See key on page 1343

Meson Full Listings

$\chi_{c2}(1P) = \chi_{c2}(3555)$

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

	Mode	Fraction (Γ_i/Γ)	Confidence level
	Hadronic decays		
Γ_1	$2(\pi^+\pi^-)$	(2.2 ±0.5) %	
Γ_2	$\pi^+\pi^- K^+ K^-$	(1.9 ±0.5) %	
Γ_3	$3(\pi^+\pi^-)$	(1.2 ±0.8) %	
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	$\pi^+\pi^- p\overline{p}$	(3.3 ±1.3) $\times 10^{-3}$	
Γ_7	$\pi^+\pi^-$	(1.9 ±1.0) $\times 10^{-3}$	
Γ_8	K^+K^-	(1.5 ±1.1) $\times 10^{-3}$	
Γ_9	$p\overline{p}$	(10.0 ±1.0) $\times 10^{-5}$	
Γ_{10}	$\pi^0\pi^0$	(1.10±0.28) $\times 10^{-3}$	
Γ_{11}	$\eta\eta$	(8 ±5) $\times 10^{-4}$	
Γ_{12}	$J/\psi(1S)\pi^+\pi^-\pi^0$	< 1.5 %	90%
	Radiative decays		
Γ_{13}	$\gamma J/\psi(1S)$	(13.5 ±1.1) %	
Γ_{14}	$\gamma\gamma$	(1.6 ±0.5) $\times 10^{-4}$	

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

$\Gamma(p\overline{p})$ Γ_9

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
206±22 OUR AVERAGE					
197±18±16	585	[7] ARMSTRONG	92	SPEC	$\overline{p}p \to e^+e^-\gamma$
$252^{+55}_{-48}\pm21$		[7] BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^-$X

[7] Restated by us using B($\chi_{c2}(1P) \to J/\psi(1S)\gamma$)B($J/\psi(1S) \to e^+e^-$) = 0.0085 ± 0.0007.

$\Gamma(\gamma\gamma)$ Γ_{14}

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
0.321±0.078±0.054		[8] ARMSTRONG	93	SPEC	$\overline{p}p \to \gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.4 ±1.7 ±0.9		BAUER	93	TPC	$e^+e^- \to e^+e^-\chi_{c2}$
<4.2	95	UEHARA	91	VNS	$e^+e^- \to e^+e^-\chi_{c2}$
<1.0	95	CHEN	90B	CLEO	$e^+e^- \to e^+e^-\chi_{c2}$
<4.2	95	AIHARA	88D	TPC	$e^+e^- \to e^+e^-$X
2.9 $^{+1.3}_{-1.0}$ ±1.7		BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma$
<1.6	90	YAMADA	77	DASP	$e^+e^- \to 3\gamma$

[8] Using B($\chi_{c2}(1P) \to p\overline{p}$) = (1.00 ± 0.23) × 10^{-4} and Γ_{total} = 2.00 ± 0.18 MeV.

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

HADRONIC DECAYS

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.022±0.005	[10] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.019±0.005	[10] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.012±0.008	[10] 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	[10] 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	[10] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
33±13	[10] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.9±1.0	4	[10] BRANDELIK	79C	DASP	$\psi(2S) \to \gamma\chi_{c2}$

$[\Gamma(\pi^+\pi^-) + \Gamma(K^+K^-)]/\Gamma_{total}$ $(\Gamma_7+\Gamma_8)/\Gamma$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
24±10	[10] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_8/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.5±1.1	2	[10] BRANDELIK	79C	DASP	$\psi(2S) \to \gamma\chi_{c2}$

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_9/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.00±0.10 OUR AVERAGE						
1.00±0.11		585	[9] ARMSTRONG	92	SPEC	$\overline{p}p \to e^+e^-\gamma$
$0.97^{+0.44}_{-0.28}\pm0.08$			BAGLIN	86B	SPEC	$\overline{p}p \to e^+e^-$X
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<9.5	90		[10] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c2}$

[9] Restated by us using B($\chi_{c2}(1P) \to J/\psi(1S)\gamma$)B($J/\psi(1S) \to e^+e^-$) = 0.0085 ± 0.0007.

$\Gamma_i\Gamma_f/\Gamma^2_{total}$ in $p\overline{p} \to \chi_{c2}(1P) \to \gamma\gamma$ $\Gamma_9\Gamma_{14}/\Gamma^2$

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.160±0.039±0.016		ARMSTRONG	93	SPEC	$\overline{p}p \to \gamma\gamma$
0.99 $^{+0.46}_{-0.35}$	6	[11] BAGLIN	87B	SPEC	$\overline{p}p \to \gamma\gamma$

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ Γ_{10}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.1 ±0.2 ±0.2	[12] LEE	85	CBAL	$\psi' \to$ photons

$\Gamma(\eta\eta)/\Gamma_{total}$ Γ_{11}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
7.9±4.1±2.4	[12] LEE	85	CBAL	$\psi' \to$ photons

$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{12}/Γ

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

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

[11] Assuming isotropic $\chi_{c2}(1P) \to \gamma\gamma$ distribution.

[12] LEE 85 result is calculated using B($\psi(2S) \to \gamma\chi_{c2}(1P)$) = 0.078 ± 0.008.

RADIATIVE DECAYS

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ Γ_{13}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.135±0.011 OUR AVERAGE					
0.124±0.015		GAISER	86	CBAL	$\psi(2S) \to \gamma$X
0.162±0.028	479	[13] OREGLIA	82	CBAL	$\psi(2S) \to \gamma\chi_{c2}$
0.14 ±0.04		[13] HIMEL	80	MRK2	$\psi(2S) \to \gamma\chi_{c2}$
0.18 ±0.05		[13] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c2}$
0.13 ±0.03		[13] BARTEL	78B	CNTR	$\psi(2S) \to \gamma\chi_{c2}$
0.11 $^{+0.13}_{-0.07}$		[13] SPITZER	78	PLUT	$\psi(2S) \to \gamma\chi_{c2}$
0.13 ±0.08		[13] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c2}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.28 ±0.13		[13] BIDDICK	77	CNTR	$\psi(2S) \to \gamma$X

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

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_{14}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.60±0.39±0.23	[14] ARMSTRONG	93	SPEC	$\overline{p}p \to \gamma\gamma$

[14] Using B($\chi_{c2}(1P) \to p\overline{p}$) = (1.00 ± 0.23) × 10^{-4}.

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

ARMSTRONG 93 PRL 70 2988 +Bettoni, Bharadwaj+ (FNAL E760 Collab.)
BAUER 93 PL B302 345 +Belcinski+ (TPC Collab.)
ARMSTRONG 92 NP B373 35 +Bettoni+ (FNAL, FERR, GENO, UCI, NWES+)
Also 92B PRL 68 1468 Armstrong, Bettoni+(FNAL, FERR, GENO, UCI, NWES+)
UEHARA 91 PL B266 188 +Abe+ (VENUS Collab.)
CHEN 90B PL B243 169 +McIlwain+ (CLEO Collab.)
AIHARA 88D PRL 60 2355 +Alston-Garnjost+ (TPC Collab.)
BAGLIN 87B PL B187 191 +Baird, Bassompierre, Borreani+ (R704 Collab.)
BAGLIN 86B PL B172 455 (LAPP, CERN, GENO, LYON, OSLO, ROMA+)
GAISER 86 PR D34 711 +Bloom, Bulos, Godfrey+ (Crystal Ball Collab.)
LEE 85 SLAC 282 (SLAC)
LEMOIGNE 82 PL 113B 509 +Barate, Astbury+ (SACL, LOIC, SHMP, IND)
OREGLIA 82 PR D25 2259 +Partridge+ (SLAC, CIT, HARV, PRIN, STAN)
Also 82B Private Comm. Oreglia (EFI)
BARATE 81 PR D24 2994 +Astbury+ (SACL, LOIC, SHMP, CERN, IND)
HIMEL 80 PRL 44 920 +Abrams, Alam, Blocker+ (LBL, SLAC)
Also 82 Private Comm. Trilling (LBL, UCB)
BRANDELIK 79B NP B160 426 +Cords+ (DASP Collab.)
BRANDELIK 79C ZPHY C1 233 +Cords+ (DASP Collab.)
BARTEL 78B PL 79B 492 +Dittmann, Duinker, Olsson, O'Neill+ (DESY, HEIDP)
SPITZER 78 Kyoto Sum. Inst. 47 (HAMB)
TANENBAUM 78 PR D17 1731 +Alam, Boyarski+ (SLAC, LBL)
Also 82 Private Comm. Trilling (LBL, UCB)
BIDDICK 77 PRL 38 1324 +Burnett+ (UCSD, UMD, PAVI, PRIN, SLAC, STAN)
FELDMAN 77 PRPL 33C 285 +Perl (LBL, SLAC)
YAMADA 77 Hamburg Conf. 69 (DASP Collab.)
TRILLING 76 Stanford Symp. 437 (LBL)
WHITAKER 76 PRL 37 1596 +Tanenbaum, Abrams, Alam+ (SLAC, LBL)