$\chi_{c2}(1P)$

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

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

[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	$p\overline{p} \to e^+e^-\gamma$
1.96 ± 0.17 ± 0.07	585	[7] ARMSTRONG	92	E760	$\overline{p}p \to e^+e^-\gamma$
2.6 $^{+1.4}_{-1.0}$	50	BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^-X$
2.8 $^{+2.1}_{-2.0}$		[8] GAISER	86	CBAL	$\psi(2S) \to \gamma X$

[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	$\pi^+\pi^- K^+K^-$	$(9.9\pm2.5)\times10^{-3}$	S=1.6
Γ_3	$3(\pi^+\pi^-)$	$(8.6\pm1.8)\times10^{-3}$	
Γ_4	$\rho^0\pi^+\pi^-$	$(7\pm4)\times10^{-3}$	
Γ_5	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(4.8\pm2.8)\times10^{-3}$	
Γ_6	$K^*(892)^0\overline{K}^*(892)^0$	$(3.8\pm0.8)\times10^{-3}$	
Γ_7	$\phi\phi$	$(1.9\pm0.7)\times10^{-3}$	
Γ_8	$\omega\omega$	$(2.0\pm0.7)\times10^{-3}$	
Γ_9	$\pi\pi$	$(2.14\pm0.25)\times10^{-3}$	
Γ_{10}	$\eta\eta$	$< 1.2\times10^{-3}$	CL=90%
Γ_{11}	$\pi^+\pi^- K^0_S K^0_S$	$(2.6\pm0.6)\times10^{-3}$	
Γ_{12}	$K^+K^-K^+K^-$	$(1.41\pm0.35)\times10^{-3}$	
Γ_{13}	$K^+K^-K^0_S K^0_S$		
Γ_{14}	$\pi^+\pi^- p\overline{p}$	$(1.32\pm0.34)\times10^{-3}$	
Γ_{15}	K^+K^-	$(7.7\pm1.4)\times10^{-4}$	
Γ_{16}	$K^0_S K^0_S$	$(6.7\pm1.1)\times10^{-4}$	
Γ_{17}	$K^0_S K^0_S p\overline{p}$	$< 7.9\times10^{-4}$	CL=90%
Γ_{18}	$p\overline{p}$	$(6.6\pm0.5)\times10^{-5}$	
Γ_{19}	$\Lambda\overline{\Lambda}$	$(2.7\pm1.3)\times10^{-4}$	
Γ_{20}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$< 3.5\times10^{-3}$	CL=90%
Γ_{21}	$J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5 %	CL=90%
Γ_{22}	$K^0_S K^+\pi^-$ + c.c.	$< 1.0\times10^{-3}$	CL=90%
Γ_{23}	$\Xi^-\overline{\Xi}^+$	$< 3.7\times10^{-4}$	CL=90%
	Radiative decays		
Γ_{24}	$\gamma J/\psi(1S)$	(20.2 ± 1.0) %	
Γ_{25}	$\gamma\gamma$	$(2.59\pm0.19)\times10^{-4}$	

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

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

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

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
27.3±1.4 OUR FIT				
27.5±1.5 OUR AVERAGE				
$27.0\pm1.5\pm1.1$	[9] ANDREOTTI	05A	E835	$p\overline{p}\to e^+e^-\gamma$
$27.7\pm1.5\pm2.0$	[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	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(K^+\overline{K}^*(892)^0\pi^- + c.c.)/\Gamma_{total}$ — 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	$\psi(2S) \to \gamma\eta\eta \to 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.9±4.1±2.4		[24] LEE	85	CBAL	$\psi' \to$ 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	$\psi(2S) \to \gamma\chi_{c2}$

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

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

$\Gamma(\pi^+\pi^-p\overline{p})/\Gamma_{total}$ — 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	$\psi(2S) \to \gamma\chi_{c2}$
2.65±1.03±0.14	[18] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

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

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

$\Gamma(K^0_SK^0_S)/\Gamma_{total}$ — 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	$\psi(2S) \to \gamma\chi_{c2}$
0.58±0.16±0.13		[18] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c2}$

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

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

$\Gamma(p\overline{p})/\Gamma_{total}$ — 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	$\psi(2S) \to \gamma\chi_{c2} \to \gamma\Lambda\overline{\Lambda}$

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ 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($\psi(2S) \to \gamma\chi_{c2}(1P)$)] = $< 3.5 \times 10^{-5}$. 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				
$4.4^{+1.6}_{-1.4}$±0.6	$14.3^{+5.2}_{-4.7}$	BAI 04F	BES	$\psi(2S) \to \gamma\chi_{c2}(1P) \to \gamma\overline{p}p$

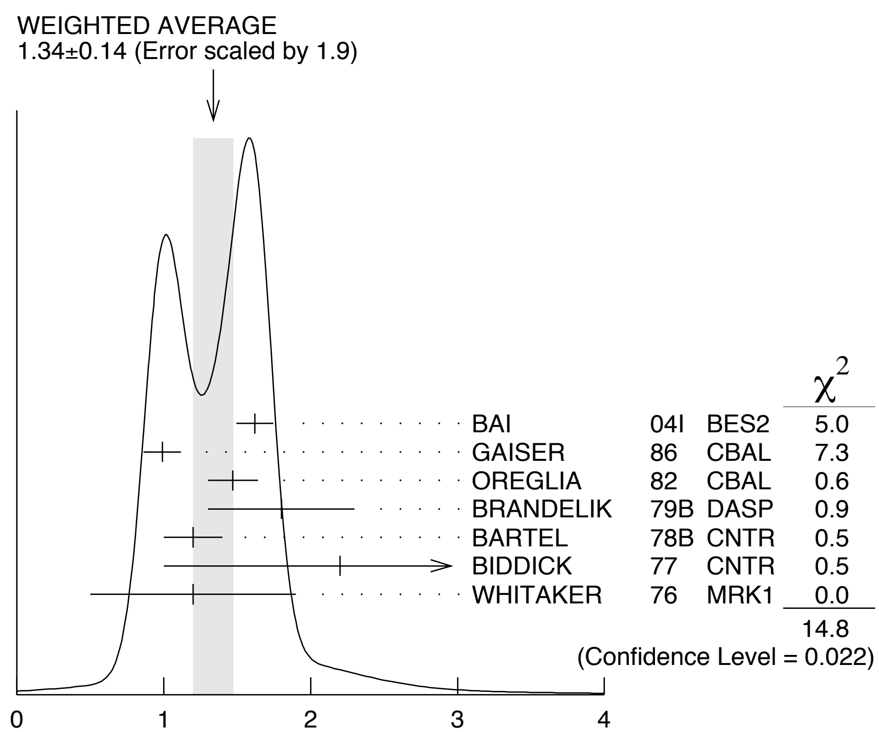
$$B(\chi_{c2}(1P) \to K^+K^-) \times \frac{\Gamma(\psi(2S) \to \gamma\chi_{c2}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$$

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 $\pi\pi$.

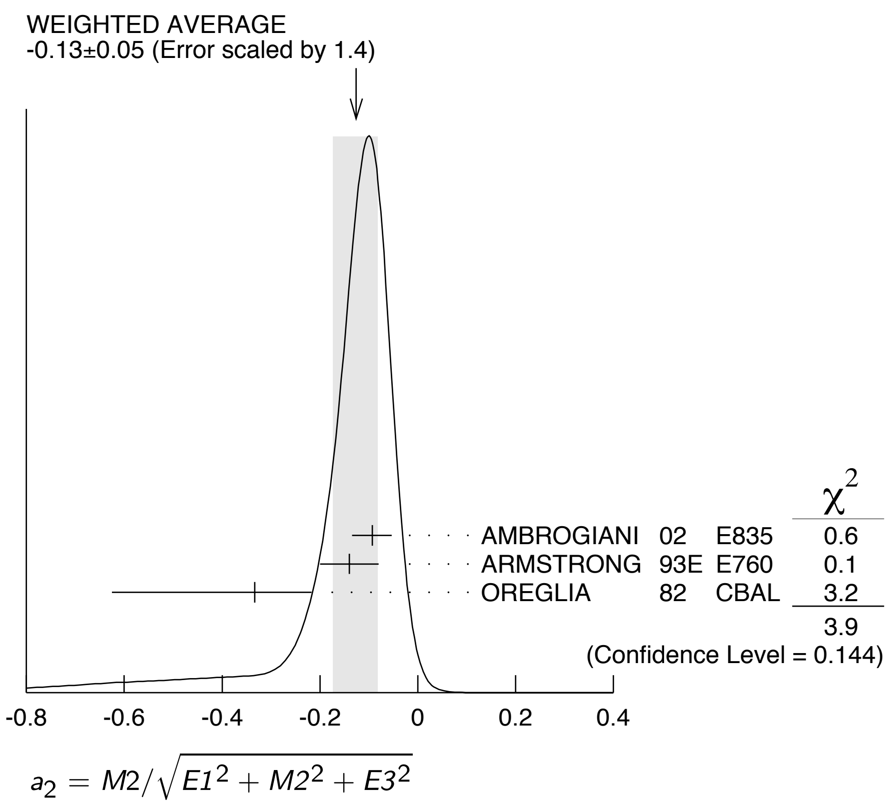
[40] Calculated by us. The value for B($\chi_{c2} \to 2\pi^+2\pi^-$) reported in BAI 99B is derived using B($\psi(2S) \to \gamma\chi_{c2}$) = (7.8 ± 0.8)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

[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.			
$-0.093^{+0.039}_{-0.041}\pm0.006$	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	$\psi(2S) \to \chi_{c1}\gamma \to J/\psi\gamma\gamma$



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

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

[42] Assuming a_3=0.

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BAGLIN	87B	PL B187 191	C. Baglin et al.	(R704 Collab.)
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GAISER	86	PR D34 711	J. Gaiser et al.	(Crystal Ball Collab.)
LEE	85	SLAC 282	R.A. Lee	(SLAC)
LEMOIGNE	82	PL 113B 509	Y. Lemoigne et al.	(SACL, LOIC, SHMP+)
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