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

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

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

| VALUE (MeV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **3414.75± 0.35 OUR AVERAGE** | | Error includes scale factor of 1.2. | | | |
| 3406 ± 7 ±6 | 230 | [1] ABE | 07 | BELL | $e^+e^- \to J/\psi(c\overline{c})$ |
| 3414.21± 0.39±0.27 | | ABLIKIM | 05G | BES2 | $\psi(2S) \to \gamma\chi_{c0}$ |
| $3414.7 {}^{+0.7}_{-0.6} \pm 0.2$ | | [2] ANDREOTTI | 03 | E835 | $\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$ |
| 3415.5 ± 0.4 ±0.4 | 392 | [3] BAGNASCO | 02 | E835 | $\overline{p}p \to \chi_{c0} \to J/\psi\gamma$ |
| $3417.4 {}^{+1.8}_{-1.9} \pm 0.2$ | | [2] AMBROGIANI | 99B | E835 | $\overline{p}p \to e^+e^-\gamma$ |
| 3414.1 ± 0.6 ±0.8 | | BAI | 99B | BES | $\psi(2S) \to \gamma X$ |
| 3417.8 ± 0.4 ±4 | | [2] GAISER | 86 | CBAL | $\psi(2S) \to \gamma X$ |
| 3416 ± 3 ±4 | | [4] TANENBAUM | 78 | MRK1 | $e^+e^-$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 3416.5 ± 3.0 | | EISENSTEIN | 01 | CLE2 | $e^+e^- \to e^+e^-\chi_{c0}$ |
| 3422 ±10 | | [4] BARTEL | 78B | CNTR | $e^+e^- \to J/\psi 2\gamma$ |
| 3415 ± 9 | | [4] BIDDICK | 77 | CNTR | $e^+e^- \to \gamma X$ |

[1] From a fit of the $J/\psi$ recoil mass spectrum. Supersedes ABE,K 02 and ABE 04G.
[2] Using mass of $\psi(2S)$ = 3686.0 MeV.
[3] Recalculated by ANDREOTTI 05A, using the value of $\psi(2S)$ mass from AULCHENKO 03.
[4] Mass value shifted by us by amount appropriate for $\psi(2S)$ mass = 3686 MeV and $J/\psi(1S)$ mass = 3097 MeV.

## $\chi_{c0}(1P)$ 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. | | | |
| $12.6 {}^{+1.5}_{-1.6} {}^{+0.9}_{-1.1}$ | | ABLIKIM | 05G | BES2 | $\psi(2S) \to \gamma\chi_{c0}$ |
| $8.6 {}^{+1.7}_{-1.3} \pm 0.1$ | | ANDREOTTI | 03 | E835 | $\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$ |
| 9.7±1.0 | 392 | [5] BAGNASCO | 02 | E835 | $\overline{p}p \to \chi_{c0} \to J/\psi\gamma$ |
| $16.6 {}^{+5.2}_{-3.7} \pm 0.1$ | | AMBROGIANI | 99B | E835 | $\overline{p}p \to e^+e^-\gamma$ |
| 14.3±2.0±3.0 | | BAI | 98I | BES | $\psi(2S) \to \gamma\pi^+\pi^-$ |
| 13.5±3.3±4.2 | | GAISER | 86 | CBAL | $\psi(2S) \to \gamma X, \gamma\pi^0\pi^0$ |

[5] Recalculated by ANDREOTTI 05A.

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

| Mode | Fraction ($\Gamma_i/\Gamma$) | Scale factor/ Confidence level |
|---|---|---|

## Hadronic decays

| | | | |
|---|---|---|---|
| $\Gamma_1$ | $2(\pi^+\pi^-)$ | $(2.43\pm0.23)$ % | |
| $\Gamma_2$ | $f_0(980)\,f_0(980) \rightarrow 2\pi^+2\pi^-$ | $(7.0 \pm2.2) \times 10^{-4}$ | |
| $\Gamma_3$ | $\pi^+\pi^-K^+K^-$ | $(2.0 \pm0.4)$ % | S=1.6 |
| $\Gamma_4$ | $f_0(980)\,f_0(980) \rightarrow \pi^+\pi^-K^+K^-$ | $(1.7\ ^{+1.1}_{-0.9}) \times 10^{-4}$ | |
| $\Gamma_5$ | $f_0(980)\,f_0(2200) \rightarrow \pi^+\pi^-K^+K^-$ | $(8.3\ ^{+2.1}_{-2.7}) \times 10^{-4}$ | |
| $\Gamma_6$ | $f_0(1370)\,f_0(1370) \rightarrow \pi^+\pi^-K^+K^-$ | $< 2.9 \times 10^{-4}$ | CL=90% |
| $\Gamma_7$ | $f_0(1370)\,f_0(1500) \rightarrow \pi^+\pi^-K^+K^-$ | $< 1.8 \times 10^{-4}$ | CL=90% |
| $\Gamma_8$ | $f_0(1370)\,f_0(1710) \rightarrow \pi^+\pi^-K^+K^-$ | $(7.1\ ^{+3.7}_{-2.5}) \times 10^{-4}$ | |
| $\Gamma_9$ | $f_0(1500)\,f_0(1370) \rightarrow \pi^+\pi^-K^+K^-$ | $< 1.4 \times 10^{-4}$ | CL=90% |
| $\Gamma_{10}$ | $f_0(1500)\,f_0(1500) \rightarrow \pi^+\pi^-K^+K^-$ | $< 5 \times 10^{-5}$ | CL=90% |
| $\Gamma_{11}$ | $f_0(1500)\,f_0(1710) \rightarrow \pi^+\pi^-K^+K^-$ | $< 7 \times 10^{-5}$ | CL=90% |
| $\Gamma_{12}$ | $\rho^0\pi^+\pi^-$ | $(1.6 \pm0.5)$ % | |
| $\Gamma_{13}$ | $3(\pi^+\pi^-)$ | $(1.20\pm0.18)$ % | |
| $\Gamma_{14}$ | $K^+\overline{K}^*(892)^0\pi^- +$ c.c. | $(1.2 \pm0.4)$ % | |
| $\Gamma_{15}$ | $K_1(1270)^+K^- +$ c.c. $\rightarrow \pi^+\pi^-K^+K^-$ | $(6.6 \pm2.0) \times 10^{-3}$ | |
| $\Gamma_{16}$ | $K_1(1400)^+K^- +$ c.c. $\rightarrow \pi^+\pi^-K^+K^-$ | $< 2.8 \times 10^{-3}$ | CL=90% |
| $\Gamma_{17}$ | $K^*(892)^0\overline{K}^*(892)^0$ | $(1.8 \pm0.6) \times 10^{-3}$ | |
| $\Gamma_{18}$ | $K_0^*(1430)^0\overline{K}_0^*(1430)^0 \rightarrow \pi^+\pi^-K^+K^-$ | $(1.04^{+0.38}_{-0.30}) \times 10^{-3}$ | |
| $\Gamma_{19}$ | $K_0^*(1430)^0\overline{K}_2^*(1430)^0 +$ c.c. $\rightarrow \pi^+\pi^-K^+K^-$ | $(8.4\ ^{+2.1}_{-2.6}) \times 10^{-4}$ | |
| $\Gamma_{20}$ | $\pi\pi$ | $(7.3 \pm0.6) \times 10^{-3}$ | |
| $\Gamma_{21}$ | $\pi^0\eta$ | | |
| $\Gamma_{22}$ | $\pi^0\eta'$ | | |
| $\Gamma_{23}$ | $\eta\eta$ | $(2.4 \pm0.4) \times 10^{-3}$ | |
| $\Gamma_{24}$ | $\eta\pi^+\pi^-$ | $< 1.1 \times 10^{-3}$ | CL=90% |
| $\Gamma_{25}$ | $\eta\eta'$ | $< 5 \times 10^{-4}$ | CL=90% |
| $\Gamma_{26}$ | $\eta'\eta'$ | $(1.7 \pm0.4) \times 10^{-3}$ | |
| $\Gamma_{27}$ | $\omega\omega$ | $(2.3 \pm0.7) \times 10^{-3}$ | |
| $\Gamma_{28}$ | $K^+K^-$ | $(5.5 \pm0.6) \times 10^{-3}$ | |
| $\Gamma_{29}$ | $K_S^0K_S^0$ | $(2.77\pm0.34) \times 10^{-3}$ | |
| $\Gamma_{30}$ | $\pi^+\pi^-\eta$ | $< 2.1 \times 10^{-4}$ | |
| $\Gamma_{31}$ | $\pi^+\pi^-\eta'$ | $< 4 \times 10^{-4}$ | |
| $\Gamma_{32}$ | $K^0K^+\pi^-+$ c.c. | $< 9.9 \times 10^{-5}$ | |

| | | | |
|---|---|---|---|
| $\Gamma_{33}$ | $K^+ K^- \pi^0$ | $< 6 \times 10^{-5}$ | |
| $\Gamma_{34}$ | $K^+ K^- \eta$ | $< 2.4 \times 10^{-4}$ | |
| $\Gamma_{35}$ | $K^+ K^- K^0_S K^0_S$ | $(1.5 \pm 0.5) \times 10^{-3}$ | |
| $\Gamma_{36}$ | $K^+ K^- K^+ K^-$ | $(2.74 \pm 0.33) \times 10^{-3}$ | |
| $\Gamma_{37}$ | $K^+ K^- \phi$ | $(1.02 \pm 0.26) \times 10^{-3}$ | |
| $\Gamma_{38}$ | $K^0_S K^0_S \pi^+ \pi^-$ | $(6.0 \pm 1.1) \times 10^{-3}$ | |
| $\Gamma_{39}$ | $\phi\phi$ | $(9.3 \pm 2.2) \times 10^{-4}$ | |
| $\Gamma_{40}$ | $p\overline{p}$ | $(2.10 \pm 0.19) \times 10^{-4}$ | |
| $\Gamma_{41}$ | $p\overline{p}\pi^0$ | $(5.8 \pm 1.3) \times 10^{-4}$ | |
| $\Gamma_{42}$ | $p\overline{p}\eta$ | $(3.9 \pm 1.2) \times 10^{-4}$ | |
| $\Gamma_{43}$ | $\pi^+ \pi^- p\overline{p}$ | $(2.1 \pm 0.7) \times 10^{-3}$ | S=1.4 |
| $\Gamma_{44}$ | $K^0_S K^0_S p\overline{p}$ | $< 8.8 \times 10^{-4}$ | CL=90% |
| $\Gamma_{45}$ | $p\overline{n}\pi^-$ | $(1.18 \pm 0.33) \times 10^{-3}$ | |
| $\Gamma_{46}$ | $\Lambda\overline{\Lambda}$ | $(4.4 \pm 1.5) \times 10^{-4}$ | |
| $\Gamma_{47}$ | $\Lambda\overline{\Lambda}\pi^+ \pi^-$ | $< 4.0 \times 10^{-3}$ | CL=90% |
| $\Gamma_{48}$ | $K^+ \overline{p}\Lambda +$ c.c. | $(1.06 \pm 0.20) \times 10^{-3}$ | |
| $\Gamma_{49}$ | $\Xi^- \overline{\Xi}^+$ | $< 1.03 \times 10^{-3}$ | CL=90% |

**Radiative decays**

| | | | |
|---|---|---|---|
| $\Gamma_{50}$ | $\gamma J/\psi(1S)$ | $(1.32 \pm 0.11)$ % | |
| $\Gamma_{51}$ | $\gamma\gamma$ | $(2.76 \pm 0.33) \times 10^{-4}$ | |

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

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

**$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$** — **$\Gamma_{40}\Gamma_{50}/\Gamma$**

| VALUE (eV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **28.8± 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 | $\overline{p}p \to \chi_{c0} \to J/\psi\gamma$ |
| $48.7^{+11.3}_{-8.9} \pm 2.4$ | | [6,7] AMBROGIANI | 99B | E835 | $\overline{p}p \to \gamma J/\psi$ |

[6] Calculated by us using $B(J/\psi(1S) \to e^+ e^-) = 0.0593 \pm 0.0010$.

[7] Values in $(\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}})$ and $(\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma^2_{\text{total}})$ are not independent. The latter is used in the fit since it is less correlated to the total width.

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

**$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$** — **$\Gamma_{20}\Gamma_{51}/\Gamma$**

| VALUE (eV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **20.9±3.0 OUR FIT** | | | | | |
| **22.7±3.2±3.5** | $129 \pm 18$ | [8] NAKAZAWA | 05 | BELL | $e^+ e^- \to e^+ e^- \chi_{c0}$ |

**$\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$** — **$\Gamma_{28}\Gamma_{51}/\Gamma$**

| VALUE (eV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **15.7±2.2 OUR FIT** | | | | | |
| **14.3±1.6±2.3** | $153 \pm 17$ | NAKAZAWA | 05 | BELL | $e^+ e^- \to e^+ e^- \chi_{c0}$ |

### $\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_1\Gamma_{51}/\Gamma$

| VALUE (eV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **70± 9 OUR FIT** | | | | |
| **75±13±8** | EISENSTEIN | 01 | CLE2 | $e^+e^- \to e^+e^-\chi_{c0}$ |

[8] We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$.

## $\chi_{c0}(1P)$ BRANCHING RATIOS

### HADRONIC DECAYS

### $\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ — $\Gamma_1/\Gamma$

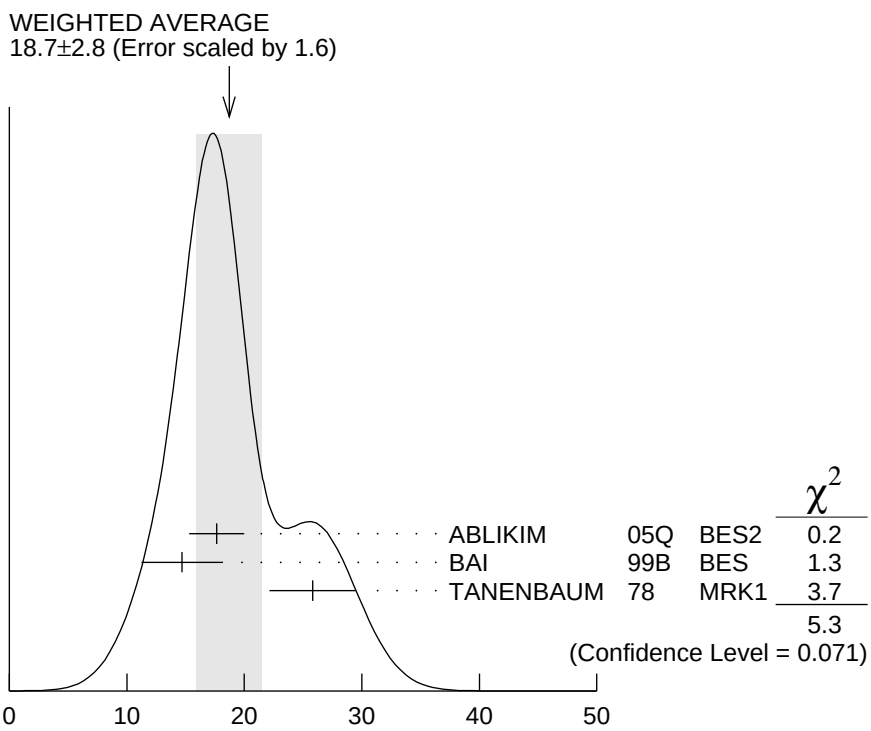
| VALUE | DOCUMENT ID |
|---|---|
| **0.0243±0.0023 OUR FIT** | |

### $\Gamma(f_0(980)f_0(980) \to 2\pi^+2\pi^-)/\Gamma_{total}$ — $\Gamma_2/\Gamma$

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **7.0±2.2±0.3** | 36 ± 9 | [9] ABLIKIM | 04G | BES | $\psi(2S) \to \gamma 2\pi^+2\pi^-$ |

### $\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{total}$ — $\Gamma_3/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **20 ±4 OUR EVALUATION** | Error includes scale factor of 1.6. Treating systematic error as correlated. | | | |
| **18.7±2.8 OUR AVERAGE** | Error includes scale factor of 1.6. See the ideogram below. | | | |
| 17.6±2.2±0.8 | [10] ABLIKIM | 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$ |
| 14.7±0.7±3.4 | [11] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |
| 25.8±3.5±1.1 | [11] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |




$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{total}$ — $\Gamma_3/\Gamma$

### $\Gamma(f_0(980) f_0(980) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total}$ — $\Gamma_4/\Gamma$

| VALUE (units $10^{-5}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| $17.^{+11.}_{-9.} \pm 1.$ | 28 | [12] ABLIKIM | 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^- K^+ K^-$ |

### $\Gamma(f_0(980) f_0(2200) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total}$ — $\Gamma_5/\Gamma$

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| $8.3^{+2.1}_{-2.6} \pm 0.4$ | 77 | [13] ABLIKIM | 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^- K^+ K^-$ |

### $\Gamma(f_0(1370) f_0(1370) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total}$ — $\Gamma_6/\Gamma$

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

### $\Gamma(f_0(1370) f_0(1500) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total}$ — $\Gamma_7/\Gamma$

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

### $\Gamma(f_0(1370) f_0(1710) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total}$ — $\Gamma_8/\Gamma$

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| $7.1^{+3.7}_{-2.5} \pm 0.3$ | 61 | [16] ABLIKIM | 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^- K^+ K^-$ |

### $\Gamma(f_0(1500) f_0(1370) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total}$ — $\Gamma_9/\Gamma$

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

### $\Gamma(f_0(1500) f_0(1500) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total}$ — $\Gamma_{10}/\Gamma$

| VALUE (units $10^{-4}$) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.5** | 90 | [18] ABLIKIM | 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^- K^+ K^-$ |

### $\Gamma(f_0(1500) f_0(1710) \to \pi^+\pi^- K^+ K^-)/\Gamma_{total}$ — $\Gamma_{11}/\Gamma$

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

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

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.016±0.005** | [20] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

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

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **12.0±1.8 OUR EVALUATION** | Treating systematic error as correlated. | | | |
| **12.0±1.7 OUR AVERAGE** | | | | |
| 11.7±1.0±1.9 | [11] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |
| 12.6±2.9±0.6 | [11] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

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

| VALUE | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|
| **0.012±0.004** | [20] TANENBAUM 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

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

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| **6.6±2.0±0.3** | 68 | [21] ABLIKIM 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$ |

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

| VALUE (units $10^{-3}$) | CL% | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| **<2.8** | 90 | [22] ABLIKIM 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$ |

### $\Gamma(K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{\text{total}}$ — $\Gamma_{17}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| **1.8±0.6±0.1** | 64 | [23] ABLIKIM 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 1.6±0.4±0.1 | 30.1±5.7 | [24,25] ABLIKIM 04H | BES | Repl. by ABLIKIM 05Q |

### $\Gamma(K_0^*(1430)^0\overline{K}_0^*(1430)^0 \to \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}}$ — $\Gamma_{18}/\Gamma$

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| $\mathbf{10.4^{+3.8}_{-3.0}\pm0.4}$ | 83 | [26] ABLIKIM 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$ |

### $\Gamma(K_0^*(1430)^0\overline{K}_2^*(1430)^0 + \text{c.c.} \to \pi^+\pi^-K^+K^-)/\Gamma_{\text{total}}$ — $\Gamma_{19}/\Gamma$

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| $\mathbf{8.4^{+2.1}_{-2.5}\pm0.4}$ | 62 | [27] ABLIKIM 05Q | BES2 | $\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$ |

### $\Gamma(\pi\pi)/\Gamma_{\text{total}}$ — $\Gamma_{20}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID |
|---|---|
| **7.3±0.6 OUR FIT** | |

### $\Gamma(\eta\eta)/\Gamma_{\text{total}}$ — $\Gamma_{23}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID |
|---|---|
| **2.4±0.4 OUR FIT** | |

### $\Gamma(\eta\eta)/\Gamma(\pi\pi)$ — $\Gamma_{23}/\Gamma_{20}$

| VALUE | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|
| **0.33±0.07 OUR FIT** | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| $0.26\pm0.09^{+0.03}_{-0.02}$ | [28] ANDREOTTI 05C | E835 | $\overline{p}p \to$ 2 mesons |
| 0.24±0.10±0.08 | [28] BAI 03C | BES | $\psi(2S) \to 5\gamma$ |

### $\Gamma(\eta\pi^+\pi^-)/\Gamma_{total}$ — $\Gamma_{24}/\Gamma$

| VALUE (units $10^{-3}$) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<1.1** | 90 | [29] ABLIKIM | 06R | BES2 | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(\eta\eta')/\Gamma_{total}$ — $\Gamma_{25}/\Gamma$

| VALUE (units $10^{-3}$) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.5** | 90 | [30] ADAMS | 07 | CLEO | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(\eta'\eta')/\Gamma_{total}$ — $\Gamma_{26}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **1.7±0.4±0.1** | 23 | [31] ADAMS | 07 | CLEO | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(\omega\omega)/\Gamma_{total}$ — $\Gamma_{27}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **2.3±0.7±0.1** | $38.1 \pm 9.6$ | [32] ABLIKIM | 05N | BES2 | $\psi(2S) \to \gamma\chi_{c0} \to \gamma 6\pi$ |

### $\Gamma(K^+K^-)/\Gamma_{total}$ — $\Gamma_{28}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID |
|---|---|
| **5.5±0.6 OUR FIT** | |

### $\Gamma(K^0_S K^0_S)/\Gamma_{total}$ — $\Gamma_{29}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID |
|---|---|
| **2.77±0.34 OUR FIT** | |

### $\Gamma(\pi^+\pi^-\eta)/\Gamma_{total}$ — $\Gamma_{30}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.21** | 90 | [33] ATHAR | 07 | CLEO | $\psi(2S) \to \gamma h^+ h^- h^0$ |

### $\Gamma(\pi^+\pi^-\eta')/\Gamma_{total}$ — $\Gamma_{31}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.4** | 90 | [34] ATHAR | 07 | CLEO | $\psi(2S) \to \gamma h^+ h^- h^0$ |

### $\Gamma(K^0 K^+\pi^- + c.c.)/\Gamma_{total}$ — $\Gamma_{32}/\Gamma$

| VALUE (units $10^{-3}$) | CL% | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|---|
| **<0.10** | | 90 | [35] ATHAR | 07 | CLEO | $\psi(2S) \to \gamma h^+ h^- h^0$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | | |
| <0.35 | 90 | | [36] ABLIKIM | 06R | BES2 | $\psi(2S) \to \gamma\chi_{c0}$ |
| <1.4 | 90 | | [11,37] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ — $\Gamma_{33}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.06** | 90 | [38] ATHAR | 07 | CLEO | $\psi(2S) \to \gamma h^+ h^- h^0$ |

### $\Gamma(K^+K^-\eta)/\Gamma_{total}$ — $\Gamma_{34}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.24** | 90 | [39] ATHAR | 07 | CLEO | $\psi(2S) \to \gamma h^+ h^- h^0$ |

### $\Gamma(K^+ K^- K^0_S K^0_S)/\Gamma_{total}$ — $\Gamma_{35}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **1.5±0.5±0.1** | 16.8 ± 4.8 | [40] ABLIKIM | 05O | BES2 | $\psi(2S) \to \gamma \chi_{c0}$ |

### $\Gamma(K^+ K^- K^+ K^-)/\Gamma_{total}$ — $\Gamma_{36}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID |
|---|---|
| **2.74±0.33 OUR FIT** | |

### $\Gamma(K^+ K^- \phi)/\Gamma_{total}$ — $\Gamma_{37}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **1.02±0.26±0.04** | 38 | [41] ABLIKIM | 06T | BES2 | $\psi(2S) \to \gamma 2K^+ 2K^-$ |

### $\Gamma(K^0_S K^0_S \pi^+ \pi^-)/\Gamma_{total}$ — $\Gamma_{38}/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **6.0±1.1±0.3** | 152 ± 14 | [42] ABLIKIM | 05O | BES2 | $\psi(2S) \to \gamma \chi_{c0}$ |

### $\Gamma(\phi\phi)/\Gamma_{total}$ — $\Gamma_{39}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID |
|---|---|
| **0.93±0.22 OUR FIT** | |

### $\Gamma(p\overline{p})/\Gamma_{total}$ — $\Gamma_{40}/\Gamma$

| VALUE (units $10^{-4}$) | DOCUMENT ID |
|---|---|
| **2.10±0.19 OUR FIT** | |

### $\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ — $\Gamma_{41}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.58±0.12±0.03** | [43] ATHAR | 07 | CLEO | $\psi(2S) \to \gamma h^+ h^- h^0$ |

### $\Gamma(p\overline{p}\eta)/\Gamma_{total}$ — $\Gamma_{42}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.39±0.11±0.02** | [44] ATHAR | 07 | CLEO | $\psi(2S) \to \gamma h^+ h^- h^0$ |

### $\Gamma(\pi^+ \pi^- p\overline{p})/\Gamma_{total}$ — $\Gamma_{43}/\Gamma$

| 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. | | | | |
| **2.1 ±1.0 OUR AVERAGE** Error includes scale factor of 2.0. | | | | |
| 1.57±0.21±0.53 | [11] BAI | 99B | BES | $\psi(2S) \to \gamma \chi_{c0}$ |
| 4.19±1.15±0.18 | [11] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma \chi_{c0}$ |

### $\Gamma(K^0_S K^0_S p\overline{p})/\Gamma_{total}$ — $\Gamma_{44}/\Gamma$

| VALUE (units $10^{-4}$) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<8.8** | 90 | [45] ABLIKIM | 06D | BES2 | $\psi(2S) \to \chi_{c0} \gamma$ |

### $\Gamma(p\overline{n}\pi^-)/\Gamma_{total}$ — $\Gamma_{45}/\Gamma$

| VALUE (units $10^{-4}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **11.8±3.2±0.5** | [46] ABLIKIM | 06I | BES2 | $\psi(2S) \to \gamma p \pi^- X$ |

### $\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ — $\Gamma_{46}/\Gamma$

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **4.4±1.2±0.9** | $15.2^{+4.2}_{-4.0}$ | [11] BAI | 03E | BES | $\psi(2S) \to \gamma\chi_{c0} \to \gamma\Lambda\overline{\Lambda}$ |

### $\Gamma(\Lambda\overline{\Lambda}\pi^+\pi^-)/\Gamma_{total}$ — $\Gamma_{47}/\Gamma$

| VALUE (units $10^{-3}$) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<4.0** | 90 | [45] ABLIKIM | 06D | BES2 | $\psi(2S) \to \chi_{c0}\gamma$ |

### $\Gamma(K^+\overline{p}\Lambda + \text{c.c.})/\Gamma_{total}$ — $\Gamma_{48}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **1.06±0.20±0.05** | [47] ATHAR | 07 | CLEO | $\psi(2S) \to \gamma h^+ h^- h^0$ |

### $\Gamma(\Xi^-\overline{\Xi}^+)/\Gamma_{total}$ — $\Gamma_{49}/\Gamma$

| VALUE (units $10^{-4}$) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<10.3** | 90 | [45] ABLIKIM | 06D | BES2 | $\psi(2S) \to \chi_{c0}\gamma$ |

### $\Gamma(p\overline{p}) \times \Gamma(\pi\pi)/\Gamma^2_{total}$ — $\Gamma_{40}\Gamma_{20}/\Gamma^2$

| VALUE (units $10^{-7}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **15.3±1.6 OUR FIT** | | | | |
| **15.3±2.4±0.8** | [48] ANDREOTTI | 03 | E835 | $\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$ |

### $\Gamma(p\overline{p}) \times \Gamma(\pi^0\eta)/\Gamma^2_{total}$ — $\Gamma_{40}\Gamma_{21}/\Gamma^2$

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

### $\Gamma(p\overline{p}) \times \Gamma(\pi^0\eta')/\Gamma^2_{total}$ — $\Gamma_{40}\Gamma_{22}/\Gamma^2$

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

### $\Gamma(p\overline{p}) \times \Gamma(\eta\eta)/\Gamma^2_{total}$ — $\Gamma_{40}\Gamma_{23}/\Gamma^2$

| VALUE (units $10^{-7}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **5.0±0.9 OUR FIT** | | | | |
| **$4.0\pm1.2^{+0.5}_{-0.3}$** | ANDREOTTI | 05C | E835 | $\overline{p}p \to \eta\eta$ |

### $\Gamma(p\overline{p}) \times \Gamma(\eta\eta')/\Gamma^2_{total}$ — $\Gamma_{40}\Gamma_{25}/\Gamma^2$

| VALUE (units $10^{-6}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $2.1^{+2.3}_{-1.5}$ | ANDREOTTI | 05C | E835 | $\overline{p}p \to \pi^0\eta$ |

[9] ABLIKIM 04G reports $[B(\chi_{c0}(1P) \to f_0(980) f_0(980) \to 2\pi^+2\pi^-) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (6.5 \pm 1.6 \pm 1.3) \times 10^{-5}$. We divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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 $[B(\chi_{c0}(1P) \to \pi^+\pi^-K^+K^-) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))] = (1.64 \pm 0.05 \pm 0.20) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \to \gamma\chi_{c0}(1P)) =$

$(9.3 \pm 0.4) \times 10^{-2}$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0})= (9.3 \pm 0.4)\%$ and $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.3 \pm 0.5)\%$.

[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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = 0.093$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = 0.093$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = 0.093$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = 0.093$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = 0.093$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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 $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = 0.093$. The measurement assumes $B(K_1(1400) \rightarrow K^*(892)\pi) = 94 \pm 6\%$.

[23] ABLIKIM 05Q reports $[B(\chi_{c0}(1P) \rightarrow K^*(892)^0 \overline{K}^*(892)^0) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))] = (0.168 \pm 0.035^{+0.047}_{-0.040}) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))$

$= (9.3 \pm 0.4) \times 10^{-2}$. 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 $[B(\chi_{c0}(1P) \rightarrow K^*(892)^0 \overline{K}^*(892)^0) \times B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))] = (1.53 \pm 0.29 \pm 0.26) \times 10^{-4}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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 $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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 $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. 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 06R reports $< 1.1 \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.093$.

[30] ADAMS 07 reports $< 0.5 \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.0922 \pm 0.0011 \pm 0.0046$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.093$.

[31] ADAMS 07 reports $(1.7 \pm 0.4 \pm 0.2) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.0922 \pm 0.0011 \pm 0.0046$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[32] ABLIKIM 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 $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[33] ATHAR 07 reports $< 0.21 \times 10^{-3}$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.093$.

[34] ATHAR 07 reports $< 0.38 \times 10^{-3}$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.093$.

[35] ATHAR 07 reports $< 0.10 \times 10^{-3}$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.093$.

[36] ABLIKIM 06R reports $< 0.35 \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.093$.

[37] Multiplied by a factor of 2 to convert from $K^0_S K^+ \pi^-$ to $K^0 K^+ \pi^-$ decay.

[38] ATHAR 07 reports $< 0.06 \times 10^{-3}$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.093$.

[39] ATHAR 07 reports $< 0.24 \times 10^{-3}$ 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 $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = 0.093$.

[40] ABLIKIM 05O reports $[B(\chi_{c0}(1P) \rightarrow K^+ K^- K^0_S K^0_S) \times B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P))] = (0.138 \pm 0.039 \pm 0.025) \times 10^{-3}$. We divide by our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[41] ABLIKIM 06T reports $(1.03 \pm 0.22 \pm 0.15) \times 10^{-3}$ for $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.2 \pm 0.4) \times 10^{-2}$. We rescale to our best value $B(\psi(2S) \rightarrow \gamma \chi_{c0}(1P)) = (9.3 \pm 0.4) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[42] ABLIKIM 05O reports [B($\chi_{c0}(1P) \rightarrow K^0_S K^0_S \pi^+\pi^-$) × B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$)] = (0.558 ± 0.051 ± 0.089) × $10^{-3}$. We divide by our best value B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$) = (9.3 ± 0.4) × $10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[43] ATHAR 07 reports (0.59 ± 0.10 ± 0.08) × $10^{-3}$ for B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$) = (9.22 ± 0.11 ± 0.46) × $10^{-2}$. We rescale to our best value B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$) = (9.3 ± 0.4) × $10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[44] ATHAR 07 reports (0.39 ± 0.11 ± 0.04) × $10^{-3}$ for B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$) = (9.22 ± 0.11 ± 0.46) × $10^{-2}$. We rescale to our best value B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$) = (9.3 ± 0.4) × $10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[45] Using B($\psi(2S) \rightarrow \chi_{c0}\gamma$) = (9.2 ± 0.5)%

[46] ABLIKIM 06I reports [B($\chi_{c0}(1P) \rightarrow p\overline{n}\pi^-$) × B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$)] = (1.10 ± 0.24 ± 0.18) × $10^{-4}$. We divide by our best value B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$) = (9.3 ± 0.4) × $10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[47] ATHAR 07 reports (1.07 ± 0.17 ± 0.12) × $10^{-3}$ for B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$) = (9.22 ± 0.11 ± 0.46) × $10^{-2}$. We rescale to our best value B($\psi(2S) \rightarrow \gamma\chi_{c0}(1P)$) = (9.3 ± 0.4) × $10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[48] We have multiplied B($p\overline{p}$)·B($\pi^0\pi^0$) measurement by 3 to obtain B($p\overline{p}$)·B($\pi\pi$).

## RADIATIVE DECAYS

### $\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ — $\Gamma_{50}/\Gamma$

| VALUE (units $10^{-4}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **132±11 OUR FIT** | | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 200±20±20 | [49] ADAM | 05A | CLEO | $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c0}$ |

### $\Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{51}/\Gamma$

| VALUE (units $10^{-4}$) | DOCUMENT ID |
|---|---|
| **2.76±0.33 OUR FIT** | |

### $\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ — $\Gamma_{51}/\Gamma_{50}$

| VALUE (units $10^{-2}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **2.09±0.34 OUR FIT** | | | | |
| **2.0 ±0.4 OUR AVERAGE** | | | | |
| 2.2 ±0.4 $^{+0.1}_{-0.2}$ | [50] ANDREOTTI | 04 | E835 | $p\overline{p} \rightarrow \chi_{c0} \rightarrow \gamma\gamma$ |
| 1.45±0.74 | [51] AMBROGIANI | 00B | E835 | $\overline{p}p \rightarrow \chi_{c2} \rightarrow \gamma\gamma, \gamma J/\psi$ |

### $\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma^2_{total}$ — $\Gamma_{40}\Gamma_{50}/\Gamma^2$

| VALUE (units $10^{-7}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **27.8±1.9 OUR FIT** | | | | | |
| **28.2±2.1 OUR AVERAGE** | | | | | |
| 28.0±1.9±1.3 | 392 | [51,52,53] BAGNASCO | 02 | E835 | $\overline{p}p \rightarrow \chi_{c0} \rightarrow J/\psi\gamma$ |
| 29.3$^{+5.7}_{-4.7}$±1.5 | 89 | [51,52] AMBROGIANI | 99B | | $\overline{p}p \rightarrow \chi_{c0} \rightarrow J/\psi\gamma$ |

## $\Gamma(p\overline{p}) \times \Gamma(\gamma\gamma)/\Gamma^2_{total}$ — $\Gamma_{40}\Gamma_{51}/\Gamma^2$

| VALUE (units $10^{-8}$) | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|
| **5.8 ±0.8 OUR FIT** | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| $6.52 \pm 1.18^{+0.48}_{-0.72}$ | [50] ANDREOTTI 04 | E835 | $p\overline{p} \to \chi_{c0} \to \gamma\gamma$ |

[49] Uses $B(\psi(2S) \to \gamma\chi_{c0} \to \gamma\gamma J/\psi)$ from ADAM 05A and $B(\psi(2S) \to \gamma\chi_{c0})$ from ATHAR 04.
[50] The values of $B(p\overline{p})B(\gamma\gamma)$ 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.
[51] Calculated by us using $B(J/\psi(1S) \to e^+e^-) = 0.0593 \pm 0.0010$.
[52] Values in $(\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total})$ and $(\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma^2_{total})$ are not independent. The latter is used in the fit since it is less correlated to the total width.
[53] Recalculated by ANDREOTTI 05A.

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## $\chi_{c0}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

### $B(\chi_{c0}(1P) \to p\overline{p}) \times \dfrac{\Gamma(\psi(2S) \to \gamma\chi_{c0}(1P))}{\Gamma(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)}$

| VALUE (units $10^{-5}$) | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|
| **6.0±0.8 OUR FIT** | | | |
| **4.6±1.9** | [54] BAI 98I | BES | $\psi(2S) \to \gamma\chi_{c0} \to \gamma\overline{p}p$ |

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

### $B(\chi_{c0}(1P) \to p\overline{p}) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))$

| VALUE (units $10^{-6}$) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| **19.5±2.0 OUR FIT** | | | | |
| $\mathbf{23.6^{+3.7}_{-3.4} \pm 3.4}$ | $89.5^{+14}_{-13}$ | BAI 04F | BES | $\psi(2S) \to \gamma\chi_{c0}(1P) \to \gamma\overline{p}p$ |

### $B(\chi_{c0}(1P) \to \gamma J/\psi(1S)) \times B(\psi(2S) \to \gamma\chi_{c0}(1P))$

| VALUE (units $10^{-2}$) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| **0.122±0.010 OUR FIT** | | | | |
| **0.073±0.018 OUR AVERAGE** | | | | |
| 0.069±0.018 | | [55] OREGLIA 82 | CBAL | $\psi(2S) \to \gamma\chi_{c0}$ |
| 0.4 ±0.3 | | [56] BRANDELIK 79B | DASP | $\psi(2S) \to \gamma\chi_{c0}$ |
| 0.16 ±0.11 | | [56] BARTEL 78B | CNTR | $\psi(2S) \to \gamma\chi_{c0}$ |
| 3.3 ±1.7 | | [57] BIDDICK 77 | CNTR | $e^+e^- \to \gamma X$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 0.18 ±0.01 ±0.02 | 172 | [58] ADAM 05A | CLEO | $\psi(2S) \to J/\psi\gamma\gamma$ |

[55] Recalculated by us using $B(J/\psi(1S) \to \ell^+\ell^-) = 0.1181 \pm 0.0020$.
[56] Recalculated by us using $B(J/\psi(1S) \to \mu^+\mu^-) = 0.0588 \pm 0.0010$.
[57] Assumes isotropic gamma distribution.
[58] Not independent from other values reported by ADAM 05A.

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

| VALUE (units $10^{-2}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **0.2151±0.0035 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 |
|---|---|---|---|---|---|
| **0.379±0.032 OUR FIT** | | | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.55 ±0.04 ±0.06 | 172 | [59] ADAM | 05A | CLEO | $\psi(2S) \rightarrow J/\psi\gamma\gamma$ |

[59] 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 |
|---|---|---|---|---|
| **2.56±0.33 OUR FIT** | | | | |
| **3.7 ±1.8 ±1.0** | LEE | 85 | CBAL | $\psi(2S) \rightarrow \gamma\chi_{c0}$ |

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

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **20.9±1.7 OUR FIT** | | | | | |
| **20.7±1.7 OUR AVERAGE** | | | | | |
| 23.9±2.7±4.1 | 97 ± 11 | [60] BAI | 03C | BES | $\psi(2S) \rightarrow \gamma\chi_{c0} \rightarrow \gamma\pi^0\pi^0$ |
| 20.2±1.1±1.5 | 720 ± 32 | [61] BAI | 98I | BES | $\psi(2S) \rightarrow \gamma\chi_{c0} \rightarrow \gamma\pi^+\pi^-$ |

[60] We have multiplied $\pi^0\pi^0$ measurement by 3 to obtain $\pi\pi$.

[61] 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 ± 0.8)% and $B(\psi' \rightarrow J/\psi\pi^+\pi^-)$ = (32.4 ± 2.6)% [BAI 98D]. We have multiplied $\pi^+\pi^-$ measurement by 3/2 to obtain $\pi\pi$.

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

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **2.2 ±0.4 OUR FIT** | | | | | |
| **2.86±0.46±0.37** | 48 | [62] ADAMS | 07 | CLEO | $\psi(2S) \rightarrow \gamma\chi_{c0}$ |

[62] Calculated by us. The value of $B(\chi_{c0}(1P) \rightarrow \eta\eta)$ reported by ADAMS 07 was derived using $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))$ = (9.22 ± 0.11 ± 0.46)% (ATHAR 04).

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

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.68 ±0.12 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 |
|---|---|---|---|---|---|
| **1.57±0.17 OUR FIT** | | | | | |
| **1.63±0.10±0.15** | 774 ± 38 | [63] BAI | 98I | BES | $\psi(2S) \rightarrow \gamma K^+K^-$ |

[63] 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 $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [BAI 98D].

$$B(\chi_{c0}(1P) \rightarrow K^0_S K^0_S) \times B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))$$

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **2.57±0.30 OUR FIT** | | | | | |
| **3.02±0.19±0.33** | 322 | ABLIKIM | 05O | BES2 | $\psi(2S) \rightarrow \gamma K^0_S K^0_S$ |

$$B(\chi_{c0}(1P) \rightarrow K^0_S K^0_S) \times \frac{\Gamma(\psi(2S) \rightarrow \gamma\chi_{c0}(1P))}{\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}$$

| VALUE (units $10^{-4}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **7.9±1.0 OUR FIT** | | | | |
| **5.6±0.8±1.3** | [64] BAI | 99B | BES | $\psi(2S) \rightarrow \gamma K^0_S K^0_S$ |

[64] Calculated by us. The value of $B(\chi_{c0} \rightarrow K^0_S K^0_S)$ reported by BAI 99B was derived using $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.3 \pm 0.8)\%$ and $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$ [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 |
|---|---|---|---|---|
| **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 | [65] BAI | 99B | BES | $\psi(2S) \rightarrow \gamma\chi_{c0}$ |
| 9.3±0.9 | [66] TANENBAUM | 78 | MRK1 | $\psi(2S) \rightarrow \gamma\chi_{c0}$ |

[65] 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].

[66] 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 $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$.

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

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **2.53±0.29 OUR FIT** | | | | | |
| **3.20±0.11±0.41** | 278 | [67] ABLIKIM | 06T | BES2 | $\psi(2S) \rightarrow \gamma 2K^+2K^-$ |

[67] Calculated by us. The value of $B(\chi_{c0} \rightarrow 2K^+2K^-)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4)\%$.

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

| VALUE (units $10^{-4}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **7.8±0.9 OUR FIT** | | | | |
| **6.1±0.8±0.9** | [68] BAI | 99B | BES | $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$ |

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

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

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **0.86±0.20 OUR FIT** | | | | | |
| **0.86±0.19±0.12** | 26 | [69] ABLIKIM | 06T | BES2 | $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$ |

[69] Calculated by us. The value of $B(\chi_{c0} \rightarrow \phi\phi)$ reported by ABLIKIM 06T was derived using $B(\psi(2S) \rightarrow \gamma\chi_{c0}(1P)) = (9.2 \pm 0.4)\%$.

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

| VALUE (units $10^{-4}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **2.7±0.6 OUR FIT** | | | | |
| **2.6±1.0±1.1** | [70] BAI | 99B | BES | $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$ |

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

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