

$\chi_{c1}(1P)$

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

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

$\chi_{c1}(1P)$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
3510.66 ± 0.07	OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.		
3510.30 ± 0.14 ± 0.16		ABLIKIM	05G BES2	$\psi(2S) \rightarrow \gamma \chi_{c1}$
3510.719 ± 0.051 ± 0.019		ANDREOTTI	05A E835	$p\bar{p} \rightarrow e^+e^-\gamma$
3509.4 ± 0.9		BAI	99B BES	$\psi(2S) \rightarrow \gamma X$
3510.60 ± 0.087 ± 0.019	513	¹ ARMSTRONG	92 E760	$\bar{p}p \rightarrow e^+e^-\gamma$
3511.3 ± 0.4 ± 0.4	30	BAGLIN	86B SPEC	$\bar{p}p \rightarrow e^+e^-X$
3512.3 ± 0.3 ± 4.0		² GAISER	86 CBAL	$\psi(2S) \rightarrow \gamma X$
3507.4 ± 1.7	91	³ LEMOIGNE	82 GOLJ	$185 \pi^- \text{Be} \rightarrow \gamma \mu^+ \mu^- A$
3510.4 ± 0.6		OREGLIA	82 CBAL	$e^+e^- \rightarrow J/\psi 2\gamma$
3510.1 ± 1.1	254	⁴ HIMEL	80 MRK2	$e^+e^- \rightarrow J/\psi 2\gamma$
3509 ± 11	21	BRANDELIK	79B DASP	$e^+e^- \rightarrow J/\psi 2\gamma$
3507 ± 3		⁴ BARTEL	78B CNTR	$e^+e^- \rightarrow J/\psi 2\gamma$
3505.0 ± 4 ± 4		^{4,5} TANENBAUM	78 MRK1	e^+e^-
3513 ± 7	367	⁴ BIDDICK	77 CNTR	$\psi(2S) \rightarrow \gamma X$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
3500 ± 10	40	TANENBAUM	75 MRK1	Hadrons γ

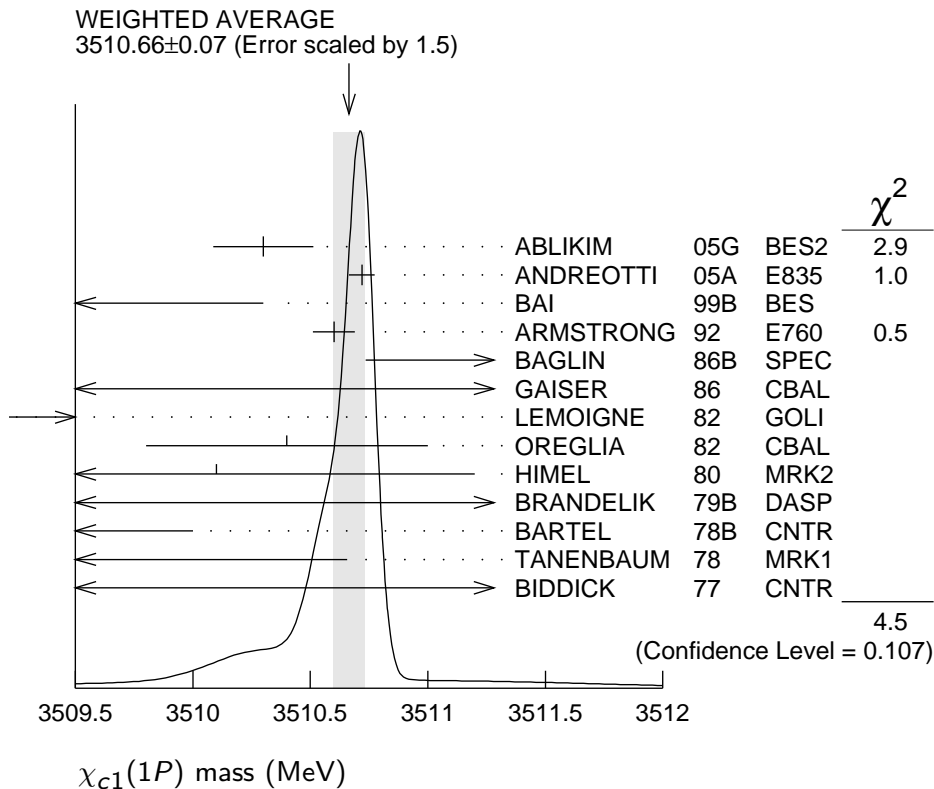
¹ Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03.

² Using mass of $\psi(2S) = 3686.0$ MeV.

³ $J/\psi(1S)$ mass constrained to 3097 MeV.

⁴ Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.

⁵ From a simultaneous fit to radiative and hadronic decay channels.



$\chi_{c1}(1P)$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.86 ± 0.05					OUR FIT
0.88 ± 0.05					OUR AVERAGE
1.39	+0.40 -0.38	+0.26 -0.77	ABLIKIM	05G BES2	$\psi(2S) \rightarrow \gamma \chi_{c1}$
$0.876 \pm 0.045 \pm 0.026$			ANDREOTTI	05A E835	$p\bar{p} \rightarrow e^+ e^- \gamma$
$0.87 \pm 0.11 \pm 0.08$		513	⁶ ARMSTRONG	92 E760	$\bar{p}p \rightarrow e^+ e^- \gamma$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
<1.3	95		BAGLIN	86B SPEC	$\bar{p}p \rightarrow e^+ e^- X$
<3.8	90		GAISER	86 CBAL	$\psi(2S) \rightarrow \gamma X$
⁶ Recalculated by ANDREOTTI 05A.					

$\chi_{c1}(1P)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
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Hadronic decays

Γ_1	$3(\pi^+\pi^-)$	$(5.8 \pm 1.4) \times 10^{-3}$	S=1.2
Γ_2	$2(\pi^+\pi^-)$	$(7.6 \pm 2.6) \times 10^{-3}$	
Γ_3	$\pi^+\pi^-\pi^0\pi^0$	$(1.25 \pm 0.17) \%$	
Γ_4	$\rho^+\pi^-\pi^0 + \text{c.c.}$	$(1.53 \pm 0.26) \%$	
Γ_5	$\rho^0\pi^+\pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$	
Γ_6	$4\pi^0$	$(5.7 \pm 0.8) \times 10^{-4}$	
Γ_7	$\pi^+\pi^-K^+K^-$	$(4.5 \pm 1.0) \times 10^{-3}$	
Γ_8	$K^+K^-\pi^0\pi^0$	$(1.17 \pm 0.29) \times 10^{-3}$	
Γ_9	$K^+\pi^-K^0\pi^0 + \text{c.c.}$	$(9.0 \pm 1.4) \times 10^{-3}$	
Γ_{10}	$\rho^+K^-K^0 + \text{c.c.}$	$(5.3 \pm 1.3) \times 10^{-3}$	
Γ_{11}	$K^*(892)^0K^0\pi^0 \rightarrow$ $K^+\pi^-K^0\pi^0 + \text{c.c.}$	$(2.4 \pm 0.7) \times 10^{-3}$	
Γ_{12}	$K^+K^-\eta\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$	
Γ_{13}	$\pi^+\pi^-K_S^0K_S^0$	$(7.2 \pm 3.1) \times 10^{-4}$	
Γ_{14}	$K^+K^-\eta$	$(3.3 \pm 1.0) \times 10^{-4}$	
Γ_{15}	$K^0K^+\pi^- + \text{c.c.}$	$(7.3 \pm 0.6) \times 10^{-3}$	
Γ_{16}	$K^*(892)^0\bar{K}^0 + \text{c.c.}$	$(1.0 \pm 0.4) \times 10^{-3}$	
Γ_{17}	$K^*(892)^+K^- + \text{c.c.}$	$(1.5 \pm 0.7) \times 10^{-3}$	
Γ_{18}	$K_J^*(1430)^0\bar{K}^0 + \text{c.c.} \rightarrow$ $K_S^0K^+\pi^- + \text{c.c.}$	$< 8 \times 10^{-4}$	CL=90%
Γ_{19}	$K_J^*(1430)^+K^- + \text{c.c.} \rightarrow$ $K_S^0K^+\pi^- + \text{c.c.}$	$< 2.3 \times 10^{-3}$	CL=90%
Γ_{20}	$K^+K^-\pi^0$	$(1.91 \pm 0.26) \times 10^{-3}$	
Γ_{21}	$\eta\pi^+\pi^-$	$(5.0 \pm 0.5) \times 10^{-3}$	
Γ_{22}	$a_0(980)^+\pi^- + \text{c.c.} \rightarrow \eta\pi^+\pi^-$	$(1.9 \pm 0.7) \times 10^{-3}$	
Γ_{23}	$f_2(1270)\eta$	$(2.8 \pm 0.8) \times 10^{-3}$	
Γ_{24}	$\pi^+\pi^-\eta'$	$(2.3 \pm 0.5) \times 10^{-3}$	
Γ_{25}	$\pi^0f_0(980) \rightarrow \pi^0\pi^+\pi^-$	$< 6 \times 10^{-6}$	CL=90%
Γ_{26}	$K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$	$(3.2 \pm 2.1) \times 10^{-3}$	
Γ_{27}	$K^*(892)^0\bar{K}^*(892)^0$	$(1.5 \pm 0.4) \times 10^{-3}$	
Γ_{28}	$K^+K^-K_S^0K_S^0$	$< 5 \times 10^{-4}$	CL=90%
Γ_{29}	$K^+K^-K^+K^-$	$(5.6 \pm 1.2) \times 10^{-4}$	
Γ_{30}	$K^+K^-\phi$	$(4.3 \pm 1.6) \times 10^{-4}$	
Γ_{31}	$\omega\omega$	$(6.0 \pm 0.7) \times 10^{-4}$	
Γ_{32}	$\omega\phi$	$(2.2 \pm 0.6) \times 10^{-5}$	
Γ_{33}	$\phi\phi$	$(4.4 \pm 0.6) \times 10^{-4}$	
Γ_{34}	$\rho\bar{\rho}$	$(7.3 \pm 0.4) \times 10^{-5}$	
Γ_{35}	$\rho\bar{\rho}\pi^0$	$(1.63 \pm 0.20) \times 10^{-4}$	
Γ_{36}	$\rho\bar{\rho}\eta$	$(1.53 \pm 0.26) \times 10^{-4}$	
Γ_{37}	$\rho\bar{\rho}\omega$	$(2.23 \pm 0.33) \times 10^{-4}$	
Γ_{38}	$\rho\bar{\rho}\phi$	$< 1.8 \times 10^{-5}$	CL=90%
Γ_{39}	$\rho\bar{\rho}\pi^+\pi^-$	$(5.0 \pm 1.9) \times 10^{-4}$	
Γ_{40}	$\rho\bar{\rho}\pi^0\pi^0$		

Γ_{41}	$p\bar{p}K^+K^-$ (non-resonant)	$(1.34 \pm 0.24) \times 10^{-4}$	
Γ_{42}	$p\bar{p}K_S^0K_S^0$	$< 4.5 \times 10^{-4}$	CL=90%
Γ_{43}	$\Lambda\bar{\Lambda}$	$(1.18 \pm 0.19) \times 10^{-4}$	
Γ_{44}	$\Lambda\bar{\Lambda}\pi^+\pi^-$	$< 1.5 \times 10^{-3}$	CL=90%
Γ_{45}	$K^+\bar{p}\Lambda$	$(4.3 \pm 0.4) \times 10^{-4}$	S=1.1
Γ_{46}	$K^+p\Lambda(1520) + c.c.$	$(1.8 \pm 0.5) \times 10^{-4}$	
Γ_{47}	$\Lambda(1520)\bar{\Lambda}(1520)$	$< 1.0 \times 10^{-4}$	CL=90%
Γ_{48}	$\Sigma^0\bar{\Sigma}^0$	$< 4 \times 10^{-5}$	CL=90%
Γ_{49}	$\Sigma^+\bar{\Sigma}^-$	$< 6 \times 10^{-5}$	CL=90%
Γ_{50}	$\Xi^0\bar{\Xi}^0$	$< 6 \times 10^{-5}$	CL=90%
Γ_{51}	$\Xi^-\bar{\Xi}^+$	$(8.4 \pm 2.3) \times 10^{-5}$	
Γ_{52}	$\pi^+\pi^- + K^+K^-$	$< 2.1 \times 10^{-3}$	
Γ_{53}	$K_S^0K_S^0$	$< 6 \times 10^{-5}$	CL=90%

Radiative decays

Γ_{54}	$\gamma J/\psi(1S)$	$(34.8 \pm 1.5) \%$
Γ_{55}	$\gamma\rho^0$	$(2.27 \pm 0.19) \times 10^{-4}$
Γ_{56}	$\gamma\omega$	$(7.1 \pm 0.9) \times 10^{-5}$
Γ_{57}	$\gamma\phi$	$(2.6 \pm 0.6) \times 10^{-5}$
Γ_{58}	$\gamma\gamma$	

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 227 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 325.4$ for 178 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_{29}	8				
x_{34}	-9	-4			
x_{43}	11	5	-5		
x_{54}	38	16	-31	21	
Γ	-13	-5	-60	-7	-29
	x_{15}	x_{29}	x_{34}	x_{43}	x_{54}

$\chi_{c1}(1P)$ PARTIAL WIDTHS

———— $\chi_{c1}(1P) \Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(\text{total})$ ————

$\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ $\Gamma_{34}\Gamma_{54}/\Gamma$

<u>VALUE (eV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
21.7±0.8 OUR FIT			
21.4±0.9 OUR AVERAGE			
21.5±0.5±0.8	⁷ ANDREOTTI 05A	E835	$p\bar{p} \rightarrow e^+e^-\gamma$
21.4±1.5±2.2	^{7,8} ARMSTRONG 92	E760	$\bar{p}p \rightarrow e^+e^-\gamma$
19.9 ^{+4.4} _{-4.0}	⁷ BAGLIN 86B	SPEC	$\bar{p}p \rightarrow e^+e^-\chi$

⁷ Calculated by us using $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0593 \pm 0.0010$.

⁸ Recalculated by ANDREOTTI 05A.

$\chi_{c1}(1P)$ BRANCHING RATIOS

———— HADRONIC DECAYS ————

$\Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_1/Γ

<u>VALUE (units 10⁻³)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
5.8±1.4 OUR EVALUATION	Error includes scale factor of 1.2. Treating systematic error as correlated.		
5.8±1.1 OUR AVERAGE			
5.4±0.7±0.9	⁹ BAI 99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c1}$
16.0±5.9±0.8	⁹ TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$

⁹ Rescaled by us using $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = (8.8 \pm 0.4)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$.

$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_2/Γ

<u>VALUE (units 10⁻³)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
7.6±2.6 OUR EVALUATION	Treating systematic error as correlated.		
8 ±4 OUR AVERAGE	Error includes scale factor of 1.5.		
4.6±2.1±2.6	¹⁰ BAI 99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c1}$
12.5±4.2±0.6	¹⁰ TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$

¹⁰ Rescaled by us using $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = (8.8 \pm 0.4)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$.

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

<u>VALUE (%)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.25±0.16±0.05	604.7	¹¹ HE 08B	CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$

¹¹ HE 08B reports $1.28 \pm 0.06 \pm 0.15 \pm 0.08 \%$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \pi^+\pi^-\pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
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1.53±0.25±0.06	712.3	12,13 HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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¹² HE 08B reports $1.56 \pm 0.13 \pm 0.22 \pm 0.10$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

¹³ 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.

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

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
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39±35	¹⁴ TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$
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¹⁴ Estimated using $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 0.087$. The errors do not contain the uncertainty in the $\psi(2S)$ decay.

$\Gamma(4\pi^0)/\Gamma_{\text{total}}$ **Γ_6/Γ**

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
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0.57±0.08±0.02	608	¹⁵ ABLIKIM 11A	BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c1}$
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¹⁵ ABLIKIM 11A reports $(0.57 \pm 0.03 \pm 0.08) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow 4\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
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4.5±1.0 OUR EVALUATION	Treating systematic error as correlated.		
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4.5±0.9 OUR AVERAGE

4.2±0.4±0.9	¹⁶ BAI	99B	BES $\psi(2S) \rightarrow \gamma\chi_{c1}$
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7.3±3.0±0.4	¹⁶ TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$
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¹⁶ Rescaled by us using $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = (8.8 \pm 0.4)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$.

$\Gamma(K^+K^-\pi^0\pi^0)/\Gamma_{\text{total}}$ **Γ_8/Γ**

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
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0.117±0.028±0.005	45.1	¹⁷ HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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¹⁷ HE 08B reports $0.12 \pm 0.02 \pm 0.02 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+K^-\pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
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0.90±0.14±0.03	141.3	¹⁸ HE	08B CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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¹⁸ HE 08B reports $0.92 \pm 0.09 \pm 0.11 \pm 0.06$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+ \pi^- K^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\rho^+ K^- K^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
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0.53±0.13±0.02	141.3	¹⁹ HE	08B CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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¹⁹ HE 08B reports $0.54 \pm 0.11 \pm 0.07 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \rho^+ K^- K^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
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0.24±0.07±0.01	141.3	²⁰ HE	08B CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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²⁰ HE 08B reports $0.25 \pm 0.06 \pm 0.03 \pm 0.02$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^*(892)^0 K^0 \pi^0 \rightarrow K^+ \pi^- K^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ K^- \eta \pi^0)/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
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0.117±0.036±0.005	141.3	²¹ HE	08B CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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²¹ HE 08B reports $0.12 \pm 0.03 \pm 0.02 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- \eta \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
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7.2±3.0±0.3	19.8 ± 7.7	²² ABLIKIM	050 BES2	$\psi(2S) \rightarrow \chi_{c1} \gamma$
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²² ABLIKIM 050 reports $[\Gamma(\chi_{c1}(1P) \rightarrow \pi^+ \pi^- K_S^0 K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ = $(0.67 \pm 0.26 \pm 0.11) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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_{14}/Γ**

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.33 \pm 0.10 \pm 0.01$	²³ ATHAR	07	CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$

²³ ATHAR 07 reports $(0.34 \pm 0.10 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- \eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>
7.3 ± 0.6 OUR FIT	

$\Gamma(K^*(892)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{16}/Γ**

<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$1.03 \pm 0.38 \pm 0.04$	22	²⁴ ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma \chi_{c1}$

²⁴ ABLIKIM 06R reports $(1.1 \pm 0.4 \pm 0.1) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^*(892)^0 \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

<u>VALUE (units 10^{-3})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$1.5 \pm 0.7 \pm 0.1$	27	²⁵ ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma \chi_{c1}$

²⁵ ABLIKIM 06R reports $(1.6 \pm 0.7 \pm 0.2) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^*(892)^+ K^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_J^*(1430)^0 \bar{K}^0 + \text{c.c.} \rightarrow K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{18}/Γ**

<u>VALUE (units 10^{-3})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 0.8	90	²⁶ ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma \chi_{c1}$

²⁶ ABLIKIM 06R reports $< 0.9 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K_J^*(1430)^0 \bar{K}^0 + \text{c.c.} \rightarrow K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

$\Gamma(K_J^*(1430)^+ K^- + \text{c.c.} \rightarrow K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{19}/Γ**

<u>VALUE (units 10^{-3})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 2.3	90	²⁷ ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma \chi_{c1}$

²⁷ ABLIKIM 06R reports $< 2.4 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K_J^*(1430)^+ K^- + \text{c.c.} \rightarrow K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

$\Gamma(K^+ K^- \pi^0)/\Gamma_{\text{total}}$ Γ_{20}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.91±0.25±0.07		28 ATHAR	07	CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$

²⁸ ATHAR 07 reports $(1.95 \pm 0.16 \pm 0.23) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\eta \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{21}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
5.0±0.5 OUR AVERAGE				

4.9±0.5±0.2		29 ATHAR	07	CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$
5.5±1.0±0.2	222	30 ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma \chi_{c1}$

²⁹ ATHAR 07 reports $(5.0 \pm 0.3 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \eta \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

³⁰ ABLIKIM 06R reports $(5.9 \pm 0.7 \pm 0.8) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \eta \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(a_0(980)^+ \pi^- + \text{c.c.} \rightarrow \eta \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{22}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.9±0.7±0.1	58	31 ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma \chi_{c1}$

³¹ ABLIKIM 06R reports $(2.0 \pm 0.5 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow a_0(980)^+ \pi^- + \text{c.c.} \rightarrow \eta \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(f_2(1270)\eta)/\Gamma_{\text{total}}$ Γ_{23}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.8±0.8±0.1	53	32 ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma \chi_{c1}$

³² ABLIKIM 06R reports $(3.0 \pm 0.7 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow f_2(1270)\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^+ \pi^- \eta')/\Gamma_{\text{total}}$ Γ_{24}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.3±0.5±0.1	33 ATHAR	07	CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$

³³ ATHAR 07 reports $(2.4 \pm 0.4 \pm 0.3) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \pi^+ \pi^- \eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^0 f_0(980) \rightarrow \pi^0 \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{25}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<6 \times 10^{-6}$	90	³⁴ ABLIKIM	11D BES3	$\psi(2S) \rightarrow \gamma \pi^0 \pi^+ \pi^-$

³⁴ ABLIKIM 11D reports $[\Gamma(\chi_{c1}(1P) \rightarrow \pi^0 f_0(980) \rightarrow \pi^0 \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ $< 6.0 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

$\Gamma(K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{26}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
32 ± 21	³⁵ TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma \chi_{c1}$

³⁵ Estimated using $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 0.087$. The errors do not contain the uncertainty in the $\psi(2S)$ decay.

$\Gamma(K^*(892)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}}$ Γ_{27}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.5 \pm 0.4 \pm 0.1$	28.4 ± 5.5	^{36,37} ABLIKIM	04H BES	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^+ \pi^-$

³⁶ ABLIKIM 04H reports $[\Gamma(\chi_{c1}(1P) \rightarrow K^*(892)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ $= (1.40 \pm 0.27 \pm 0.22) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

³⁷ Assumes $B(K^*(892)^0 \rightarrow K^- \pi^+) = 2/3$.

$\Gamma(K^+ K^- K_S^0 K_S^0)/\Gamma_{\text{total}}$ Γ_{28}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<5	90	3.2 ± 2.4	³⁸ ABLIKIM	050 BES2	$\psi(2S) \rightarrow \chi_{c1} \gamma$

³⁸ ABLIKIM 050 reports $[\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- K_S^0 K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ $< 4.2 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

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

VALUE (units 10^{-3})	DOCUMENT ID
0.56 ± 0.12 OUR FIT	

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$0.43 \pm 0.16 \pm 0.02$	17	³⁹ ABLIKIM	06T BES2	$\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

³⁹ ABLIKIM 06T reports $(0.46 \pm 0.16 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- \phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\omega\omega)/\Gamma_{\text{total}}$ **Γ_{31}/Γ**

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$6.0 \pm 0.7 \pm 0.2$	597	⁴⁰ ABLIKIM	11K BES3	$\psi(2S) \rightarrow \gamma$ hadrons

⁴⁰ ABLIKIM 11K reports $(6.0 \pm 0.3 \pm 0.7) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \omega\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\omega\phi)/\Gamma_{\text{total}}$ **Γ_{32}/Γ**

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.22 \pm 0.06 \pm 0.01$	15	⁴¹ ABLIKIM	11K BES3	$\psi(2S) \rightarrow \gamma$ hadrons

⁴¹ ABLIKIM 11K reports $(0.22 \pm 0.06 \pm 0.02) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \omega\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi\phi)/\Gamma_{\text{total}}$ **Γ_{33}/Γ**

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$4.4 \pm 0.5 \pm 0.2$	366	⁴² ABLIKIM	11K BES3	$\psi(2S) \rightarrow \gamma$ hadrons

⁴² ABLIKIM 11K reports $(4.4 \pm 0.3 \pm 0.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \phi\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\bar{p})/\Gamma_{\text{total}}$ **Γ_{34}/Γ**

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>
0.73 ± 0.04 OUR FIT	

$\Gamma(p\bar{p}\pi^0)/\Gamma_{\text{total}}$ **Γ_{35}/Γ**

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.163 ± 0.020 OUR AVERAGE			

$0.171 \pm 0.020 \pm 0.007$	⁴³ ONYISI	10	CLE3	$\psi(2S) \rightarrow \gamma p\bar{p}X$
$0.117 \pm 0.049 \pm 0.005$	⁴⁴ ATHAR	07	CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

⁴³ ONYISI 10 reports $(1.75 \pm 0.16 \pm 0.13 \pm 0.11) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁴⁴ ATHAR 07 reports $(1.2 \pm 0.5 \pm 0.1) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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_{36}/Γ**

<u>VALUE (units 10^{-3})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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0.153±0.026±0.006		45 ONYISI	10 CLE3	$\psi(2S) \rightarrow \gamma p\bar{p}X$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.16	90	46 ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$
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⁴⁵ ONYISI 10 reports $(1.56 \pm 0.22 \pm 0.14 \pm 0.10) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow p\bar{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁴⁶ ATHAR 07 reports $< 0.16 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow p\bar{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

$\Gamma(p\bar{p}\omega)/\Gamma_{\text{total}}$ **Γ_{37}/Γ**

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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0.223±0.032±0.009	47 ONYISI	10 CLE3	$\psi(2S) \rightarrow \gamma p\bar{p}X$
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⁴⁷ ONYISI 10 reports $(2.28 \pm 0.28 \pm 0.16 \pm 0.14) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow p\bar{p}\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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_{38}/Γ**

<u>VALUE (units 10^{-5})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<1.8	90	48 ABLIKIM	11F BES3	$\psi(2S) \rightarrow \gamma p\bar{p}K^+K^-$
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⁴⁸ ABLIKIM 11F reports $< 1.82 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow p\bar{p}\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

$\Gamma(p\bar{p}\pi^+\pi^-)/\Gamma_{\text{total}}$ **Γ_{39}/Γ**

<u>VALUE (units 10^{-3})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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0.50±0.19 OUR EVALUATION	Treating systematic error as correlated.		
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0.50±0.19 OUR AVERAGE

0.46±0.12±0.15	49 BAI	99B BES	$\psi(2S) \rightarrow \gamma\chi_{c1}$
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1.08±0.77±0.05	49 TANENBAUM	78 MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$
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⁴⁹ Rescaled by us using $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = (8.8 \pm 0.4)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$.

$\Gamma(p\bar{p}\pi^0\pi^0)/\Gamma_{\text{total}}$ **Γ_{40}/Γ**

<u>VALUE (%)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<0.05	90	50 HE	08B CLEO	$e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$
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⁵⁰ HE 08B reports $< 0.05\%$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow p\bar{p}\pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

$\Gamma(\rho\bar{p}K^+K^- \text{ (non-resonant)})/\Gamma_{\text{total}}$ **Γ_{41}/Γ**

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
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1.34±0.23±0.05	82 ± 9	⁵¹ ABLIKIM	11F BES3	$\psi(2S) \rightarrow \gamma\rho\bar{p}K^+K^-$
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⁵¹ ABLIKIM 11F reports $(1.35 \pm 0.15 \pm 0.19) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \rho\bar{p}K^+K^- \text{ (non-resonant)})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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_{42}/Γ**

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
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<4.5	90	⁵² ABLIKIM	06D BES2	$\psi(2S) \rightarrow \gamma\chi_{c1}$
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⁵² Using $B(\psi(2S) \rightarrow \chi_{c1}\gamma) (9.1 \pm 0.6)\%$.

$\Gamma(\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$ **Γ_{43}/Γ**

VALUE (units 10^{-4})	DOCUMENT ID
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1.18±0.19 OUR FIT	
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$\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}$ **Γ_{44}/Γ**

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
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<1.5	90	⁵³ ABLIKIM	06D BES2	$\psi(2S) \rightarrow \gamma\chi_{c1}$
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⁵³ Using $B(\psi(2S) \rightarrow \chi_{c1}\gamma) (9.1 \pm 0.6)\%$.

$\Gamma(K^+\bar{p}\Lambda)/\Gamma_{\text{total}}$ **Γ_{45}/Γ**

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
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4.3±0.4 OUR AVERAGE				Error includes scale factor of 1.1.
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4.5±0.4±0.2	3k	^{54,55} ABLIKIM	13D BES3	$\psi(2S) \rightarrow \gamma\Lambda\bar{p}K^+$
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3.2±0.9±0.1		⁵⁶ ATHAR	07 CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$
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⁵⁴ ABLIKIM 13D reports $(4.5 \pm 0.2 \pm 0.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+\bar{p}\Lambda)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁵⁵ Using $B(\Lambda \rightarrow p\pi^-) = 63.9\%$.

⁵⁶ ATHAR 07 reports $(3.3 \pm 0.9 \pm 0.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+\bar{p}\Lambda)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+\rho\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{46}/Γ**

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
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1.8±0.5±0.1	48 ± 10	⁵⁷ ABLIKIM	11F BES3	$\psi(2S) \rightarrow \gamma\rho\bar{p}K^+K^-$
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⁵⁷ ABLIKIM 11F reports $(1.81 \pm 0.38 \pm 0.28) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+\rho\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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_{47}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<1.0	90	⁵⁸ ABLIKIM	11F BES3	$\psi(2S) \rightarrow \gamma p \bar{p} K^+ K^-$

⁵⁸ ABLIKIM 11F reports $< 1.00 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \Lambda(1520)\bar{\Lambda}(1520))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

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

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.4	90	3.8 ± 2.5	⁵⁹ NAIK	08 CLEO	$\psi(2S) \rightarrow \gamma\Sigma^0\bar{\Sigma}^0$

⁵⁹ NAIK 08 reports $< 0.44 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

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

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.6	90	4.3 ± 2.3	⁶⁰ NAIK	08 CLEO	$\psi(2S) \rightarrow \gamma\Sigma^+\bar{\Sigma}^-$

⁶⁰ NAIK 08 reports $< 0.65 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

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

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.6	90	1.7 ± 2.4	⁶¹ NAIK	08 CLEO	$\psi(2S) \rightarrow \gamma\Xi^0\bar{\Xi}^0$

⁶¹ NAIK 08 reports $< 0.60 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \Xi^0\bar{\Xi}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

$\Gamma(\Xi^-\bar{\Xi}^+)/\Gamma_{\text{total}}$ Γ_{51}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$0.84 \pm 0.22 \pm 0.03$	16.4 ± 4.3		⁶² NAIK	08 CLEO	$\psi(2S) \rightarrow \gamma\Xi^-\bar{\Xi}^+$

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

< 3.4	90		⁶³ ABLIKIM	06D BES2	$\psi(2S) \rightarrow \gamma\chi_{c1}$
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⁶² NAIK 08 reports $(0.86 \pm 0.22 \pm 0.08) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \Xi^-\bar{\Xi}^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁶³ Using $B(\psi(2S) \rightarrow \chi_{c1}\gamma)$ $(9.1 \pm 0.6)\%$.

$[\Gamma(\pi^+\pi^-) + \Gamma(K^+K^-)]/\Gamma_{\text{total}}$ **Γ_{52}/Γ**

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
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<21		64 FELDMAN	77 MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<38	90	64 BRANDELIK	79B DASP	$\psi(2S) \rightarrow \gamma\chi_{c1}$
64 Estimated using $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 0.087$. The errors do not contain the uncertainty in the $\psi(2S)$ decay.				

$\Gamma(K_S^0 K_S^0)/\Gamma_{\text{total}}$ **Γ_{53}/Γ**

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
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<0.6	90	65 ABLIKIM	050 BES2	$\psi(2S) \rightarrow \chi_{c1}\gamma$
65 ABLIKIM 050 reports $[\Gamma(\chi_{c1}(1P) \rightarrow K_S^0 K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ $< 0.6 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.3 \times 10^{-2}$.				

————— **RADIATIVE DECAYS** —————

$\Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ **Γ_{54}/Γ**

VALUE	DOCUMENT ID	TECN	COMMENT
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0.348 ± 0.015 OUR FIT

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

0.379 ± 0.008 ± 0.021	66 ADAM	05A CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c1}$
66 Uses $B(\psi(2S) \rightarrow \gamma\chi_{c1} \rightarrow \gamma\gamma J/\psi)$ from ADAM 05A and $B(\psi(2S) \rightarrow \gamma\chi_{c1})$ from ATHAR 04.			

$\Gamma(\gamma\rho^0)/\Gamma_{\text{total}}$ **Γ_{55}/Γ**

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
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227 ± 19 OUR AVERAGE

226 ± 23 ± 9	432 ± 25	67 ABLIKIM	11E BES3	$\psi(2S) \rightarrow \gamma\gamma\rho^0$
228 ± 25 ± 9	186 ± 15	68 BENNETT	08A CLEO	$\psi(2S) \rightarrow \gamma\gamma\rho^0$
67 ABLIKIM 11E reports $(228 \pm 13 \pm 22) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \gamma\rho^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.				
68 BENNETT 08A reports $(243 \pm 19 \pm 22) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \gamma\rho^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.				

$\Gamma(\gamma\omega)/\Gamma_{\text{total}}$ **Γ_{56}/Γ**

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
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71 ± 9 OUR AVERAGE

69 ± 9 ± 3	136 ± 14	69 ABLIKIM	11E BES3	$\psi(2S) \rightarrow \gamma\gamma\omega$
78 ± 18 ± 3	39 ± 7	70 BENNETT	08A CLEO	$\psi(2S) \rightarrow \gamma\gamma\omega$

⁶⁹ ABLIKIM 11E reports $(69.7 \pm 7.2 \pm 6.6) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \gamma\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁷⁰ BENNETT 08A reports $(83 \pm 15 \pm 12) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \gamma\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\gamma\phi)/\Gamma_{\text{total}}$ Γ_{57}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
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$26 \pm 6 \pm 1$		43 ± 9	⁷¹ ABLIKIM	11E BES3	$\psi(2S) \rightarrow \gamma\gamma\phi$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<24	90	5.2 ± 3.1	⁷² BENNETT	08A CLEO	$\psi(2S) \rightarrow \gamma\gamma\phi$
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⁷¹ ABLIKIM 11E reports $(25.8 \pm 5.2 \pm 2.3) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \gamma\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁷² BENNETT 08A reports $< 26 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \gamma\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.3 \times 10^{-2}$.

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ Γ_{58}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

< 3.5	90	ECKLUND	08A CLEO	$\psi(2S) \rightarrow \gamma\chi_{c1} \rightarrow 3\gamma$
<150	90	⁷³ YAMADA	77 DASP	$e^+e^- \rightarrow 3\gamma$

⁷³ Estimated using $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 0.087$. The errors do not contain the uncertainty in the $\psi(2S)$ decay.

$\chi_{c1}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

$\Gamma(\chi_{c1}(1P) \rightarrow p\bar{p})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{34}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
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1.98 ± 0.16 OUR FIT			
1.1 ± 1.0	⁷⁴ BAI	98i BES	$\psi(2S) \rightarrow \gamma\chi_{c1} \rightarrow \gamma\bar{p}p$

⁷⁴ Calculated by us. The value for $B(\chi_{c1} \rightarrow p\bar{p})$ reported in BAI 98i is derived using $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = (8.7 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

$$\Gamma(\chi_{c1}(1P) \rightarrow \Lambda\bar{\Lambda})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$$

$$\Gamma_{43}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{\psi(2S)}$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
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10.9 ± 1.7 OUR FIT

10.5 ± 1.6 ± 0.6	46 ± 7	⁷⁵ NAIK	08	CLEO $\psi(2S) \rightarrow \gamma\Lambda\bar{\Lambda}$
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⁷⁵ Calculated by us. NAIK 08 reports $B(\chi_{c1} \rightarrow \Lambda\bar{\Lambda}) = (11.6 \pm 1.8 \pm 0.7 \pm 0.7) \times 10^{-5}$ using $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = (9.07 \pm 0.11 \pm 0.54)\%$.

$$\Gamma(\chi_{c1}(1P) \rightarrow \Lambda\bar{\Lambda})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$$

$$\Gamma_{43}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
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3.2 ± 0.5 OUR FIT

7.1^{+2.8}_{-2.4} ± 1.3	9.0 ^{+3.5} _{-3.1}	⁷⁶ BAI	03E	BES $\psi(2S) \rightarrow \gamma\Lambda\bar{\Lambda}$
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⁷⁶ BAI 03E reports [$B(\chi_{c1} \rightarrow \Lambda\bar{\Lambda}) B(\psi(2S) \rightarrow \gamma\chi_{c1}) / B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-)] \times [B^2(\Lambda \rightarrow \pi^-p) / B(J/\psi \rightarrow p\bar{p})] = (1.33^{+0.52}_{-0.46} \pm 0.25)\%$. We calculate from this measurement the presented value using $B(\Lambda \rightarrow \pi^-p) = (63.9 \pm 0.5)\%$ and $B(J/\psi \rightarrow p\bar{p}) = (2.17 \pm 0.07) \times 10^{-3}$.

$$\Gamma(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$$

$$\Gamma_{54}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{\psi(2S)}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
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3.23 ± 0.07 OUR FIT

2.93 ± 0.15 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.

3.377 ± 0.009 ± 0.183	142k	ABLIKIM	120	BES3 $\psi(2S) \rightarrow \gamma\chi_{c1}$
2.81 ± 0.05 ± 0.23	13k	BAI	04I	BES2 $\psi(2S) \rightarrow J/\psi\gamma\gamma$
2.56 ± 0.12 ± 0.20		GAISER	86	CBAL $\psi(2S) \rightarrow \gamma X$
2.78 ± 0.30		⁷⁷ OREGLIA	82	CBAL $\psi(2S) \rightarrow \gamma\chi_{c1}$
2.2 ± 0.5		⁷⁸ BRANDELIK	79B	DASP $\psi(2S) \rightarrow \gamma\chi_{c1}$
2.9 ± 0.5		⁷⁸ BARTEL	78B	CNTR $\psi(2S) \rightarrow \gamma\chi_{c1}$
5.0 ± 1.5		⁷⁹ BIDDICK	77	CNTR $e^+e^- \rightarrow \gamma X$
2.8 ± 0.9		⁷⁷ WHITAKER	76	MRK1 e^+e^-

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

3.56 ± 0.03 ± 0.12	24.9k	⁸⁰ MENDEZ	08	CLEO $\psi(2S) \rightarrow \gamma\chi_{c1}$
3.44 ± 0.06 ± 0.13	3.7k	⁸¹ ADAM	05A	CLEO Repl. by MENDEZ 08

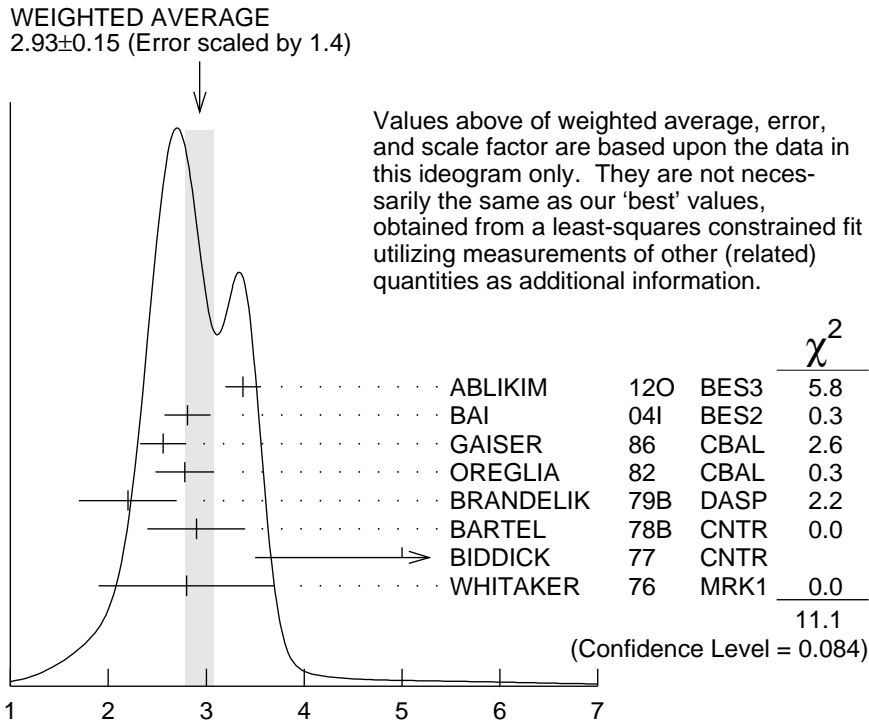
⁷⁷ Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$.

⁷⁸ Recalculated by us using $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = 0.0588 \pm 0.0010$.

⁷⁹ Assumes isotropic gamma distribution.

⁸⁰ Not independent from other measurements of MENDEZ 08.

⁸¹ Not independent from other values reported by ADAM 05A.



$$\Gamma(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))/\Gamma_{\text{total}} \text{ (units } 10^{-2}\text{)}$$

$$\Gamma(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S) \text{ anything})$$

$$\Gamma_{54}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_9^{\psi(2S)}$$

$$\Gamma_{54}/\Gamma \times \Gamma_{119}^{\psi(2S)}/(\Gamma_{11}^{\psi(2S)} + \Gamma_{12}^{\psi(2S)} + \Gamma_{13}^{\psi(2S)} + 0.348\Gamma_{119}^{\psi(2S)} + 0.198\Gamma_{120}^{\psi(2S)})$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
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5.36±0.12 OUR FIT

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

5.70±0.04±0.15	24.9k	⁸² MENDEZ	08	CLEO $\psi(2S) \rightarrow \gamma \chi_{c1}$
5.77±0.10±0.12	3.7k	ADAM	05A	CLEO Repl. by MENDEZ 08

⁸² Not independent from other measurements of MENDEZ 08.

$$\Gamma(\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)$$

$$\Gamma_{54}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
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9.49±0.21 OUR FIT

10.15±0.28 OUR AVERAGE

10.17±0.07±0.27	24.9k	MENDEZ	08	CLEO $\psi(2S) \rightarrow \gamma \chi_{c1}$
12.6 ±0.3 ±3.8	3k	⁸³ ABLIKIM	04B	BES $\psi(2S) \rightarrow J/\psi X$
8.5 ±2.1		⁸⁴ HIMEL	80	MRK2 $\psi(2S) \rightarrow \gamma \chi_{c1}$

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

10.24±0.17±0.23	3.7k	⁸⁵ ADAM	05A	CLEO Repl. by MENDEZ 08
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⁸³ From a fit to the J/ψ recoil mass spectra.

⁸⁴ The value for $B(\psi(2S) \rightarrow \gamma\chi_{c1}) \times B(\chi_{c1} \rightarrow \gamma J/\psi(1S))$ quoted 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 $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$.

⁸⁵ Not independent from other values reported by ADAM 05A.

$$\frac{\Gamma(\chi_{c1}(1P) \rightarrow K^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}}{\Gamma_{15}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
6.8±0.5 OUR FIT			
7.2±0.6 OUR AVERAGE			
7.3±0.5±0.5	⁸⁶ ATHAR	07	CLEO $\psi(2S) \rightarrow \gamma K_S^0 K^+ \pi^-$
7.0±0.5±0.9	⁸⁷ ABLIKIM	06R	BES2 $\psi(2S) \rightarrow \gamma\chi_{c1}$

⁸⁶ Calculated by us. The value of $B(\chi_{c1} \rightarrow K^0 K^+ \pi^- + \text{c.c.})$ reported by ATHAR 07 was derived using $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54)\%$.

⁸⁷ Calculated by us. ABLIKIM 06R reports $B(\chi_{c1} \rightarrow K_S^0 K^+ \pi^-) = (4.0 \pm 0.3 \pm 0.5) \times 10^{-3}$. We use $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = (8.7 \pm 0.4) \times 10^{-2}$.

$$\frac{\Gamma(\chi_{c1}(1P) \rightarrow K^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))/\Gamma_{\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-}}{\Gamma_{15}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
19.9±1.6 OUR FIT			
13.2±2.4±3.2	⁸⁸ BAI	99B	BES $\psi(2S) \rightarrow \gamma K_S^0 K^+ \pi^-$

⁸⁸ Calculated by us. The value of $B(\chi_{c1} \rightarrow K_S^0 K^+ \pi^-)$ reported by BAI 99B was derived using $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (8.7 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

$$\frac{\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}}{\Gamma_{29}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.52±0.11 OUR FIT				
0.61±0.11±0.08	54	⁸⁹ ABLIKIM	06T	BES2 $\psi(2S) \rightarrow \gamma K^+ K^+ K^- K^-$

⁸⁹ Calculated by us. The value of $B(\chi_{c1} \rightarrow 2K^+ 2K^-)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (8.7 \pm 0.8)\%$.

$$\frac{\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))/\Gamma_{\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-}}{\Gamma_{29}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.53±0.31 OUR FIT			
1.13±0.40±0.29	⁹⁰ BAI	99B	BES $\psi(2S) \rightarrow \gamma K^+ K^+ K^- K^-$

⁹⁰ Calculated by us. The value of $B(\chi_{c1} \rightarrow 2K^+ 2K^-)$ reported by BAI 99B was derived using $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (8.7 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

$$\frac{\Gamma(\chi_{c1}(1P) \rightarrow p\bar{p})}{\Gamma_{\text{total}}} \times \frac{\Gamma(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))}{\Gamma_{\text{total}}} \times \frac{\Gamma_{34}/\Gamma \times \Gamma_{119}^{\psi(2S)}/\Gamma_{\psi(2S)}}{\Gamma_{\text{total}}}$$

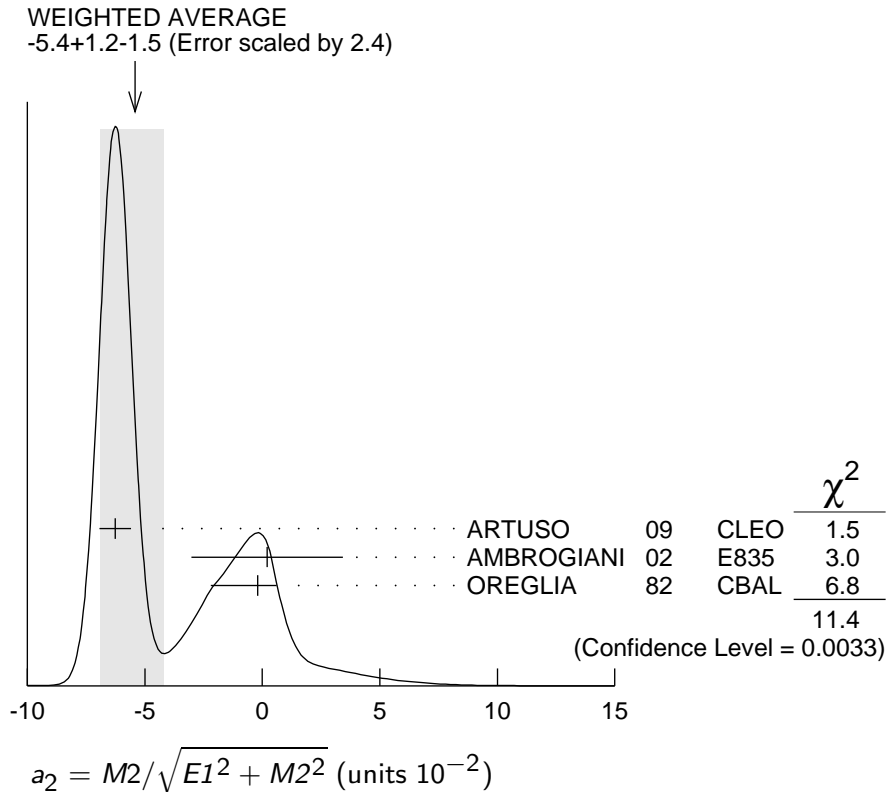
VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.7 ± 0.5				OUR FIT
7.5 ± 1.4				OUR AVERAGE Error includes scale factor of 2.0.
$8.2 \pm 0.7 \pm 0.4$	141 ± 13	⁹¹ NAIK	08	CLEO $\psi(2S) \rightarrow \gamma p\bar{p}$
$4.8^{+1.4}_{-1.3} \pm 0.6$	$18.2^{+5.5}_{-4.9}$	BAI	04F	BES $\psi(2S) \rightarrow \gamma\chi_{c1}(1P) \rightarrow \gamma\bar{p}p$

⁹¹ Calculated by us. NAIK 08 reports $B(\chi_{c1} \rightarrow p\bar{p}) = (9.0 \pm 0.8 \pm 0.4 \pm 0.5) \times 10^{-5}$ using $B(\psi(2S) \rightarrow \gamma\chi_{c1}) = (9.07 \pm 0.11 \pm 0.54)\%$.

MULTIPOLE AMPLITUDES IN $\chi_{c1}(1P) \rightarrow \gamma J/\psi(1S)$

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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
$-5.4^{+1.2}_{-1.5}$				OUR AVERAGE Error includes scale factor of 2.4. See the ideogram below.
$-6.26 \pm 0.63 \pm 0.24$	39k	ARTUSO	09	CLEO $\psi(2S) \rightarrow \gamma\gamma l^+ l^-$
$0.2 \pm 3.2 \pm 0.4$	2090	AMBROGIANI	02	E835 $p\bar{p} \rightarrow \chi_{c1} \rightarrow J/\psi\gamma$
$-0.2^{+0.8}_{-2.0}$	921	OREGLIA	82	CBAL $\psi(2S) \rightarrow \chi_{c1}\gamma \rightarrow J/\psi\gamma\gamma$



MULTIPOLE AMPLITUDES IN $\psi(2S) \rightarrow \gamma\chi_{c1}(1S)$ RADIATIVE DECAY

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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
2.9 ± 0.8 OUR AVERAGE				
2.76 ± 0.73 ± 0.23	39k	ARTUSO	09	CLEO $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
7.7 $^{+5.0}_{-4.5}$	921	OREGLIA	82	CBAL $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS

$\psi(2S) \rightarrow \gamma\chi_{c1}(1S)$ and $\chi_{c1} \rightarrow \gamma J/\psi(1S)$

a_2/b_2 Magnetic quadrupole transition amplitude ratio

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
-2.27$^{+0.57}_{-0.99}$	39k	⁹² ARTUSO	09	CLEO $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

⁹²Statistical and systematic errors combined. Not independent of $a_2(\chi_{c1})$ and $b_2(\chi_{c1})$ values from ARTUSO 09.

$\chi_{c1}(1P)$ REFERENCES

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ABLIKIM	12O	PRL 109 172002	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	11A	PR D83 012006	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	11D	PR D83 032003	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	11K	PRL 107 092001	M. Ablikim <i>et al.</i>	(BES III Collab.)
ONYISI	10	PR D82 011103	P.U.E. Onyisi <i>et al.</i>	(CLEO Collab.)
ARTUSO	09	PR D80 112003	M. Artuso <i>et al.</i>	(CLEO 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.)
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ATHAR	07	PR D75 032002	S.B. Athar <i>et al.</i>	(CLEO Collab.)
ABLIKIM	06D	PR D73 052006	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.)
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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	03E	PR D67 112001	J.Z. Bai <i>et al.</i>	(BES Collab.)
AMBROGIANI	02	PR D65 052002	M. Ambrogiani <i>et al.</i>	(FNAL E835 Collab.)
BAI	99B	PR D60 072001	J.Z. Bai <i>et al.</i>	(BES Collab.)
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ARMSTRONG	92	NP B373 35	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
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TANENBAUM	78	PR D17 1731	W.M. Tanenbaum <i>et al.</i>	(SLAC, LBL)
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