$\chi_{c2}(1P)$

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

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

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3556.20 ± 0.09 OUR AVERAGE					
3555.70 ± 0.59 ± 0.39		ABLIKIM	05G	BES2	$\psi(2S) \rightarrow \gamma\chi_{c2}$
3556.173 ± 0.123 ± 0.020		ANDREOTTI	05A	E835	$p\overline{p} \rightarrow e^+e^-\gamma$
3559.9 ± 2.9		EISENSTEIN	01	CLE2	$e^+e^- \rightarrow e^+e^-\chi_{c2}$
3556.4 ± 0.7		BAI	99B	BES	$\psi(2S) \rightarrow \gamma X$
3556.22 ± 0.131 ± 0.020	585	[1] ARMSTRONG	92	E760	$\overline{p}p \rightarrow e^+e^-\gamma$
3556.9 ± 0.4 ± 0.5	50	BAGLIN	86B	SPEC	$\overline{p}p \rightarrow e^+e^-X$
3557.8 ± 0.2 ± 4		[2] GAISER	86	CBAL	$\psi(2S) \rightarrow \gamma X$
3553.4 ± 2.2	66	[3] LEMOIGNE	82	GOLI	185 π^- Be $\rightarrow \gamma\mu^+\mu^-$ A
3555.9 ± 0.7		[4] OREGLIA	82	CBAL	$e^+e^- \rightarrow J/\psi 2\gamma$
3557 ± 1.5	69	[5] HIMEL	80	MRK2	$e^+e^- \rightarrow J/\psi 2\gamma$
3551 ± 11	15	BRANDELIK	79B	DASP	$e^+e^- \rightarrow J/\psi 2\gamma$
3553 ± 4		[5] BARTEL	78B	CNTR	$e^+e^- \rightarrow J/\psi 2\gamma$
3553 ± 4 ± 4		[5,6] TANENBAUM	78	MRK1	e^+e^-
3563 ± 7	360	[5] BIDDICK	77	CNTR	$e^+e^- \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3543 ± 10	4	WHITAKER	76	MRK1	$e^+e^- \rightarrow J/\psi 2\gamma$

[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] Assuming $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.
[5] Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.
[6] From a simultaneous fit to radiative and hadronic decay channels.

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2.06 ± 0.12 OUR FIT					
1.95 ± 0.13 OUR AVERAGE					
1.915 ± 0.188 ± 0.013		ANDREOTTI	05A	E835	$p\overline{p} \rightarrow e^+e^-\gamma$
1.96 ± 0.17 ± 0.07	585	[7] ARMSTRONG	92	E760	$\overline{p}p \rightarrow e^+e^-\gamma$
$2.6^{+1.4}_{-1.0}$	50	BAGLIN	86B	SPEC	$\overline{p}p \rightarrow e^+e^-X$
$2.8^{+2.1}_{-2.0}$		[8] GAISER	86	CBAL	$\psi(2S) \rightarrow \gamma X$

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

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

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
	Hadronic decays		
Γ_1	$2(\pi^+\pi^-)$	(1.23±0.15) %	
Γ_2	$\pi^+\pi^- K^+ K^-$	(9.9 ±2.5) $\times 10^{-3}$	S=1.6
Γ_3	$3(\pi^+\pi^-)$	(8.6 ±1.8) $\times 10^{-3}$	
Γ_4	$\rho^0\pi^+\pi^-$	(7 ±4) $\times 10^{-3}$	
Γ_5	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	(4.8 ±2.8) $\times 10^{-3}$	
Γ_6	$K^*(892)^0\overline{K}^*(892)^0$	(3.8 ±0.8) $\times 10^{-3}$	
Γ_7	$\phi\phi$	(1.9 ±0.7) $\times 10^{-3}$	
Γ_8	$\omega\omega$	(2.0 ±0.7) $\times 10^{-3}$	
Γ_9	$\pi\pi$	(2.14±0.25) $\times 10^{-3}$	
Γ_{10}	$\eta\eta$	< 1.2 $\times 10^{-3}$	CL=90%
Γ_{11}	$\pi^+\pi^- K^0_S K^0_S$	(2.6 ±0.6) $\times 10^{-3}$	
Γ_{12}	$K^+ K^- K^+ K^-$	(1.41±0.35) $\times 10^{-3}$	
Γ_{13}	$K^+ K^- K^0_S K^0_S$		
Γ_{14}	$\pi^+\pi^- p\overline{p}$	(1.32±0.34) $\times 10^{-3}$	
Γ_{15}	$K^+ K^-$	(7.7 ±1.4) $\times 10^{-4}$	
Γ_{16}	$K^0_S K^0_S$	(6.7 ±1.1) $\times 10^{-4}$	
Γ_{17}	$K^0_S K^0_S p\overline{p}$	< 7.9 $\times 10^{-4}$	CL=90%
Γ_{18}	$p\overline{p}$	(6.6 ±0.5) $\times 10^{-5}$	
Γ_{19}	$\Lambda\overline{\Lambda}$	(2.7 ±1.3) $\times 10^{-4}$	
Γ_{20}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	< 3.5 $\times 10^{-3}$	CL=90%
Γ_{21}	$J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5 %	CL=90%
Γ_{22}	$K^0_S K^+\pi^-$ + c.c.	< 1.0 $\times 10^{-3}$	CL=90%
Γ_{23}	$\Xi^-\overline{\Xi}^+$	< 3.7 $\times 10^{-4}$	CL=90%
	Radiative decays		
Γ_{24}	$\gamma J/\psi(1S)$	(20.2 ±1.0) %	
Γ_{25}	$\gamma\gamma$	(2.59±0.19) $\times 10^{-4}$	

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

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

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ **$\Gamma_{18}\Gamma_{24}/\Gamma$**

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
27.3±1.4 OUR FIT				
27.5±1.5 OUR AVERAGE				
27.0±1.5±1.1	[9] ANDREOTTI	05A	E835	$p\overline{p} \to e^+e^-\gamma$
27.7±1.5±2.0	[9,10] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
36 ±8	[9] BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^- X$

$\Gamma(\gamma\gamma) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — $\Gamma_{25}\Gamma_{24}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
108± 8 OUR FIT				
117± 10 OUR AVERAGE				
111± 12± 9	147 ± 15	[11] DOBBS 06	CLE3	10.4 $e^+e^- \to e^+e^-\chi_{c2}$
114± 11± 9	136 ± 13.3	[11,12] ABE 02T	BELL	$e^+e^- \to e^+e^-\chi_{c2}$
139± 55± 21		[11,13] ACCIARRI 99E	L3	$e^+e^- \to e^+e^-\chi_{c2}$
242± 65± 51		[11,14] ACKER..,K... 98	OPAL	$e^+e^- \to e^+e^-\chi_{c2}$
150± 42± 36		[11,15] DOMINICK 94	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$
470±240±120		[11,16] BAUER 93	TPC	$e^+e^- \to e^+e^-\chi_{c2}$

[9] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010.
[10] Recalculated by ANDREOTTI 05A.
[11] Calculated by us using B($J/\psi \to \ell^+\ell^-$) = 0.1187 ± 0.0008.
[12] All systematic errors added in quadrature.
[13] The value for Γ($\chi_{c2} \to \gamma\gamma$) reported in ACCIARRI 99E is derived using B($\chi_{c2} \to \gamma J/\psi(1S)$)×B($J/\psi(1S) \to \ell^+\ell^-$) = 0.0162 ± 0.0014.
[14] The value for Γ($\chi_{c2} \to \gamma\gamma$) reported in ACKERSTAFF,K 98 is derived using B($\chi_{c2} \to \gamma J/\psi(1S)$) = 0.135 ± 0.011 and B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1203 ± 0.0038.
[15] The value for Γ($\chi_{c2} \to \gamma\gamma$) reported in DOMINICK 94 is derived using B($\chi_{c2} \to \gamma J/\psi(1S)$)= 0.135 ± 0.011, B($J/\psi(1S) \to e^+e^-$) = 0.0627 ± 0.0020, and B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0597 ± 0.0025.
[16] The value for Γ($\chi_{c2} \to \gamma\gamma$) reported in BAUER 93 is derived using B($\chi_{c2} \to \gamma J/\psi(1S)$)= 0.135 ± 0.011, B($J/\psi(1S) \to e^+e^-$) = 0.0627 ± 0.0020, and B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0597 ± 0.0025.

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

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_9\Gamma_{25}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.14±0.12 OUR FIT				
1.14±0.21±0.17	54 ± 10	[17] NAKAZAWA 05	BELL	$e^+e^- \to e^+e^-\chi_{c2}$

$\Gamma(K^+K^-) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{15}\Gamma_{25}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.41±0.05 OUR FIT				
0.44±0.11±0.07	33 ± 8	NAKAZAWA 05	BELL	$e^+e^- \to e^+e^-\chi_{c2}$

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_{25}/\Gamma$

VALUE (eV)	DOCUMENT ID	TECN	COMMENT
6.6±0.9 OUR FIT			
6.4±1.8±0.8	EISENSTEIN 01	CLE2	$e^+e^- \to e^+e^-\chi_{c2}$

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

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

HADRONIC DECAYS

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

VALUE	DOCUMENT ID
0.0123±0.0015 OUR FIT	

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
9.9±2.5 OUR EVALUATION Error includes scale factor of 1.6. Treating systematic error as correlated.				
10.0±3.5 OUR AVERAGE Error includes scale factor of 2.3.				
7.5±0.6±1.8	[18] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
15.0±2.6±0.8	[18] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_3/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.6±1.8 OUR EVALUATION Treating systematic error as correlated.				
8.6±1.8 OUR AVERAGE				
8.6±0.9±1.6	[18] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
8.7±5.9±0.5	[18] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
68±40	[19] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_5/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
48±28	[19] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_6/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±0.7±0.2	57.5 ± 6.4	[20,21] ABLIKIM	04H	BES	$\psi(2S) \to \gamma K^+K^-\pi^+\pi^-$

$\Gamma(\phi\phi)/\Gamma_{total}$ — Γ_7/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.9±0.5±0.5	[18] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.6±0.6±0.1	57 ± 11	[22] ABLIKIM	05O	BES2	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(\omega\omega)/\Gamma_{total}$ — Γ_8/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.0±0.7±0.1	27.7 ± 7.4	[23] ABLIKIM	05N	BES2	$\psi(2S) \to \gamma\chi_{c2} \to \gamma 6\pi$

$\Gamma(\pi\pi)/\Gamma_{total}$ Γ_9/Γ

VALUE (units 10^{-3})	DOCUMENT ID
2.14±0.25 OUR FIT	

$\Gamma(\eta\eta)/\Gamma_{total}$ Γ_{10}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<12	90	[18] BAI	03C	BES	$\psi(2S) \rightarrow \gamma\eta\eta \rightarrow 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.9±4.1±2.4		[24] LEE	85	CBAL	$\psi' \rightarrow$ photons

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.41±0.25±0.25	[18] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$

$\Gamma(K^+K^-K^0_S K^0_S)/\Gamma_{total}$ Γ_{13}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
<4	90	2.3 ± 2.2	[25] ABLIKIM	05O	BES2	$e^+e^- \rightarrow \chi_{c2}\gamma$

$\Gamma(\pi^+\pi^- p\overline{p})/\Gamma_{total}$ Γ_{14}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.32±0.34 OUR EVALUATION Treating systematic error as correlated.				
1.3 ±0.5 OUR AVERAGE Error includes scale factor of 1.3.				
1.17±0.19±0.30	[18] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$
2.65±1.03±0.14	[18] TANENBAUM	78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c2}$

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

VALUE (units 10^{-3})	DOCUMENT ID
0.77±0.14 OUR FIT	

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ Γ_{16}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.67±0.11 OUR AVERAGE					
0.71±0.12±0.03	65.1 ± 8.7	[26] ABLIKIM	05O	BES2	$\psi(2S) \rightarrow \gamma\chi_{c2}$
0.58±0.16±0.13		[18] BAI	99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c2}$

$\Gamma(K^0_S K^0_S p\overline{p})/\Gamma_{total}$ Γ_{17}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<7.9	90	[27] ABLIKIM	06D	BES2	$\psi(2S) \rightarrow \chi_{c2}\gamma$

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{18}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
0.66±0.05 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{19}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.7±1.2±0.5	$8.3^{+3.7}_{-3.4}$	[18] BAI	03E	BES	$\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma\Lambda\overline{\Lambda}$

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ Γ_{20}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.5	90	[27] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2}\gamma$

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{21}/Γ

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

$\Gamma(K^0_S K^+\pi^- + \text{c.c.})/\Gamma_{total}$ Γ_{22}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	[18] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{23}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.7	90	[27] ABLIKIM	06D	BES2	$\psi(2S) \to \chi_{c2}\gamma$

[18] Rescaled by us using B($\psi(2S) \to \gamma\chi_{c2}$)= (8.1 ± 0.4)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = 0.318 ± 0.006.

[19] Estimated using B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 0.078; the errors do not contain the uncertainty in the $\psi(2S)$ decay.

[20] ABLIKIM 04H reports [B($\chi_{c2}(1P) \to K^*(892)^0\overline{K}^*(892)^0$) × B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = (3.11 ± 0.36 ± 0.48) × 10^{-4}. We divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (8.1 ± 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.

[21] Assumes B($K^*(892)^0 \to K^-\pi^+$) = 2/3.

[22] ABLIKIM 05O reports [B($\chi_{c2}(1P) \to \pi^+\pi^- K^0_S K^0_S$) × B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = (0.207 ± 0.039 ± 0.033) × 10^{-3}. We divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (8.1 ± 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.

[23] ABLIKIM 05N reports [B($\chi_{c2}(1P) \to \omega\omega$) × B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = (0.165 ± 0.044 ± 0.032) × 10^{-3}. We divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (8.1 ± 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.

[24] Calculated using B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 0.078 ± 0.008.

[25] ABLIKIM 05O reports [B($\chi_{c2}(1P) \to K^+K^- K^0_S K^0_S$) × B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = < 3.5 × 10^{-5}. We divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 0.081.

[26] ABLIKIM 05O reports [B($\chi_{c2}(1P) \to K^0_S K^0_S$) × B($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = (0.0572 ± 0.0076 ± 0.0063) × 10^{-3}. We divide by our best value B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = (8.1 ± 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.

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

RADIATIVE DECAYS

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ Γ_{24}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.202±0.010 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.199±0.005±0.012	[28] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to \gamma\chi_{c2}$

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

VALUE (units 10^{-4})	DOCUMENT ID
2.59±0.19 OUR FIT	

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ — Γ_{25}/Γ_{24}

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
1.28±0.11 OUR FIT			
0.99±0.18	[29] AMBROGIANI 00B	E835	$\overline{p}p \to \chi_{c2} \to \gamma\gamma, \gamma J/\psi$

$\Gamma(\gamma\gamma) \times \Gamma(p\overline{p})/\Gamma^2_{total}$ — $\Gamma_{25}\Gamma_{18}/\Gamma^2$

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
1.70±0.20 OUR FIT			
1.7 ±0.4 OUR AVERAGE			
1.60±0.42	ARMSTRONG 93	E760	$\overline{p}p \to \gamma\gamma X$
9.9 ±4.5	BAGLIN 87B	SPEC	$\overline{p}p \to \gamma\gamma X$

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

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

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

$$B(\chi_{c2}(1P) \to p\overline{p}) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
1.67±0.17 OUR FIT			
1.4 ±1.1	[31] BAI 98I	BES	$\psi(2S) \to \gamma\chi_{c2} \to \gamma\overline{p}p$

$$B(\chi_{c2}(1P) \to p\overline{p}) \times B(\psi(2S) \to \gamma\chi_{c2}(1P))$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
5.3±0.5 OUR FIT				
$\mathbf{4.4^{+1.6}_{-1.4}\pm0.6}$	$14.3^{+5.2}_{-4.7}$	BAI 04F	BES	$\psi(2S) \to \gamma\chi_{c2}(1P) \to \gamma\overline{p}p$

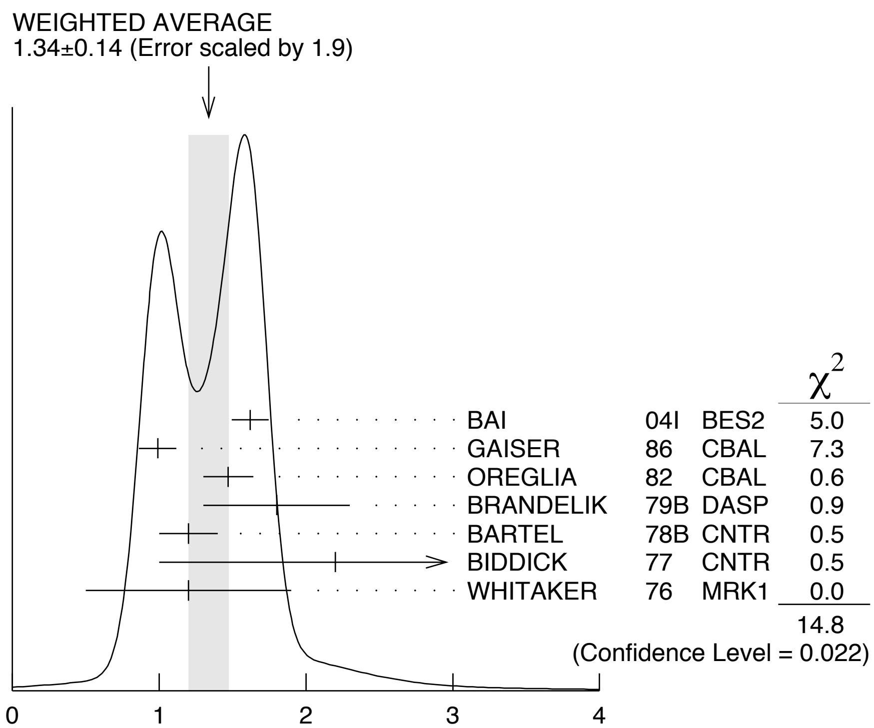
$$B(\chi_{c2}(1P) \to K^+K^-) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.195±0.017 OUR FIT				
0.190±0.034±0.019	115 ± 13	[32] BAI 98I	BES	$\psi(2S) \to \gamma K^+K^-$

$B(\chi_{c2}(1P) \to \gamma J/\psi(1S)) \times B(\psi(2S) \to \gamma\chi_{c2}(1P))$

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.63±0.04 OUR FIT					
1.34±0.14 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.				
1.62±0.04±0.12	5.8k	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
0.99±0.10±0.08		GAISER	86	CBAL	$\psi(2S) \to \gamma X$
1.47±0.17		[33] OREGLIA	82	CBAL	$\psi(2S) \to \gamma\chi_{c2}$
1.8 ±0.5		[34] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c2}$
1.2 ±0.2		[34] BARTEL	78B	CNTR	$\psi(2S) \to \gamma\chi_{c2}$
2.2 ±1.2		[35] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
1.2 ±0.7		[33] WHITAKER	76	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.85±0.04±0.07	1.9k	[30] ADAM	05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

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



$B(\chi_{c2}(1P) \to \gamma J/\psi(1S)) \times B(\psi(2S) \to \gamma\chi_{c2}(1P))$

$B(\chi_{c2}(1P) \to \gamma J/\psi) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\,anything)}$

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.90±0.05 OUR FIT					
3.11±0.07±0.07	1.9k	ADAM	05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

$B(\chi_{c2}(1P) \to \gamma J/\psi(1S)) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
5.12±0.19 OUR FIT					
4.2 ±1.1 OUR AVERAGE					
6.0 ±2.8	1.3k	[36] ABLIKIM	04B	BES	$\psi(2S) \to J/\psi X$
3.9 ±1.2		[37] HIMEL	80	MRK2	$\psi(2S) \to \gamma\chi_{c2}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5.52±0.13±0.13	1.9k	[30] ADAM	05A	CLEO	$\psi(2S) \to J/\psi\gamma\gamma$

$B(\chi_{c2}(1P) \to \gamma\gamma) \times B(\psi(2S) \to \gamma\chi_{c2}(1P))$

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.09±0.19 OUR FIT				
7.0 ±2.1 ±2.0	LEE	85	CBAL	$\psi(2S) \to \gamma\chi_{c2}$

$B(\chi_{c2}(1P) \to \pi\pi) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.54±0.05 OUR FIT					
0.54±0.06 OUR AVERAGE					
0.66±0.18±0.37	21 ± 6	[38] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$
0.54±0.05±0.04	185 ± 16	[39] BAI	98I	BES	$\psi(2S) \to \gamma\pi^+\pi^-$

$B(\chi_{c2}(1P) \to 2(\pi^+\pi^-)) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.1±0.4 OUR FIT				
3.1±1.0 OUR AVERAGE Error includes scale factor of 2.5.				
2.3±0.1±0.5	[40] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$
4.3±0.6	[41] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

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

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

[33] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$.

[34] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$.

[35] Assumes isotropic gamma distribution.

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

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

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

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

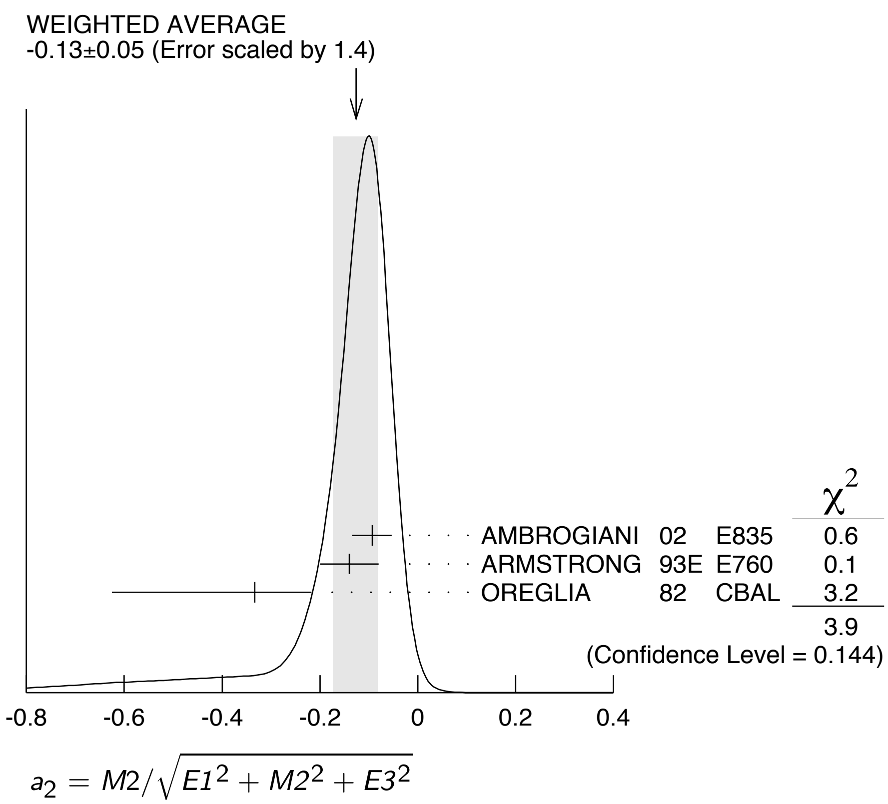
[40] Calculated by us. The value for B($\chi_{c2} \to 2\pi^+ 2\pi^-$) reported in BAI 99B is derived using B($\psi(2S) \to \gamma\chi_{c2}$) = (7.8 ± 0.8)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

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

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

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
−0.13 ±0.05 OUR AVERAGE		Error includes scale factor of 1.4. See the ideogram below.		
$-0.093^{+0.039}_{-0.041} \pm 0.006$	5908	[42] AMBROGIANI 02	E835	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
−0.14 ±0.06	1904	[42] ARMSTRONG 93E	E760	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
$-0.333^{+0.116}_{-0.292}$	441	[42] OREGLIA 82	CBAL	$\psi(2S) \to \chi_{c1}\gamma \to J/\psi\gamma\gamma$



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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$0.011^{+0.041}_{-0.033}$ OUR AVERAGE				
$0.020^{+0.055}_{-0.044} \pm 0.009$	5908	AMBROGIANI 02	E835	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$
$0.00\ ^{+0.06}_{-0.05}$	1904	ARMSTRONG 93E	E760	$p\overline{p} \to \chi_{c2} \to J/\psi\gamma$

[42] Assuming a_3=0.

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GAISER	86	PR D34 711	J. Gaiser et al.	(Crystal Ball Collab.)
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LEMOIGNE	82	PL 113B 509	Y. Lemoigne et al.	(SACL, LOIC, SHMP+)
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