

$\chi_{c0}(1P)$

$$J^{PC} = 0^+(0^{++})$$

$\chi_{c0}(1P)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
3414.76 ± 0.35 OUR AVERAGE		Error includes scale factor of 1.2.		
3414.21 ± 0.39 ± 0.27		ABLIKIM	05G BES2	$\psi(2S) \rightarrow \gamma \chi_{c0}$
3414.7 $^{+0.7}_{-0.6}$ ± 0.2		¹ ANDREOTTI	03 E835	$\bar{p}p \rightarrow \chi_{c0} \rightarrow \pi^0 \pi^0$
3415.5 ± 0.4 ± 0.4	392	² BAGNASCO	02 E835	$\bar{p}p \rightarrow \chi_{c0} \rightarrow J/\psi \gamma$
3417.4 $^{+1.8}_{-1.9}$ ± 0.2		¹ AMBROGIANI	99B E835	$\bar{p}p \rightarrow e^+ e^- \gamma$
3414.1 ± 0.6 ± 0.8		BAI	99B BES	$\psi(2S) \rightarrow \gamma X$
3417.8 ± 0.4 ± 4		¹ GAISER	86 CBAL	$\psi(2S) \rightarrow \gamma X$
3416 ± 3 ± 4		³ TANENBAUM	78 MRK1	$e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3407 ± 11	89	⁴ ABE	04G BELL	$10.6 e^+ e^- \rightarrow J/\psi(c\bar{c})$
3416.5 ± 3.0		EISENSTEIN	01 CLE2	$e^+ e^- \rightarrow e^+ e^- \chi_{c0}$
3422 ± 10		³ BARTEL	78B CNTR	$e^+ e^- \rightarrow J/\psi 2\gamma$
3415 ± 9		³ BIDDICK	77 CNTR	$e^+ e^- \rightarrow \gamma X$

¹ Using mass of $\psi(2S) = 3686.0$ MeV.² Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03.³ Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.⁴ From a fit of the J/ψ recoil mass spectrum. Systematic errors not estimated.

$\chi_{c0}(1P)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
10.4 ± 0.7 OUR FIT				
10.5 ± 0.9 OUR AVERAGE		Error includes scale factor of 1.2.		
12.6 $^{+1.5+0.9}_{-1.6-1.1}$		ABLIKIM	05G BES2	$\psi(2S) \rightarrow \gamma \chi_{c0}$
8.6 $^{+1.7}_{-1.3}$ ± 0.1		ANDREOTTI	03 E835	$\bar{p}p \rightarrow \chi_{c0} \rightarrow \pi^0 \pi^0$
9.7 ± 1.0	392	⁵ BAGNASCO	02 E835	$\bar{p}p \rightarrow \chi_{c0} \rightarrow J/\psi \gamma$
16.6 $^{+5.2}_{-3.7}$ ± 0.1		AMBROGIANI	99B E835	$\bar{p}p \rightarrow e^+ e^- \gamma$
14.3 ± 2.0 ± 3.0		BAI	98I BES	$\psi(2S) \rightarrow \gamma \pi^+ \pi^-$
13.5 ± 3.3 ± 4.2		GAISER	86 CBAL	$\psi(2S) \rightarrow \gamma X, \gamma \pi^0 \pi^0$

⁵ Recalculated by ANDREOTTI 05A.

$\chi_{c0}(1P)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
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Hadronic decays

Γ_1	$2(\pi^+\pi^-)$	$(2.41 \pm 0.23) \%$	
Γ_2	$f_0(980)f_0(980) \rightarrow 2\pi^+2\pi^-$	$(7.1 \pm 2.3) \times 10^{-4}$	
Γ_3	$\pi^+\pi^-K^+K^-$	$(2.0 \pm 0.4) \%$	S=1.6
Γ_4	$f_0(980)f_0(980) \rightarrow \pi^+\pi^-K^+K^-$	$(1.7 \pm 1.1 \pm 1.0) \times 10^{-4}$	
Γ_5	$f_0(980)f_0(2200) \rightarrow \pi^+\pi^-K^+K^-$	$(8.4 \pm 2.2 \pm 2.7) \times 10^{-4}$	
Γ_6	$f_0(1370)f_0(1370) \rightarrow \pi^+\pi^-K^+K^-$	$< 2.9 \times 10^{-4}$	CL=90%
Γ_7	$f_0(1370)f_0(1500) \rightarrow \pi^+\pi^-K^+K^-$	$< 1.8 \times 10^{-4}$	CL=90%
Γ_8	$f_0(1370)f_0(1710) \rightarrow \pi^+\pi^-K^+K^-$	$(7.1 \pm 3.8 \pm 2.5) \times 10^{-4}$	
Γ_9	$f_0(1500)f_0(1370) \rightarrow \pi^+\pi^-K^+K^-$	$< 1.4 \times 10^{-4}$	CL=90%
Γ_{10}	$f_0(1500)f_0(1500) \rightarrow \pi^+\pi^-K^+K^-$	$< 6 \times 10^{-5}$	CL=90%
Γ_{11}	$f_0(1500)f_0(1710) \rightarrow \pi^+\pi^-K^+K^-$	$< 7 \times 10^{-5}$	CL=90%
Γ_{12}	$\rho^0\pi^+\pi^-$	$(1.6 \pm 0.5) \%$	
Γ_{13}	$3(\pi^+\pi^-)$	$(1.19 \pm 0.18) \%$	
Γ_{14}	$K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$	$(1.2 \pm 0.4) \%$	
Γ_{15}	$K_1(1270)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-$	$(6.7 \pm 2.0) \times 10^{-3}$	
Γ_{16}	$K_1(1400)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-$	$< 2.9 \times 10^{-3}$	CL=90%
Γ_{17}	$K^*(892)^0\bar{K}^*(892)^0$	$(1.8 \pm 0.6) \times 10^{-3}$	
Γ_{18}	$K_0^*(1430)^0\bar{K}_0^*(1430)^0 \rightarrow \pi^+\pi^-K^+K^-$	$(1.05 \pm 0.39 \pm 0.30) \times 10^{-3}$	
Γ_{19}	$K_0^*(1430)^0\bar{K}_2^*(1430)^0 + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-$	$(8.5 \pm 2.1 \pm 2.6) \times 10^{-4}$	
Γ_{20}	K^+K^-	$(5.4 \pm 0.6) \times 10^{-3}$	
Γ_{21}	$\pi\pi$	$(7.2 \pm 0.6) \times 10^{-3}$	
Γ_{22}	$\pi^0\eta$		
Γ_{23}	$\pi^0\eta'$		
Γ_{24}	$\eta\eta$	$(1.9 \pm 0.5) \times 10^{-3}$	
Γ_{25}	$\eta\eta'$		
Γ_{26}	$\omega\omega$	$(2.3 \pm 0.7) \times 10^{-3}$	
Γ_{27}	$K^+K^-K_S^0K_S^0$	$(1.5 \pm 0.5) \times 10^{-3}$	
Γ_{28}	$K^+K^-K^+K^-$	$(2.1 \pm 0.4) \times 10^{-3}$	
Γ_{29}	$K_S^0K_S^0$	$(2.8 \pm 0.7) \times 10^{-3}$	S=1.9
Γ_{30}	$K_S^0K_S^0\pi^+\pi^-$	$(6.1 \pm 1.1) \times 10^{-3}$	
Γ_{31}	$K_S^0K_S^0p\bar{p}$	$< 8.8 \times 10^{-4}$	CL=90%
Γ_{32}	$\pi^+\pi^-p\bar{p}$	$(2.1 \pm 0.7) \times 10^{-3}$	S=1.4

Γ_{33}	$\phi\phi$	$(9 \pm 5) \times 10^{-4}$	
Γ_{34}	$p\bar{p}$	$(2.24 \pm 0.27) \times 10^{-4}$	
Γ_{35}	$\Lambda\bar{\Lambda}$	$(4.4 \pm 1.5) \times 10^{-4}$	
Γ_{36}	$\Lambda\bar{\Lambda}\pi^+\pi^-$	$< 4.0 \times 10^{-3}$	CL=90%
Γ_{37}	$\Xi^-\Xi^+$	$< 1.03 \times 10^{-3}$	CL=90%
Γ_{38}	$K_S^0 K^+\pi^- + \text{c.c.}$	$< 7 \times 10^{-4}$	CL=90%

Radiative decays

Γ_{39}	$\gamma J/\psi(1S)$	$(1.30 \pm 0.11) \%$
Γ_{40}	$\gamma\gamma$	$(2.76 \pm 0.33) \times 10^{-4}$

 $\chi_{c0}(1P)$ PARTIAL WIDTHS

$$\text{————— } \chi_{c0}(1P) \Gamma(i) \Gamma(\gamma J/\psi(1S)) / \Gamma(\text{total}) \text{ —————}$$

$\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S)) / \Gamma_{\text{total}}$					$\Gamma_{34}\Gamma_{39}/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	

29.2 ± 2.7 OUR FIT

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

$26.6 \pm 2.6 \pm 1.4$	392	^{6,7} BAGNASCO	02	E835	$\bar{p}p \rightarrow \chi_{c0} \rightarrow J/\psi\gamma$
$48.7^{+11.3}_{-8.9} \pm 2.4$		^{6,7} AMBROGIANI	99B	E835	$\bar{p}p \rightarrow \gamma J/\psi$

⁶ Calculated by us using $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0593 \pm 0.0010$.⁷ Values in $(\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S)) / \Gamma_{\text{total}})$ and $(\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S)) / \Gamma_{\text{total}}^2)$ are not independent. The latter is used in the fit since it is less correlated to the total width.

$$\text{————— } \chi_{c0}(1P) \Gamma(i) \Gamma(\gamma\gamma) / \Gamma(\text{total}) \text{ —————}$$

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma) / \Gamma_{\text{total}}$					$\Gamma_{21}\Gamma_{40}/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	

20.7 ± 3.0 OUR FIT

22.7 ± 3.2 ± 3.5	129 ± 18	⁸ NAKAZAWA	05	BELL	$e^+e^- \rightarrow e^+e^-\chi_{c0}$
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$\Gamma(K^+K^-) \times \Gamma(\gamma\gamma) / \Gamma_{\text{total}}$					$\Gamma_{20}\Gamma_{40}/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	

15.6 ± 2.2 OUR FIT

14.3 ± 1.6 ± 2.3	153 ± 17	NAKAZAWA	05	BELL	$e^+e^- \rightarrow e^+e^-\chi_{c0}$
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$\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma) / \Gamma_{\text{total}}$					$\Gamma_1\Gamma_{40}/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	

69 ± 9 OUR FIT

75 ± 13 ± 8		EISENSTEIN	01	CLE2	$e^+e^- \rightarrow e^+e^-\chi_{c0}$
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⁸ We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$. **$\chi_{c0}(1P)$ BRANCHING RATIOS**

$$\text{————— } \text{HADRONIC DECAYS} \text{ —————}$$

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

0.0241 ± 0.0023 OUR FIT

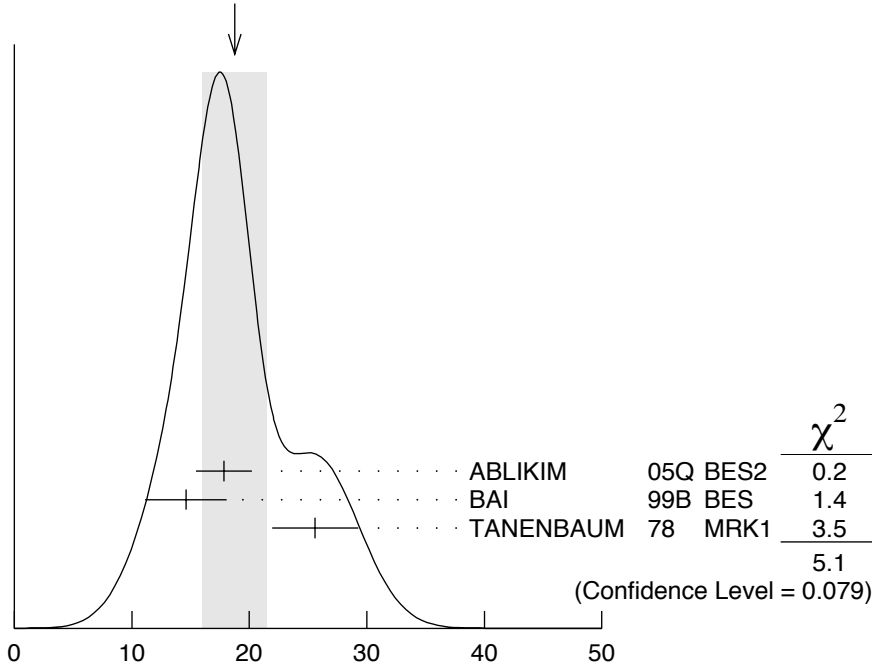
$\Gamma(f_0(980)f_0(980) \rightarrow 2\pi^+ 2\pi^-)/\Gamma_{\text{total}}$ Γ_2/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$7.1 \pm 2.2 \pm 0.3$	36 ± 9	⁹ ABLIKIM	04G BES	$\psi(2S) \rightarrow \gamma 2\pi^+ 2\pi^-$

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

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
20 ± 4 OUR EVALUATION	Error includes scale factor of 1.6. Treating systematic error as correlated.		
18.8 ± 2.7 OUR AVERAGE	Error includes scale factor of 1.6. See the ideogram below.		
$17.8 \pm 2.2 \pm 0.8$	¹⁰ ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- K^+ K^-$
$14.6 \pm 0.7 \pm 3.4$	¹¹ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c0}$
$25.6 \pm 3.5 \pm 1.1$	¹¹ TANENBAUM	78 MRK1	$\psi(2S) \rightarrow \gamma \chi_{c0}$

WEIGHTED AVERAGE
 18.8 ± 2.7 (Error scaled by 1.6)



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

$\Gamma(f_0(980)f_0(980) \rightarrow \pi^+ \pi^- K^+ K^-)/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$17. \substack{+11. \\ -10.} \pm 1.$	28	¹² ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- K^+ K^-$

$\Gamma(f_0(980)f_0(2200) \rightarrow \pi^+ \pi^- K^+ K^-)/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$8.4 \substack{+2.1 \\ -2.7} \pm 0.4$	77	¹³ ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- K^+ K^-$

$$\Gamma(f_0(1370)f_0(1370) \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}} \quad \Gamma_6/\Gamma$$

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<2.9	90	14 ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$

$$\Gamma(f_0(1370)f_0(1500) \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}} \quad \Gamma_7/\Gamma$$

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<1.8	90	15 ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$

$$\Gamma(f_0(1370)f_0(1710) \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}} \quad \Gamma_8/\Gamma$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$7.1^{+3.8}_{-2.5} \pm 0.3$	61	16 ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$

$$\Gamma(f_0(1500)f_0(1370) \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}} \quad \Gamma_9/\Gamma$$

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<1.4	90	17 ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$

$$\Gamma(f_0(1500)f_0(1500) \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}} \quad \Gamma_{10}/\Gamma$$

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<0.6	90	18 ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$

$$\Gamma(f_0(1500)f_0(1710) \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}} \quad \Gamma_{11}/\Gamma$$

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<0.7	90	19 ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$

$$\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{\text{total}} \quad \Gamma_{12}/\Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
0.016 ± 0.005	20 TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c0}$

$$\Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}} \quad \Gamma_{13}/\Gamma$$

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
11.9 ± 1.8 OUR EVALUATION	Treating systematic error as correlated.		
11.9 ± 1.7 OUR AVERAGE			
$11.6 \pm 1.0 \pm 1.9$	11 BAI	99B BES	$\psi(2S) \rightarrow \gamma\chi_{c0}$
$12.4 \pm 2.8 \pm 0.6$	11 TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c0}$

$$\Gamma(K^+\bar{K}^*(892)^0\pi^- + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{14}/\Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
0.012 ± 0.004	20 TANENBAUM 78	MRK1	$\psi(2S) \rightarrow \gamma\chi_{c0}$

$$\Gamma(K_1(1270)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}} \quad \Gamma_{15}/\Gamma$$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$6.7 \pm 2.0 \pm 0.3$	68	21 ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$

$$\Gamma(K_1(1400)^+K^- + \text{c.c.} \rightarrow \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}} \quad \Gamma_{16}/\Gamma$$

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
<2.9	90	22 ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma\pi^+\pi^-K^+K^-$

$\Gamma(K^*(892)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}}$ Γ_{17}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.8 \pm 0.6 \pm 0.1$	64	²³ ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.7 \pm 0.4 \pm 0.1$	30.1 ± 5.7	^{24,25} ABLIKIM	04H BES	Repl. by ABLIKIM 05Q

 $\Gamma(K_0^*(1430)^0 \bar{K}_0^*(1430)^0 \rightarrow \pi^+ \pi^- K^+ K^-)/\Gamma_{\text{total}}$ Γ_{18}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$10.5^{+3.8}_{-3.0} \pm 0.5$	83	²⁶ ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- K^+ K^-$

 $\Gamma(K_0^*(1430)^0 \bar{K}_2^*(1430)^0 + \text{c.c.} \rightarrow \pi^+ \pi^- K^+ K^-)/\Gamma_{\text{total}}$ Γ_{19}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$8.5^{+2.1}_{-2.6} \pm 0.4$	62	²⁷ ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- K^+ K^-$

 $\Gamma(K^+ K^-)/\Gamma_{\text{total}}$ Γ_{20}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
5.4 ± 0.6 OUR FIT	

 $\Gamma(\pi \pi)/\Gamma_{\text{total}}$ Γ_{21}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
7.2 ± 0.6 OUR FIT	

 $\Gamma(\eta \eta)/\Gamma_{\text{total}}$ Γ_{24}/Γ

VALUE (units 10^{-3})	DOCUMENT ID
1.9 ± 0.5 OUR FIT	

 $\Gamma(\eta \eta)/\Gamma(\pi \pi)$ Γ_{24}/Γ_{21}

VALUE	DOCUMENT ID	TECN	COMMENT
0.26 ± 0.08 OUR FIT			

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

$0.26 \pm 0.09^{+0.03}_{-0.02}$	²⁸ ANDREOTTI	05C E835	$\bar{p} p \rightarrow 2 \text{ mesons}$
$0.24 \pm 0.10 \pm 0.08$	²⁸ BAI	03C BES	$\psi(2S) \rightarrow 5\gamma$

 $\Gamma(\omega \omega)/\Gamma_{\text{total}}$ Γ_{26}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$2.3 \pm 0.7 \pm 0.1$	38.1 ± 9.6	²⁹ ABLIKIM	05N BES2	$\psi(2S) \rightarrow \gamma \chi_{c0} \rightarrow \gamma 6\pi$

 $\Gamma(K^+ K^- K_S^0 \bar{K}_S^0)/\Gamma_{\text{total}}$ Γ_{27}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$1.5 \pm 0.5 \pm 0.1$	16.8 ± 4.8	³⁰ ABLIKIM	05O BES2	$\psi(2S) \rightarrow \gamma \chi_{c0}$

 $\Gamma(K^+ K^- K^+ K^-)/\Gamma_{\text{total}}$ Γ_{28}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
$2.12 \pm 0.26 \pm 0.32$	¹¹ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c0}$

$\Gamma(K_S^0 K_S^0)/\Gamma_{\text{total}}$ Γ_{29}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
2.8 ± 0.7 OUR AVERAGE	Error includes scale factor of 1.9.			
$3.3 \pm 0.4 \pm 0.1$	322 ± 20	³¹ ABLIKIM	05O BES2	$\psi(2S) \rightarrow \gamma \chi_{c0}$
$1.94 \pm 0.28 \pm 0.47$		¹¹ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c0}$

 $\Gamma(K_S^0 K_S^0 \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{30}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$6.1 \pm 1.1 \pm 0.3$	152 ± 14	³² ABLIKIM	05O BES2	$\psi(2S) \rightarrow \gamma \chi_{c0}$

 $\Gamma(K_S^0 K_S^0 p \bar{p})/\Gamma_{\text{total}}$ Γ_{31}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
< 8.8	90	³³ ABLIKIM	06D BES2	$\psi(2S) \rightarrow \chi_{c0} \gamma$

 $\Gamma(\pi^+ \pi^- p \bar{p})/\Gamma_{\text{total}}$ Γ_{32}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
2.1 ± 0.7 OUR EVALUATION	Error includes scale factor of 1.4. Treating systematic error as correlated.		
2.0 ± 1.0 OUR AVERAGE	Error includes scale factor of 2.0.		
$1.55 \pm 0.21 \pm 0.52$	¹¹ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c0}$
$4.15 \pm 1.14 \pm 0.18$	¹¹ TANENBAUM	78 MRK1	$\psi(2S) \rightarrow \gamma \chi_{c0}$

 $\Gamma(\phi\phi)/\Gamma_{\text{total}}$ Γ_{33}/Γ

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
$0.91 \pm 0.34 \pm 0.36$	¹¹ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c0}$

 $\Gamma(p\bar{p})/\Gamma_{\text{total}}$ Γ_{34}/Γ

VALUE (units 10^{-4})	DOCUMENT ID
2.16 ± 0.19 OUR FIT	

 $\Gamma(\Lambda \bar{\Lambda})/\Gamma_{\text{total}}$ Γ_{35}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
$4.4 \pm 1.2 \pm 0.9$	$15.2^{+4.2}_{-4.0}$	¹¹ BAI	03E BES	$\psi(2S) \rightarrow \gamma \chi_{c0} \rightarrow \gamma \Lambda \bar{\Lambda}$

 $\Gamma(\Lambda \bar{\Lambda} \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{36}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
< 4.0	90	³³ ABLIKIM	06D BES2	$\psi(2S) \rightarrow \chi_{c0} \gamma$

 $\Gamma(\Xi^- \bar{\Xi}^+)/\Gamma_{\text{total}}$ Γ_{37}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
< 10.3	90	³³ ABLIKIM	06D BES2	$\psi(2S) \rightarrow \chi_{c0} \gamma$

 $\Gamma(K_S^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{38}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID	TECN	COMMENT
< 0.7	90	¹¹ BAI	99B BES	$\psi(2S) \rightarrow \gamma \chi_{c0}$

$$\Gamma(p\bar{p}) \times \Gamma(\pi\pi)/\Gamma_{\text{total}}^2 \quad \Gamma_{34}\Gamma_{21}/\Gamma^2$$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
15.5±1.6 OUR FIT			
15.3±2.4±0.8	34 ANDREOTTI 03 E835		$\bar{p}p \rightarrow \chi_{c0} \rightarrow \pi^0 \pi^0$

$$\Gamma(p\bar{p}) \times \Gamma(\eta\eta)/\Gamma_{\text{total}}^2 \quad \Gamma_{34}\Gamma_{24}/\Gamma^2$$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
4.1±1.1 OUR FIT			
4.0±1.2^{+0.5}_{-0.3}	ANDREOTTI 05C E835		$\bar{p}p \rightarrow \eta\eta$

$$\Gamma(p\bar{p}) \times \Gamma(\pi^0\eta)/\Gamma_{\text{total}}^2 \quad \Gamma_{34}\Gamma_{22}/\Gamma^2$$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
<0.4	ANDREOTTI 05C E835		$\bar{p}p \rightarrow \pi^0\eta$

$$\Gamma(p\bar{p}) \times \Gamma(\pi^0\eta')/\Gamma_{\text{total}}^2 \quad \Gamma_{34}\Gamma_{23}/\Gamma^2$$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
<2.5	ANDREOTTI 05C E835		$\bar{p}p \rightarrow \pi^0\eta$

$$\Gamma(p\bar{p}) \times \Gamma(\eta\eta')/\Gamma_{\text{total}}^2 \quad \Gamma_{34}\Gamma_{25}/\Gamma^2$$

VALUE (units 10^{-6})	DOCUMENT ID	TECN	COMMENT
2.1^{+2.3}_{-1.5}	ANDREOTTI 05C E835		$\bar{p}p \rightarrow \pi^0\eta$

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

- ⁹ ABLIKIM 04G reports $[B(\chi_{c0}(1P) \rightarrow f_0(980)f_0(980) \rightarrow 2\pi^+2\pi^-) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))] = (6.5 \pm 1.6 \pm 1.3) \times 10^{-5}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ¹⁰ ABLIKIM 05Q reports $[B(\chi_{c0}(1P) \rightarrow \pi^+\pi^-K^+K^-) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))] = (1.64 \pm 0.05 \pm 0.20) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ¹¹ Rescaled by us using $B(\psi(2S) \rightarrow \gamma\chi_{c0}) = (9.2 \pm 0.4)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = 0.318 \pm 0.006$.
- ¹² ABLIKIM 05Q reports $[B(\chi_{c0}(1P) \rightarrow f_0(980)f_0(980) \rightarrow \pi^+\pi^-K^+K^-) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))] = (1.59 \pm 0.50^{+0.89}_{-0.72}) \times 10^{-5}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. One of the $f_0(980)$ mesons is identified via decay to $\pi^+\pi^-$ while the other via K^+K^- decay.
- ¹³ ABLIKIM 05Q reports $(8.42 \pm 1.42^{+1.65}_{-2.29}) \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. The f_0 mesons are identified via $f_0(980) \rightarrow \pi^+\pi^-$ and $f_0(2200) \rightarrow K^+K^-$ decays.
- ¹⁴ ABLIKIM 05Q reports $< 2.9 \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = 0.092$. One of the $f_0(1370)$ mesons is identified via decay to $\pi^+\pi^-$ while the other via K^+K^- decay.

- 15 ABLIKIM 05Q reports $< 1.8 \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.092$. The f_0 mesons are identified via $f_0(1370) \rightarrow \pi^+ \pi^-$ and $f_0(1500) \rightarrow K^+ K^-$ decays.
- 16 ABLIKIM 05Q reports $(7.12 \pm 1.85^{+3.28}_{-1.68}) \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. The f_0 mesons are identified via $f_0(1370) \rightarrow \pi^+ \pi^-$ and $f_0(1710) \rightarrow K^+ K^-$ decays.
- 17 ABLIKIM 05Q reports $< 1.4 \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.092$. The f_0 mesons are identified via $f_0(1500) \rightarrow \pi^+ \pi^-$ and $f_0(1370) \rightarrow K^+ K^-$ decays.
- 18 ABLIKIM 05Q reports $< 0.55 \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.092$. One of the $f_0(1500)$ is identified via decay to $\pi^+ \pi^-$ while the other via $K^+ K^-$ decay.
- 19 ABLIKIM 05Q reports $< 0.73 \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.092$. The f_0 mesons are identified via $f_0(1500) \rightarrow \pi^+ \pi^-$ and $f_0(1710) \rightarrow K^+ K^-$ decays.
- 20 Calculated using $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.094$; the errors do not contain the uncertainty in the $\psi(2S)$ decay.
- 21 ABLIKIM 05Q reports $(6.66 \pm 1.31^{+1.60}_{-1.51}) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. The measurement assumes $B(K_1(1270) \rightarrow K \rho(770)) = 42 \pm 6\%$.
- 22 ABLIKIM 05Q reports $< 2.85 \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.092$. The measurement assumes $B(K_1(1400) \rightarrow K^*(892) \pi) = 94 \pm 6\%$.
- 23 ABLIKIM 05Q reports $[B(\chi_{c0}(1P) \rightarrow K^*(892)^0 \bar{K}^*(892)^0) \times B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))]$ $= (0.168 \pm 0.035^{+0.047}_{-0.040}) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 24 Assumes $B(K^*(892)^0 \rightarrow K^- \pi^+) = 2/3$.
- 25 ABLIKIM 04H reports $[B(\chi_{c0}(1P) \rightarrow K^*(892)^0 \bar{K}^*(892)^0) \times B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))]$ $= (1.53 \pm 0.29 \pm 0.26) \times 10^{-4}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 26 ABLIKIM 05Q reports $(10.44 \pm 2.37^{+3.05}_{-1.90}) \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 27 ABLIKIM 05Q reports $(8.49 \pm 1.66^{+1.32}_{-1.99}) \times 10^{-4}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.22 \pm 0.11 \pm 0.46) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- 28 We have multiplied $\pi^0 \pi^0$ measurement by 3 to obtain $\pi \pi$.

- ²⁹ ABLIKIM 05N reports $[B(\chi_{c0}(1P) \rightarrow \omega\omega) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))] = (0.212 \pm 0.053 \pm 0.037) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³⁰ ABLIKIM 05O reports $[B(\chi_{c0}(1P) \rightarrow K^+K^-K_S^0K_S^0) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))] = (0.138 \pm 0.039 \pm 0.025) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³¹ ABLIKIM 05O reports $[B(\chi_{c0}(1P) \rightarrow K_S^0K_S^0) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))] = (0.302 \pm 0.019 \pm 0.033) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³² ABLIKIM 05O reports $[B(\chi_{c0}(1P) \rightarrow K_S^0K_S^0\pi^+\pi^-) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))] = (0.558 \pm 0.051 \pm 0.089) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³³ Using $B(\psi(2S) \rightarrow \chi_{c0}\gamma) = (9.2 \pm 0.5)\%$
- ³⁴ We have multiplied $B(p\bar{p}) \cdot B(\pi^0\pi^0)$ measurement by 3 to obtain $B(p\bar{p}) \cdot B(\pi\pi)$.

RADIATIVE DECAYS

$\Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$

Γ_{39}/Γ

VALUE (units 10^{-4})

DOCUMENT ID

TECN

COMMENT

130±11 OUR FIT

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

200±20±20

³⁶ ADAM

05A CLEO $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c0}$

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$

Γ_{40}/Γ

VALUE (units 10^{-4})

DOCUMENT ID

2.76±0.33 OUR FIT

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$

Γ_{40}/Γ_{39}

VALUE (units 10^{-2})

DOCUMENT ID

TECN

COMMENT

2.12±0.34 OUR FIT

2.0 ±0.4 OUR AVERAGE

2.2 ±0.4 $^{+0.1}_{-0.2}$

³⁵

ANDREOTTI 04

E835

$p\bar{p} \rightarrow \chi_{c0} \rightarrow \gamma\gamma$

1.45±0.74

³⁷

AMBROGIANI 00B

E835

$\bar{p}p \rightarrow \chi_{c2} \rightarrow \gamma\gamma, \gamma J/\psi$

³⁵ The values of $B(p\bar{p})B(\gamma\gamma)$ and $B(\gamma\gamma)B(\gamma J/\psi)$ measured by ANDREOTTI 04 are not independent. The latter is used in the fit because of smaller systematics.

$\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}^2$

$\Gamma_{34}\Gamma_{39}/\Gamma^2$

VALUE (units 10^{-7})

EVTS

DOCUMENT ID

TECN

COMMENT

28.1±1.9 OUR FIT

28.2±2.1 OUR AVERAGE

28.0±1.9±1.3

³⁹² ^{37,38,39}

BAGNASCO

02

E835

$\bar{p}p \rightarrow \chi_{c0} \rightarrow J/\psi\gamma$

29.3 $^{+5.7}_{-4.7}$ ±1.5

89

^{37,38}

AMBROGIANI 99B

$\bar{p}p \rightarrow \chi_{c0} \rightarrow J/\psi\gamma$

$$\Gamma(p\bar{p}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}^2 \qquad \Gamma_{34}\Gamma_{40}/\Gamma^2$$

VALUE (units 10^{-8})	DOCUMENT ID	TECN	COMMENT
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6.0 ± 0.8 OUR FIT

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

$6.52 \pm 1.18^{+0.48}_{-0.72}$	³⁵ ANDREOTTI 04	E835	$p\bar{p} \rightarrow \chi_{c0} \rightarrow \gamma\gamma$
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³⁶ Uses $B(\psi(2S) \rightarrow \gamma\chi_{c0} \rightarrow \gamma\gamma J/\psi)$ from ADAM 05A and $B(\psi(2S) \rightarrow \gamma\chi_{c0})$ from ATHAR 04.³⁷ Calculated by us using $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0593 \pm 0.0010$.³⁸ Values in $(\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}})$ and $(\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}^2)$ are not independent. The latter is used in the fit since it is less correlated to the total width.³⁹ Recalculated by ANDREOTTI 05A. **$\chi_{c0}(1P)$ CROSS-PARTICLE BRANCHING RATIOS**

$$B(\chi_{c0}(1P) \rightarrow p\bar{p}) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}$$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
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6.2 ± 0.8 OUR FIT

4.6 ± 1.9	⁴⁰ BAI	98I BES	$\psi(2S) \rightarrow \gamma\chi_{c0} \rightarrow \gamma\bar{p}p$
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⁴⁰ Calculated by us. The value for $B(\chi_{c0} \rightarrow p\bar{p})$ reported in BAI 98I is derived using $B(\psi(2S) \rightarrow \gamma\chi_{c0}) = (9.3 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

$$B(\chi_{c0}(1P) \rightarrow p\bar{p}) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
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19.9 ± 2.1 OUR FIT

$23.6^{+3.7}_{-3.4} \pm 3.4$	89.5^{+14}_{-13}	BAI	04F BES	$\psi(2S) \rightarrow \gamma\chi_{c0}(1P) \rightarrow \gamma\bar{p}p$
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$$B(\chi_{c0}(1P) \rightarrow \gamma J/\psi(1S)) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
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0.120 ± 0.010 OUR FIT**0.073 ± 0.018 OUR AVERAGE**

0.069 ± 0.018	⁴¹ OREGLIA	82 CBAL	$\psi(2S) \rightarrow \gamma\chi_{c0}$
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0.4 ± 0.3	⁴² BRANDELIK	79B DASP	$\psi(2S) \rightarrow \gamma\chi_{c0}$
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0.16 ± 0.11	⁴² BARTEL	78B CNTR	$\psi(2S) \rightarrow \gamma\chi_{c0}$
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3.3 ± 1.7	⁴³ BIDDICK	77 CNTR	$e^+e^- \rightarrow \gamma X$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.18 \pm 0.01 \pm 0.02$	172	⁴⁴ ADAM	05A CLEO	$\psi(2S) \rightarrow J/\psi\gamma\gamma$
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⁴¹ Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$.⁴² Recalculated by us using $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = 0.0588 \pm 0.0010$.⁴³ Assumes isotropic gamma distribution.⁴⁴ Not independent from other values reported by ADAM 05A.

$$B(\chi_{c0}(1P) \rightarrow \gamma J/\psi) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \text{ anything})}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.214 ± 0.004 OUR FIT				
0.31 ± 0.02 ± 0.03	172	ADAM	05A CLEO	$\psi(2S) \rightarrow J/\psi \gamma \gamma$

$$B(\chi_{c0}(1P) \rightarrow \gamma J/\psi) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)}$$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
0.377 ± 0.033 OUR FIT				

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

0.55 ± 0.04 ± 0.06 172 ⁴⁵ ADAM 05A CLEO $\psi(2S) \rightarrow J/\psi \gamma \gamma$

⁴⁵ Not independent from other values reported by ADAM 05A.

$$B(\chi_{c0}(1P) \rightarrow \gamma \gamma) \times B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))$$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
2.55 ± 0.33 OUR FIT			
3.7 ± 1.8 ± 1.0	LEE	85 CBAL	$\psi(2S) \rightarrow \gamma \chi_{c0}$

$$B(\chi_{c0}(1P) \rightarrow \pi \pi) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)}$$

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
20.9±1.7 OUR FIT				
20.7±1.7 OUR AVERAGE				
23.9±2.7±4.1	97 ± 11	46 BAI	03C BES	$\psi(2S) \rightarrow \gamma \chi_{c0} \rightarrow \gamma \pi^0 \pi^0$
20.2±1.1±1.5	720 ± 32	47 BAI	98I BES	$\psi(2S) \rightarrow \gamma \chi_{c0} \rightarrow \gamma \pi^+ \pi^-$

⁴⁶ We have multiplied $\pi^0 \pi^0$ measurement by 3 to obtain $\pi \pi$.

⁴⁷ Calculated by us. The value for $B(\chi_{c0} \rightarrow \pi^+ \pi^-)$ reported in BAI 98I is derived using $B(\psi' \rightarrow \gamma \chi_{c0}) = (9.3 \pm 0.8)\%$ and $B(\psi' \rightarrow J/\psi \pi^+ \pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D]. We have multiplied $\pi^+ \pi^-$ measurement by 3/2 to obtain $\pi \pi$.

$$B(\chi_{c0}(1P) \rightarrow \eta \eta) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)}$$

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
0.55 ± 0.15 OUR FIT			
0.578 ± 0.241 ± 0.158	BAI	03C BES	$\psi(2S) \rightarrow \gamma \eta \eta$

$$B(\chi_{c0}(1P) \rightarrow K^+ K^-) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)}$$

VALUE (units 10^{-3})	EVTs	DOCUMENT ID	TECN	COMMENT
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1.58±0.17 OUR FIT**1.63±0.10±0.15** 774 ± 38 48 BAI 98I BES $\psi(2S) \rightarrow \gamma K^+ K^-$

⁴⁸ Calculated by us. The value for $B(\chi_{c0} \rightarrow K^+ K^-)$ reported by BAI 98I is derived using $B(\psi(2S) \rightarrow \gamma \chi_{c0}) = (9.3 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

$$B(\chi_{c0}(1P) \rightarrow 2(\pi^+ \pi^-)) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)}$$

VALUE (units 10^{-3})	DOCUMENT ID	TECN	COMMENT
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7.0±0.6 OUR FIT**6.9±2.4 OUR AVERAGE** Error includes scale factor of 3.8.4.4±0.1±0.9 ⁴⁹ BAI 99B BES $\psi(2S) \rightarrow \gamma \chi_{c0}$ 9.3±0.9 ⁵⁰ TANENBAUM 78 MRK1 $\psi(2S) \rightarrow \gamma \chi_{c0}$

⁴⁹ Calculated by us. The value for $B(\chi_{c0} \rightarrow 2\pi^+ 2\pi^-)$ reported in BAI 99B is derived using $B(\psi(2S) \rightarrow \gamma \chi_{c0}) = (9.3 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

⁵⁰ The value $B(\psi(1S) \rightarrow \gamma \chi_{c0}) \times B(\chi_{c0} \rightarrow 2\pi^+ 2\pi^-)$ reported in TANENBAUM 78 is derived using $B(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) \times B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = (4.6 \pm 0.7)\%$. Calculated by us using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1181 \pm 0.0020$.

$\chi_{c0}(1P)$ REFERENCES

ABLIKIM	06D	PR D73 052006	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05G	PR D71 092002	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05N	PL B630 7	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05O	PL B630 21	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05Q	PR D72 092002	M. Ablikim <i>et al.</i>	(BES Collab.)
ADAM	05A	PRL 94 232002	N.E. Adam <i>et al.</i>	(CLEO Collab.)
ANDREOTTI	05A	NP B717 34	M. Andreotti <i>et al.</i>	(FNAL E835 Collab.)
ANDREOTTI	05C	PR D72 112002	M. Andreotti <i>et al.</i>	(FNAL E835 Collab.)
NAKAZAWA	05	PL B615 39	H. Nakazawa <i>et al.</i>	(BELLE Collab.)
ABE	04G	PR D70 071102	K. Abe <i>et al.</i>	(BELLE Collab.)
ABLIKIM	04G	PR D70 092002	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	04H	PR D70 092003	M. Ablikim <i>et al.</i>	(BES Collab.)
ANDREOTTI	04	PL B584 16	M. Andreotti <i>et al.</i>	(E835 Collab.)
ATHAR	04	PR D70 112002	S.B. Athar <i>et al.</i>	(CLEO Collab.)
BAI	04F	PR D69 092001	J.Z. Bai <i>et al.</i>	(BES Collab.)
ANDREOTTI	03	PRL 91 091801	M. Andreotti <i>et al.</i>	(FNAL E835 Collab.)
AULCHENKO	03	PL B573 63	V.M. Aulchenko <i>et al.</i>	(KEDR Collab.)
BAI	03C	PR D67 032004	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	03E	PR D67 112001	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAGNASCO	02	PL B533 237	S. Bagnasco <i>et al.</i>	(FNAL E835 Collab.)
EISENSTEIN	01	PRL 87 061801	B.I. Eisenstein <i>et al.</i>	(CLEO Collab.)
AMBROGIANI	00B	PR D62 052002	M. Ambrogiani <i>et al.</i>	(FNAL E835 Collab.)
AMBROGIANI	99B	PRL 83 2902	M. Ambrogiani <i>et al.</i>	(FNAL E835 Collab.)
BAI	99B	PR D60 072001	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98D	PR D58 092006	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98I	PRL 81 3091	J.Z. Bai <i>et al.</i>	(BES Collab.)
GAISER	86	PR D34 711	J. Gaiser <i>et al.</i>	(Crystal Ball Collab.)
LEE	85	SLAC 282	R.A. Lee	(SLAC)

OREGLIA	82	PR D25 2259	M.J. Oreglia <i>et al.</i>	(SLAC, CIT, HARV+)
BRANDELIK	79B	NP B160 426	R. Brandelik <i>et al.</i>	(DASP Collab.)
BARTEL	78B	PL 79B 492	W. Bartel <i>et al.</i>	(DESY, HEIDP)
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum <i>et al.</i>	(SLAC, LBL)
Also		Private Comm.	G. Trilling	(LBL, UCB)
BIDDICK	77	PRL 38 1324	C.J. Biddick <i>et al.</i>	(UCSD, UMD, PAVI+)

OTHER RELATED PAPERS

BARBERIS	00G	PL B485 357	D. Barberis <i>et al.</i>	(Omega Expt.)
ACCIARRI	99T	PL B461 155	M. Acciarri <i>et al.</i>	(L3 Collab.)
CHEN	90B	PL B243 169	W.Y. Chen <i>et al.</i>	(CLEO Collab.)
AIHARA	88D	PRL 60 2355	H. Aihara <i>et al.</i>	(TPC Collab.)
FELDMAN	75B	PRL 35 821	G.J. Feldman <i>et al.</i>	(LBL, SLAC)
Also		PRL 35 1189	G.J. Feldman	
Erratum.				
TANENBAUM	75	PRL 35 1323	W.M. Tanenbaum <i>et al.</i>	(LBL, SLAC)