$\chi_{c1}(1P)$

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

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	$\overline{p}p \to e^+e^-X$
<3.8	90	GAISER	86	CBAL	$\psi(2S) \to \gamma X$

[1] Recalculated by ANDREOTTI 05A.

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

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
	Hadronic decays		
Γ_1	$3(\pi^+\pi^-)$	$(\ 5.8\ \pm1.4\ )\times10^{-3}$	S=1.2
Γ_2	$2(\pi^+\pi^-)$	$(\ 7.6\ \pm2.6\ )\times10^{-3}$	
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	$\rho^0\pi^+\pi^-$	$(\ 3.9\ \pm3.5\ )\times10^{-3}$	
Γ_6	$4\pi^0$	$(\ 5.4\ \pm0.8\ )\times10^{-4}$	
Γ_7	$\pi^+\pi^-K^+K^-$	$(\ 4.5\ \pm1.0\ )\times10^{-3}$	
Γ_8	$K^+K^-\pi^0\pi^0$	$(\ 1.12\pm0.27)\times10^{-3}$	
Γ_9	$K^+K^-\pi^+\pi^-\pi^0$	(1.15±0.13) %	
Γ_{10}	$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	$(\ 7.5\ \pm0.8\ )\times10^{-3}$	
Γ_{11}	$K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(\ 8.6\ \pm1.4\ )\times10^{-3}$	
Γ_{12}	$\rho^-K^+\overline{K}^0$ + c.c.	$(\ 5.0\ \pm1.2\ )\times10^{-3}$	
Γ_{13}	$K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0$ + c.c.	$(\ 2.3\ \pm0.6\ )\times10^{-3}$	
Γ_{14}	$K^+K^-\eta\pi^0$	$(\ 1.12\pm0.34)\times10^{-3}$	
Γ_{15}	$\pi^+\pi^-K^0_S K^0_S$	$(\ 6.9\ \pm2.9\ )\times10^{-4}$	
Γ_{16}	$K^+K^-\eta$	$(\ 3.2\ \pm1.0\ )\times10^{-4}$	
Γ_{17}	$\overline{K}^0K^+\pi^-$ + c.c.	$(\ 7.0\ \pm0.6\ )\times10^{-3}$	
Γ_{18}	$K^*(892)^0\overline{K}^0$ + c.c.	$(10\ \ \pm4\ \ )\times10^{-4}$	
Γ_{19}	$K^*(892)^+K^-$ + c.c.	$(\ 1.4\ \pm0.6\ )\times10^{-3}$	
Γ_{20}	$K^*_J(1430)^0\overline{K}^0$ + c.c. $\to K^0_S K^+\pi^-$ + c.c.	$<\ 8\ \ \times10^{-4}$	CL=90%
Γ_{21}	$K^*_J(1430)^+K^-$ + c.c. $\to K^0_S K^+\pi^-$ + c.c.	$<\ 2.1\ \ \times10^{-3}$	CL=90%
Γ_{22}	$K^+K^-\pi^0$	$(\ 1.81\pm0.24)\times10^{-3}$	
Γ_{23}	$\eta\pi^+\pi^-$	$(\ 4.62\pm0.23)\times10^{-3}$	
Γ_{24}	$a_0(980)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(\ 3.2\ \pm0.4\ )\times10^{-3}$	S=2.2
Γ_{25}	$a_2(1320)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(\ 1.76\pm0.24)\times10^{-4}$	
Γ_{26}	$a_2(1700)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$(\ 4.6\ \pm0.7\ )\times10^{-5}$	
Γ_{27}	$f_2(1270)\eta \to \eta\pi^+\pi^-$	$(\ 3.5\ \pm0.6\ )\times10^{-4}$	
Γ_{28}	$f_4(2050)\eta \to \eta\pi^+\pi^-$	$(\ 2.5\ \pm0.9\ )\times10^{-5}$	
Γ_{29}	$\pi_1(1400)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$<\ 5\ \ \times10^{-5}$	CL=90%
Γ_{30}	$\pi_1(1600)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$<\ 1.5\ \ \times10^{-5}$	CL=90%
Γ_{31}	$\pi_1(2015)^+\pi^-$ + c.c. $\to \eta\pi^+\pi^-$	$<\ 8\ \ \times10^{-6}$	CL=90%

Γ_{32}	$f_2(1270)\eta$	$(\ 6.7\ \pm1.1\ )\times10^{-4}$	
Γ_{33}	$\pi^+\pi^-\eta'$	$(\ 2.2\ \pm0.4\ )\times10^{-3}$	
Γ_{34}	$K^+K^-\eta'(958)$	$(\ 8.8\ \pm0.9\ )\times10^{-4}$	
Γ_{35}	$K_0^*(1430)^+K^-$ + c.c.	$(\ 6.4\ ^{+2.2}_{-2.8}\ )\times10^{-4}$	
Γ_{36}	$f_0(980)\eta'(958)$	$(\ 1.6\ ^{+1.4}_{-0.7}\ )\times10^{-4}$	
Γ_{37}	$f_0(1710)\eta'(958)$	$(\ 7\ \ ^{+7}_{-5}\ )\times10^{-5}$	
Γ_{38}	$f_2'(1525)\eta'(958)$	$(\ 9\ \ \pm6\ \ )\times10^{-5}$	
Γ_{39}	$\pi^0 f_0(980)\to\ \pi^0\pi^+\pi^-$	$(\ 3.5\ \pm0.9\ )\times10^{-7}$	
Γ_{40}	$K^+\overline{K}^*(892)^0\pi^-$ + c.c.	$(\ 3.2\ \pm2.1\ )\times10^{-3}$	
Γ_{41}	$K^*(892)^0\overline{K}^*(892)^0$	$(\ 1.4\ \pm0.4\ )\times10^{-3}$	
Γ_{42}	$K^+K^-K_S^0K_S^0$	$<\ 4\ \times10^{-4}$	CL=90%
Γ_{43}	$K_S^0K_S^0K_S^0K_S^0$	$(\ 3.5\ \pm1.0\ )\times10^{-5}$	
Γ_{44}	$K^+K^-K^+K^-$	$(\ 5.4\ \pm1.1\ )\times10^{-4}$	
Γ_{45}	$K^+K^-\phi$	$(\ 4.1\ \pm1.5\ )\times10^{-4}$	
Γ_{46}	$\overline{K}^0K^+\pi^-\phi$ + c.c.	$(\ 3.3\ \pm0.5\ )\times10^{-3}$	
Γ_{47}	$K^+K^-\pi^0\phi$	$(\ 1.62\pm0.30)\times10^{-3}$	
Γ_{48}	$\phi\pi^+\pi^-\pi^0$	$(\ 7.5\ \pm1.0\ )\times10^{-4}$	
Γ_{49}	$\omega\omega$	$(\ 5.7\ \pm0.7\ )\times10^{-4}$	
Γ_{50}	ωK^+K^-	$(\ 7.8\ \pm0.9\ )\times10^{-4}$	
Γ_{51}	$\omega\phi$	$(\ 2.7\ \pm0.4\ )\times10^{-5}$	
Γ_{52}	$\phi\phi$	$(\ 4.2\ \pm0.5\ )\times10^{-4}$	
Γ_{53}	$\phi\phi\eta$	$(\ 3.0\ \pm0.5\ )\times10^{-4}$	
Γ_{54}	$p\overline{p}$	$(\ 7.60\pm0.34)\times10^{-5}$	
Γ_{55}	$p\overline{p}\pi^0$	$(\ 1.55\pm0.18)\times10^{-4}$	
Γ_{56}	$p\overline{p}\eta$	$(\ 1.45\pm0.25)\times10^{-4}$	
Γ_{57}	$p\overline{p}\omega$	$(\ 2.12\pm0.31)\times10^{-4}$	
Γ_{58}	$p\overline{p}\phi$	$<\ 1.7\ \times10^{-5}$	CL=90%
Γ_{59}	$p\overline{p}\pi^+\pi^-$	$(\ 5.0\ \pm1.9\ )\times10^{-4}$	
Γ_{60}	$p\overline{p}\pi^0\pi^0$	$<\ 5\ \times10^{-4}$	CL=90%
Γ_{61}	$p\overline{p}K^+K^-$ (non-resonant)	$(\ 1.27\pm0.22)\times10^{-4}$	
Γ_{62}	$p\overline{p}K_S^0K_S^0$	$<\ 4.5\ \times10^{-4}$	CL=90%
Γ_{63}	$p\overline{n}\pi^-$	$(\ 3.8\ \pm0.5\ )\times10^{-4}$	
Γ_{64}	$\overline{p}n\pi^+$	$(\ 3.9\ \pm0.5\ )\times10^{-4}$	
Γ_{65}	$p\overline{n}\pi^-\pi^0$	$(\ 1.03\pm0.12)\times10^{-3}$	
Γ_{66}	$\overline{p}n\pi^+\pi^0$	$(\ 1.01\pm0.12)\times10^{-3}$	
Γ_{67}	$\Lambda\overline{\Lambda}$	$(\ 1.27\pm0.08)\times10^{-4}$	
Γ_{68}	$\Lambda\overline{\Lambda}\pi^+\pi^-$	$(\ 2.9\ \pm0.5\ )\times10^{-4}$	
Γ_{69}	$\Lambda\overline{\Lambda}\pi^+\pi^-$ (non-resonant)	$(\ 2.5\ \pm0.6\ )\times10^{-4}$	
Γ_{70}	$\Sigma(1385)^+\overline{\Lambda}\pi^-$ + c.c.	$<\ 1.3\ \times10^{-4}$	CL=90%
Γ_{71}	$\Sigma(1385)^-\overline{\Lambda}\pi^+$ + c.c.	$<\ 1.3\ \times10^{-4}$	CL=90%
Γ_{72}	$K^+\overline{p}\Lambda$+c.c.	$(\ 4.2\ \pm0.4\ )\times10^{-4}$	S=1.2
Γ_{73}	$nK_S^0\overline{\Lambda}$ + c.c.	$(\ 1.66\pm0.17)\times10^{-4}$	

Γ_{74}	$K^*(892)^+\overline{p}\Lambda+$ c.c.	$(4.9 \pm 0.7) \times 10^{-4}$	
Γ_{75}	$K^+\overline{p}\Lambda(1520)+$ c.c.	$(1.7 \pm 0.4) \times 10^{-4}$	
Γ_{76}	$\Lambda(1520)\overline{\Lambda}(1520)$	$< 9 \times 10^{-5}$	CL=90%
Γ_{77}	$\Sigma^0\overline{\Sigma}^0$	$(4.2 \pm 0.6) \times 10^{-5}$	
Γ_{78}	$\Sigma^+\overline{p}K^0_S+$ c.c.	$(1.53\pm 0.12) \times 10^{-4}$	
Γ_{79}	$\Sigma^0\overline{p}K^++$ c.c.	$(1.46\pm 0.10) \times 10^{-4}$	
Γ_{80}	$\Sigma^+\overline{\Sigma}^-$	$(3.6 \pm 0.7) \times 10^{-5}$	
Γ_{81}	$\Sigma^-\overline{\Sigma}^+$	$(5.7 \pm 1.5) \times 10^{-5}$	
Γ_{82}	$\Sigma(1385)^+\overline{\Sigma}(1385)^-$	$< 9 \times 10^{-5}$	CL=90%
Γ_{83}	$\Sigma(1385)^-\overline{\Sigma}(1385)^+$	$< 5 \times 10^{-5}$	CL=90%
Γ_{84}	$K^-\Lambda\overline{\Xi}^++$ c.c.	$(1.35\pm 0.24) \times 10^{-4}$	
Γ_{85}	$\Xi^0\overline{\Xi}^0$	$< 6 \times 10^{-5}$	CL=90%
Γ_{86}	$\Xi^-\overline{\Xi}^+$	$(8.0 \pm 2.1) \times 10^{-5}$	
Γ_{87}	$\pi^+\pi^- + K^+K^-$	$< 2.1 \times 10^{-3}$	
Γ_{88}	$K^0_S K^0_S$	$< 6 \times 10^{-5}$	CL=90%
Γ_{89}	$\eta_c\pi^+\pi^-$	$< 3.2 \times 10^{-3}$	CL=90%

Radiative decays

Γ_{90}	$\gamma J/\psi(1S)$	(34.3 ± 1.0) %	
Γ_{91}	$\gamma\rho^0$	$(2.16\pm 0.17) \times 10^{-4}$	
Γ_{92}	$\gamma\omega$	$(6.8 \pm 0.8) \times 10^{-5}$	
Γ_{93}	$\gamma\phi$	$(2.4 \pm 0.5) \times 10^{-5}$	
Γ_{94}	$\gamma\gamma$	$< 6.3 \times 10^{-6}$	CL=90%
Γ_{95}	$e^+e^- J/\psi(1S)$	$(3.46\pm 0.22) \times 10^{-3}$	
Γ_{96}	$\mu^+\mu^- J/\psi(1S)$	$(2.33\pm 0.29) \times 10^{-4}$	

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 $\chi^2 = 379.8$ for 199 degrees of freedom.

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

x_{44}	3				
x_{54}	4	2			
x_{67}	11	4	5		
x_{90}	23	9	2	29	
Γ	−12	−5	−63	−15	−41
	x_{17}	x_{44}	x_{54}	x_{67}	x_{90}

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

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

$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ $\Gamma_{54}\Gamma_{90}/\Gamma$

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.

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

VALUE (%)	EVTS		DOCUMENT ID		TECN	COMMENT
1.45±0.24±0.04	712.3	[1,2]	HE	08B	CLEO	$e^+e^- \to \gamma h^+ h^- h^0 h^0$

[1] HE 08B reports 1.56 ± 0.13 ± 0.22 ± 0.10 % from a measurement of $[\Gamma(\chi_{c1}(1P) \to \rho^+\pi^-\pi^0 + \text{ c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07\pm0.11\pm0.54)\times10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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.

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

VALUE (units 10^{-3})		DOCUMENT ID		TECN	COMMENT
3.9±3.5	[1]	TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

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

$\Gamma(4\pi^0)/\Gamma_{\text{total}}$ Γ_6/Γ

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

[1] ABLIKIM 11A reports $(0.57\pm0.03\pm0.08)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to 4\pi^0)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{\text{total}}$ 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	$\psi(2S) \to \gamma\chi_{c1}$
7.3±3.0±0.4	[1]	TANENBAUM	78	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

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

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

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

[1] HE 08B reports $(0.12\pm0.02\pm0.02\pm0.01)\times10^{-2}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+K^-\pi^0\pi^0)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

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

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

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

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

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

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

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

[1] HE 08B reports $0.92 \pm 0.09 \pm 0.11 \pm 0.06$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

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

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

[1] HE 08B reports $0.54 \pm 0.11 \pm 0.07 \pm 0.03$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to \rho^- K^+ \overline{K}^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

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

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

[1] HE 08B reports $0.25 \pm 0.06 \pm 0.03 \pm 0.02$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^*(892)^0\overline{K}^0\pi^0 \to K^+\pi^-\overline{K}^0\pi^0 + \text{c.c.})/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

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

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

[1] HE 08B reports $0.12 \pm 0.03 \pm 0.02 \pm 0.01$ % from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+K^-\eta\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

$\Gamma(\pi^+\pi^- K^0_S K^0_S)/\Gamma_{total}$ 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 $[\Gamma(\chi_{c1}(1P) \to \pi^+\pi^- K^0_S K^0_S)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.67 \pm 0.26 \pm 0.11) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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.

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

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

$\Gamma(K^*(892)^0\overline{K^0} + c.c.)/\Gamma_{total}$ 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 $[\Gamma(\chi_{c1}(1P) \to K^*(892)^0\overline{K}^0 + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

$\Gamma(K^*(892)^+K^- + c.c.)/\Gamma_{total}$ 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 $[\Gamma(\chi_{c1}(1P) \to K^*(892)^+K^- + c.c.)/\Gamma_{total}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8 \times 10^{-4}$	90	[1] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

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

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

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

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{\text{total}}$ 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 $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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 $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0907 \pm 0.0011 \pm 0.0054$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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 $[\Gamma(\chi_{c1}(1P) \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(a_0(980)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ 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 $[\Gamma(\chi_{c1}(1P) \to a_0(980)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.55 \pm 0.31) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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 $[\Gamma(\chi_{c1}(1P) \to a_0(980)^+\pi^- + \text{c.c.} \to \eta\pi^+\pi^-)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. 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
$<1.5\times10^{-5}$	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 $< 1.5\times10^{-5}$ 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 $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = (9.55\pm0.31)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = 9.75\times10^{-2}$.

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8\times10^{-6}$	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 $< 8\times10^{-6}$ 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 $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = (9.55\pm0.31)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = 9.75\times10^{-2}$.

$\Gamma(f_2(1270)\eta)/\Gamma_{\text{total}}$ 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 $(6.4\pm1.1)\times10^{-4}$ 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 $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = (9.55\pm0.31)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = (9.75\pm0.24)\times10^{-2}$. 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 $(3.0\pm0.7\pm0.5)\times10^{-3}$ 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 $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = (8.7\pm0.4)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = (9.75\pm0.24)\times10^{-2}$. 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 $(2.4\pm0.4\pm0.3)\times10^{-3}$ 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 $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = 0.0907\pm0.0011\pm0.0054$, which we rescale to our best value $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = (9.75\pm0.24)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+K^-\eta'(958))/\Gamma_{\text{total}}$ 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 $B(\psi(2S)\to\gamma\chi_{c1}) = (9.2\pm0.4)\%$. Uncertainty includes both statistical and systematic contributions combined in quadrature.

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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$\mathbf{6.41 \pm 0.57^{+2.09}_{-2.71}}$	[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.

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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$\mathbf{1.65 \pm 0.47^{+1.32}_{-0.56}}$	[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.

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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.71 \pm 0.22^{+0.68}_{-0.48}}$	[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.

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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.92 \pm 0.23^{+0.55}_{-0.51}}$	[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.

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

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.35 \pm 0.09}$		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 $[\Gamma(\chi_{c1}(1P) \to \pi^0 f_0(980) \to \pi^0\pi^+\pi^-)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))] < 6.0 \times 10^{-7}$ which we divide by our best value B($\psi(2S) \to \gamma\chi_{c1}(1P)$) $= 9.75 \times 10^{-2}$.

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

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$\mathbf{32 \pm 21}$	[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.

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

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

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

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

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

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<4\times10^{-4}$	90	3.2 ± 2.4	[1] ABLIKIM	05O	BES2	$\psi(2S)\to\chi_{c1}\gamma$

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P)\to K^+K^-K^0_SK^0_S)/\Gamma_{total}]\times[B(\psi(2S)\to\gamma\chi_{c1}(1P))]<4.2\times10^{-5}$ which we divide by our best value $B(\psi(2S)\to\gamma\chi_{c1}(1P))=9.75\times10^{-2}$.

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

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.35\pm0.10\pm0.01$	22	[1] ABLIKIM	19AA	BES3	$\psi(2S)\to\gamma4K^0_S$

[1] Using $B(K^0_S\to\pi^+\pi^-)=(69.20\pm0.05)\%$. ABLIKIM 19AA reports $[\Gamma(\chi_{c1}(1P)\to K^0_SK^0_SK^0_SK^0_S)/\Gamma_{total}]\times[B(\psi(2S)\to\gamma\chi_{c1}(1P))]=(3.4\pm0.9\pm0.3)\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\gamma\chi_{c1}(1P))=(9.75\pm0.24)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value..

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

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

$\Gamma(K^+K^-\phi)/\Gamma_{total}$ Γ_{45}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.41\pm0.15\pm0.01$	17	[1] ABLIKIM	06T	BES2	$\psi(2S)\to\gamma2K^+2K^-$

[1] ABLIKIM 06T reports $(0.46\pm0.16\pm0.06)\times10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P)\to K^+K^-\phi)/\Gamma_{total}]\times[B(\psi(2S)\to\gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S)\to\gamma\chi_{c1}(1P))=(8.7\pm0.4)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\to\gamma\chi_{c1}(1P))=(9.75\pm0.24)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$3.27\pm0.28\pm0.46$	ABLIKIM	15M	BES3	$\psi(2S)\to\gamma\chi_{c1}$

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

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$1.62\pm0.12\pm0.28$	ABLIKIM	15M	BES3	$\psi(2S)\to\gamma\chi_{c1}$

$\Gamma(\phi\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{48}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$0.75\pm0.06\pm0.08$	373	[1] ABLIKIM	13B	BES3	$e^+e^-\to\psi(2S)\to\gamma\chi_{c1}$

[1] Using 1.06×10^8 $\psi(2S)$ mesons and $B(\psi(2S)\to\chi_{c1}\gamma)=(9.2\pm0.4)\%$.

$\Gamma(\omega\omega)/\Gamma_{\text{total}}$ Γ_{49}/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 $[\Gamma(\chi_{c1}(1P) \to \omega\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

$\Gamma(\omega K^+ K^-)/\Gamma_{\text{total}}$ Γ_{50}/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 $B(\psi(2S) \to \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$.

$\Gamma(\omega\phi)/\Gamma_{\text{total}}$ Γ_{51}/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 $[\Gamma(\chi_{c1}(1P) \to \omega\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (2.67 \pm 0.31 \pm 0.27) \times 10^{-6}$ 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 $[\Gamma(\chi_{c1}(1P) \to \omega\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

$\Gamma(\phi\phi)/\Gamma_{\text{total}}$ Γ_{52}/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 $[\Gamma(\chi_{c1}(1P) \to \phi\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

$\Gamma(\phi\phi\eta)/\Gamma_{\text{total}}$ Γ_{53}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3.0±0.4±0.2	83.6	[1] ABLIKIM	20B	BES3	$\psi(2S) \to \gamma\phi\phi\eta$

[1] ABLIKIM 20B reports $(2.96 \pm 0.43 \pm 0.22) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \phi\phi\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$.

$\Gamma(p\overline{p})/\Gamma_{\text{total}}$ Γ_{54}/Γ

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

$\Gamma(p\overline{p}\pi^0)/\Gamma_{\text{total}}$ Γ_{55}/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 $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

[2] ATHAR 07 reports $(1.2 \pm 0.5 \pm 0.1) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

$\Gamma(p\overline{p}\eta)/\Gamma_{\text{total}}$ Γ_{56}/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 $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

[2] ATHAR 07 reports $< 0.16 \times 10^{-3}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(p\overline{p}\omega)/\Gamma_{\text{total}}$ Γ_{57}/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 $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

$\Gamma(p\overline{p}\phi)/\Gamma_{\text{total}}$ Γ_{58}/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 $[\Gamma(\chi_{c1}(1P) \to p\overline{p}\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{59}/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				
$0.46\pm0.12\pm0.15$	[1] BAI	99B	BES	$\psi(2S)\to\ \gamma\chi_{c1}$
$1.08\pm0.77\pm0.05$	[1] TANENBAUM	78	MRK1	$\psi(2S)\to\ \gamma\chi_{c1}$

[1] Rescaled by us using $B(\psi(2S)\to\ \gamma\chi_{c1}) = (8.8\pm0.4)\%$ and $B(\psi(2S)\to J/\psi(1S)\pi^+\pi^-) = (32.6\pm0.5)\%$.

$\Gamma(p\overline{p}\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_{60}/Γ

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
$<5\times10^{-4}$	90	[1] HE	08B	CLEO	$e^+e^-\to\ \gamma h^+h^-h^0h^0$

[1] HE 08B reports $<0.05\times10^{-2}$ from a measurement of $[\Gamma(\chi_{c1}(1P)\to\ p\overline{p}\pi^0\pi^0)/\Gamma_{\text{total}}]\times[B(\psi(2S)\to\ \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S)\to\ \gamma\chi_{c1}(1P)) = (9.07\pm0.11\pm0.54)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\to\ \gamma\chi_{c1}(1P)) = 9.75\times10^{-2}$.

$\Gamma(p\overline{p}K^+K^-(\text{non-resonant}))/\Gamma_{\text{total}}$ Γ_{61}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$1.27\pm0.22\pm0.03$	82 ± 9	[1] ABLIKIM	11F	BES3	$\psi(2S)\to\ \gamma p\overline{p}K^+K^-$

[1] ABLIKIM 11F reports $(1.35\pm0.15\pm0.19)\times10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P)\to p\overline{p}K^+K^-(\text{non-resonant}))/\Gamma_{\text{total}}]\times[B(\psi(2S)\to\ \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = (9.2\pm0.4)\times10^{-2}$, which we rescale to our best value $B(\psi(2S)\to\gamma\chi_{c1}(1P)) = (9.75\pm0.24)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p\overline{p}K^0_SK^0_S)/\Gamma_{\text{total}}$ Γ_{62}/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 $B(\psi(2S)\to\ \chi_{c1}\gamma)$ $(9.1\pm0.6)\%$.

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

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$3.8\pm0.5\pm0.1$	1412	[1] ABLIKIM	12J	BES3	$\psi(2S)\to\ \gamma p\overline{n}\pi^-$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c1}(1P)\to\ p\overline{n}\pi^-)/\Gamma_{\text{total}}]\times[B(\psi(2S)\to\ \gamma\chi_{c1}(1P))] = (0.37\pm0.02\pm0.04)\times10^{-4}$ which we divide by our best value $B(\psi(2S)\to\ \gamma\chi_{c1}(1P)) = (9.75\pm0.24)\times10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$3.9\pm0.5\pm0.1$	1625	[1] ABLIKIM	12J	BES3	$\psi(2S)\to\ \gamma\overline{p}n\pi^+$

[1] ABLIKIM 12J reports $[\Gamma(\chi_{c1}(1P)\to\ \overline{p}n\pi^+)/\Gamma_{\text{total}}]\times[B(\psi(2S)\to\ \gamma\chi_{c1}(1P))] = (0.38\pm0.02\pm0.04)\times10^{-4}$ which we divide by our best value $B(\psi(2S)\to\ \gamma\chi_{c1}(1P)) = (9.75\pm0.24)\times10^{-2}$. 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_{65}/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_{66}/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_{67}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
1.27±0.08 OUR FIT	

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ Γ_{68}/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 ± 0.6)%.

$\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-(\text{non-resonant}))/\Gamma_{total}$ Γ_{69}/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_{70}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-4}$	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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^-\overline{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{71}/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 $[\Gamma(\chi_{c1}(1P) \to \Sigma(1385)^-\overline{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{72}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2±0.4 OUR AVERAGE	Error includes scale factor of 1.2.				
$9.2^{+2.8}_{-2.4} \pm 0.4$	24	[1] LU	19	BELL	$B^+ \to \overline{p}\Lambda K^+ K^+$
$4.2 \pm 0.4 \pm 0.1$	3k	[2,3] ABLIKIM	13D	BES3	$\psi(2S) \to \gamma\Lambda\overline{p}K^+$
$3.1 \pm 0.9 \pm 0.1$		[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 $[\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda\text{+c.c.})/\Gamma_{\text{total}}] \times [\text{B}(B^+ \to \chi_{c1}(1P)K^+)]$ assuming $\text{B}(B^+ \to \chi_{c1}(1P)K^+) = (4.79 \pm 0.23) \times 10^{-4}$, which we rescale to our best value $\text{B}(B^+ \to \chi_{c1}(1P)K^+) = (4.74 \pm 0.22) \times 10^{-4}$. 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 $[\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda\text{+c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

[4] ATHAR 07 reports $(3.3 \pm 0.9 \pm 0.4) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda\text{+c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(nK^0_S\overline{\Lambda} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{73}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.66±0.12±0.12	399	[1] ABLIKIM	21AV	BES3	$\psi(2S) \to \gamma n K^0_S\overline{\Lambda}$ + c.c.

[1] ABLIKIM 21AV reports $(1.66 \pm 0.12 \pm 0.12) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to nK^0_S\overline{\Lambda} + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = 0.0975 \pm 0.0024$. Also uses $\text{B}(\overline{\Lambda} \to \overline{p}\pi^+) = (63.9 \pm 0.5)\%$ and $\text{B}(K^0_S \to \pi^+\pi^-) = (69.20 \pm 0.05)\%$.

$\Gamma(K^*(892)^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{74}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
4.9±0.7±0.1	328	[1] ABLIKIM	19AU	BES3	$\psi(2S) \to \gamma K^{*+}\overline{p}\Lambda$

[1] ABLIKIM 19AU reports $[\Gamma(\chi_{c1}(1P) \to K^*(892)^+\overline{p}\Lambda\text{+ c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))] = (4.8 \pm 0.5 \pm 0.4) \times 10^{-5}$ which we divide by our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+\overline{p}\Lambda(1520)+\text{c.c.})/\Gamma_{\text{total}}$ Γ_{75}/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 $(1.81\pm0.38\pm0.28)\times10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to K^+\overline{p}\Lambda(1520)+\text{ c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, 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.

$\Gamma(\Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{\text{total}}$ Γ_{76}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<9\times10^{-5}$	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 $[\Gamma(\chi_{c1}(1P) \to \Lambda(1520)\overline{\Lambda}(1520))/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{77}/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 $[\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.41\pm0.05\pm0.03)\times10^{-5}$ 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 $[\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $[\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma^+\overline{\Sigma}^-)/\Gamma_{\text{total}}$ Γ_{80}/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 $[\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))] = (0.35\pm0.06\pm0.02)\times10^{-5}$ 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 $[\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $[\Gamma(\chi_{c1}(1P) \to \Sigma^+\overline{\Sigma}^-)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma^-\overline{\Sigma}^+)/\Gamma_{\text{total}}$ Γ_{81}/Γ

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
5.7±1.4±0.6	214	[1] ABLIKIM	20I	BES3	$\psi(2S) \to \gamma\Sigma^-\overline{\Sigma}^+$

[1] ABLIKIM 20I reports $(5.7 \pm 1.4 \pm 0.6) \times 10^{-5}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Sigma^-\overline{\Sigma}^+)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$.

$\Gamma(\Sigma(1385)^+\overline{\Sigma}(1385)^-)/\Gamma_{\text{total}}$ Γ_{82}/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 $[\Gamma(\chi_{c1}(1P) \to \Sigma(1385)^+\overline{\Sigma}(1385)^-)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Sigma(1385)^-\overline{\Sigma}(1385)^+)/\Gamma_{\text{total}}$ Γ_{83}/Γ

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

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

$\Gamma(K^-\Lambda\overline{\Xi}^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{84}/Γ

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

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

$\Gamma(\Xi^0\overline{\Xi}^0)/\Gamma_{\text{total}}$ Γ_{85}/Γ

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

[1] NAIK 08 reports $< 0.60 \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Xi^0\overline{\Xi}^0)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{\text{total}}$ Γ_{86}/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	$\psi(2S) \to \gamma\Xi^+\overline{\Xi}^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 3.4	90	[2] ABLIKIM	06D	BES2	$\psi(2S) \to \gamma\chi_{c1}$

[1] NAIK 08 reports $(0.86 \pm 0.22 \pm 0.08) \times 10^{-4}$ from a measurement of $[\Gamma(\chi_{c1}(1P) \to \Xi^-\overline{\Xi}^+)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.07 \pm 0.11 \pm 0.54) \times 10^{-2}$, which we rescale to our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = (9.75 \pm 0.24) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma(\pi^+\pi^-) + \Gamma(K^+K^-)]/\Gamma_{\text{total}}$ Γ_{87}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 21 \times 10^{-4}$		[1] FELDMAN	77	MRK1	$\psi(2S) \to \gamma\chi_{c1}$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 38 \times 10^{-4}$	90	[1] BRANDELIK	79B	DASP	$\psi(2S) \to \gamma\chi_{c1}$

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

$\Gamma(K^0_S K^0_S)/\Gamma_{\text{total}}$ Γ_{88}/Γ

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

[1] ABLIKIM 05O reports $[\Gamma(\chi_{c1}(1P) \to K^0_S K^0_S)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))] < 0.6 \times 10^{-5}$ which we divide by our best value $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\eta_c\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{89}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 3.2 \times 10^{-3}$	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 $\text{B}(\psi(2S) \to \chi_{c1}\gamma) = (9.2 \pm 0.4)\%$.

[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

$\Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$ Γ_{90}/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 $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P))$ and the product $\text{B}(\psi(2S) \to \gamma\chi_{c1}(1P)) \times \text{B}(\chi_{c1}(1P) \to \gamma J/\psi(1S))$ also measured in ABLIKIM 17U.

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

$\Gamma(\gamma\rho^0)/\Gamma_{\text{total}}$ Γ_{91}/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 $[\Gamma(\chi_{c1}(1P) \to \gamma\rho^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $[\Gamma(\chi_{c1}(1P) \to \gamma\rho^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

$\Gamma(\gamma\omega)/\Gamma_{\text{total}}$ Γ_{92}/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 $[\Gamma(\chi_{c1}(1P) \to \gamma\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $[\Gamma(\chi_{c1}(1P) \to \gamma\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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.

$\Gamma(\gamma\phi)/\Gamma_{\text{total}}$ Γ_{93}/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 $[\Gamma(\chi_{c1}(1P) \to \gamma\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ 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 $[\Gamma(\chi_{c1}(1P) \to \gamma\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \to \gamma\chi_{c1}(1P))]$ assuming $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.4) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = 9.75 \times 10^{-2}$.

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ Γ_{94}/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. • • •

$< 3.5 \times 10^{-5}$	90		ECKLUND	08A	CLEO	$\psi(2S) \to \gamma\chi_{c1} \to 3\gamma$
$<150 \times 10^{-5}$	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_{95}/Γ

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.65 \pm 0.23 \pm 0.09$	1.9k	[1,2] 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.

[2] Not independent from other measurements reported by ABLIKIM 17I

$\Gamma(e^+e^- J/\psi(1S))/\Gamma(\gamma J/\psi(1S))$ Γ_{95}/Γ_{90}

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

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

$\Gamma(\mu^+\mu^- J/\psi(1S))/\Gamma(e^+e^- J/\psi(1S))$ Γ_{96}/Γ_{95}

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$6.73 \pm 0.51 \pm 0.50$	222	ABLIKIM	19Z	BES3	$\psi(2S) \to \gamma\chi_c \to \gamma(\mu^+\mu^- J/\psi)$

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

$\Gamma(\chi_{c1}(1P) \to p\overline{p})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{54}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

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 $B(\psi(2S) \to \gamma\chi_{c1}) = (8.7 \pm 0.8)\%$ and $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{total} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{total}$ $\Gamma_{67}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-6})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
12.4 ± 0.8 OUR FIT					
12.3 ± 0.9 OUR AVERAGE Error includes scale factor of 1.2.					
$12.8 \pm 0.6 \pm 0.6$	528	ABLIKIM	21L	BES3	$\psi(2S) \to \gamma p\pi^-\overline{p}\pi^+$
$10.5 \pm 1.6 \pm 0.6$	46	[1] NAIK	08	CLEO	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$11.2 \pm 1.0 \pm 0.9$	136	[2,3]	ABLIKIM	13H	BES3	$\psi(2S) \to \gamma\Lambda\overline{\Lambda}$

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

[2] Superseded by ABLIKIM 21L

[3] 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 $B(\chi_{c1} \to \Lambda\overline{\Lambda}) \times B(\psi(2S) \to \gamma\chi_{c1})$ assuming $B(\psi(2S) \to \gamma\chi_{c1}) = (9.2 \pm 0.4)\%$.

$\Gamma(\chi_{c1}(1P) \to \Lambda\overline{\Lambda})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)$ $\Gamma_{67}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3.58 ± 0.22 OUR FIT					
$7.1\ ^{+2.8}_{-2.4} \pm 1.3$	$9.0^{+3.5}_{-3.1}$	[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 $B(\Lambda \to \pi^- p) = (63.9 \pm 0.5)\%$ and $B(J/\psi \to p\overline{p}) = (2.17 \pm 0.07) \times 10^{-3}$.

$\Gamma(\chi_{c1}(1P) \to \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$ $\Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma^{\psi(2S)}$

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.			
$3.518 \pm 0.010 \pm 0.120$	143k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma J/\psi$
$3.442 \pm 0.010 \pm 0.132$	1.9M	ABLIKIM	17U	BES3	$e^+e^- \to \gamma X$
$2.81 \pm 0.05 \pm 0.23$	13k	BAI	04I	BES2	$\psi(2S) \to J/\psi\gamma\gamma$
$2.56 \pm 0.12 \pm 0.20$		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. • • •

$3.377 \pm 0.009 \pm 0.183$	142k	[5] ABLIKIM	12O	BES3	$\psi(2S) \to \gamma\chi_{c1}$
$3.56 \pm 0.03 \pm 0.12$	24.9k	[6] MENDEZ	08	CLEO	$\psi(2S) \to \gamma\chi_{c1}$
$3.44 \pm 0.06 \pm 0.13$	3.7k	[7] ADAM	05A	CLEO	Repl. by MENDEZ 08

[1] Uses $B(J/\psi \to e^+e^-) = (5.971 \pm 0.032)\%$ and $B(J/\psi \to \mu^+\mu^-) = (5.961 \pm 0.033)\%$.

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

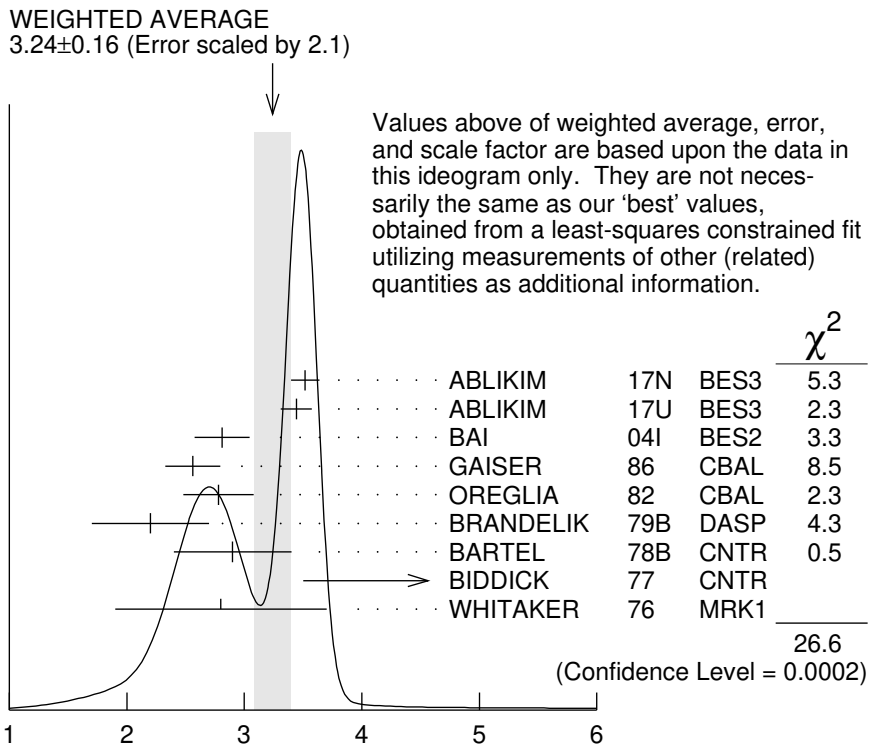
[3] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$.

[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.



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

$\Gamma\left(\chi_{c1}(1P) \to \gamma J/\psi(1S)\right)/\Gamma_{\text{total}} \times \Gamma\left(\psi(2S) \to \gamma\chi_{c1}(1P)\right)/\Gamma\left(\psi(2S) \to J/\psi(1S)\,\text{anything}\right)$ $\Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{10}^{\psi(2S)}$

$\Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{10}^{\psi(2S)} = \Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/(\Gamma_{12}^{\psi(2S)}+\Gamma_{13}^{\psi(2S)}+\Gamma_{14}^{\psi(2S)}+0.343\Gamma_{163}^{\psi(2S)}+0.190\Gamma_{164}^{\psi(2S)})$

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.

$\Gamma\left(\chi_{c1}(1P) \to \gamma J/\psi(1S)\right)/\Gamma_{\text{total}} \times \Gamma\left(\psi(2S) \to \gamma\chi_{c1}(1P)\right)/\Gamma\left(\psi(2S) \to J/\psi(1S)\pi^+\pi^-\right)$ $\Gamma_{90}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

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. • • •

$10.24 \pm 0.17 \pm 0.23$	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 $B(\psi(2S) \to \gamma\chi_{c1}) \times B(\chi_{c1} \to \gamma J/\psi(1S))$ quoted in HIMEL 80 is derived using $B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-) = (33 \pm 3)\%$ and $B(J/\psi(1S) \to \ell^+\ell^-) = 0.138 \pm 0.018$. Calculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$.

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

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

$\Gamma_{17}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-4})	*DOCUMENT ID*		*TECN*	*COMMENT*
6.8±0.5 OUR FIT				
7.2±0.6 OUR AVERAGE				
$7.3 \pm 0.5 \pm 0.5$	[1] ATHAR	07	CLEO	$\psi(2S) \to \gamma K_S^0 K^+\pi^-$
$7.0 \pm 0.5 \pm 0.9$	[2] ABLIKIM	06R	BES2	$\psi(2S) \to \gamma\chi_{c1}$

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

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

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

$\Gamma_{17}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

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

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

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

$\Gamma_{44}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma^{\psi(2S)}$

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 $B(\psi(2S) \to \gamma\chi_{c1}(1P)) = (8.7 \pm 0.8)\%$.

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

$\Gamma_{44}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma_{12}^{\psi(2S)}$

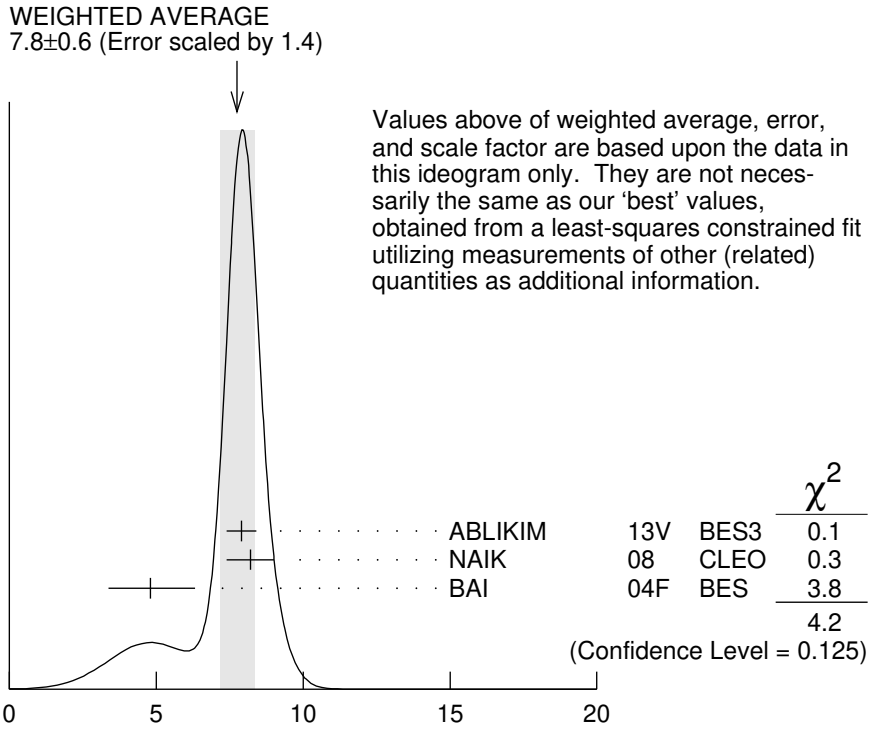
VALUE (units 10^{-4})	*DOCUMENT ID*		*TECN*	*COMMENT*
1.52±0.31 OUR FIT				
1.13±0.40±0.29	[1] BAI	99B	BES	$\psi(2S) \to \gamma K^+K^+K^-K^-$

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

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

$\Gamma_{54}/\Gamma \times \Gamma^{\psi(2S)}_{163}/\Gamma^{\psi(2S)}$

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

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

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

$\Gamma_{78}/\Gamma \times \Gamma^{\psi(2S)}_{163}/\Gamma^{\psi(2S)}$

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.49±0.09±0.07	258	[1] ABLIKIM	19BB	BES3	$\psi(2S) \to \gamma\Sigma^+\overline{p}K^0_S$ + c.c.

[1] Calculated by us. ABLIKIM 19BB reports $B(\chi_{c1} \to \Sigma^+\overline{p}K^0_S + \text{c.c.}) = (1.53 \pm 0.10 \pm 0.08) \times 10^{-4}$ using $B(\psi(2S) \to \gamma\chi_{c1}) = (9.75 \pm 0.24)\%$ and other branching fractions from PDG 18.

$\Gamma(\chi_{c1}(1P) \to \Sigma^0\overline{p}K^+ + \text{c.c.})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \to \gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$ $\Gamma_{79}/\Gamma \times \Gamma_{163}^{\psi(2S)}/\Gamma^{\psi(2S)}$

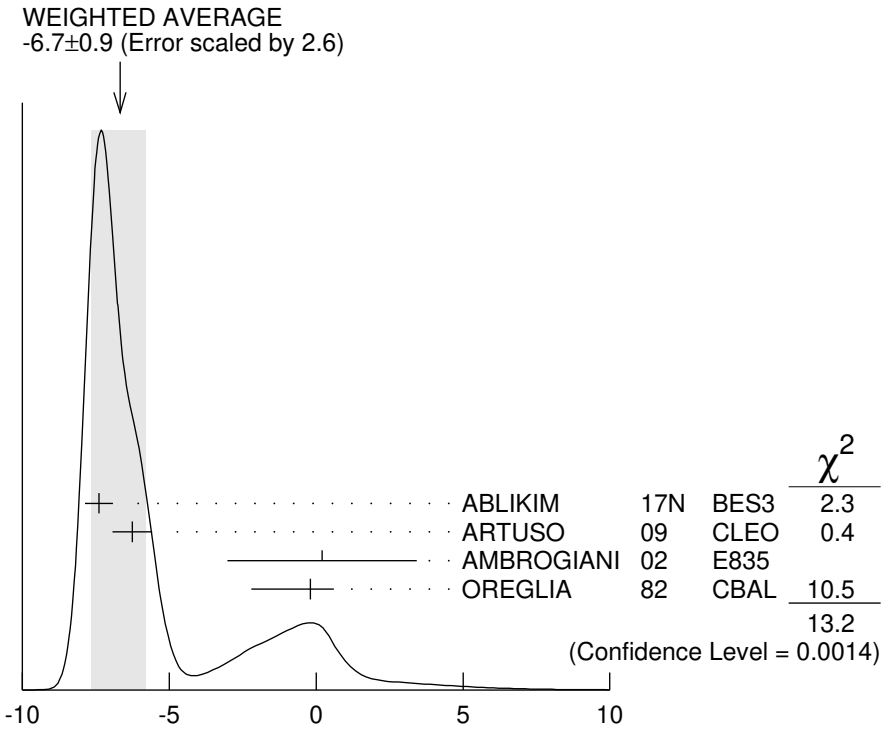
VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.42±0.07±0.06	493	[1] ABLIKIM	20AE	BES3	$\psi(2S) \to \gamma\Sigma^0\overline{p}K^+ + \text{c.c.}$

[1] Calculated by us. ABLIKIM 20AE reports $B(\chi_{c1} \to \Sigma^0\overline{p}K^+ + \text{c.c.}) = (1.46 \pm 0.07 \pm 0.07) \times 10^{-4}$ using $B(\psi(2S) \to \gamma\chi_c^0) = (9.75 \pm 0.24)\%$ and other branching fractions from PDG 20.

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

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

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
−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	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$-6.26 \pm 0.63 \pm 0.24$	39k	ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$0.2 \pm 3.2 \pm 0.4$	2090	AMBROGIANI	02	E835	$p\overline{p} \to \chi_{c1} \to J/\psi\gamma$
$-0.2\ ^{+0.8}_{-2.0}$	921	OREGLIA	82	CBAL	$\psi(2S) \to \chi_{c1}\gamma \to J/\psi\gamma\gamma$



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

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

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

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

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.5 ±0.4 OUR AVERAGE					
$2.29 \pm 0.39 \pm 0.27$	164k	[1] ABLIKIM	17N	BES3	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$2.76 \pm 0.73 \pm 0.23$	39k	ARTUSO	09	CLEO	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$
$7.7\ ^{+5.0}_{-4.5}$	921	OREGLIA	82	CBAL	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

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

MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS $\psi(2S) \to \gamma\chi_{c1}(1S)$ and $\chi_{c1} \to \gamma J/\psi(1S)$

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	$\psi(2S) \to \gamma\gamma\ell^+\ell^-$

[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	21AV	JHEP 2111 217	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	21L	PR D103 112004	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	20AE	PR D102 092006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	20B	PR D101 012012	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	20I	PR D101 092002	M. Ablikim *et al.*	(BESIII Collab.)
PDG	20	PTEP 2020 083C01	P.A. Zyla *et al.*	(PDG Collab.)
ABLIKIM	19AA	PR D99 052008	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19AU	PR D100 052010	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19BB	PR D100 092006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19J	PR D99 012015	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	19Z	PR D99 051101	M. Ablikim *et al.*	(BESIII Collab.)
LU	19	PR D99 032003	P.-C. Lu *et al.*	(BELLE Collab.)
ABLIKIM	18D	PRL 121 022001	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	18V	PR D97 052011	M. Ablikim *et al.*	(BESIII Collab.)
PDG	18	PR D98 030001	M. Tanabashi *et al.*	(PDG 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.*	(BESIII Collab.)
ABLIKIM	17I	PRL 118 221802	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17K	PR D95 032002	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17N	PR D95 072004	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	17U	PR D96 032001	M. Ablikim *et al.*	(BESIII Collab.)
PDG	16	CP C40 100001	C. Patrignani *et al.*	(PDG Collab.)
ABLIKIM	15I	PR D91 092006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	15M	PR D91 112008	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	14J	PR D89 074030	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	13B	PR D87 012002	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	13D	PR D87 012007	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	13H	PR D87 032007	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	13V	PR D88 112001	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	12I	PR D86 052004	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	12J	PR D86 052011	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	12O	PRL 109 172002	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	11A	PR D83 012006	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	11D	PR D83 032003	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	11E	PR D83 112005	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	11F	PR D83 112009	M. Ablikim *et al.*	(BESIII Collab.)
ABLIKIM	11K	PRL 107 092001	M. Ablikim *et al.*	(BESIII 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)
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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)