKIM 12J BES3 $\psi(2S) \rightarrow \gamma\rho\bar{n}\pi^-$ 10.2±3.4±0.2 ²ABLIKIM 06I BES2 $\psi(2S) \rightarrow \gamma\rho\pi^-X$

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

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

$\Gamma(\bar{p}n\pi^+)/\Gamma_{\text{total}}$ Γ_{64}/Γ

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

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

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

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

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

 $\Gamma(\bar{p}n\pi^+\pi^0)/\Gamma_{\text{total}}$ Γ_{66}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$21.1 \pm 1.8 \pm 0.4$	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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$ Γ_{67}/Γ

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

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

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$125 \pm 15 \pm 3$		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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

 $\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^- (\text{non-resonant}))/\Gamma_{\text{total}}$ Γ_{69}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$66 \pm 15 \pm 1$	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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Sigma(1385)^+\bar{\Lambda}\pi^- + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{70}/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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

 $\Gamma(\Sigma(1385)^-\bar{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{71}/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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

 $\Gamma(K^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{72}/Γ**

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

7.8±0.5 OUR AVERAGE

7.7±0.5±0.2	5k	^{1,2} ABLIKIM	13D	BES3 $\psi(2S) \rightarrow \gamma \Lambda \bar{p} K^+$
-------------	----	------------------------	-----	--

8.3±1.6±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 $[\Gamma(\chi_{c2}(1P) \rightarrow K^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

 $\Gamma(K^+\bar{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{73}/Γ**

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

2.8±0.7±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 $[\Gamma(\chi_{c2}(1P) \rightarrow K^+\bar{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda(1520)\bar{\Lambda}(1520))/\Gamma_{\text{total}}$ Γ_{74}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$4.6 \pm 1.4 \pm 0.1$	90	29 ± 7	¹ ABLIKIM	11F BES3	$\psi(2S) \rightarrow \gamma p \bar{p} K^+ K^-$

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

 $\Gamma(\Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{75}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
< 0.6	90		¹ ABLIKIM	13H BES3	$\psi(2S) \rightarrow \gamma \Sigma^0 \bar{\Sigma}^0$

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

< 0.7	90	7.5 ± 3.4	² NAIK	08 CLEO	$\psi(2S) \rightarrow \gamma \Sigma^0 \bar{\Sigma}^0$
---------	----	---------------	-------------------	---------	---

¹ ABLIKIM 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

² NAIK 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

 $\Gamma(\Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}$ Γ_{76}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
< 0.7	90	4.0 ± 3.5	¹ NAIK	08 CLEO	$\psi(2S) \rightarrow \gamma \Sigma^+ \bar{\Sigma}^-$

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

< 0.8	90		² ABLIKIM	13H BES3	$\psi(2S) \rightarrow \gamma \Sigma^+ \bar{\Sigma}^-$
---------	----	--	----------------------	----------	---

¹ NAIK 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

² ABLIKIM 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

 $\Gamma(\Sigma(1385)^+\bar{\Sigma}(1385)^-)/\Gamma_{\text{total}}$ Γ_{77}/Γ

VALUE (units 10^{-5})	CL%	EVTS	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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^-\bar{\Sigma}(1385)^+)/\Gamma_{\text{total}}$ Γ_{78}/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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.76 ± 0.32 ± 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Xi^0\bar{\Xi}^0)/\Gamma_{\text{total}}$ Γ_{80}/Γ

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

¹ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\Xi^-\bar{\Xi}^+)/\Gamma_{\text{total}}$ Γ_{81}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
1.42 ± 0.31 ± 0.03		29 ± 5	¹ NAIK 08	CLEO	$\psi(2S) \rightarrow \gamma \Xi^-\bar{\Xi}^+$

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

< 3.7	90		² ABLIKIM 06D	BES2	$\psi(2S) \rightarrow \chi_{c2}\gamma$
-------	----	--	--------------------------	------	--

¹ NAIK 08 reports $(1.45 \pm 0.30 \pm 0.15) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c2}(1P) \rightarrow \Xi^-\bar{\Xi}^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.52 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{82}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.015	90	BARATE 81	SPEC	190 GeV $\pi^-\text{Be} \rightarrow 2\pi 2\mu$

$\Gamma(\pi^0\eta_c)/\Gamma_{\text{total}}$ Γ_{83}/Γ

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

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_{84}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
-------	-----	-------------	------	---------

$<0.54 \times 10^{-2}$ 90 ^{1,2} ABLIKIM 13B BES3 $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$

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

$<1.2 \times 10^{-2}$ 90 ^{1,3} ABLIKIM 13B BES3 $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$

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

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.

$\Gamma(\eta_c(1S)\pi^+\pi^-)/\Gamma(\overline{K}^0 K^+ \pi^- + \text{c.c.})$ Γ_{84}/Γ_{41}

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
-------	-----	-------------	------	---------

<16.4 90 ¹ LEES 12AE BABR $e^+e^- \rightarrow e^+e^-\pi^+\pi^-\eta_c$

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

————— RADIATIVE DECAYS —————

$\Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ Γ_{85}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

19.0 ± 0.5 OUR FIT

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

$18.64 \pm 0.08 \pm 1.69$ 1.0M ¹ ABLIKIM 17U BES3 $e^+e^- \rightarrow \gamma X$

$19.9 \pm 0.5 \pm 1.2$ ² ADAM 05A CLEO $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$

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

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

$\Gamma(\gamma\rho^0)/\Gamma_{\text{total}}$ Γ_{86}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	-----	------	-------------	------	---------

<19 90 13 ± 11 ¹ ABLIKIM 11E BES3 $\psi(2S) \rightarrow \gamma\gamma\rho^0$

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

<40 90 17.2 ± 6.8 ² BENNETT 08A CLEO $\psi(2S) \rightarrow \gamma\gamma\rho^0$

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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\gamma\omega)/\Gamma_{\text{total}}$ Γ_{87}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	-----	------	-------------	------	---------

<6 90 1 ± 6 ¹ ABLIKIM 11E BES3 $\psi(2S) \rightarrow \gamma\gamma\omega$

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

<6 90 0.0 ± 1.8 ² BENNETT 08A CLEO $\psi(2S) \rightarrow \gamma\gamma\omega$

- 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.
- 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\gamma\phi)/\Gamma_{\text{total}}$ **Γ_{88}/Γ**

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

- 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.
- 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.52 \times 10^{-2}$.

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ **Γ_{89}/Γ**

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

$\Gamma(e^+e^-J/\psi(1S))/\Gamma_{\text{total}}$ **Γ_{90}/Γ**

<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.37 ± 0.15 ± 0.05	1.3k	¹ ABLIKIM	17I BES3	$\psi(2S) \rightarrow \gamma e^+e^-J/\psi$

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

$\Gamma(e^+e^-J/\psi(1S))/\Gamma(\gamma J/\psi(1S))$ **Γ_{90}/Γ_{85}**

<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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.

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ **Γ_{89}/Γ_{85}**

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.50 ± 0.05 OUR FIT			
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 $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0593 \pm 0.0010$.

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}} \times \Gamma(p\bar{p})/\Gamma_{\text{total}}$				$\Gamma_{89}/\Gamma \times \Gamma_{54}/\Gamma$
VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT	
2.09 ± 0.13 OUR FIT				
1.7 ± 0.4 OUR AVERAGE				
1.60 ± 0.42	ARMSTRONG 93	E760	$\bar{p}p \rightarrow \gamma\gamma X$	
9.9 ± 4.5	BAGLIN	87B SPEC	$\bar{p}p \rightarrow \gamma\gamma X$	

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

$\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \pi^+ \pi^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$				$\Gamma_{14}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$
VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT	
2.31 ± 0.26 OUR FIT				
2.5 ± 0.9 OUR AVERAGE				

Error includes scale factor of 2.3.

1.90 ± 0.14 ± 0.44	BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$
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 $B(J/\psi \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$.

$\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}}$				$\Gamma_{18}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$
VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT	
2.1 ± 0.4 OUR FIT				
3.11 ± 0.36 ± 0.48	ABLIKIM	04H	BES2	$\psi(2S) \rightarrow \gamma\chi_{c2}$

$\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$				$\Gamma_{54}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$
VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT	
2.01 ± 0.09 OUR FIT				
1.4 ± 1.1	¹ BAI	98i	BES	$\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma\bar{p}p$

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].

$\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}}$				$\Gamma_{54}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$
VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.98 ± 0.32 OUR FIT				
7.1 ± 0.5 OUR AVERAGE				

Error includes scale factor of 1.2.

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

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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

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

$$\Gamma_{67}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{\psi(2S)}$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

17.5±1.3 OUR FIT**17.4±1.4 OUR AVERAGE**

18.2±1.4±0.9	207	¹ ABLIKIM	13H BES3	$\psi(2S) \rightarrow \gamma\Lambda\bar{\Lambda}$
15.9±2.1±1.0	71 ± 9	² NAIK	08 CLEO	$\psi(2S) \rightarrow \gamma\Lambda\bar{\Lambda}$

¹ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (8.74 \pm 0.35)\%$.

² 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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

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

$$\Gamma_{67}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

5.1±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 $B(J/\psi \rightarrow p\bar{p}) = (2.17 \pm 0.07) \times 10^{-3}$.

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

$$\Gamma_{24}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{\psi(2S)}$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

2.12±0.08 OUR FIT**2.17±0.09 OUR AVERAGE**

2.19±0.05±0.15	4.5k	¹ ABLIKIM	10A BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$
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 $\pi\pi$.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \pi\pi)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}{\Gamma_{24}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

0.612±0.023 OUR FIT**0.54 ±0.06 OUR AVERAGE**

0.66 ±0.18 ±0.37	21 ± 6	¹ BAI	03C BES	$\psi(2S) \rightarrow \gamma\pi^0\pi^0$
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 $\pi\pi$.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \eta\eta)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{30}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

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	$\psi(2S) \rightarrow \gamma\eta\eta$
< 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	$\psi(2S) \rightarrow \text{photons}$

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

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.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{31}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

9.6±0.6 OUR FIT**10.5±0.3±0.6**

1.6k		¹ ASNER	09 CLEO	$\psi(2S) \rightarrow \gamma K^+K^-$
------	--	--------------------	---------	--------------------------------------

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 $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}{\Gamma_{31}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

0.276±0.017 OUR FIT**0.190±0.034±0.019**

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

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].

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

$$\Gamma_{32} / \Gamma \times \Gamma_{141}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
5.0 ± 0.4 OUR FIT				
5.0 ± 0.4 OUR AVERAGE				
4.9 ± 0.3 ± 0.3	373 ± 20	¹ ASNER	09 CLEO	$\psi(2S) \rightarrow \gamma K_S^0 K_S^0$
5.72 ± 0.76 ± 0.63	65	ABLIKIM	050 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$.

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

$$\Gamma_{32} / \Gamma \times \Gamma_{141}^{\psi(2S)} / \Gamma_{11}^{\psi(2S)}$$

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

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 $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

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

$$\Gamma_{41} / \Gamma \times \Gamma_{141}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.22 ± 0.17 OUR FIT				
1.15 ± 0.18 OUR AVERAGE				
1.21 ± 0.19 ± 0.09	37	¹ ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
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 $K_S^0 K^\pm \pi^\mp$.

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

$$\Gamma_1 / \Gamma \times \Gamma_{141}^{\psi(2S)} / \Gamma_{11}^{\psi(2S)}$$

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.79 ± 0.26 OUR FIT			
3.1 ± 1.0 OUR AVERAGE			Error includes scale factor of 2.5.
2.3 ± 0.1 ± 0.5	¹ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c2}$
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 $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{49}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

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

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

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma_{49}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

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

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].

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \phi\phi)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{20}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.01±0.08 OUR FIT				
0.98±0.13 OUR AVERAGE				Error includes scale factor of 1.3.

0.94±0.03±0.10	849	¹ ABLIKIM	11K BES3	$\psi(2S) \rightarrow \gamma$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4)\%$.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \phi\phi)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma_{20}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

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

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].

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{85}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
1.81 ±0.04 OUR FIT				
1.69 ±0.16 OUR AVERAGE				Error includes scale factor of 3.4. See the ideogram below.
1.996±0.008±0.070	81k	¹ ABLIKIM	17N BES3	$\psi(2S) \rightarrow \gamma\gamma J/\psi$

1.793 ± 0.008 ± 0.163	1.0M	ABLIKIM	17U	BES3	$e^+e^- \rightarrow \gamma X$
1.62 ± 0.04 ± 0.12	5.8k	BAI	04I	BES2	$\psi(2S) \rightarrow J/\psi \gamma \gamma$
0.99 ± 0.10 ± 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 ± 0.007 ± 0.102	76k	⁵ ABLIKIM	12O	BES3	$\psi(2S) \rightarrow \gamma \chi_{c2}$
1.95 ± 0.02 ± 0.07	12.4k	⁶ MENDEZ	08	CLEO	$\psi(2S) \rightarrow \gamma \chi_{c2}$
1.85 ± 0.04 ± 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 $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = 0.0588 \pm 0.0010$.

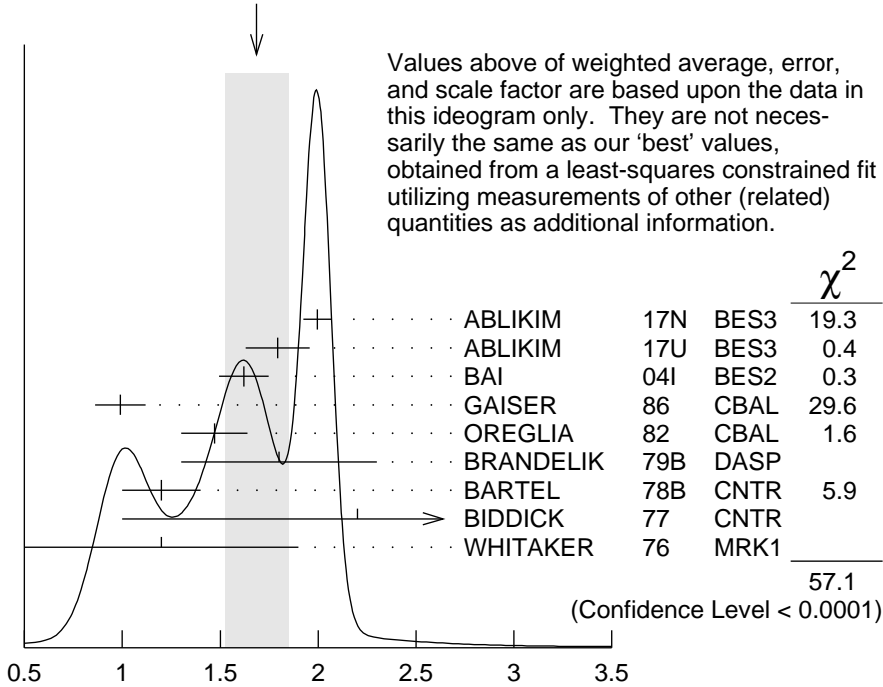
⁴ Assumes isotropic gamma distribution.

⁵ Superseded by ABLIKIM 17N.

⁶ Not independent from other measurements of MENDEZ 08.

⁷ Not independent from other values reported by ADAM 05A.

WEIGHTED AVERAGE
1.69 ± 0.16 (Error scaled by 3.4)



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

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

$$\frac{\Gamma_{85}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_9^{\psi(2S)}}{\Gamma_{85}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_9^{\psi(2S)} + \Gamma_{11}^{\psi(2S)} + \Gamma_{12}^{\psi(2S)} + \Gamma_{13}^{\psi(2S)} + 0.343\Gamma_{140}^{\psi(2S)} + 0.190\Gamma_{141}^{\psi(2S)}}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

2.95 ± 0.06 OUR FIT

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

3.12 ± 0.03 ± 0.09	12.4k	¹ MENDEZ	08	CLEO	$\psi(2S) \rightarrow \gamma \chi_{c2}$
3.11 ± 0.07 ± 0.07	1.9k	ADAM	05A	CLEO	Repl. by MENDEZ 08

¹ Not independent from other measurements of MENDEZ 08.

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

$$\frac{\Gamma_{85}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}{\Gamma_{85}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

5.22 ± 0.11 OUR FIT

5.53 ± 0.17 OUR AVERAGE

5.56 ± 0.05 ± 0.16	12.4k	MENDEZ	08	CLEO	$\psi(2S) \rightarrow \gamma \chi_{c2}$
6.0 ± 2.8	1.3k	¹ ABLIKIM	04B	BES	$\psi(2S) \rightarrow J/\psi X$
3.9 ± 1.2		² HIMEL	80	MRK2	$\psi(2S) \rightarrow \gamma \chi_{c2}$

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

5.52 ± 0.13 ± 0.13	1.9k	³ ADAM	05A	CLEO	Repl. by MENDEZ 08
--------------------	------	-------------------	-----	------	--------------------

¹ From a fit to the J/ψ recoil mass spectra.

² The value for $B(\psi(2S) \rightarrow \gamma \chi_{c2}) \times B(\chi_{c2} \rightarrow \gamma J/\psi(1S))$ reported in HIMEL 80 is derived using $B(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) = (33 \pm 3)\%$ and $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.138 \pm 0.018$. Calculated by us using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = (0.1181 \pm 0.0020)$.

³ Not independent from other values reported by ADAM 05A.

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

$$\frac{\Gamma_{89}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{\psi(2S)}}{\Gamma_{89}/\Gamma \times \Gamma_{141}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

2.71 ± 0.08 OUR FIT

2.82 ± 0.10 OUR AVERAGE

2.83 ± 0.08 ± 0.06	5k	¹ ABLIKIM	17AE	BES3	$\psi(2S) \rightarrow \gamma \chi_{c2} \rightarrow 3\gamma$
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	$\psi(2S) \rightarrow \gamma \chi_{c2} \rightarrow 3\gamma$
--------------------	------	----------------------	-----	------	---

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.

$\Gamma(\chi_{c2}(1P) \rightarrow \gamma\gamma)/\Gamma(\chi_{c0}(1P) \rightarrow \gamma\gamma)$					$\Gamma_{89}/\Gamma_{89}^{\chi_{c0}(1P)}$
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	$\psi(2S) \rightarrow \gamma\chi_{cJ} \rightarrow 3\gamma$	
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

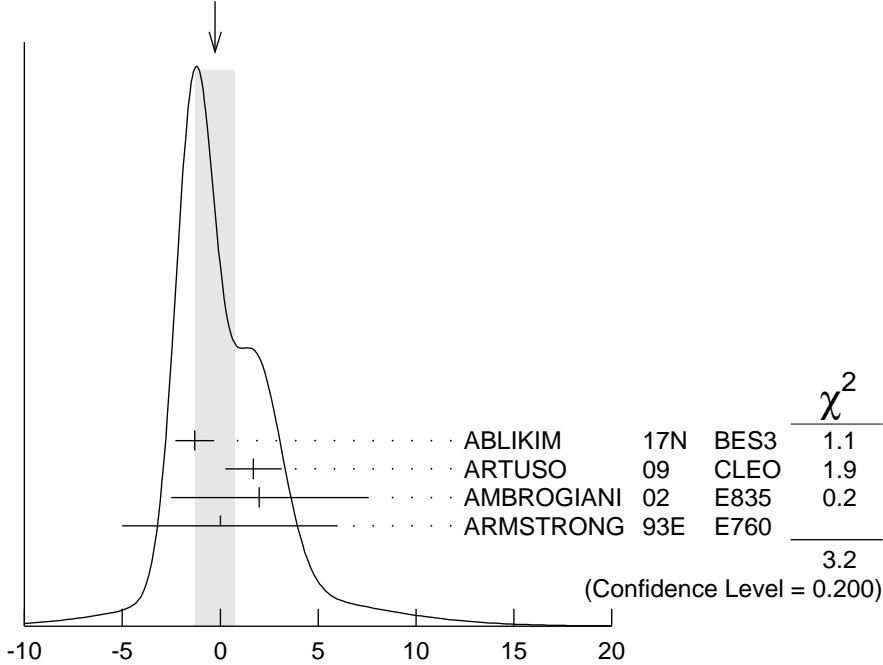
$a_2 = M2/\sqrt{E1^2 + M2^2 + E3^2}$ Magnetic quadrupole fractional transition amplitude

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 ⁺ _{-4.1} ± 3.9±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	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
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±0.9±0.4	89k	¹ ABLIKIM	17N BES3	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
1.7±1.4±0.3	19.8k	² ARTUSO	09 CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
2.0 ⁺ _{-4.4} ± 5.5±0.9	5908	AMBROGIANI	02 E835	$p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$
0 ⁺ ₋₅ ± 6	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 .				

WEIGHTED AVERAGE
 -0.3 ± 1.0 (Error scaled by 1.3)



$a_3 = E3 / \sqrt{E1^2 + M2^2 + E3^2}$ 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 $\psi(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$

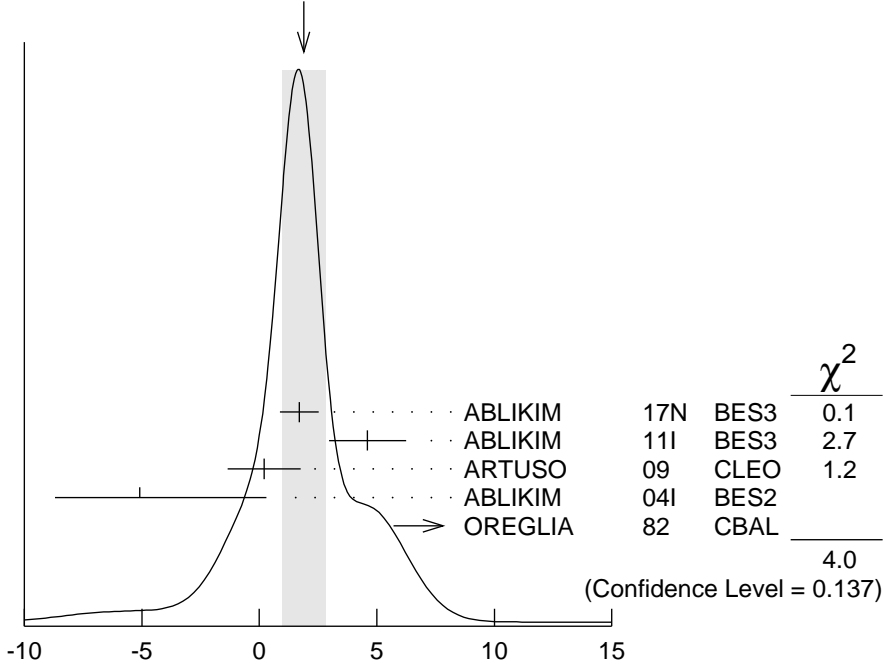
¹ Correlated with a_2 , a_3 , and b_3 with correlation coefficients $\rho_{a_2 b_2} = -0.605$, $\rho_{a_3 b_2} = -0.422$, and $\rho_{b_2 b_3} = 0.384$.

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 $a_3 = b_3 = 0$.

WEIGHTED AVERAGE
 1.9 ± 0.9 (Error scaled by 1.4)



$b_2 = M_2 / \sqrt{E_1^2 + M_2^2 + E_3^2}$ Magnetic quadrupole fractional transition amplitude (units 10^{-2})

$b_3 = E_3 / \sqrt{E_1^2 + M_2^2 + E_3^2}$ 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 M_2 and E_3 amplitudes b_2 and b_3 .

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS

$\psi(2S) \rightarrow \gamma\chi_{c2}(1P)$ 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 M_2 amplitudes a_2 and b_2 , and fixed E_3 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

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>	(BES III Collab.)
ABLIKIM	17AG	PR D96 111102	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	17AI	PR D96 112006	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	17I	PRL 118 221802	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	17N	PR D95 072004	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	17U	PR D96 032001	M. Ablikim <i>et al.</i>	(BES III 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>	(BES III Collab.)
ABLIKIM	15M	PR D91 112008	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	15N	PR D91 112018	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	14J	PR D89 074030	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	13B	PR D87 012002	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	13D	PR D87 012007	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	13H	PR D87 032007	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	13V	PR D88 112001	M. Ablikim <i>et al.</i>	(BES III 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>	(BES III Collab.)
ABLIKIM	12I	PR D86 052004	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	12J	PR D86 052011	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	12O	PRL 109 172002	M. Ablikim <i>et al.</i>	(BES III 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>	(BES III Collab.)
ABLIKIM	11E	PR D83 112005	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	11F	PR D83 112009	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	11I	PR D84 092006	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	11K	PRL 107 092001	M. Ablikim <i>et al.</i>	(BES III 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>	(BES III 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.)
ATHAR	04	PR D70 112002	S.B. Athar <i>et al.</i>	(CLEO 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. Akerstaff <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)