$\chi_{c1}(1P)$

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

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
3510.67 ± 0.05 OUR AVERAGE		Error includes scale factor of 1.2.		
3508.4 ± 1.9 ±0.7	460	[1] AAIJ 17BB	LHCB	$pp \to b\overline{b}X \to 2(K^+K^-)X$
3510.71 ± 0.04 ±0.09	4.8k	[2] AAIJ 17BI	LHCB	$\chi_{c1} \to J/\psi\mu^+\mu^-$
3510.30 ± 0.14 ±0.16		ABLIKIM 05G	BES2	$\psi(2S) \to \gamma\chi_{c1}$
3510.719± 0.051±0.019		ANDREOTTI 05A	E835	$p\overline{p} \to e^+e^-\gamma$
3509.4 ± 0.9		BAI 99B	BES	$\psi(2S) \to \gamma X$
3510.60 ± 0.087±0.019	513	[3] ARMSTRONG 92	E760	$\overline{p}p \to e^+e^-\gamma$
3511.3 ± 0.4 ±0.4	30	BAGLIN 86B	SPEC	$\overline{p}p \to e^+e^-X$
3512.3 ± 0.3 ±4.0		[4] GAISER 86	CBAL	$\psi(2S) \to \gamma X$
3507.4 ± 1.7	91	[5] LEMOIGNE 82	GOLI	185 π^- Be $\to \gamma\mu^+\mu^-$ A
3510.4 ± 0.6		OREGLIA 82	CBAL	$e^+e^- \to J/\psi 2\gamma$
3510.1 ± 1.1	254	[6] HIMEL 80	MRK2	$e^+e^- \to J/\psi 2\gamma$
3509 ±11	21	BRANDELIK 79B	DASP	$e^+e^- \to J/\psi 2\gamma$
3507 ± 3		[6] BARTEL 78B	CNTR	$e^+e^- \to J/\psi 2\gamma$
3505.0 ± 4 ±4		[6,7] TANENBAUM 78	MRK1	e^+e^-
3513 ± 7	367	[6] BIDDICK 77	CNTR	$\psi(2S) \to \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3500 ±10	40	TANENBAUM 75	MRK1	Hadrons γ

[1] From a fit of the $\phi\phi$ invariant mass with the width of $\chi_{c1}(1P)$ fixed to the PDG 16 value.
[2] AAIJ 17BI reports also $m(\chi_{c2}) - m(\chi_{c1}) = 45.39 \pm 0.07 \pm 0.03$ MeV.
[3] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03.
[4] Using mass of $\psi(2S) = 3686.0$ MeV.
[5] $J/\psi(1S)$ mass constrained to 3097 MeV.
[6] Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.
[7] From a simultaneous fit to radiative and hadronic decay channels.

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

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.84 ±0.04 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	[1] 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	$\overline{p}p \rightarrow e^+e^- X$
<3.8	90	GAISER	86	CBAL	$\psi(2S) \rightarrow \gamma X$

[1] 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	$\pi^+\pi^-\pi^0\pi^0$	(1.19 ± 0.15) %	
Γ_4	$\rho^+\pi^-\pi^0$ + c.c.	(1.45 ± 0.24) %	
Γ_5	$\rho^0\pi^+\pi^-$	$(3.9 \pm 3.5) \times 10^{-3}$	
Γ_6	$4\pi^0$	$(5.4 \pm 0.8) \times 10^{-4}$	
Γ_7	$\pi^+\pi^- K^+ K^-$	$(4.5 \pm 1.0) \times 10^{-3}$	
Γ_8	$K^+ K^- \pi^0\pi^0$	$(1.12 \pm 0.27) \times 10^{-3}$	
Γ_9	$K^+ K^- \pi^+\pi^-\pi^0$	(1.15 ± 0.13) %	
Γ_{10}	$K^0_S K^\pm \pi^\mp \pi^+\pi^-$	$(7.5 \pm 0.8) \times 10^{-3}$	
Γ_{11}	$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(8.6 \pm 1.4) \times 10^{-3}$	
Γ_{12}	$\rho^- K^+\overline{K}^0$ + c.c.	$(5.0 \pm 1.2) \times 10^{-3}$	
Γ_{13}	$K^*(892)^0\overline{K}^0\pi^0 \rightarrow K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(2.3 \pm 0.6) \times 10^{-3}$	
Γ_{14}	$K^+ K^-\eta\pi^0$	$(1.12 \pm 0.34) \times 10^{-3}$	
Γ_{15}	$\pi^+\pi^- K^0_S K^0_S$	$(6.9 \pm 2.9) \times 10^{-4}$	
Γ_{16}	$K^+ K^-\eta$	$(3.2 \pm 1.0) \times 10^{-4}$	
Γ_{17}	$\overline{K}^0 K^+\pi^-$ + c.c.	$(7.0 \pm 0.6) \times 10^{-3}$	
Γ_{18}	$K^*(892)^0\overline{K}^0$ + c.c.	$(10 \pm 4) \times 10^{-4}$	
Γ_{19}	$K^*(892)^+ K^-$ + c.c.	$(1.4 \pm 0.6) \times 10^{-3}$	
Γ_{20}	$K^*_J(1430)^0\overline{K}^0$ + c.c. $\rightarrow K^0_S K^+\pi^-$ + c.c.	$< 8 \times 10^{-4}$	CL=90%
Γ_{21}	$K^*_J(1430)^+ K^-$ + c.c. $\rightarrow K^0_S K^+\pi^-$ + c.c.	$< 2.1 \times 10^{-3}$	CL=90%
Γ_{22}	$K^+ K^-\pi^0$	$(1.81 \pm 0.24) \times 10^{-3}$	
Γ_{23}	$\eta\pi^+\pi^-$	$(4.62 \pm 0.23) \times 10^{-3}$	
Γ_{24}	$a_0(980)^+\pi^-$ + c.c. $\rightarrow \eta\pi^+\pi^-$	$(3.2 \pm 0.4) \times 10^{-3}$	S=2.2
Γ_{25}	$a_2(1320)^+\pi^-$ + c.c. $\rightarrow \eta\pi^+\pi^-$	$(1.76 \pm 0.24) \times 10^{-4}$	
Γ_{26}	$a_2(1700)^+\pi^-$ + c.c. $\rightarrow \eta\pi^+\pi^-$	$(4.6 \pm 0.7) \times 10^{-5}$	
Γ_{27}	$f_2(1270)\eta \rightarrow \eta\pi^+\pi^-$	$(3.5 \pm 0.6) \times 10^{-4}$	
Γ_{28}	$f_4(2050)\eta \rightarrow \eta\pi^+\pi^-$	$(2.5 \pm 0.9) \times 10^{-5}$	
Γ_{29}	$\pi_1(1400)^+\pi^-$ + c.c. $\rightarrow \eta\pi^+\pi^-$	$< 5 \times 10^{-5}$	CL=90%
Γ_{30}	$\pi_1(1600)^+\pi^-$ + c.c. $\rightarrow \eta\pi^+\pi^-$	$< 1.5 \times 10^{-5}$	CL=90%
Γ_{31}	$\pi_1(2015)^+\pi^-$ + c.c. $\rightarrow \eta\pi^+\pi^-$	$< 8 \times 10^{-6}$	CL=90%

Γ_{32}	$f_2(1270)\eta$	$(6.7 \pm 1.1) \times 10^{-4}$	
Γ_{33}	$\pi^+\pi^-\eta'$	$(2.2 \pm 0.4) \times 10^{-3}$	
Γ_{34}	$K^+K^-\eta'(958)$	$(8.8 \pm 0.9) \times 10^{-4}$	
Γ_{35}	$K_0^*(1430)^+K^-$ + c.c.	$(6.4 {}^{+2.2}_{-2.8}) \times 10^{-4}$	
Γ_{36}	$f_0(980)\eta'(958)$	$(1.6 {}^{+1.4}_{-0.7}) \times 10^{-4}$	
Γ_{37}	$f_0(1710)\eta'(958)$	$(7 {}^{+7}_{-5}) \times 10^{-5}$	
Γ_{38}	$f_2'(1525)\eta'(958)$	$(9 \pm 6) \times 10^{-5}$	
Γ_{39}	$\pi^0 f_0(980) \rightarrow \pi^0\pi^+\pi^-$	$(3.5 \pm 0.9) \times 10^{-7}$	
Γ_{40}	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(3.2 \pm 2.1) \times 10^{-3}$	
Γ_{41}	$K^*(892)^0\overline{K}^*(892)^0$	$(1.4 \pm 0.4) \times 10^{-3}$	
Γ_{42}	$K^+K^-K_S^0K_S^0$	$< 4 \times 10^{-4}$	CL=90%
Γ_{43}	$K^+K^-K^+K^-$	$(5.4 \pm 1.1) \times 10^{-4}$	
Γ_{44}	$K^+K^-\phi$	$(4.1 \pm 1.5) \times 10^{-4}$	
Γ_{45}	$\overline{K}^0K^+\pi^-\phi$ + c.c.	$(3.3 \pm 0.5) \times 10^{-3}$	
Γ_{46}	$K^+K^-\pi^0\phi$	$(1.62 \pm 0.30) \times 10^{-3}$	
Γ_{47}	$\phi\pi^+\pi^-\pi^0$	$(7.5 \pm 1.0) \times 10^{-4}$	
Γ_{48}	$\omega\omega$	$(5.7 \pm 0.7) \times 10^{-4}$	
Γ_{49}	ωK^+K^-	$(7.8 \pm 0.9) \times 10^{-4}$	
Γ_{50}	$\omega\phi$	$(2.7 \pm 0.4) \times 10^{-5}$	
Γ_{51}	$\phi\phi$	$(4.2 \pm 0.5) \times 10^{-4}$	
Γ_{52}	$p\overline{p}$	$(7.60 \pm 0.34) \times 10^{-5}$	
Γ_{53}	$p\overline{p}\pi^0$	$(1.55 \pm 0.18) \times 10^{-4}$	
Γ_{54}	$p\overline{p}\eta$	$(1.45 \pm 0.25) \times 10^{-4}$	
Γ_{55}	$p\overline{p}\omega$	$(2.12 \pm 0.31) \times 10^{-4}$	
Γ_{56}	$p\overline{p}\phi$	$< 1.7 \times 10^{-5}$	CL=90%
Γ_{57}	$p\overline{p}\pi^+\pi^-$	$(5.0 \pm 1.9) \times 10^{-4}$	
Γ_{58}	$p\overline{p}\pi^0\pi^0$	$< 5 \times 10^{-4}$	CL=90%
Γ_{59}	$p\overline{p}K^+K^-$ (non-resonant)	$(1.27 \pm 0.22) \times 10^{-4}$	
Γ_{60}	$p\overline{p}K_S^0K_S^0$	$< 4.5 \times 10^{-4}$	CL=90%
Γ_{61}	$p\overline{n}\pi^-$	$(3.8 \pm 0.5) \times 10^{-4}$	
Γ_{62}	$\overline{p}n\pi^+$	$(3.9 \pm 0.5) \times 10^{-4}$	
Γ_{63}	$p\overline{n}\pi^-\pi^0$	$(1.03 \pm 0.12) \times 10^{-3}$	
Γ_{64}	$\overline{p}n\pi^+\pi^0$	$(1.01 \pm 0.12) \times 10^{-3}$	
Γ_{65}	$\Lambda\overline{\Lambda}$	$(1.14 \pm 0.11) \times 10^{-4}$	
Γ_{66}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(2.9 \pm 0.5) \times 10^{-4}$	
Γ_{67}	$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$(2.5 \pm 0.6) \times 10^{-4}$	
Γ_{68}	$\Sigma(1385)^+\overline{\Lambda}\pi^-$ + c.c.	$< 1.3 \times 10^{-4}$	CL=90%
Γ_{69}	$\Sigma(1385)^-\overline{\Lambda}\pi^+$ + c.c.	$< 1.3 \times 10^{-4}$	CL=90%
Γ_{70}	$K^+\overline{p}\Lambda$+c.c.	$(4.2 \pm 0.4) \times 10^{-4}$	S=1.2
Γ_{71}	$K^+\overline{p}\Lambda(1520)$ + c.c.	$(1.7 \pm 0.4) \times 10^{-4}$	
Γ_{72}	$\Lambda(1520)\overline{\Lambda}(1520)$	$< 9 \times 10^{-5}$	CL=90%
Γ_{73}	$\Sigma^0\overline{\Sigma}^0$	$(4.2 \pm 0.6) \times 10^{-5}$	

Γ_{74}	$\Sigma^+ \overline{\Sigma}^-$		$(3.6 \pm 0.7) \times 10^{-5}$	
Γ_{75}	$\Sigma(1385)^+ \overline{\Sigma}(1385)^-$	$<$	9×10^{-5}	CL=90%
Γ_{76}	$\Sigma(1385)^- \overline{\Sigma}(1385)^+$	$<$	5×10^{-5}	CL=90%
Γ_{77}	$K^- \Lambda \overline{\Xi}^+$ + c.c.		$(1.35 \pm 0.24) \times 10^{-4}$	
Γ_{78}	$\Xi^0 \overline{\Xi}^0$	$<$	6×10^{-5}	CL=90%
Γ_{79}	$\Xi^- \overline{\Xi}^+$		$(8.0 \pm 2.1) \times 10^{-5}$	
Γ_{80}	$\pi^+ \pi^- + K^+ K^-$	$<$	2.1×10^{-3}	
Γ_{81}	$K^0_S K^0_S$	$<$	6×10^{-5}	CL=90%
Γ_{82}	$\eta_c \pi^+ \pi^-$	$<$	3.2×10^{-3}	CL=90%
	Radiative decays			
Γ_{83}	$\gamma J/\psi(1S)$		(34.3 ± 1.0) %	
Γ_{84}	$\gamma \rho^0$		$(2.16 \pm 0.17) \times 10^{-4}$	
Γ_{85}	$\gamma \omega$		$(6.8 \pm 0.8) \times 10^{-5}$	
Γ_{86}	$\gamma \phi$		$(2.4 \pm 0.5) \times 10^{-5}$	
Γ_{87}	$\gamma \gamma$	$<$	6.3×10^{-6}	CL=90%
Γ_{88}	$e^+ e^- J/\psi(1S)$		$(3.65 \pm 0.25) \times 10^{-3}$	

CONSTRAINED FIT INFORMATION

A multiparticle fit to $\chi_{c1}(1P)$, $\chi_{c0}(1P)$, $\chi_{c2}(1P)$, and $\psi(2S)$ with 4 total widths, a partial width, 25 combinations of partial widths obtained from integrated cross section, and 84 branching ratios uses 248 measurements to determine 49 parameters. The overall fit has a $\chi^2 = 378.1$ for 199 degrees of freedom.

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

x_{43}	3				
x_{52}	4	2			
x_{65}	7	3	4		
x_{83}	23	9	2	20	
Γ	−12	−5	−63	−10	−41
	x_{17}	x_{43}	x_{52}	x_{65}	x_{83}

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

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

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ — **$\Gamma_{52}\Gamma_{83}/\Gamma$**

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
21.9±0.8 OUR FIT				
21.4±0.9 OUR AVERAGE				
21.5±0.5±0.8	[1] ANDREOTTI	05A	E835	$p\overline{p} \to e^+ e^- \gamma$
21.4±1.5±2.2	[1,2] ARMSTRONG	92	E760	$\overline{p} p \to e^+ e^- \gamma$
$19.9^{+4.4}_{-4.0}$	[1] BAGLIN	86B	SPEC	$\overline{p} p \to e^+ e^- X$

[1] Calculated by us using B($J/\psi(1S) \to e^+e^-$) = 0.0593 ± 0.0010.
[2] 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	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
16.0±5.9±0.8	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

[1] 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)%.

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ 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	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
12.5±4.2±0.6	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

[1] 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)%.

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
1.19±0.15±0.03	604.7	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports 1.28 ± 0.06 ± 0.15 ± 0.08 % from a measurement of [$\Gamma(\chi_{c1}(1P) \to \pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$] × [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($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.75 \pm 0.24) \times 10^{-2}$. 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
1.45±0.24±0.04	712.3	[1,2] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports 1.56 ± 0.13 ± 0.22 ± 0.10 % from a measurement of [$\Gamma(\chi_{c1}(1P) \to \rho^+\pi^-\pi^0 + \text{c.c.})/\Gamma_{total}$] × [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($\psi(2S) \to \gamma\chi_{c1}(1P)$) = $(9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[2] 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^{-3})	DOCUMENT ID	TECN	COMMENT
3.9±3.5	[1] TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$

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

$\Gamma(4\pi^0)/\Gamma_{total}$ Γ_6/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
5.4±0.8±0.1	608	[1] ABLIKIM 11A	BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c1}$

[1] ABLIKIM 11A reports $(0.57 \pm 0.03 \pm 0.08) \times 10^{-3}$ from a measurement of [$\Gamma(\chi_{c1}(1P) \rightarrow 4\pi^0)/\Gamma_{total}$] × [B($\psi(2S) \rightarrow \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \rightarrow \gamma\chi_{c1}(1P)$) = $(9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value B($\psi(2S) \rightarrow \gamma\chi_{c1}(1P)$) = $(9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{total}$ Γ_7/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	[1] BAI 99B	BES	$\psi(2S) \rightarrow \gamma\chi_{c1}$
7.3±3.0±0.4	[1] TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$

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

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
1.12±0.27±0.03	45.1	[1] HE 08B	CLEO	$e^+e^- \rightarrow \gamma h^+h^-h^0h^0$

[1] HE 08B reports $(0.12 \pm 0.02 \pm 0.02 \pm 0.01) \times 10^{-2}$ from a measurement of [$\Gamma(\chi_{c1}(1P) \rightarrow K^+K^-\pi^0\pi^0)/\Gamma_{total}$] × [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($\psi(2S) \rightarrow \gamma\chi_{c1}(1P)$) = $(9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
11.46±0.12±1.29	12k	[1] ABLIKIM 13B	BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and B($\psi(2S) \rightarrow \chi_{c1}\gamma$) = (9.2 ± 0.4)%.

$\Gamma(K^0_S K^\pm\pi^\mp\pi^+\pi^-)/\Gamma_{total}$ Γ_{10}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
7.52±0.11±0.79	5.1k	[1] ABLIKIM 13B	BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and B($\psi(2S) \rightarrow \chi_{c1}\gamma$) = (9.2 ± 0.4)%.

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.86±0.13±0.02	141.3	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.92 \pm 0.09 \pm 0.11 \pm 0.06$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07\pm0.11\pm0.54)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\rho^-K^+\overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.50±0.12±0.01	141.3	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.54 \pm 0.11 \pm 0.07 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to \rho^-K^+\overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07\pm0.11\pm0.54)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{13}/Γ

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.23±0.06±0.01	141.3	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.25 \pm 0.06 \pm 0.03 \pm 0.02$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
0.112±0.034±0.003	141.3	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports $0.12 \pm 0.03 \pm 0.02 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+K^-\eta\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54)\times10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.9±2.9±0.2	19.8 ± 7.7	[1] ABLIKIM	05O	BES2	$\psi(2S) \to \chi_{c1}\gamma$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \to \pi^+\pi^-K^0_SK^0_S)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.67\pm0.26\pm0.11)\times10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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_{16}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.2±1.0±0.1	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $(0.34 \pm 0.10 \pm 0.04) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+K^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	DOCUMENT ID
7.0±0.6 OUR FIT	

$\Gamma(K^*(892)^0\overline{K}^0 + \text{c.c.})/\Gamma_{total}$ — Γ_{18}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.98±0.37±0.02	22	[1] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 06R reports $(1.1 \pm 0.4 \pm 0.1) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^0\overline{K}^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^+K^- + \text{c.c.})/\Gamma_{total}$ — Γ_{19}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.43±0.65±0.03	27	[1] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 06R reports $(1.6 \pm 0.7 \pm 0.2) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^+K^- + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_J^*(1430)^0\overline{K}^0 + \text{c.c.} \to K_S^0K^+\pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{20}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8 × 10	90	[1] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 06R reports $< 0.9 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K_J^*(1430)^0\overline{K}^0 + \text{c.c.} \to K_S^0K^+\pi^- + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(K_J^*(1430)^+K^- + \text{c.c.} \to K_S^0K^+\pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{21}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.1 \times 10^{-3}$	90	[1] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 06R reports $< 2.4 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K_J^*(1430)^+K^- + \text{c.c.} \to K_S^0K^+\pi^- + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(K^+ K^- \pi^0)/\Gamma_{total}$ — Γ_{22}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.81±0.24±0.04	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $(1.95 \pm 0.16 \pm 0.23) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+ K^- \pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.62±0.23 OUR AVERAGE					
4.58±0.23±0.11		[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$
4.7 ±0.5 ±0.1		[3] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$
5.3 ±0.9 ±0.1	222	[4] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] From an amplitude analysis using an isobar model.

[2] ABLIKIM 17K reports $(4.67 \pm 0.03 \pm 0.23 \pm 0.16) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] ATHAR 07 reports $(5.0 \pm 0.3 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[4] ABLIKIM 06R reports $(5.9 \pm 0.7 \pm 0.8) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(a_0(980)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{24}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.2 ±0.4 OUR AVERAGE Error includes scale factor of 2.2.					
3.33±0.19±0.08		[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$
1.79±0.63±0.04	58	[3] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] From an amplitude analysis using an isobar model.

[2] ABLIKIM 17K reports $(3.40 \pm 0.03 \pm 0.19 \pm 0.11) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to a_0(980)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] ABLIKIM 06R reports $(2.0 \pm 0.5 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to a_0(980)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(a_2(1320)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{25}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.176±0.023±0.004	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $(0.18 \pm 0.01 \pm 0.02 \pm 0.01) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to a_2(1320)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(a_2(1700)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{26}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
4.6±0.7±0.1	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $(4.7 \pm 0.4 \pm 0.6 \pm 0.2) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to a_2(1700)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(f_2(1270)\eta \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{27}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.5±0.6±0.1	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $(0.36 \pm 0.01 \pm 0.06 \pm 0.01) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to f_2(1270)\eta \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(f_4(2050)\eta \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{28}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.5±0.9±0.1	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $(2.6 \pm 0.4 \pm 0.8 \pm 0.1) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to f_4(2050)\eta \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi_1(1400)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ — Γ_{29}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5 \times 10^{-5}$	90	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.
[2] ABLIKIM 17K reports $< 4.6 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi_1(1400)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\pi_1(1600)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{30}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.5 \times 10^{-5}$	90	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.

[2] ABLIKIM 17K reports $< 1.5 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi_1(1600)^+\pi^- + \text{ c.c. } \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\pi_1(2015)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{31}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8 \times 10^{-6}$	90	[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$

[1] From an amplitude analysis using an isobar model.

[2] ABLIKIM 17K reports $< 8 \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi_1(2015)^+\pi^- + \text{ c.c. } \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(f_2(1270)\eta)/\Gamma_{\text{total}}$ Γ_{32}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.67±0.11 OUR AVERAGE					
0.63±0.11±0.02		[1,2] ABLIKIM	17K	BES3	$\psi(2S) \to \gamma\eta\pi^+\pi^-$
2.7 ±0.8 ±0.1	53	[3] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 17K reports $(6.4 \pm 1.1) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to f_2(1270)\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] From an amplitude analysis using an isobar model.

[3] ABLIKIM 06R reports $(3.0 \pm 0.7 \pm 0.5) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to f_2(1270)\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^+\pi^-\eta')/\Gamma_{\text{total}}$ Γ_{33}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
2.2±0.4±0.1	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ATHAR 07 reports $(2.4 \pm 0.4 \pm 0.3) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \pi^+\pi^-\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+ K^- \eta'(958))/\Gamma_{total}$ Γ_{34}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
8.75±0.87	310	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+ K^- \eta'(958)$

[1] Derived using $B(\psi(2S) \to \gamma \chi_{c1}) = (9.2 \pm 0.4)\%$. Uncertainty includes both statistical and systematic contributions combined in quadrature.

$\Gamma(K_0^*(1430)^+ K^- + c.c.)/\Gamma_{total}$ Γ_{35}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$6.41 \pm 0.57 {}^{+2.09}_{-2.71}$	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+ K^- \eta'(958)$

[1] Normalized to $B(\chi_{c1} \to K^+ K^- \eta'(958))$ branching fraction.

$\Gamma(f_0(980)\eta'(958))/\Gamma_{total}$ Γ_{36}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$1.65 \pm 0.47 {}^{+1.32}_{-0.56}$	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+ K^- \eta'(958)$

[1] Normalized to $B(\chi_{c1} \to K^+ K^- \eta'(958))$ branching fraction.

$\Gamma(f_0(1710)\eta'(958))/\Gamma_{total}$ Γ_{37}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$0.71 \pm 0.22 {}^{+0.68}_{-0.48}$	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+ K^- \eta'(958)$

[1] Normalized to $B(\chi_{c1} \to K^+ K^- \eta'(958))$ branching fraction.

$\Gamma(f_2'(1525)\eta'(958))/\Gamma_{total}$ Γ_{38}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$0.92 \pm 0.23 {}^{+0.55}_{-0.51}$	[1] ABLIKIM	14J	BES3	$\psi(2S) \to \gamma K^+ K^- \eta'(958)$

[1] Normalized to $B(\chi_{c1} \to K^+ K^- \eta'(958))$ branching fraction.

$\Gamma(\pi^0 f_0(980) \to \pi^0 \pi^+ \pi^-)/\Gamma_{total}$ Γ_{39}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
0.35±0.09		ABLIKIM	18D	BES3	$\psi(2S) \to \gamma \pi^0 \pi^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6	90	[1] ABLIKIM	11D	BES3	$\psi(2S) \to \gamma \pi^0 \pi^+ \pi^-$

[1] ABLIKIM 11D reports $[\Gamma(\chi_{c1}(1P) \to \pi^0 f_0(980) \to \pi^0 \pi^+ \pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma \chi_{c1}(1P))] < 6.0 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \to \gamma \chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(K^+ \overline{K}^*(892)^0 \pi^- + c.c.)/\Gamma_{total}$ Γ_{40}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
32±21	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma \chi_{c1}$

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

$\Gamma\big(K^*(892)^0\overline{K}^*(892)^0\big)/\Gamma_{\text{total}}$ Γ_{41}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.44±0.36±0.03	28.4 ± 5.5	[1,2] ABLIKIM	04H	BES	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^+ \pi^-$

[1] ABLIKIM 04H reports $[\Gamma\big(\chi_{c1}(1P) \rightarrow K^*(892)^0\overline{K}^*(892)^0\big)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))] = (1.40 \pm 0.27 \pm 0.22) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma\big(K^+K^-K^0_SK^0_S\big)/\Gamma_{\text{total}}$ Γ_{42}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<4 \times 10^{-4}$	90	3.2 ± 2.4	[1] ABLIKIM	05O	BES2	$\psi(2S) \rightarrow \chi_{c1}\gamma$

[1] ABLIKIM 05O reports $[\Gamma\big(\chi_{c1}(1P) \rightarrow K^+K^-K^0_SK^0_S\big)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))] < 4.2 \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma\big(K^+K^-K^+K^-\big)/\Gamma_{\text{total}}$ Γ_{43}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
0.54±0.11 OUR FIT	

$\Gamma\big(K^+K^-\phi\big)/\Gamma_{\text{total}}$ Γ_{44}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.41±0.15±0.01	17	[1] ABLIKIM	06T	BES2	$\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

[1] ABLIKIM 06T reports $(0.46 \pm 0.16 \pm 0.06) \times 10^{-3}$ from a measurement of $[\Gamma\big(\chi_{c1}(1P) \rightarrow K^+K^-\phi\big)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma\big(\overline{K}^0K^+\pi^-\phi + \text{c.c.}\big)/\Gamma_{\text{total}}$ Γ_{45}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.27±0.28±0.46	ABLIKIM	15M	BES3	$\psi(2S) \rightarrow \gamma\chi_{c1}$

$\Gamma\big(K^+K^-\pi^0\phi\big)/\Gamma_{\text{total}}$ Γ_{46}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.62±0.12±0.28	ABLIKIM	15M	BES3	$\psi(2S) \rightarrow \gamma\chi_{c1}$

$\Gamma\big(\phi\pi^+\pi^-\pi^0\big)/\Gamma_{\text{total}}$ Γ_{47}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.75±0.06±0.08	373	[1] ABLIKIM	13B	BES3	$e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \rightarrow \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.7±0.7±0.1	597	[1] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[1] ABLIKIM 11K reports $(6.0 \pm 0.3 \pm 0.7) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \omega\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\omega K^+ K^-)/\Gamma_{total}$ — Γ_{49}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.78±0.04±0.08	628	[1] ABLIKIM	13B	BES3	$e^+ e^- \to \psi(2S) \to \gamma\chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$.

$\Gamma(\omega\phi)/\Gamma_{total}$ — Γ_{50}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.27±0.04±0.01	105	[1] ABLIKIM	19J	BES3	$\psi(2S) \to \gamma$hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.21±0.06±0.01	15	[2,3] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$hadrons

[1] ABLIKIM 19J reports $[\Gamma(\chi_{c1}(1P) \to \omega\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (2.67 \pm 0.31 \pm 0.27) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 11K reports $(0.22 \pm 0.06 \pm 0.02) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \omega\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] Superseded by ABLIKIM 19J.

$\Gamma(\phi\phi)/\Gamma_{total}$ — Γ_{51}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±0.5±0.1	366	[1] ABLIKIM	11K	BES3	$\psi(2S) \to \gamma$ hadrons

[1] ABLIKIM 11K reports $(4.4 \pm 0.3 \pm 0.5) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \phi\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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_{52}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
0.760±0.034 OUR FIT	

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{53}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.155±0.018 OUR AVERAGE				
0.163±0.019±0.004	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
0.112±0.047±0.003	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ONYISI 10 reports $(1.75 \pm 0.16 \pm 0.13 \pm 0.11) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ATHAR 07 reports $(1.2 \pm 0.5 \pm 0.1) \times 10^{-4}$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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_{54}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
0.145±0.024±0.004		[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.15	90	[2] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] ONYISI 10 reports $(1.56 \pm 0.22 \pm 0.14 \pm 0.10) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\eta)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{55}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
0.212±0.030±0.005	[1] ONYISI	10	CLE3	$\psi(2S) \to \gamma p\overline{p}X$

[1] ONYISI 10 reports $(2.28 \pm 0.28 \pm 0.16 \pm 0.14) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ Γ_{56}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.7 \times 10^{-5}$	90	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $< 1.82 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{57}/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	[1] BAI	99B	BES	$\psi(2S) \to \gamma\chi_{c1}$
1.08±0.77±0.05	[1] TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

[1] 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)%.

$\Gamma(p\overline{p}\pi^0\pi^0)/\Gamma_{total}$ — Γ_{58}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5 × 10⁻⁴	90	[1] HE	08B	CLEO	$e^+e^- \to \gamma h^+h^-h^0h^0$

[1] HE 08B reports < 0.05 × 10^{-2} from a measurement of [$\Gamma(\chi_{c1}(1P) \to p\overline{p}\pi^0\pi^0)/\Gamma_{total}$] × [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($\psi(2S) \to \gamma\chi_{c1}(1P)$) = 9.75 × 10^{-2}.

$\Gamma(p\overline{p}K^+K^-\text{ (non-resonant)})/\Gamma_{total}$ — Γ_{59}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.27±0.22±0.03	82 ± 9	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports (1.35 ± 0.15 ± 0.19) × 10^{-4} from a measurement of [$\Gamma(\chi_{c1}(1P) \to p\overline{p}K^+K^-\text{ (non-resonant)})/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] assuming B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.2 ± 0.4) × 10^{-2}, which we rescale to our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.75 ± 0.24) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p}K^0_SK^0_S)/\Gamma_{total}$ — Γ_{60}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.5	90	[1] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

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

$\Gamma(p\overline{n}\pi^-)/\Gamma_{total}$ — Γ_{61}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±0.5±0.1	1412	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p\overline{n}\pi^-$

[1] ABLIKIM 12J reports [$\Gamma(\chi_{c1}(1P) \to p\overline{n}\pi^-)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] = (0.37 ± 0.02 ± 0.04) × 10^{-4} which we divide by our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.75 ± 0.24) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{p}n\pi^+)/\Gamma_{total}$ — Γ_{62}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.9±0.5±0.1	1625	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma\overline{p}n\pi^+$

[1] ABLIKIM 12J reports [$\Gamma(\chi_{c1}(1P) \to \overline{p}n\pi^+)/\Gamma_{total}$] × [B($\psi(2S) \to \gamma\chi_{c1}(1P)$)] = (0.38 ± 0.02 ± 0.04) × 10^{-4} which we divide by our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) = (9.75 ± 0.24) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{n}\pi^-\pi^0)/\Gamma_{total}$ — Γ_{63}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
10.3±1.1±0.2	1082	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma p\overline{n}\pi^-\pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c1}(1P) \to p\overline{n}\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (1.00 \pm 0.05 \pm 0.10) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{p}n\pi^+\pi^0)/\Gamma_{total}$ — Γ_{64}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
10.1±1.1±0.2	1261	[1] ABLIKIM	12J	BES3	$\psi(2S) \to \gamma\overline{p}n\pi^+\pi^0$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c1}(1P) \to \overline{p}n\pi^+\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.98 \pm 0.05 \pm 0.10) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — Γ_{65}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
1.14±0.11 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — Γ_{66}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
29±5±1		105	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<150	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] ABLIKIM 12I reports $(31.1 \pm 3.4 \pm 3.9) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-\text{(non-resonant)})/\Gamma_{total}$ — Γ_{67}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
25±6±1	13	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$

[1] ABLIKIM 12I reports $(26.2 \pm 5.5 \pm 3.3) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda}\pi^+\pi^-\text{(non-resonant)})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Sigma(1385)^+\overline{\Lambda}\pi^- + \text{c.c.})/\Gamma_{total}$ — Γ_{68}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.3 × 10⁻⁴	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Sigma(1385)^+\overline{\Lambda}\pi^-$

[1] ABLIKIM 12I reports $< 14 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma(1385)^+\overline{\Lambda}\pi^- + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^- \overline{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{total}$ Γ_{69}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<13	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Sigma(1385)^-\overline{\Lambda}\pi^+$

[1] ABLIKIM 12I reports $< 14 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma(1385)^-\overline{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}$ Γ_{70}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±0.4 OUR AVERAGE	Error includes scale factor of 1.2.				
$9.1^{+2.7}_{-2.3}\pm0.4$	24	[1] LU	19	BELL	$B^+ \to \overline{p}\Lambda K^+ K^+$
$4.2\pm0.4\pm0.1$	3k	[2,3] ABLIKIM	13D	BES3	$\psi(2S) \to \gamma\Lambda\overline{p}K^+$
$3.1\pm0.9\pm0.1$		[4] ATHAR	07	CLEO	$\psi(2S) \to \gamma h^+ h^- h^0$

[1] LU 19 reports $(9.15^{+2.63}_{-2.25} \pm 0.86) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(1P) K^+)]$ assuming $B(B^+ \to \chi_{c1}(1P) K^+) = (4.79 \pm 0.23) \times 10^{-4}$, which we rescale to our best value $B(B^+ \to \chi_{c1}(1P) K^+) = (4.84 \pm 0.23) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 13D reports $(4.5 \pm 0.2 \pm 0.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] Using $B(\Lambda \to p\pi^-) = 63.9\%$.

[4] ATHAR 07 reports $(3.3 \pm 0.9 \pm 0.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+\overline{p}\Lambda(1520) + \text{c.c.})/\Gamma_{total}$ Γ_{71}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.71±0.44±0.04	48 ± 10	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(1.81 \pm 0.38 \pm 0.28) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda(1520) + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}$ Γ_{72}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9 \times 10^{-5}$	90	[1] ABLIKIM	11F	BES3	$\psi(2S) \to \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $< 1.00 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ — Γ_{73}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±0.6±0.1		103	[1] ABLIKIM	18V	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6	90		[2] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$
<4	90	3.8 ± 2.5	[3] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^0\overline{\Sigma}^0$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.41 \pm 0.05 \pm 0.03) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 13H reports $< 0.62 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

[3] NAIK 08 reports $< 0.44 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{total}$ — Γ_{74}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.6±0.6±0.1		59	[1] ABLIKIM	18V	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8	90		[2] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$
<6	90	4.3 ± 2.3	[3] NAIK	08	CLEO	$\psi(2S) \to \gamma\Sigma^+\overline{\Sigma}^-$

[1] ABLIKIM 18V reports $[\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.35 \pm 0.06 \pm 0.02) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] ABLIKIM 13H reports $< 0.87 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

[3] NAIK 08 reports $< 0.65 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^+\overline{\Sigma}(1385)^-)/\Gamma_{total}$ — Γ_{75}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9 \times 10^{-5}$	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$

[1] ABLIKIM 12I reports $< 10 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma(1385)^+\overline{\Sigma}(1385)^-)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^- \overline{\Sigma}(1385)^+)/\Gamma_{total}$ Γ_{76}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5 \times 10^{-5}$	90	[1] ABLIKIM	12I	BES3	$\psi(2S) \rightarrow \gamma\Lambda\overline{\Lambda}\pi^+\pi^-$

[1] ABLIKIM 12I reports $< 5.7 \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \Sigma(1385)^- \overline{\Sigma}(1385)^+)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(K^- \Lambda \overline{\Xi}^+ + \text{c.c.})/\Gamma_{total}$ Γ_{77}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.35±0.24±0.03	49	[1] ABLIKIM	15I	BES3	$\psi(2S) \rightarrow \gamma K^- \Lambda \overline{\Xi}^+ +$ c.c.

[1] ABLIKIM 15I reports $[\Gamma(\chi_{c1}(1P) \rightarrow K^- \Lambda \overline{\Xi}^+ + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))] = (1.32 \pm 0.20 \pm 0.12) \times 10^{-5}$ which we divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Xi^0 \overline{\Xi}^0)/\Gamma_{total}$ Γ_{78}/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<6 \times 10^{-5}$	90	1.7 ± 2.4	[1] NAIK	08	CLEO	$\psi(2S) \rightarrow \gamma\Xi^0\overline{\Xi}^0$

[1] NAIK 08 reports $< 0.60 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \Xi^0\overline{\Xi}^0)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Xi^- \overline{\Xi}^+)/\Gamma_{total}$ Γ_{79}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.80±0.21±0.02		16.4 ± 4.3	[1] NAIK	08	CLEO	$\psi(2S) \rightarrow \gamma\Xi^+\overline{\Xi}^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 3.4	90		[2] ABLIKIM	06D	BES2	$\psi(2S) \rightarrow \gamma\chi_{c1}$

[1] NAIK 08 reports $(0.86 \pm 0.22 \pm 0.08) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \rightarrow \Xi^-\overline{\Xi}^+)/\Gamma_{total}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$[\Gamma(\pi^+\pi^-) + \Gamma(K^+K^-)]/\Gamma_{total}$ Γ_{80}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<21 \times 10^{-4}$		[1] FELDMAN	77	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<38 \times 10^{-4}$	90	[1] BRANDELIK	79B	DASP	$\psi(2S) \rightarrow \gamma\chi_{c1}$

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

$\Gamma(K^0_S K^0_S)/\Gamma_{total}$ Γ_{81}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<6 × 10^{-5}	90	[1] ABLIKIM	05O	BES2	$\psi(2S) \to \chi_{c1}\gamma$

[1] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\eta_c \pi^+\pi^-)/\Gamma_{total}$ Γ_{82}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.2 × 10^{-3}	90	[1,2] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<4.4 \times 10^{-3}$	90	[1,3] ABLIKIM	13B	BES3	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S) \to \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$.
[2] Using the $\eta_c \to K^0_S K^\pm \pi^\mp$ decays.
[3] Using the $\eta_c \to K^+K^-\pi^0$ decays.

RADIATIVE DECAYS

$\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ Γ_{83}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
34.3 ±1.0 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
34.75±0.11±1.70	1.9M	[1] ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
37.9 ±0.8 ±2.1		[2] ADAM	05A	CLEO	$e^+e^- \to \psi(2S) \to \gamma\chi_{c1}$

[1] Not independent from $B(\psi(2S) \to \gamma\chi_{c1}(1P))$ and the product $B(\psi(2S) \to \gamma\chi_{c1}(1P)) \times B(\chi_{c1}(1P) \to \gamma J/\psi(1S))$ also measured in ABLIKIM 17U.
[2] 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_{84}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
216±17 OUR AVERAGE					
215±22±5	432 ± 25	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\rho^0$
217±24±5	186 ± 15	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\rho^0$

[1] ABLIKIM 11E reports $(228 \pm 13 \pm 22) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\rho^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
[2] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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_{85}/Γ

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
68± 8 OUR AVERAGE					
66± 9±2	136 ± 14	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\omega$
74±17±2	39 ± 7	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\omega$

[1] ABLIKIM 11E reports $(69.7 \pm 7.2 \pm 6.6) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\omega)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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_{86}/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
24±5±1		43 ± 9	[1] ABLIKIM	11E	BES3	$\psi(2S) \to \gamma\gamma\phi$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<23	90	5.2 ± 3.1	[2] BENNETT	08A	CLEO	$\psi(2S) \to \gamma\gamma\phi$

[1] ABLIKIM 11E reports $(25.8 \pm 5.2 \pm 2.3) \times 10^{-6}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \gamma\phi)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_{87}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 6.3 × 10^{-6}	90	ABLIKIM	17AE	BES3	$\psi(2S) \to \gamma\chi_{c1} \to 3\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 3.5 × 10^{-5}	90	ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{c1} \to 3\gamma$
<150 × 10^{-5}	90	[1] YAMADA	77	DASP	$e^+e^- \to 3\gamma$

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

$\Gamma(e^+e^- J/\psi(1S))/\Gamma_{total}$ Γ_{88}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.65±0.23±0.09	1.9k	[1] ABLIKIM	17I	BES3	$\psi(2S) \to \gamma e^+e^- J/\psi$

[1] ABLIKIM 17I reports $(3.73 \pm 0.09 \pm 0.25) \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to e^+e^- J/\psi(1S))/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(e^+e^- J/\psi(1S))/\Gamma(\gamma J/\psi(1S))$ Γ_{88}/Γ_{83}

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
10.1±0.3±0.5	1.9k	[1] ABLIKIM	17I	BES3	$\psi(2S) \to e^+e^-\gamma J/\psi$

[1] Uses B($\psi(2S) \to \gamma\chi_{c1}(1P)$) × B($\chi_{c1}(1P) \to \gamma J/\psi(1S)$) = $(351.8 \pm 1.0 \pm 12.0) \times 10^{-4}$ from ABLIKIM 17N and accounts for common systematic errors.

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

$\Gamma(\chi_{c1}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{52}/\Gamma \times \Gamma_{148}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.14±0.10 OUR FIT				
1.1 ±1.0	[1] BAI	98I	BES	$\psi(2S) \to \gamma\chi_{c1} \to \gamma\overline{p}p$

[1] 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 ± 0.8)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = (32.4 ± 2.6)% [BAI 98D].

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{65}/\Gamma \times \Gamma_{148}^{\psi(2S)}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
11.1±1.1 OUR FIT					
10.9±1.1 OUR AVERAGE					
11.2±1.0±0.9	136	[1] ABLIKIM	13H	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$
10.5±1.6±0.6	46 ± 7	[2] NAIK	08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[1] Calculated by us. ABLIKIM 13H reports B($\chi_{c1} \to \Lambda\overline{\Lambda}$) = $(12.2 \pm 1.1 \pm 1.1) \times 10^{-5}$ from a measurement of B($\chi_{c1} \to \Lambda\overline{\Lambda}$) × B($\psi(2S) \to \gamma\chi_{c1}$) assuming B($\psi(2S) \to \gamma\chi_{c1}$) = (9.2 ± 0.4)%.

[2] 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($\psi(2S) \to \gamma\chi_{c1}$) = $(9.07 \pm 0.11 \pm 0.54)$%.

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{65}/\Gamma \times \Gamma_{148}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

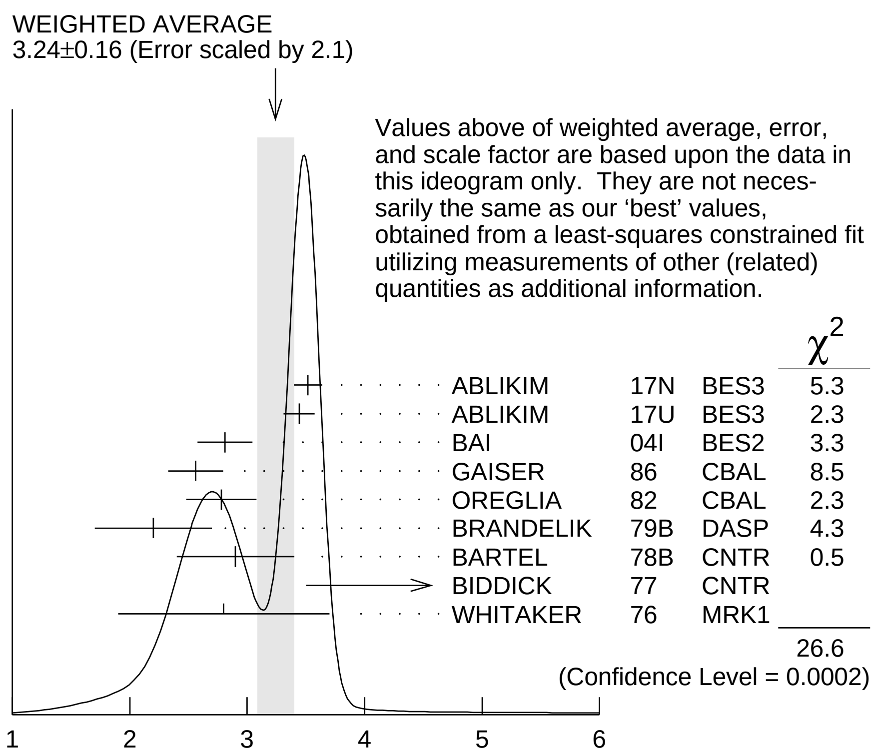
VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.20±0.30 OUR FIT					
7.1 $^{+2.8}_{-2.4}$ ±1.3	$9.0^{+3.5}_{-3.1}$	[1] BAI	03E	BES	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

[1] 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($J/\psi \to p\overline{p}$) = $(2.17 \pm 0.07) \times 10^{-3}$.

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{83}/\Gamma \times \Gamma^{\psi(2S)}_{148}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.34 ±0.06 OUR FIT					
3.24 ±0.16 OUR AVERAGE		Error includes scale factor of 2.1. See the ideogram below.			
3.518±0.010±0.120	143k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma J/\psi$
3.442±0.010±0.132	1.9M	ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
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		[2] OREGLIA	82	CBAL	$\psi(2S) \to \gamma\chi_{c1}$
2.2 ±0.5		[3] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$
2.9 ±0.5		[3] BARTEL	78B	CNTR	$\psi(2S) \to \gamma\chi_{c1}$
5.0 ±1.5		[4] BIDDICK	77	CNTR	$e^+e^- \to \gamma X$
2.8 ±0.9		[2] WHITAKER	76	MRK1	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.377±0.009±0.183	142k	[5] ABLIKIM	12O	BES3	$\psi(2S) \to \gamma\chi_{c1}$
3.56 ±0.03 ±0.12	24.9k	[6] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
3.44 ±0.06 ±0.13	3.7k	[7] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Uses B($J/\psi \to e^+e^-$) = (5.971 ± 0.032)% and B($J/\psi \to \mu^+\mu^-$) = (5.961 ± 0.033)%.
[2] Recalculated by us using B($J/\psi(1S) \to \ell^+\ell^-$) = 0.1181 ± 0.0020.
[3] Recalculated by us using B($J/\psi(1S) \to \mu^+\mu^-$) = 0.0588 ± 0.0010.
[4] Assumes isotropic gamma distribution.
[5] Superseded by ABLIKIM 17N.
[6] Not independent from other measurements of MENDEZ 08.
[7] Not independent from other values reported by ADAM 05A.



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

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\text{anything})$ $\Gamma_{83}/\Gamma \times \Gamma_{148}^{\psi(2S)}/\Gamma_{9}^{\psi(2S)}$

$\Gamma_{83}/\Gamma \times \Gamma_{148}^{\psi(2S)}/\Gamma_{9}^{\psi(2S)} = \Gamma_{83}/\Gamma \times \Gamma_{148}^{\psi(2S)}/(\Gamma_{11}^{\psi(2S)}+\Gamma_{12}^{\psi(2S)}+\Gamma_{13}^{\psi(2S)}+0.343\Gamma_{148}^{\psi(2S)}+0.190\Gamma_{149}^{\psi(2S)})$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
5.43±0.10 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.70±0.04±0.15	24.9k	[1] MENDEZ 08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
5.77±0.10±0.12	3.7k	ADAM 05A	CLEO	Repl. by MENDEZ 08

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

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{83}/\Gamma \times \Gamma_{148}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
9.63±0.17 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	[1] ABLIKIM 04B	BES	$\psi(2S) \to J/\psi X$
8.5 ±2.1		[2] 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	[3] ADAM 05A	CLEO	Repl. by MENDEZ 08

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

[2] 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.

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

$\Gamma(\chi_{c1}(1P) \to \overline{K}^0 K^+\pi^- + \text{c.c.})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{17}/\Gamma \times \Gamma_{148}^{\psi(2S)}/\Gamma^{\psi(2S)}$

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	[1] ATHAR 07	CLEO	$\psi(2S) \to \gamma K^0_S K^+\pi^-$
7.0±0.5±0.9	[2] ABLIKIM 06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] 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)%.

[2] 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}.

$\Gamma(\chi_{c1}(1P) \to \overline{K}^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\quad \Gamma_{17}/\Gamma \times \Gamma^{\psi(2S)}_{148}/\Gamma^{\psi(2S)}_{11}$

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
19.6±1.6 OUR FIT				
13.2±2.4±3.2	[1] BAI	99B	BES	$\psi(2S) \to \gamma K^0_S K^+ \pi^-$

[1] 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].

$\Gamma(\chi_{c1}(1P) \to K^+ K^- K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$ $\quad \Gamma_{43}/\Gamma \times \Gamma^{\psi(2S)}_{148}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.53±0.11 OUR FIT					
0.61±0.11±0.08	54	[1] ABLIKIM	06T	BES2	$\psi(2S) \to \gamma K^+ K^+ K^- K^-$

[1] 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)%.

$\Gamma(\chi_{c1}(1P) \to K^+ K^- K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\quad \Gamma_{43}/\Gamma \times \Gamma^{\psi(2S)}_{148}/\Gamma^{\psi(2S)}_{11}$

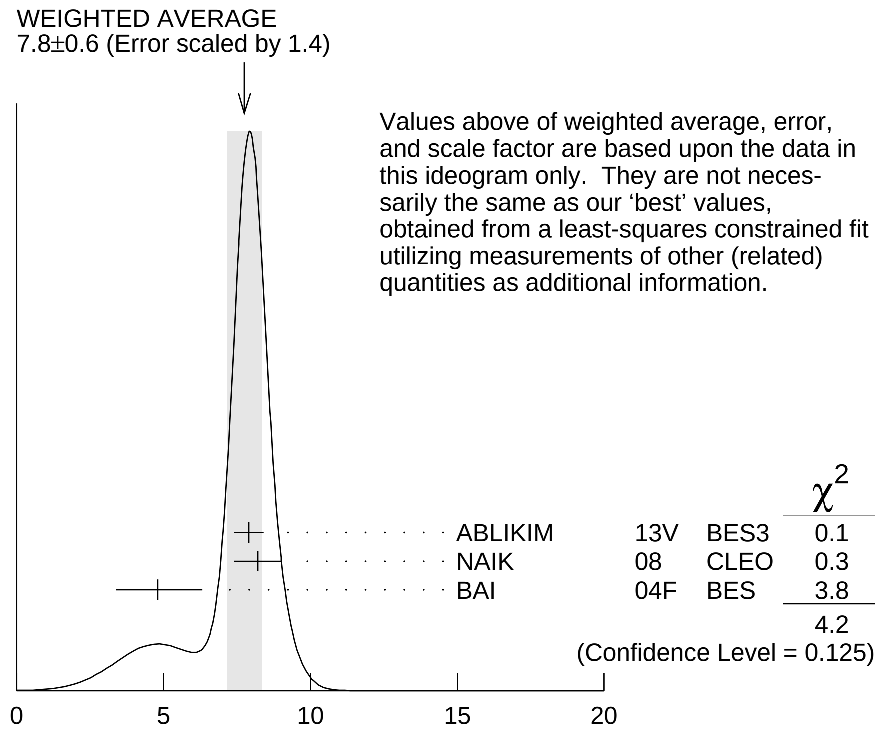
VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.52±0.31 OUR FIT				
1.13±0.40±0.29	[1] BAI	99B	BES	$\psi(2S) \to \gamma K^+ K^+ K^- K^-$

[1] 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].

$\Gamma(\chi_{c1}(1P) \to p\overline{p})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$ $\quad \Gamma_{52}/\Gamma \times \Gamma^{\psi(2S)}_{148}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
7.41±0.35 OUR FIT					
7.8 ±0.6 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.				
7.9 ±0.4 ±0.3	453	ABLIKIM	13V	BES3	$\psi(2S) \to \gamma p \overline{p}$
8.2 ±0.7 ±0.4	141 ± 13	[1] 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	$\psi(2S) \to \gamma\chi_{c1}(1P) \to \gamma\overline{p}p$

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



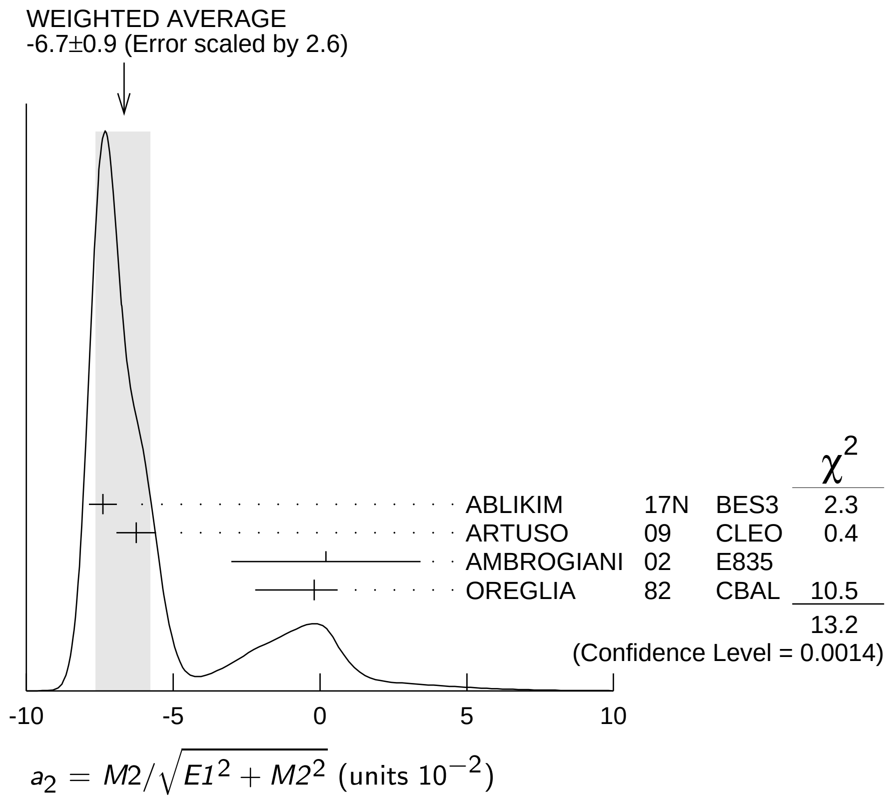
$\Gamma\Big(\chi_{c1}(1P) \rightarrow p\overline{p}\Big)/\Gamma_{\text{total}} \times \Gamma\Big(\psi(2S) \rightarrow \gamma\chi_{c1}(1P)\Big)/\Gamma_{\text{total}}$ (units 10^{-6})

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

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

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
−6.7 ±0.9 OUR AVERAGE		Error includes scale factor of 2.6. See the ideogram below.			
$-7.40 \pm 0.33 \pm 0.34$	164k	[1] ABLIKIM	17N	BES3	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$-6.26 \pm 0.63 \pm 0.24$	39k	ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
$0.2 \pm 3.2 \pm 0.4$	2090	AMBROGIANI	02	E835	$p\overline{p} \rightarrow \chi_{c1} \rightarrow J/\psi\gamma$
$-0.2\ ^{+0.8}_{-2.0}$	921	OREGLIA	82	CBAL	$\psi(2S) \rightarrow \chi_{c1}\gamma \rightarrow J/\psi\gamma\gamma$

[1] Correlated with b_2 with correlation coefficient $\rho_{a_2 b_2} = 0.133$.



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

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

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.5 ±0.4 OUR AVERAGE					
2.29±0.39±0.27	164k	[1] ABLIKIM	17N	BES3	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$
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	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

[1] Correlated with a_2 with correlation coefficient $\rho_{a_2 b_2} = 0.133$.

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS $\psi(2S) \rightarrow \gamma\chi_{c1}(1P)$ 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	[1] ARTUSO	09	CLEO	$\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

[1] 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

ABLIKIM	19J	PR D99 012015	M. Ablikim *et al.*	(BES III Collab.)
LU	19	PR D99 032003	P.-C. Lu *et al.*	(BELLE Collab.)
ABLIKIM	18D	PRL 121 022001	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	18V	PR D97 052011	M. Ablikim *et al.*	(BES III Collab.)
AAIJ	17BB	EPJ C77 609	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17BI	PRL 119 221801	R. Aaij *et al.*	(LHCb Collab.)
ABLIKIM	17AE	PR D96 092007	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	17I	PRL 118 221802	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	17K	PR D95 032002	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	17N	PR D95 072004	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	17U	PR D96 032001	M. Ablikim *et al.*	(BES III Collab.)
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)
ABLIKIM	15I	PR D91 092006	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	15M	PR D91 112008	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	14J	PR D89 074030	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13B	PR D87 012002	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13D	PR D87 012007	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13H	PR D87 032007	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	13V	PR D88 112001	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	12I	PR D86 052004	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	12J	PR D86 052011	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	12O	PRL 109 172002	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	11A	PR D83 012006	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	11D	PR D83 032003	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	11E	PR D83 112005	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	11F	PR D83 112009	M. Ablikim *et al.*	(BES III Collab.)
ABLIKIM	11K	PRL 107 092001	M. Ablikim *et al.*	(BES III Collab.)
ONYISI	10	PR D82 011103	P.U.E. Onyisi *et al.*	(CLEO Collab.)
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 091501	K.M. Ecklund *et al.*	(CLEO Collab.)
HE	08B	PR D78 092004	Q. He *et al.*	(CLEO Collab.)
MENDEZ	08	PR D78 011102	H. Mendez *et al.*	(CLEO Collab.)
NAIK	08	PR D78 031101	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)