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

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

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

| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **3415.19± 0.34 OUR AVERAGE** | | | | | |
| $3414.7\ ^{+\ 0.7}_{-\ 0.6}\pm 0.2$ | | [1] ANDREOTTI | 03 | E835 | $\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$ |
| 3415.4 ± 0.4 ± 0.2 | 392 | [1] BAGNASCO | 02 | E835 | $\overline{p}p \to \chi_{c0} \to J/\psi\gamma$ |
| 3416.5 ± 3.0 | | EISENSTEIN | 01 | CLE2 | $e^+e^- \to e^+e^-\chi_{c0}$ |
| $3417.4\ ^{+\ 1.8}_{-\ 1.9}\pm 0.2$ | | [1] 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 | | [1] GAISER | 86 | CBAL | $\psi(2S) \to \gamma X$ |
| 3422 ±10 | | [2] BARTEL | 78B | CNTR | $e^+e^- \to J/\psi 2\gamma$ |
| 3416 ± 3 ± 4 | | [2] TANENBAUM | 78 | MRK1 | $e^+e^-$ |
| 3415 ± 9 | | [2] BIDDICK | 77 | CNTR | $e^+e^- \to \gamma X$ |

[1] Using mass of $\psi(2S) = 3686.0$ MeV.

[2] 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* |
|---|---|---|---|---|---|
| **10.1±0.8 OUR FIT** | | | | | |
| **10.2±0.9 OUR AVERAGE** Error includes scale factor of 1.2. | | | | | |
| $8.6^{+1.7}_{-1.3}\pm 0.1$ | | ANDREOTTI | 03 | E835 | $\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$ |
| 9.8±1.0±0.1 | 392 | 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 | $\psi(2S) \to \gamma X,\ \gamma\pi^0\pi^0$ |

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

| | Mode | Fraction ($\Gamma_i/\Gamma$) | Confidence level |
|---|---|---|---|
| | **Hadronic decays** | | |
| $\Gamma_1$ | $2(\pi^+\pi^-)$ | (2.58±0.31) % | |
| $\Gamma_2$ | $\pi^+\pi^-K^+K^-$ | (2.1 ±0.5 ) % | |
| $\Gamma_3$ | $\rho^0\pi^+\pi^-$ | (1.6 ±0.5 ) % | |
| $\Gamma_4$ | $3(\pi^+\pi^-)$ | (1.27±0.22) % | |
| $\Gamma_5$ | $K^+\overline{K}^*(892)^0\pi^-$ + c.c. | (1.2 ±0.4 ) % | |
| $\Gamma_6$ | $K^+K^-$ | (6.0 ±0.9 ) $\times 10^{-3}$ | |
| $\Gamma_7$ | $\pi\pi$ | (7.4 ±0.8 ) $\times 10^{-3}$ | |

| | | | | |
|---|---|---|---|---|
| $\Gamma_8$ | $\eta\eta$ | $(2.1 \pm 1.1 ) \times 10^{-3}$ | | |
| $\Gamma_9$ | $K^+K^-K^+K^-$ | $(2.3 \pm 0.5 ) \times 10^{-3}$ | | |
| $\Gamma_{10}$ | $K^0_S K^0_S$ | $(2.1 \pm 0.6 ) \times 10^{-3}$ | | |
| $\Gamma_{11}$ | $\pi^+\pi^- p\overline{p}$ | $(2.2 \pm 0.8 ) \times 10^{-3}$ | | |
| $\Gamma_{12}$ | $\phi\phi$ | $(1.0 \pm 0.6 ) \times 10^{-3}$ | | |
| $\Gamma_{13}$ | $p\overline{p}$ | $(2.24 \pm 0.27) \times 10^{-4}$ | | |
| $\Gamma_{14}$ | $\Lambda\overline{\Lambda}$ | $(4.7 \pm 1.6 ) \times 10^{-4}$ | | |
| $\Gamma_{15}$ | $K^0_S K^+\pi^- +$ c.c. | $< 8$ | $\times 10^{-4}$ | 90% |

**Radiative decays**

| | | | | |
|---|---|---|---|---|
| $\Gamma_{16}$ | $\gamma J/\psi(1S)$ | $(1.18 \pm 0.14)$ % | | |
| $\Gamma_{17}$ | $\gamma\gamma$ | $(2.6 \pm 0.5 ) \times 10^{-4}$ | | |

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

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

**$\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{total}$** **$\Gamma_{13}\Gamma_{16}/\Gamma$**

| VALUE (eV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **26.8± 2.9 OUR FIT** | | | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $26.6 \pm 2.6 \pm 1.4$ | 392 | [3,4] BAGNASCO | 02 | E835 | $\overline{p}p \to \chi_{c0} \to J/\psi\gamma$ |
| $48.7^{+11.3}_{-8.9} \pm 2.4$ | | [3,4] AMBROGIANI | 99B | E835 | $\overline{p}p \to \gamma J/\psi$ |

**$\Gamma(\gamma\gamma) \times \Gamma(2(\pi^+\pi^-))/\Gamma_{total}$** **$\Gamma_{17}\Gamma_1/\Gamma$**

| VALUE (eV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **67±14 OUR FIT** | | | | |
| **75±13±8** | EISENSTEIN | 01 | CLE2 | $e^+e^- \to e^+e^-\chi_{c0}$ |

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

[4] 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.

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

### HADRONIC DECAYS

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

| VALUE | DOCUMENT ID |
|---|---|
| **0.0258±0.0031 OUR FIT** | |

**$\Gamma(\pi^+\pi^- K^+K^-)/\Gamma_{total}$** **$\Gamma_2/\Gamma$**

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **21 ±5 OUR EVALUATION** Treating systematic error as correlated. | | | | |
| **21 ±6 OUR AVERAGE** Error includes scale factor of 1.9. | | | | |
| $15.6 \pm 0.7 \pm 3.9$ | [5] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |
| $27.4 \pm 3.7 \pm 2.7$ | [5] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_3/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.016±0.005** | [6] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ $\Gamma_4/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **12.7±2.2 OUR EVALUATION** | Treating systematic error as correlated. | | | |
| **12.7±2.0 OUR AVERAGE** | | | | |
| 12.4±1.1±2.3 | [5] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |
| 13.3±3.0±1.3 | [5] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(K^+\overline{K}^*(892)^0\pi^- + \text{c.c.})/\Gamma_{total}$ $\Gamma_5/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.012±0.004** | [6] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(K^+K^-)/\Gamma_{total}$ $\Gamma_6/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **6.0±0.4±0.8** | 774±38 | [5] BAI | 98I | BES | $\psi(2S) \to \gamma\chi_{c0}$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 6 ±3 | | [6] BRANDELIK | 79B | DASP | $\psi(2S) \to \gamma\chi_{c0}$ |
| 9 ±4 | | [6] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(K^0_S K^0_S)/\Gamma_{total}$ $\Gamma_{10}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **2.08±0.30±0.54** | [5] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(\pi\pi)/\Gamma_{total}$ $\Gamma_7/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID |
|---|---|
| **7.4±0.8 OUR FIT** | |

### $\Gamma(K^+K^-K^+K^-)/\Gamma_{total}$ $\Gamma_9/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **2.27±0.28±0.40** | [5] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(\pi^+\pi^- p\overline{p})/\Gamma_{total}$ $\Gamma_{11}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **2.2 ±0.8 OUR EVALUATION** | Treating systematic error as correlated. | | | |
| **2.2 ±1.1 OUR AVERAGE** | Error includes scale factor of 1.9. | | | |
| 1.66±0.22±0.58 | [5] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |
| 4.4 ±1.2 ±0.4 | [5] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(\phi\phi)/\Gamma_{total}$ $\Gamma_{12}/\Gamma$

| VALUE (units $10^{-3}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **1.0±0.4±0.4** | [5] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(\eta\eta)/\Gamma_{total}$ $\Gamma_8/\Gamma$

| VALUE (units $10^{-3}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **2.1±0.9±0.6** | 12.7±5.3 | [5] BAI | 03C | BES | $\psi(2S) \to \gamma\eta\eta \to 5\gamma$ |

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

| | | | | | |
|---|---|---|---|---|---|
| 2.5±0.8±0.8 | [7] LEE | 85 | CBAL | $\psi' \to$ photons | |

### $\Gamma(\eta\eta)/\Gamma(\pi\pi)$ $\Gamma_8/\Gamma_7$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|

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

| | | | | | |
|---|---|---|---|---|---|
| 0.24±0.10±0.08 | [8] BAI | 03C | BES | $\psi(2S) \to 5\gamma$ | |

### $\Gamma(K^0_S K^+\pi^- + \text{c.c.})/\Gamma_{total}$ $\Gamma_{15}/\Gamma$

| VALUE (units $10^{-3}$) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.8** | 90 | [5] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |

### $\Gamma(p\overline{p})/\Gamma_{total}$ $\Gamma_{13}/\Gamma$

| VALUE (units $10^{-4}$) | DOCUMENT ID |
|---|---|
| **2.24±0.27 OUR FIT** | |

### $\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ $\Gamma_{14}/\Gamma$

| VALUE (units $10^{-4}$) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **4.7±1.3±1.0** | $15.2^{+4.2}_{-4.0}$ | [5] BAI | 03E | BES | $\psi(2S) \to \gamma\chi_{c0} \to \gamma\Lambda\overline{\Lambda}$ |

### $\Gamma(p\overline{p}) \times \Gamma(\pi\pi)/\Gamma^2_{total}$ $\Gamma_{13}\Gamma_7/\Gamma^2$

| VALUE (units $10^{-7}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **16.7±1.9 OUR FIT** | | | | |
| **15.3±2.4±0.8** | [9] ANDREOTTI | 03 | E835 | $\overline{p}p \to \chi_{c0} \to \pi^0\pi^0$ |

[5] Rescaled by us using B($\psi(2S) \to \gamma\chi_{c0}$)= (8.6 ± 0.7)% and B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = 0.317 ± 0.011.

[6] Calculated using B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = 0.094; the errors do not contain the uncertainty in the $\psi(2S)$ decay.

[7] Calculated using B($\psi(2S) \to \gamma\chi_{c0}(1P)$) = 0.093 ± 0.008.

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

[9] 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

### $\Gamma(\gamma J/\psi(1S))/\Gamma_{total}$ $\Gamma_{16}/\Gamma$

| VALUE (units $10^{-4}$) | DOCUMENT ID |
|---|---|
| **118±14 OUR FIT** | |

### $\Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_{17}/\Gamma$

| VALUE (units $10^{-4}$) | DOCUMENT ID |
|---|---|
| **2.6±0.5 OUR FIT** | |

### $\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$ $\Gamma_{17}/\Gamma_{16}$

| *VALUE* (units $10^{-2}$) | | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **2.2 ±0.6 OUR FIT** | | | | | |
| **1.45±0.74** | [10] | AMBROGIANI | 00B | E835 | $\overline{p}p \rightarrow \chi_{c2} \rightarrow \gamma\gamma, \gamma J/\psi$ |

### $\Gamma(p\overline{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma^2_{\text{total}}$ $\Gamma_{13}\Gamma_{16}/\Gamma^2$

| *VALUE* (units $10^{-7}$) | *EVTS* | | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|---|
| **26.5±2.0 OUR FIT** | | | | | | |
| **27.5±2.1 OUR AVERAGE** | | | | | | |
| $27.2 \pm 1.9 \pm 1.3$ | 392 | [10,11] | BAGNASCO | 02 | E835 | $\overline{p}p \rightarrow \chi_{c0} \rightarrow J/\psi\gamma$ |
| $29.3^{+5.7}_{-4.7} \pm 1.5$ | 89 | [10,11] | AMBROGIANI | 99B | | $\overline{p}p \rightarrow \chi_{c0} \rightarrow J/\psi\gamma$ |

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

[11] 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.

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

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

| *VALUE* (units $10^{-5}$) | | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **6.1±1.1 OUR FIT** | | | | | |
| **4.6±1.9** | [12] | BAI | 98I | BES | $\psi(2S) \rightarrow \gamma\chi_{c0} \rightarrow \gamma p\overline{p}$ |

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

| *VALUE* (units $10^{-2}$) | | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **0.101±0.012 OUR FIT** | | | | | |
| **0.073±0.018 OUR AVERAGE** | | | | | |
| $0.069 \pm 0.018$ | [13] | OREGLIA | 82 | CBAL | $\psi(2S) \rightarrow \gamma\chi_{c0}$ |
| $0.4 \pm 0.3$ | [14] | BRANDELIK | 79B | DASP | $\psi(2S) \rightarrow \gamma\chi_{c0}$ |
| $0.16 \pm 0.11$ | [14] | BARTEL | 78B | CNTR | $\psi(2S) \rightarrow \gamma\chi_{c0}$ |
| $3.3 \pm 1.7$ | [15] | BIDDICK | 77 | CNTR | $e^+ e^- \rightarrow \gamma X$ |

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

| *VALUE* (units $10^{-5}$) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **2.2±0.5 OUR FIT** | | | | |
| **3.7±1.8±1.0** | LEE | 85 | CBAL | $\psi(2S) \rightarrow \gamma\chi_{c0}$ |

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

| *VALUE* (units $10^{-4}$) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **20.1±2.1 OUR FIT** | | | | | |
| **20.7±1.7 OUR AVERAGE** | | | | | |
| 23.9±2.7±4.1 | 96.9± 11.1 | [16] BAI | 03C | BES | $\psi(2S) \to \gamma\chi_{c0} \to \gamma\pi^0\pi^0$ |
| 20.2±1.1±1.5 | 720± 32 | [17] BAI | 98I | BES | $\psi(2S) \to \gamma\chi_{c0} \to \gamma\pi^+\pi^-$ |

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

| *VALUE* (units $10^{-3}$) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **7.0±0.8 OUR FIT** | | | | |
| **6.9±2.4 OUR AVERAGE** Error includes scale factor of 3.8. | | | | |
| 4.4±0.1±0.9 | [18] BAI | 99B | BES | $\psi(2S) \to \gamma\chi_{c0}$ |
| 9.3±0.9 | [19] TANENBAUM | 78 | MRK1 | $\psi(2S) \to \gamma\chi_{c0}$ |

[12] 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].

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

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

[15] Assumes isotropic gamma distribution.

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

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

[18] Calculated by us. The value for $B(\chi_{c0} \to 2\pi^+2\pi^-)$ reported in BAI 99B 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].

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

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


| | | | | |
|---|---|---|---|---|
| ANDREOTTI | 03 | PRL 91 091801 | M. Andreotti *et al.* | (FNAL E835 Collab.) |
| BAI | 03C | PR D67 032004 | J.Z. Bai *et al.* | (BES Collab.) |
| BAI | 03E | PR D67 112001 | J.Z. Bai *et al.* | (BES Collab.) |
| BAGNASCO | 02 | PL B533 237 | S. Bagnasco *et al.* | (FNAL E835 Collab.) |
| EISENSTEIN | 01 | PRL 87 061801 | B.I. Eisenstein *et al.* | (CLEO Collab.) |
| AMBROGIANI | 00B | PR D62 052002 | M. Ambrogiani *et al.* | (FNAL E835 Collab.) |
| AMBROGIANI | 99B | PRL 83 2902 | 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.) |
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| LEE | 85 | SLAC 282 | R.A. Lee | (SLAC) |
| OREGLIA | 82 | PR D25 2259 | M.J. Oreglia *et al.* | (SLAC, CIT, HARV+) |
| BRANDELIK | 79B | NP B160 426 | R. Brandelik *et al.* | (DASP Collab.) |
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| Also | 82 | Private Comm. | G. Trilling | (LBL, UCB) |
| BIDDICK | 77 | PRL 38 1324 | C.J. Biddick *et al.* | (UCSD, UMD, PAVI+) |

## OTHER RELATED PAPERS

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