$\chi_{c1}(1P)$

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

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

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
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	$p\overline{p} \rightarrow e^+e^-\gamma$
3509.4 ± 0.9		BAI	99B	BES	$\psi(2S) \rightarrow \gamma X$
3510.60 ± 0.087 ± 0.019	513	[1] ARMSTRONG	92	E760	$\overline{p}p \rightarrow e^+e^-\gamma$
3511.3 ± 0.4 ±0.4	30	BAGLIN	86B	SPEC	$\overline{p}p \rightarrow e^+e^- X$
3512.3 ± 0.3 ±4.0		[2] GAISER	86	CBAL	$\psi(2S) \rightarrow \gamma X$
3507.4 ± 1.7	91	[3] LEMOIGNE	82	GOLI	185 π^- 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

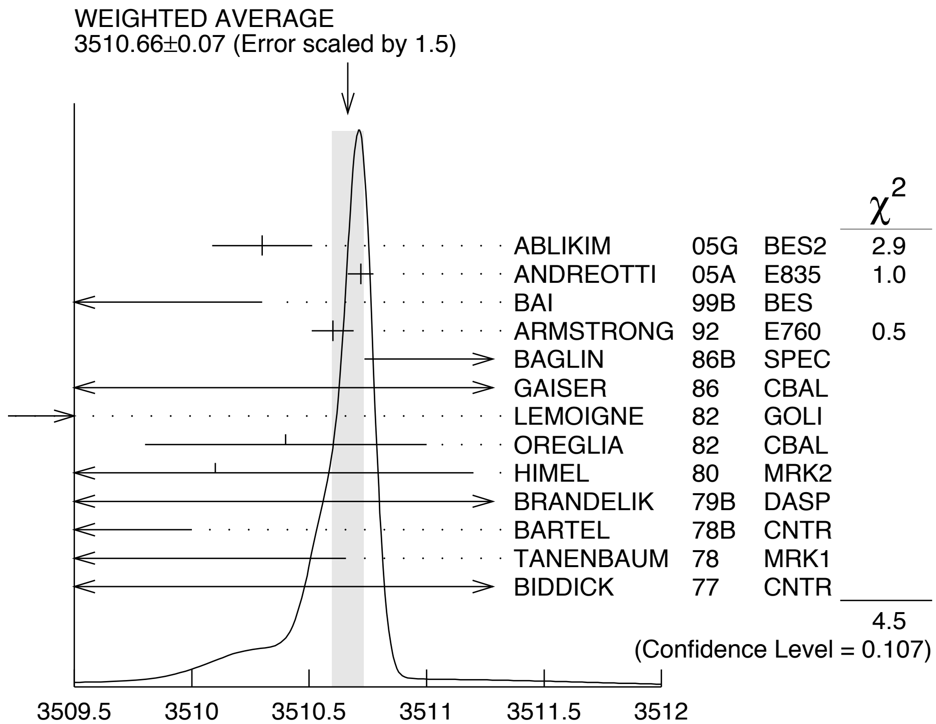
[1] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03.

[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.



$\chi_{c1}(1P)$ mass (MeV)

$\chi_{c1}(1P)$ 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	$\psi(2S) \to \gamma\chi_{c1}$
0.876±0.045±0.026			ANDREOTTI	05A	E835	$p\overline{p} \to e^+e^-\gamma$
0.87 ±0.11 ±0.08		513	[6] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<1.3	95		BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^-X$
<3.8	90		GAISER	86	CBAL	$\psi(2S) \to \gamma X$

[6] Recalculated by ANDREOTTI 05A.

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

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

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	$\pi^+\pi^-\pi^0\pi^0$	(1.26 ± 0.17) %	
Γ_4	$\rho^+\pi^-\pi^0$ + c.c.	(1.53 ± 0.26) %	
Γ_5	$\rho^0\pi^+\pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$	
Γ_6	$\pi^+\pi^- K^+ K^-$	$(4.5 \pm 1.0) \times 10^{-3}$	
Γ_7	$K^+ K^- \pi^0\pi^0$	$(1.18\pm0.29) \times 10^{-3}$	
Γ_8	$K^+\pi^- K^0\pi^0$ + c.c.	$(9.0 \pm 1.5) \times 10^{-3}$	
Γ_9	$\rho^+ K^- K^0$ + c.c.	$(5.3 \pm 1.3) \times 10^{-3}$	
Γ_{10}	$K^*(892)^0 K^0\pi^0 \to K^+\pi^- K^0\pi^0$ + c.c.	$(2.5 \pm 0.7) \times 10^{-3}$	
Γ_{11}	$K^+ K^-\eta\pi^0$	$(1.2 \pm 0.4) \times 10^{-3}$	
Γ_{12}	$\pi^+\pi^- K^0_S K^0_S$	$(7.2 \pm 3.1) \times 10^{-4}$	
Γ_{13}	$K^+ K^-\eta$	$(3.3 \pm 1.0) \times 10^{-4}$	
Γ_{14}	$K^0 K^+\pi^-$ + c.c.	$(7.3 \pm 0.6) \times 10^{-3}$	
Γ_{15}	$K^*(892)^0 \overline{K}^0$ + c.c.	$(1.0 \pm 0.4) \times 10^{-3}$	
Γ_{16}	$K^*(892)^+ K^-$ + c.c.	$(1.5 \pm 0.7) \times 10^{-3}$	
Γ_{17}	$K^*_J(1430)^0 \overline{K}^0$ + c.c. $\to K^0_S K^+\pi^-$ + c.c.	$< 8 \times 10^{-4}$	CL=90%
Γ_{18}	$K^*_J(1430)^+ K^-$ + c.c. $\to K^0_S K^+\pi^-$ + c.c.	$< 2.3 \times 10^{-3}$	CL=90%
Γ_{19}	$K^+ K^-\pi^0$	$(1.91\pm0.26) \times 10^{-3}$	
Γ_{20}	$\eta\pi^+\pi^-$	$(5.0 \pm 0.5) \times 10^{-3}$	
Γ_{21}	$a_0(980)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(1.9 \pm 0.7) \times 10^{-3}$	
Γ_{22}	$f_2(1270)\eta$	$(2.8 \pm 0.8) \times 10^{-3}$	
Γ_{23}	$\pi^+\pi^-\eta'$	$(2.4 \pm 0.5) \times 10^{-3}$	
Γ_{24}	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(3.2 \pm 2.1) \times 10^{-3}$	
Γ_{25}	$K^*(892)^0\overline{K}^*(892)^0$	$(1.5 \pm 0.4) \times 10^{-3}$	
Γ_{26}	$K^+ K^- K^0_S K^0_S$	$< 5 \times 10^{-4}$	CL=90%
Γ_{27}	$K^+ K^- K^+ K^-$	$(5.6 \pm 1.2) \times 10^{-4}$	
Γ_{28}	$K^+ K^-\phi$	$(4.3 \pm 1.6) \times 10^{-4}$	
Γ_{29}	$p\overline{p}$	$(7.3 \pm 0.4) \times 10^{-5}$	
Γ_{30}	$p\overline{p}\pi^0$	$(1.2 \pm 0.5) \times 10^{-4}$	
Γ_{31}	$p\overline{p}\eta$	$< 1.6 \times 10^{-4}$	CL=90%
Γ_{32}	$\pi^+\pi^- p\overline{p}$	$(5.0 \pm 1.9) \times 10^{-4}$	
Γ_{33}	$\pi^0\pi^0 p\overline{p}$		
Γ_{34}	$K^0_S K^0_S p\overline{p}$	$< 4.5 \times 10^{-4}$	CL=90%
Γ_{35}	$\Lambda\overline{\Lambda}$	$(1.18\pm0.19) \times 10^{-4}$	
Γ_{36}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$< 1.5 \times 10^{-3}$	CL=90%
Γ_{37}	$K^+\overline{p}\Lambda$	$(3.2 \pm 1.0) \times 10^{-4}$	
Γ_{38}	$\Sigma^0\overline{\Sigma}^0$	$< 4 \times 10^{-5}$	CL=90%
Γ_{39}	$\Sigma^+\overline{\Sigma}^-$	$< 6 \times 10^{-5}$	CL=90%

Γ_{40}	$\Xi^0 \overline{\Xi}^0$	$< 6 \times 10^{-5}$	CL=90%
Γ_{41}	$\Xi^- \overline{\Xi}^+$	$(8.4 \pm 2.3) \times 10^{-5}$	
Γ_{42}	$\pi^+\pi^- + K^+K^-$	$< 2.1 \times 10^{-3}$	
Γ_{43}	$K^0_S K^0_S$	$< 6 \times 10^{-5}$	CL=90%

Radiative decays

Γ_{44}	$\gamma J/\psi(1S)$	(34.4 ± 1.5) %	
Γ_{45}	$\gamma \rho^0$	$(2.29 \pm 0.27) \times 10^{-4}$	
Γ_{46}	$\gamma \omega$	$(7.8 \pm 1.8) \times 10^{-5}$	
Γ_{47}	$\gamma \phi$	$< 2.4 \times 10^{-5}$	CL=90%
Γ_{48}	$\gamma\gamma$		

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, 24 combinations of partial widths obtained from integrated cross section, and 82 branching ratios uses 213 measurements to determine 47 parameters. The overall fit has a $\chi^2 = 301.4$ for 166 degrees of freedom.

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

x_{27}	8				
x_{29}	−9	−4			
x_{35}	11	5	−5		
x_{44}	36	16	−32	20	
Γ	−13	−5	−59	−7	−30
	x_{14}	x_{27}	x_{29}	x_{35}	x_{44}

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

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

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ **$\Gamma_{29}\Gamma_{44}/\Gamma$**

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
21.7±0.8 OUR FIT				
21.4±0.9 OUR AVERAGE				
$21.5 \pm 0.5 \pm 0.8$	[7] ANDREOTTI	05A	E835	$p\overline{p} \to e^+e^-\gamma$
$21.4 \pm 1.5 \pm 2.2$	[7,8] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
$19.9^{+4.4}_{-4.0}$	[7] BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^- X$

[7] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010.
[8] Recalculated by ANDREOTTI 05A.

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

HADRONIC DECAYS

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
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	$\psi(2S) \to \gamma\chi_{c1}$
16.0±5.9±0.8	[9] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

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

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
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	$\psi(2S) \to \gamma\chi_{c1}$
12.5±4.2±0.6	[10] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

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

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.26±0.16±0.05	604.7	[11] HE	08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[11] HE 08B reports 1.28 ± 0.06 ± 0.15 ± 0.08 % from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.53±0.25±0.06	712.3	[12,13] HE	08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[12] HE 08B reports 1.56 ± 0.13 ± 0.22 ± 0.10 % from a measurement of $[\Gamma(\chi_{c1}(1P) \to \rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. 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.

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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
39±35	[14] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

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

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

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
4.5±1.0 OUR EVALUATION	Treating systematic error as correlated.		
4.5±0.9 OUR AVERAGE			
4.2±0.4±0.9	[15] BAI 99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
7.3±3.0±0.4	[15] TANENBAUM 78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

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

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.118±0.029±0.005	45.1	[16] HE 08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[16] HE 08B reports 0.12 ± 0.02 ± 0.02 ± 0.01 % from a measurement of [$\Gamma(\chi_{c1}(1P) \to K^+K^-\pi^0\pi^0)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.07 ± 0.11 ± 0.54) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.90±0.14±0.03	141.3	[17] HE 08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[17] HE 08B reports 0.92 ± 0.09 ± 0.11 ± 0.06 % from a measurement of [$\Gamma(\chi_{c1}(1P) \to K^+\pi^-K^0\pi^0 + \text{c.c.})/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.07±0.11±0.54)×$10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.53±0.13±0.02	141.3	[18] HE 08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[18] HE 08B reports 0.54 ± 0.11 ± 0.07 ± 0.03 % from a measurement of [$\Gamma(\chi_{c1}(1P) \to \rho^+K^-K^0 + \text{c.c.})/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.07±0.11±0.54)×$10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.25±0.07±0.01	141.3	[19] HE 08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[19] HE 08B reports 0.25 ± 0.06 ± 0.03 ± 0.02 % from a measurement of [$\Gamma(\chi_{c1}(1P) \to K^*(892)^0K^0\pi^0 \to K^+\pi^-K^0\pi^0 + \text{c.c.})/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.07 ± 0.11 ± 0.54) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ K^- \eta \pi^0)/\Gamma_{total}$ Γ_{11}/Γ

VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT
0.118±0.036±0.005	141.3	[20] HE 08B	CLEO	$e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$

[20] HE 08B reports $0.12 \pm 0.03 \pm 0.02 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- \eta \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
7.2±3.1±0.3	19.8 ± 7.7	[21] ABLIKIM 05O	BES2	$\psi(2S) \rightarrow \chi_{c1} \gamma$

[21] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \rightarrow \pi^+ \pi^- K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))] = (0.67 \pm 0.26 \pm 0.11) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.33±0.10±0.01	[22] ATHAR 07	CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

[22] ATHAR 07 reports $(0.34 \pm 0.10 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- \eta)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^0 K^+ \pi^- + c.c.)/\Gamma_{total}$ Γ_{14}/Γ

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

$\Gamma(K^*(892)^0 \overline{K}^0 + c.c.)/\Gamma_{total}$ Γ_{15}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.03±0.38±0.04	22	[23] ABLIKIM 06R	BES2	$\psi(2S) \rightarrow \gamma \chi_{c1}$

[23] ABLIKIM 06R reports $(1.1 \pm 0.4 \pm 0.1) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^*(892)^0 \overline{K}^0 + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.5±0.7±0.1	27	[24] ABLIKIM 06R	BES2	$\psi(2S) \rightarrow \gamma \chi_{c1}$

[24] ABLIKIM 06R reports $(1.6 \pm 0.7 \pm 0.2) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow K^*(892)^+ K^- + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_J^*(1430)^0 \overline{K}^0 + \text{c.c.} \to K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ — Γ_{17}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[25] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma \chi_{c1}$

[25] ABLIKIM 06R reports $< 0.9 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K_J^*(1430)^0 \overline{K}^0 + \text{c.c.} \to K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

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

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2.3	90	[26] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma \chi_{c1}$

[26] ABLIKIM 06R reports $< 2.4 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K_J^*(1430)^+ K^- + \text{c.c.} \to K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

$\Gamma(K^+ K^- \pi^0)/\Gamma_{\text{total}}$ — Γ_{19}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.91±0.25±0.07	[27] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[27] ATHAR 07 reports $(1.95 \pm 0.16 \pm 0.23) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ K^- \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. 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_{20}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.0±0.5 OUR AVERAGE					
4.9±0.5±0.2		[28] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$
5.6±1.0±0.2	222	[29] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma \chi_{c1}$

[28] ATHAR 07 reports $(5.0 \pm 0.3 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[29] ABLIKIM 06R reports $(5.9 \pm 0.7 \pm 0.8) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(a_0(980)^+ \pi^- + \text{c.c.} \to \eta \pi^+ \pi^-)/\Gamma_{\text{total}}$ — Γ_{21}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.9±0.7±0.1	58	[30] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma \chi_{c1}$

[30] ABLIKIM 06R reports $(2.0 \pm 0.5 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow a_0(980)^+ \pi^- + \text{ c.c.} \rightarrow \eta \pi^+ \pi^-)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(f_2(1270)\eta)/\Gamma_{total}$ Γ_{22}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8±0.8±0.1	53	[31] ABLIKIM	06R	BES2	$\psi(2S) \rightarrow \gamma \chi_{c1}$

[31] ABLIKIM 06R reports $(3.0 \pm 0.7 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow f_2(1270)\eta)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^+ \pi^- \eta')/\Gamma_{total}$ Γ_{23}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.4±0.5±0.1	[32] ATHAR	07	CLEO	$\psi(2S) \rightarrow \gamma h^+ h^- h^0$

[32] ATHAR 07 reports $(2.4 \pm 0.4 \pm 0.3) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \pi^+ \pi^- \eta')/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ \overline{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{24}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
32±21	[33] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma \chi_{c1}$

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

$\Gamma(K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}$ Γ_{25}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.5±0.4±0.1	28.4 ± 5.5	[34,35] ABLIKIM	04H	BES	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^+ \pi^-$

[34] ABLIKIM 04H reports $[\Gamma(\chi_{c1}(1P) \rightarrow K^*(892)^0 \overline{K}^*(892)^0)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))] = (1.40 \pm 0.27 \pm 0.22) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[35] Assumes $B(K^*(892)^0 \rightarrow K^- \pi^+) = 2/3$.

$\Gamma(K^+ K^- K^0_S K^0_S)/\Gamma_{total}$ Γ_{26}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<5	90	3.2 ± 2.4	[36] ABLIKIM	05O	BES2	$\psi(2S) \rightarrow \chi_{c1}\gamma$

[36] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \rightarrow K^+ K^- K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P))] < 4.2 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

$\Gamma(K^+K^-K^+K^-)/\Gamma_{total}$ Γ_{27}/Γ

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

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.43±0.16±0.02	17	[37] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma 2K^+ 2K^-$

[37] ABLIKIM 06T reports $(0.46 \pm 0.16 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+K^-\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{29}/Γ

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

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{30}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.118±0.049±0.005	[38] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[38] ATHAR 07 reports $(0.12 \pm 0.05 \pm 0.01) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.16	90	[39] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[39] ATHAR 07 reports $< 0.16 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

$\Gamma(\pi^+\pi^-p\overline{p})/\Gamma_{total}$ Γ_{32}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.50±0.19 OUR EVALUATION	Treating systematic error as correlated.			
0.50±0.19 OUR AVERAGE				
0.46±0.12±0.15	[40] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
1.08±0.77±0.05	[40] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

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

$\Gamma(\pi^0\pi^0p\overline{p})/\Gamma_{total}$ Γ_{33}/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.05	90	[41] HE	08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[41] HE 08B reports < 0.05 % from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi^0\pi^0 p\overline{p})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

$\Gamma(K^0_S K^0_S p\overline{p})/\Gamma_{total}$ Γ_{34}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.5	90	[42] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[42] Using B($\psi(2S) \to \chi_{c1}\gamma$) (9.1 ± 0.6)%.

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{35}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
1.18±0.19 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ Γ_{36}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	[43] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[43] Using B($\psi(2S) \to \chi_{c1}\gamma$) (9.1 ± 0.6)%.

$\Gamma(K^+\overline{p}\Lambda)/\Gamma_{total}$ Γ_{37}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.32±0.09±0.01	[44] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[44] ATHAR 07 reports $(0.33 \pm 0.09 \pm 0.04) \times 10^{-3}$ from a measurement of [$\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = 0.0907 ± 0.0011 ± 0.0054, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{38}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.4	90	3.8 ± 2.5	[45] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$

[45] NAIK 08 reports $< 0.44 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = 9.2×10^{-2}.

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

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.6	90	4.3 ± 2.3	[46] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$

[46] NAIK 08 reports $< 0.65 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = 9.2×10^{-2}.

$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{total}$ Γ_{40}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<0.6	90	1.7 ± 2.4	[47] NAIK	08	CLEO	$\psi(2S) \to \gamma\Xi^0\overline{\Xi}^0$

[47] NAIK 08 reports $< 0.60 \times 10^{-4}$ from a measurement of [$\Gamma(\chi_{c1}(1P) \to \Xi^0\overline{\Xi}^0)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = 9.2×10^{-2}.

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{41}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.84±0.22±0.03		16.4 ± 4.3	[48] NAIK	08	CLEO	$\psi(2S) \to \gamma \Xi^+ \overline{\Xi}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 3.4	90		[49] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma \chi_{c1}$

[48] NAIK 08 reports $(0.86 \pm 0.22 \pm 0.08) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Xi^-\overline{\Xi}^+)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[49] Using $B(\psi(2S) \to \chi_{c1}\gamma)$ (9.1 ± 0.6)%.

$\left[\Gamma(\pi^+\pi^-) + \Gamma(K^+K^-)\right]/\Gamma_{total}$ Γ_{42}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<21		[50] FELDMAN	77	MRK1	$\psi(2S) \to \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<38	90	[50] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$

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

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ Γ_{43}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.6	90	[51] ABLIKIM	05O	BES2	$\psi(2S) \to \chi_{c1}\gamma$

[51] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \to K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] < 0.6 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

RADIATIVE DECAYS

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ Γ_{44}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.344±0.015 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.379±0.008±0.021	[52] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

[52] Uses $B(\psi(2S) \to \gamma\chi_{c1} \to \gamma\gamma J/\psi)$ from ADAM 05A and $B(\psi(2S) \to \gamma\chi_{c1})$ from ATHAR 04.

$\Gamma(\gamma\rho^0)/\Gamma_{total}$ Γ_{45}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
229±25±9	186 ± 15	[53] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\rho^0$

[53] BENNETT 08A reports $(243 \pm 19 \pm 22) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\rho^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\gamma\omega)/\Gamma_{total}$ — Γ_{46}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
78±18±3	39.2 ± 7.1	[54] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\omega$

[54] BENNETT 08A reports $(83 \pm 15 \pm 12) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\gamma\phi)/\Gamma_{total}$ — Γ_{47}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<24	90	5.2 ± 3.1	[55] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\phi$

[55] BENNETT 08A reports $< 26 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.2 \times 10^{-2}$.

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{48}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$ 3.5	90	ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{c1} \to 3\gamma$
$<$150	90	[56] YAMADA	77	DASP	$e^+e^- \to 3\gamma$

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

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

$\Gamma(\chi_{c1}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ — $\Gamma_{29}/\Gamma \times \Gamma_{106}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.02±0.16 OUR FIT				
1.1 ±1.0	[57] BAI	98I	BES	$\psi(2S) \to \gamma\chi_{c1} \to \gamma\overline{p}p$

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

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ — $\Gamma_{35}/\Gamma \times \Gamma_{106}^{\psi(2S)}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
10.9±1.7 OUR FIT					
10.5±1.6±0.6	46 ± 7	[58] NAIK	08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[58] Calculated by us. NAIK 08 reports $B(\chi_{c1} \to \Lambda\overline{\Lambda}) = (11.6 \pm 1.8 \pm 0.7 \pm 0.7) \times 10^{-5}$ using $B(\psi(2S) \to \gamma\chi_{c1}) = (9.07 \pm 0.11 \pm 0.54)\%$.

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{35}/\Gamma \times \Gamma^{\psi(2S)}_{106}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.3±0.5 OUR FIT					
$\mathbf{7.1^{+2.8}_{-2.4}\pm1.3}$	$9.0^{+3.5}_{-3.1}$	[59] BAI	03E	BES	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[59] BAI 03E reports [B($\chi_{c1} \to \Lambda\overline{\Lambda}$) B($\psi(2S) \to \gamma\chi_{c1}$) / B($\psi(2S) \to J/\psi\pi^+\pi^-$)] × [B^2($\Lambda \to \pi^- p$) / B($J/\psi \to p\overline{p}$)] = $(1.33^{+0.52}_{-0.46} \pm 0.25)$%. We calculate from this measurement the presented value using B($\Lambda \to \pi^- p$) = (63.9 ± 0.5)% and B($J/\psi \to p\overline{p}$) = (2.17 ± 0.07) × 10^{-3}.

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{44}/\Gamma \times \Gamma^{\psi(2S)}_{106}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.18±0.08 OUR FIT					
2.70±0.13 OUR AVERAGE					
2.81±0.05±0.23	13k	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
2.56±0.12±0.20		GAISER	86	CBAL	$\psi(2S) \to \gamma X$
2.78±0.30		[60] OREGLIA	82	CBAL	$\psi(2S) \to \gamma\chi_{c1}$
2.2 ±0.5		[61] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$
2.9 ±0.5		[61] BARTEL	78B	CNTR	$\psi(2S) \to \gamma\chi_{c1}$
5.0 ±1.5		[62] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
2.8 ±0.9		[60] 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	[63] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
3.44±0.06±0.13	3.7k	[64] ADAM	05A	CLEO	Repl. by MENDEZ 08

[60] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020.
[61] Recalculated by us using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010.
[62] Assumes isotropic gamma distribution.
[63] Not independent from other measurements of MENDEZ 08.
[64] Not independent from other values reported by ADAM 05A.

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\text{anything})$ $\Gamma_{44}/\Gamma \times \Gamma^{\psi(2S)}_{106}/\Gamma^{\psi(2S)}_{9}$

$$\Gamma_{44}/\Gamma \times \Gamma^{\psi(2S)}_{106}/\Gamma^{\psi(2S)}_{9} = \Gamma_{44}/\Gamma \times \Gamma^{\psi(2S)}_{106}/(\Gamma^{\psi(2S)}_{11}+\Gamma^{\psi(2S)}_{12}+\Gamma^{\psi(2S)}_{13}+0.344\Gamma^{\psi(2S)}_{106}+0.195\Gamma^{\psi(2S)}_{107})$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.35±0.12 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.70±0.04±0.15	24.9k	[65] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
5.77±0.10±0.12	3.7k	ADAM	05A	CLEO	Repl. by MENDEZ 08

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

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{44}/\Gamma \times \Gamma^{\psi(2S)}_{106}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
9.47±0.23 OUR FIT					
10.15±0.28 OUR AVERAGE					
10.17±0.07±0.27	24.9k	MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
12.6 ±0.3 ±3.8	3k	[66] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
8.5 ±2.1		[67] HIMEL	80	MRK2	$\psi(2S) \to \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
10.24±0.17±0.23	3.7k	[68] ADAM	05A	CLEO	Repl. by MENDEZ 08

[66] From a fit to the J/ψ recoil mass spectra.

[67] The value for B($\psi(2S) \to \gamma\chi_{c1}$)×B($\chi_{c1} \to \gamma J/\psi(1S)$) quoted in HIMEL 80 is derived using B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (33 ± 3)% and B($J/\psi(1S) \to \ell^+\ell^-$) = 0.138 ± 0.018. Calculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020.

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

$\Gamma(\chi_{c1}(1P) \to K^0 K^+\pi^- + c.c.)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{14}/\Gamma \times \Gamma^{\psi(2S)}_{106}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.8±0.5 OUR FIT				
7.2±0.6 OUR AVERAGE				
7.3±0.5±0.5	[69] ATHAR	07	CLEO	$\psi(2S) \to \gamma K^0_S K^+\pi^-$
7.0±0.5±0.9	[70] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

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

[70] Calculated by us. ABLIKIM 06R reports B($\chi_{c1} \to K^0_S K^+\pi^-$) = (4.0 ± 0.3 ± 0.5) × 10^{-3}. We use B($\psi(2S) \to \gamma\chi_{c1}$) = (8.7 ± 0.4) × 10^{-2}.

$\Gamma(\chi_{c1}(1P) \to K^0 K^+\pi^- + c.c.)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{14}/\Gamma \times \Gamma^{\psi(2S)}_{106}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
20.2±1.6 OUR FIT				
13.2±2.4±3.2	[71] BAI	99B	BES	$\psi(2S) \to \gamma K^0_S K^+\pi^-$

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

$\Gamma(\chi_{c1}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{27}/\Gamma \times \Gamma^{\psi(2S)}_{106}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.52±0.11 OUR FIT					
0.61±0.11±0.08	54	[72] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma K^+K^+K^-K^-$

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

$\Gamma(\chi_{c1}(1P) \to K^+K^-K^+K^-)/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{27}/\Gamma \times \Gamma_{106}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.54±0.31 OUR FIT			
1.13±0.40±0.29	[73] BAI 99B	BES	$\psi(2S) \to \gamma K^+K^+K^-K^-$

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

$\Gamma(\chi_{c1}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{29}/\Gamma \times \Gamma_{106}^{\psi(2S)}/\Gamma^{\psi(2S)}$

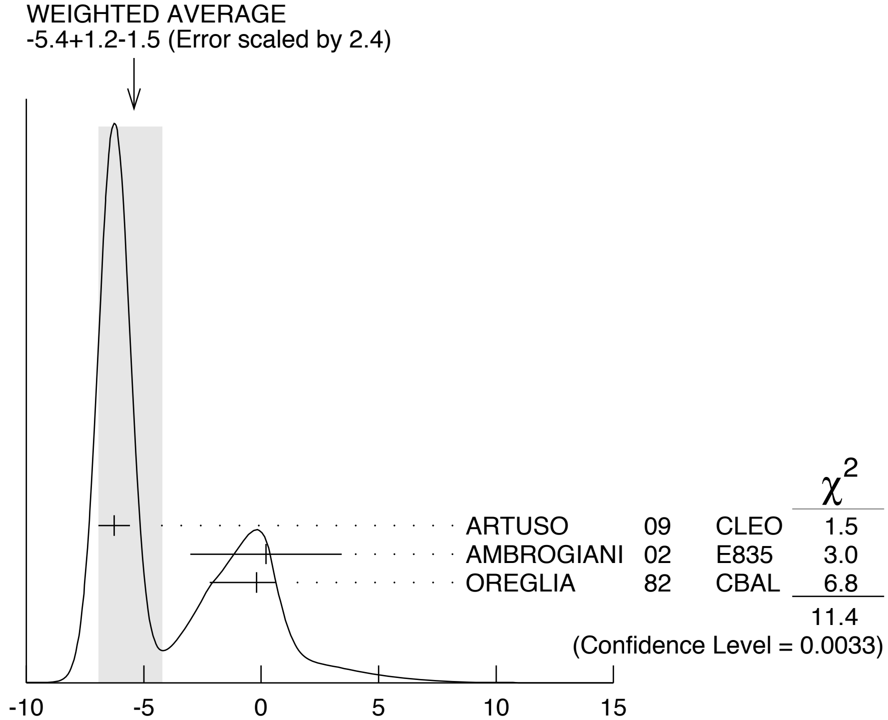
VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
6.8±0.5 OUR FIT				
7.5±1.4 OUR AVERAGE Error includes scale factor of 2.0.				
8.2±0.7±0.4	141 ± 13	[74] NAIK 08	CLEO	$\psi(2S) \to \gamma p\overline{p}$
$4.8^{+1.4}_{-1.3}$±0.6	$18.2^{+5.5}_{-4.9}$	BAI 04F	BES	$\psi(2S) \to \gamma\chi_{c1}(1P) \to \gamma\overline{p}p$

[74] Calculated by us. NAIK 08 reports B($\chi_{c1} \to p\overline{p}$) = (9.0 ± 0.8 ± 0.4 ± 0.5) × 10^{-5} using B($\psi(2S) \to \gamma\chi_{c1}$) = (9.07 ± 0.11 ± 0.54)%.

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

$a_2 = M2/\sqrt{E1^2 + M2^2}$ 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±0.63±0.24	39k	ARTUSO 09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
0.2 ±3.2 ±0.4	2090	AMBROGIANI 02	E835	$p\overline{p} \to \chi_{c1} \to J/\psi\gamma$
$-0.2^{+0.8}_{-2.0}$	921	OREGLIA 82	CBAL	$\psi(2S) \to \chi_{c1}\gamma \to J/\psi\gamma\gamma$



$a_2 = M2/\sqrt{E1^2 + M2^2}$ (units 10^{-2})

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
$\mathbf{-2.27^{+0.57}_{-0.99}}$	39k	[75] ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

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

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

ARTUSO	09	PR D80 112003	M. Artuso *et al.*	(CLEO Collab.)
BENNETT	08A	PRL 101 151801	J.V. Bennett *et al.*	(CLEO Collab.)
ECKLUND	08A	PR D78 091501R	K.M. Ecklund *et al.*	(CLEO Collab.)
HE	08B	PR D78 092004	Q. He *et al.*	(CLEO Collab.)
MENDEZ	08	PR D78 011102R	H. Mendez *et al.*	(CLEO Collab.)
NAIK	08	PR D78 031101R	P. Naik *et al.*	(CLEO Collab.)
ATHAR	07	PR D75 032002	S.B. Athar *et al.*	(CLEO Collab.)
ABLIKIM	06D	PR D73 052006	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06R	PR D74 072001	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	06T	PL B642 197	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05G	PR D71 092002	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	05O	PL B630 21	M. Ablikim *et al.*	(BES Collab.)
ADAM	05A	PRL 94 232002	N.E. Adam *et al.*	(CLEO Collab.)
ANDREOTTI	05A	NP B717 34	M. Andreotti *et al.*	(FNAL E835 Collab.)
ABLIKIM	04B	PR D70 012003	M. Ablikim *et al.*	(BES Collab.)
ABLIKIM	04H	PR D70 092003	M. Ablikim *et al.*	(BES Collab.)
ATHAR	04	PR D70 112002	S.B. Athar *et al.*	(CLEO Collab.)
BAI	04F	PR D69 092001	J.Z. Bai *et al.*	(BES Collab.)
BAI	04I	PR D70 012006	J.Z. Bai *et al.*	(BES Collab.)
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)
BAI	03E	PR D67 112001	J.Z. Bai *et al.*	(BES Collab.)
AMBROGIANI	02	PR D65 052002	M. Ambrogiani *et al.*	(FNAL E835 Collab.)
BAI	99B	PR D60 072001	J.Z. Bai *et al.*	(BES Collab.)
BAI	98D	PR D58 092006	J.Z. Bai *et al.*	(BES Collab.)
BAI	98I	PRL 81 3091	J.Z. Bai *et al.*	(BES Collab.)
ARMSTRONG	92	NP B373 35	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)
Also		PRL 68 1468	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)
BAGLIN	86B	PL B172 455	C. Baglin	(LAPP, CERN, GENO, LYON, OSLO+)
GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)
LEMOIGNE	82	PL 113B 509	Y. Lemoigne *et al.*	(SACL, LOIC, SHMP+)
OREGLIA	82	PR D25 2259	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)
Also		Private Comm.	M.J. Oreglia	(EFI)
HIMEL	80	PRL 44 920	T. Himel *et al.*	(LBL, SLAC)
Also		Private Comm.	G. Trilling	(LBL, UCB)
BRANDELIK	79B	NP B160 426	R. Brandelik *et al.*	(DASP Collab.)
BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum *et al.*	(SLAC, LBL)
Also		Private Comm.	G. Trilling	(LBL, UCB)
BIDDICK	77	PRL 38 1324	C.J. Biddick *et al.*	(UCSD, UMD, PAVI+)
FELDMAN	77	PRPL 33C 285	G.J. Feldman, M.L. Perl	(LBL, SLAC)
YAMADA	77	Hamburg Conf. 69	S. Yamada	(DASP Collab.)
WHITAKER	76	PRL 37 1596	J.S. Whitaker *et al.*	(SLAC, LBL)
TANENBAUM	75	PRL 35 1323	W.M. Tanenbaum *et al.*	(LBL, SLAC)