

$\chi_{c2}(1P)$ 

$$I^G(J^{PC}) = 0^+(2^{++})$$

See the Review on " $\psi(2S)$  and  $\chi_c$  branching ratios" before the  $\chi_{c0}(1P)$  Listings.

### $\chi_{c2}(1P)$ MASS

| VALUE (MeV)   | EVTS               | DOCUMENT ID              | TECN     | COMMENT  |
|---|--------------------|--------------------------|----------|--|
| <b>3556.20 ± 0.09</b>   | <b>OUR AVERAGE</b> |                          |          |  |
| 3555.3 ± 0.6 ± 2.2  | 2.5k               | UEHARA                   | 08 BELL  | $\gamma\gamma \rightarrow$ hadrons                   |
| 3555.70 ± 0.59 ± 0.39   |                    | ABLIKIM                  | 05G BES2 | $\psi(2S) \rightarrow \gamma\chi_{c2}$               |
| 3556.173 ± 0.123 ± 0.020  |                    | ANDREOTTI                | 05A E835 | $p\bar{p} \rightarrow e^+e^-\gamma$                  |
| 3559.9 ± 2.9  |                    | EISENSTEIN               | 01 CLE2  | $e^+e^- \rightarrow e^+e^-\chi_{c2}$                 |
| 3556.4 ± 0.7  |                    | BAI                      | 99B BES  | $\psi(2S) \rightarrow \gamma X$                      |
| 3556.22 ± 0.131 ± 0.020   | 585                | <sup>1</sup> ARMSTRONG   | 92 E760  | $\bar{p}p \rightarrow e^+e^-\gamma$                  |
| 3556.9 ± 0.4 ± 0.5  | 50                 | BAGLIN                   | 86B SPEC | $\bar{p}p \rightarrow e^+e^-X$                       |
| 3557.8 ± 0.2 ± 4  |                    | <sup>2</sup> GAISER      | 86 CBAL  | $\psi(2S) \rightarrow \gamma X$                      |
| 3553.4 ± 2.2  | 66                 | <sup>3</sup> LEMOIGNE    | 82 GOLI  | 185 $\pi^- \text{Be} \rightarrow \gamma\mu^+\mu^- A$ |
| 3555.9 ± 0.7  |                    | <sup>4</sup> OREGLIA     | 82 CBAL  | $e^+e^- \rightarrow J/\psi 2\gamma$                  |
| 3557 ± 1.5  | 69                 | <sup>5</sup> HIMEL       | 80 MRK2  | $e^+e^- \rightarrow J/\psi 2\gamma$                  |
| 3551 ± 11   | 15                 | BRANDELIK                | 79B DASP | $e^+e^- \rightarrow J/\psi 2\gamma$                  |
| 3553 ± 4  |                    | <sup>5</sup> BARTEL      | 78B CNTR | $e^+e^- \rightarrow J/\psi 2\gamma$                  |
| 3553 ± 4 ± 4  |                    | <sup>5,6</sup> TANENBAUM | 78 MRK1  | $e^+e^-$   |
| 3563 ± 7  | 360                | <sup>5</sup> BIDDICK     | 77 CNTR  | $e^+e^- \rightarrow \gamma X$                        |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● |                    |                          |          |  |
| 3555.4 ± 1.3  | 53                 | UEHARA                   | 13 BELL  | $\gamma\gamma \rightarrow K_S^0 K_S^0$               |
| 3543 ± 10   | 4                  | WHITAKER                 | 76 MRK1  | $e^+e^- \rightarrow J/\psi 2\gamma$                  |

<sup>1</sup> Recalculated by ANDREOTTI 05A, using the value of  $\psi(2S)$  mass from AULCHENKO 03.

<sup>2</sup> Using mass of  $\psi(2S) = 3686.0$  MeV.

<sup>3</sup>  $J/\psi(1S)$  mass constrained to 3097 MeV.

<sup>4</sup> Assuming  $\psi(2S)$  mass = 3686 MeV and  $J/\psi(1S)$  mass = 3097 MeV.

<sup>5</sup> Mass value shifted by us by amount appropriate for  $\psi(2S)$  mass = 3686 MeV and  $J/\psi(1S)$  mass = 3097 MeV.

<sup>6</sup> From a simultaneous fit to radiative and hadronic decay channels.

### $\chi_{c2}(1P)$ WIDTH

| VALUE (MeV)                         | EVTS               | DOCUMENT ID            | TECN     | COMMENT                             |
|-------------------------------------|--------------------|------------------------|----------|-------------------------------------|
| <b>1.93 ± 0.11</b>                  | <b>OUR FIT</b>     |                        |          |                                     |
| <b>1.95 ± 0.13</b>                  | <b>OUR AVERAGE</b> |                        |          |                                     |
| 1.915 ± 0.188 ± 0.013               |                    | ANDREOTTI              | 05A E835 | $p\bar{p} \rightarrow e^+e^-\gamma$ |
| 1.96 ± 0.17 ± 0.07                  | 585                | <sup>1</sup> ARMSTRONG | 92 E760  | $\bar{p}p \rightarrow e^+e^-\gamma$ |
| 2.6 <sup>+1.4</sup> <sub>-1.0</sub> | 50                 | BAGLIN                 | 86B SPEC | $\bar{p}p \rightarrow e^+e^-X$      |
| 2.8 <sup>+2.1</sup> <sub>-2.0</sub> |                    | <sup>2</sup> GAISER    | 86 CBAL  | $\psi(2S) \rightarrow \gamma X$     |

<sup>1</sup> Recalculated by ANDREOTTI 05A.

<sup>2</sup> Errors correspond to 90% confidence level; authors give only width range.

## $\chi_{c2}(1P)$ DECAY MODES

| Mode                   | Fraction ( $\Gamma_i/\Gamma$ )   | Confidence level                 |     |
|------------------------|--|----------------------------------|-----|
| <b>Hadronic decays</b> |  |                                  |     |
| $\Gamma_1$             | $2(\pi^+\pi^-)$  | ( 1.07±0.10 ) %                  |     |
| $\Gamma_2$             | $\rho\rho$   |                                  |     |
| $\Gamma_3$             | $\pi^+\pi^-\pi^0\pi^0$   | ( 1.91±0.25 ) %                  |     |
| $\Gamma_4$             | $\rho^+\pi^-\pi^0 + \text{c.c.}$   | ( 2.3 ±0.4 ) %                   |     |
| $\Gamma_5$             | $4\pi^0$   | ( 1.16±0.16 ) × 10 <sup>-3</sup> |     |
| $\Gamma_6$             | $K^+K^-\pi^0\pi^0$   | ( 2.2 ±0.4 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_7$             | $K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$   | ( 1.44±0.21 ) %                  |     |
| $\Gamma_8$             | $\rho^-K^+\bar{K}^0 + \text{c.c.}$   | ( 4.3 ±1.3 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_9$             | $K^*(892)^0K^-\pi^+ \rightarrow$<br>$K^-\pi^+K^0\pi^0 + \text{c.c.}$             | ( 3.1 ±0.8 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{10}$          | $K^*(892)^0\bar{K}^0\pi^0 \rightarrow$<br>$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$ | ( 4.0 ±0.9 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{11}$          | $K^*(892)^-K^+\pi^0 \rightarrow$<br>$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$       | ( 3.9 ±0.9 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{12}$          | $K^*(892)^+\bar{K}^0\pi^- \rightarrow$<br>$K^+\pi^-\bar{K}^0\pi^0 + \text{c.c.}$ | ( 3.1 ±0.8 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{13}$          | $K^+K^-\eta\pi^0$  | ( 1.3 ±0.5 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{14}$          | $K^+K^-\pi^+\pi^-$   | ( 8.9 ±1.0 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{15}$          | $K^+K^-\pi^+\pi^-\pi^0$  | ( 1.17±0.13 ) %                  |     |
| $\Gamma_{16}$          | $K_S^0K^\pm\pi^\mp\pi^+\pi^-$  | ( 7.3 ±0.8 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{17}$          | $K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$   | ( 2.2 ±1.1 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{18}$          | $K^*(892)^0\bar{K}^*(892)^0$   | ( 2.4 ±0.5 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{19}$          | $3(\pi^+\pi^-)$  | ( 8.6 ±1.8 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{20}$          | $\phi\phi$   | ( 1.12±0.10 ) × 10 <sup>-3</sup> |     |
| $\Gamma_{21}$          | $\omega\omega$   | ( 8.8 ±1.1 ) × 10 <sup>-4</sup>  |     |
| $\Gamma_{22}$          | $\omega K^+K^-$  | ( 7.3 ±0.9 ) × 10 <sup>-4</sup>  |     |
| $\Gamma_{23}$          | $\omega\phi$   |                                  |     |
| $\Gamma_{24}$          | $\pi\pi$   | ( 2.33±0.12 ) × 10 <sup>-3</sup> |     |
| $\Gamma_{25}$          | $\rho^0\pi^+\pi^-$   | ( 3.8 ±1.6 ) × 10 <sup>-3</sup>  |     |
| $\Gamma_{26}$          | $\pi^+\pi^-\eta$   | ( 5.0 ±1.3 ) × 10 <sup>-4</sup>  |     |
| $\Gamma_{27}$          | $\pi^+\pi^-\eta'$  | ( 5.2 ±1.9 ) × 10 <sup>-4</sup>  |     |
| $\Gamma_{28}$          | $\eta\eta$   | ( 5.7 ±0.5 ) × 10 <sup>-4</sup>  |     |
| $\Gamma_{29}$          | $K^+K^-$   | ( 1.05±0.07 ) × 10 <sup>-3</sup> |     |
| $\Gamma_{30}$          | $K_S^0K_S^0$   | ( 5.5 ±0.4 ) × 10 <sup>-4</sup>  |     |
| $\Gamma_{31}$          | $\bar{K}^0K^+\pi^- + \text{c.c.}$  | ( 1.34±0.19 ) × 10 <sup>-3</sup> |     |
| $\Gamma_{32}$          | $K^+K^-\pi^0$  | ( 3.2 ±0.8 ) × 10 <sup>-4</sup>  |     |
| $\Gamma_{33}$          | $K^+K^-\eta$   | < 3.4 × 10 <sup>-4</sup>         | 90% |
| $\Gamma_{34}$          | $K^+K^-\eta'(958)$   | ( 1.94±0.34 ) × 10 <sup>-4</sup> |     |
| $\Gamma_{35}$          | $\eta\eta'$  | < 6 × 10 <sup>-5</sup>           | 90% |
| $\Gamma_{36}$          | $\eta'\eta'$   | < 1.0 × 10 <sup>-4</sup>         | 90% |

|               |  |                                    |     |
|---------------|--|------------------------------------|-----|
| $\Gamma_{37}$ | $\pi^+ \pi^- K_S^0 K_S^0$                          | $( 2.3 \pm 0.6 ) \times 10^{-3}$   |     |
| $\Gamma_{38}$ | $K^+ K^- K_S^0 K_S^0$                              | $< 4 \times 10^{-4}$               | 90% |
| $\Gamma_{39}$ | $K^+ K^- K^+ K^-$                                  | $( 1.73 \pm 0.21 ) \times 10^{-3}$ |     |
| $\Gamma_{40}$ | $K^+ K^- \phi$                                     | $( 1.48 \pm 0.31 ) \times 10^{-3}$ |     |
| $\Gamma_{41}$ | $\bar{K}^0 K^+ \pi^- \phi + \text{c.c.}$           | $( 4.8 \pm 0.7 ) \times 10^{-3}$   |     |
| $\Gamma_{42}$ | $K^+ K^- \pi^0 \phi$                               | $( 2.7 \pm 0.5 ) \times 10^{-3}$   |     |
| $\Gamma_{43}$ | $\phi \pi^+ \pi^- \pi^0$                           | $( 9.3 \pm 1.2 ) \times 10^{-4}$   |     |
| $\Gamma_{44}$ | $\rho \bar{\rho}$                                  | $( 7.5 \pm 0.4 ) \times 10^{-5}$   |     |
| $\Gamma_{45}$ | $\rho \bar{\rho} \pi^0$                            | $( 4.9 \pm 0.4 ) \times 10^{-4}$   |     |
| $\Gamma_{46}$ | $\rho \bar{\rho} \eta$                             | $( 1.82 \pm 0.26 ) \times 10^{-4}$ |     |
| $\Gamma_{47}$ | $\rho \bar{\rho} \omega$                           | $( 3.8 \pm 0.5 ) \times 10^{-4}$   |     |
| $\Gamma_{48}$ | $\rho \bar{\rho} \phi$                             | $( 2.9 \pm 0.9 ) \times 10^{-5}$   |     |
| $\Gamma_{49}$ | $\rho \bar{\rho} \pi^+ \pi^-$                      | $( 1.32 \pm 0.34 ) \times 10^{-3}$ |     |
| $\Gamma_{50}$ | $\rho \bar{\rho} \pi^0 \pi^0$                      | $( 8.2 \pm 2.5 ) \times 10^{-4}$   |     |
| $\Gamma_{51}$ | $\rho \bar{\rho} K^+ K^-$ (non-resonant)           | $( 2.00 \pm 0.34 ) \times 10^{-4}$ |     |
| $\Gamma_{52}$ | $\rho \bar{\rho} K_S^0 K_S^0$                      | $< 7.9 \times 10^{-4}$             | 90% |
| $\Gamma_{53}$ | $\rho \bar{n} \pi^-$                               | $( 8.9 \pm 1.0 ) \times 10^{-4}$   |     |
| $\Gamma_{54}$ | $\bar{\rho} n \pi^+$                               | $( 9.3 \pm 0.9 ) \times 10^{-4}$   |     |
| $\Gamma_{55}$ | $\rho \bar{n} \pi^- \pi^0$                         | $( 2.27 \pm 0.19 ) \times 10^{-3}$ |     |
| $\Gamma_{56}$ | $\bar{\rho} n \pi^+ \pi^0$                         | $( 2.21 \pm 0.20 ) \times 10^{-3}$ |     |
| $\Gamma_{57}$ | $\Lambda \bar{\Lambda}$                            | $( 1.92 \pm 0.16 ) \times 10^{-4}$ |     |
| $\Gamma_{58}$ | $\Lambda \bar{\Lambda} \pi^+ \pi^-$                | $( 1.31 \pm 0.17 ) \times 10^{-3}$ |     |
| $\Gamma_{59}$ | $\Lambda \bar{\Lambda} \pi^+ \pi^-$ (non-resonant) | $( 6.9 \pm 1.6 ) \times 10^{-4}$   |     |
| $\Gamma_{60}$ | $\Sigma(1385)^+ \bar{\Lambda} \pi^- + \text{c.c.}$ | $< 4 \times 10^{-4}$               | 90% |
| $\Gamma_{61}$ | $\Sigma(1385)^- \bar{\Lambda} \pi^+ + \text{c.c.}$ | $< 6 \times 10^{-4}$               | 90% |
| $\Gamma_{62}$ | $K^+ \bar{\rho} \Lambda + \text{c.c.}$             | $( 8.1 \pm 0.6 ) \times 10^{-4}$   |     |
| $\Gamma_{63}$ | $K^+ \bar{\rho} \Lambda(1520) + \text{c.c.}$       | $( 2.9 \pm 0.7 ) \times 10^{-4}$   |     |
| $\Gamma_{64}$ | $\Lambda(1520) \bar{\Lambda}(1520)$                | $( 4.8 \pm 1.5 ) \times 10^{-4}$   |     |
| $\Gamma_{65}$ | $\Sigma^0 \bar{\Sigma}^0$                          | $< 6 \times 10^{-5}$               | 90% |
| $\Gamma_{66}$ | $\Sigma^+ \bar{\Sigma}^-$                          | $< 7 \times 10^{-5}$               | 90% |
| $\Gamma_{67}$ | $\Sigma(1385)^+ \bar{\Sigma}(1385)^-$              | $< 1.6 \times 10^{-4}$             | 90% |
| $\Gamma_{68}$ | $\Sigma(1385)^- \bar{\Sigma}(1385)^+$              | $< 8 \times 10^{-5}$               | 90% |
| $\Gamma_{69}$ | $K^- \Lambda \Xi^+ + \text{c.c.}$                  | $( 1.84 \pm 0.34 ) \times 10^{-4}$ |     |
| $\Gamma_{70}$ | $\Xi^0 \bar{\Xi}^0$                                | $< 1.1 \times 10^{-4}$             | 90% |
| $\Gamma_{71}$ | $\Xi^- \bar{\Xi}^+$                                | $( 1.48 \pm 0.33 ) \times 10^{-4}$ |     |
| $\Gamma_{72}$ | $J/\psi(1S) \pi^+ \pi^- \pi^0$                     | $< 1.5 \%$                         | 90% |
| $\Gamma_{73}$ | $\pi^0 \eta_c$                                     | $< 3.2 \times 10^{-3}$             | 90% |
| $\Gamma_{74}$ | $\eta_c(1S) \pi^+ \pi^-$                           | $< 5.4 \times 10^{-3}$             | 90% |

### Radiative decays

|               |                     |                        |     |
|---------------|---------------------|------------------------|-----|
| $\Gamma_{75}$ | $\gamma J/\psi(1S)$ | $( 19.2 \pm 0.7 ) \%$  |     |
| $\Gamma_{76}$ | $\gamma \rho^0$     | $< 2.0 \times 10^{-5}$ | 90% |

|               |                |                                  |                  |     |
|---------------|----------------|----------------------------------|------------------|-----|
| $\Gamma_{77}$ | $\gamma\omega$ | $< 6$                            | $\times 10^{-6}$ | 90% |
| $\Gamma_{78}$ | $\gamma\phi$   | $< 8$                            | $\times 10^{-6}$ | 90% |
| $\Gamma_{79}$ | $\gamma\gamma$ | $(2.74 \pm 0.14) \times 10^{-4}$ |                  |     |

### CONSTRAINED FIT INFORMATION

A multiparticle fit to  $\chi_{c1}(1P)$ ,  $\chi_{c0}(1P)$ ,  $\chi_{c2}(1P)$ , and  $\psi(2S)$  with 4 total widths, a partial width, 25 combinations of partial widths obtained from integrated cross section, and 84 branching ratios uses 240 measurements to determine 49 parameters. The overall fit has a  $\chi^2 = 342.4$  for 191 degrees of freedom.

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

|          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| $x_{14}$ | 13       |          |          |          |          |          |          |          |          |          |
| $x_{17}$ | 3        | 21       |          |          |          |          |          |          |          |          |
| $x_{18}$ | 8        | 7        | 1        |          |          |          |          |          |          |          |
| $x_{20}$ | 14       | 12       | 3        | 7        |          |          |          |          |          |          |
| $x_{24}$ | 19       | 16       | 3        | 10       | 24       |          |          |          |          |          |
| $x_{25}$ | 19       | 3        | 1        | 2        | 3        | 4        |          |          |          |          |
| $x_{28}$ | 11       | 9        | 2        | 6        | 14       | 27       | 2        |          |          |          |
| $x_{29}$ | 14       | 12       | 3        | 7        | 17       | 33       | 3        | 19       |          |          |
| $x_{30}$ | 13       | 11       | 2        | 6        | 15       | 28       | 3        | 17       | 20       |          |
| $x_{31}$ | 7        | 6        | 1        | 4        | 8        | 16       | 1        | 9        | 11       | 10       |
| $x_{39}$ | 9        | 8        | 2        | 5        | 10       | 18       | 2        | 10       | 13       | 11       |
| $x_{44}$ | 16       | 13       | 3        | 8        | 16       | 24       | 4        | 14       | 17       | 15       |
| $x_{57}$ | 11       | 9        | 2        | 6        | 14       | 28       | 2        | 16       | 20       | 17       |
| $x_{75}$ | 24       | 21       | 4        | 12       | 29       | 55       | 5        | 32       | 40       | 34       |
| $x_{79}$ | -8       | -6       | -1       | -3       | 1        | 19       | -2       | 13       | 13       | 10       |
| $\Gamma$ | -28      | -23      | -5       | -14      | -28      | -43      | -6       | -25      | -32      | -28      |
|          | $x_1$    | $x_{14}$ | $x_{17}$ | $x_{18}$ | $x_{20}$ | $x_{24}$ | $x_{25}$ | $x_{28}$ | $x_{29}$ | $x_{30}$ |
| $x_{39}$ | 6        |          |          |          |          |          |          |          |          |          |
| $x_{44}$ | 8        | 10       |          |          |          |          |          |          |          |          |
| $x_{57}$ | 9        | 11       | 14       |          |          |          |          |          |          |          |
| $x_{75}$ | 19       | 22       | 19       | 33       |          |          |          |          |          |          |
| $x_{79}$ | 6        | 4        | 26       | 13       | 30       |          |          |          |          |          |
| $\Gamma$ | -15      | -19      | -54      | -25      | -61      | -52      |          |          |          |          |
|          | $x_{31}$ | $x_{39}$ | $x_{44}$ | $x_{57}$ | $x_{75}$ | $x_{79}$ |          |          |          |          |

$\chi_{c2}(1P)$  PARTIAL WIDTHS $\chi_{c2}(1P) \Gamma(i)\Gamma(\gamma J/\psi(1S))/\Gamma(\text{total})$  $\Gamma(p\bar{p}) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$   $\Gamma_{44}\Gamma_{75}/\Gamma$ 

| VALUE (eV)                  | DOCUMENT ID                 | TECN | COMMENT                             |
|-----------------------------|-----------------------------|------|-------------------------------------|
| <b>27.9±1.3 OUR FIT</b>     |                             |      |                                     |
| <b>27.5±1.5 OUR AVERAGE</b> |                             |      |                                     |
| 27.0±1.5±1.1                | <sup>1</sup> ANDREOTTI 05A  | E835 | $p\bar{p} \rightarrow e^+e^-\gamma$ |
| 27.7±1.5±2.0                | <sup>1,2</sup> ARMSTRONG 92 | E760 | $\bar{p}p \rightarrow e^+e^-\gamma$ |
| 36 ±8                       | <sup>1</sup> BAGLIN 86B     | SPEC | $\bar{p}p \rightarrow e^+e^-X$      |

<sup>1</sup> Calculated by us using  $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0593 \pm 0.0010$ .<sup>2</sup> Recalculated by ANDREOTTI 05A. $\Gamma(\gamma\gamma) \times \Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$   $\Gamma_{79}\Gamma_{75}/\Gamma$ 

| VALUE (eV)                 | EVTS       | DOCUMENT ID                | TECN     | COMMENT                                   |
|----------------------------|------------|----------------------------|----------|---|
| <b>102± 5 OUR FIT</b>      |            |                            |          |   |
| <b>117± 10 OUR AVERAGE</b> |            |                            |          |   |
| 111± 12± 9                 | 147 ± 15   | <sup>1</sup> DOBBS         | 06 CLE3  | 10.4 $e^+e^- \rightarrow e^+e^-\chi_{c2}$ |
| 114± 11± 9                 | 136 ± 13.3 | <sup>1,2</sup> ABE         | 02T BELL | $e^+e^- \rightarrow e^+e^-\chi_{c2}$      |
| 139± 55± 21                |            | <sup>1,3</sup> ACCIARRI    | 99E L3   | $e^+e^- \rightarrow e^+e^-\chi_{c2}$      |
| 242± 65± 51                |            | <sup>1,4</sup> ACKER.,K... | 98 OPAL  | $e^+e^- \rightarrow e^+e^-\chi_{c2}$      |
| 150± 42± 36                |            | <sup>1,5</sup> DOMINICK    | 94 CLE2  | $e^+e^- \rightarrow e^+e^-\chi_{c2}$      |
| 470±240±120                |            | <sup>1,6</sup> BAUER       | 93 TPC   | $e^+e^- \rightarrow e^+e^-\chi_{c2}$      |

<sup>1</sup> Calculated by us using  $B(J/\psi \rightarrow \ell^+\ell^-) = 0.1187 \pm 0.0008$ .<sup>2</sup> All systematic errors added in quadrature.<sup>3</sup> The value for  $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$  reported in ACCIARRI 99E is derived using  $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) \times B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.0162 \pm 0.0014$ .<sup>4</sup> The value for  $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$  reported in ACKERSTAFF,K 98 is derived using  $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$  and  $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1203 \pm 0.0038$ .<sup>5</sup> The value for  $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$  reported in DOMINICK 94 is derived using  $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$ ,  $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0627 \pm 0.0020$ , and  $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = 0.0597 \pm 0.0025$ .<sup>6</sup> The value for  $\Gamma(\chi_{c2} \rightarrow \gamma\gamma)$  reported in BAUER 93 is derived using  $B(\chi_{c2} \rightarrow \gamma J/\psi(1S)) = 0.135 \pm 0.011$ ,  $B(J/\psi(1S) \rightarrow e^+e^-) = 0.0627 \pm 0.0020$ , and  $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = 0.0597 \pm 0.0025$ . $\chi_{c2}(1P) \Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$  $\Gamma(2(\pi^+\pi^-)) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_1\Gamma_{79}/\Gamma$ 

| VALUE (eV)                  | EVTS       | DOCUMENT ID   | TECN | COMMENT  |
|-----------------------------|------------|---------------|------|--|
| <b>5.7 ±0.5 OUR FIT</b>     |            |               |      |  |
| <b>5.2 ±0.7 OUR AVERAGE</b> |            |               |      |  |
| 5.01±0.44±0.55              | 1597 ± 138 | UEHARA 08     | BELL | $\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(\pi^+\pi^-)$ |
| 6.4 ±1.8 ±0.8               |            | EISENSTEIN 01 | CLE2 | $e^+e^- \rightarrow e^+e^-\chi_{c2}$                           |

$\Gamma(\rho\rho) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{2}\Gamma_{79}/\Gamma$

| VALUE (eV) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------|-----|------|-------------|------|---------|
|------------|-----|------|-------------|------|---------|

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

|      |    |      |        |    |   |
|------|----|------|--------|----|---|
| <7.8 | 90 | <598 | UEHARA | 08 | BELL $\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(\pi^+\pi^-)$ |
|------|----|------|--------|----|---|

$\Gamma(K^+K^-\pi^+\pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{14}\Gamma_{79}/\Gamma$

| VALUE (eV) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------|-----|------|-------------|------|---------|
|------------|-----|------|-------------|------|---------|

**4.7 ± 0.5 OUR FIT**

|                           |  |          |        |    |  |
|---------------------------|--|----------|--------|----|--|
| <b>4.42 ± 0.42 ± 0.53</b> |  | 780 ± 74 | UEHARA | 08 | BELL $\gamma\gamma \rightarrow \chi_{c2} \rightarrow K^+K^-\pi^+\pi^-$ |
|---------------------------|--|----------|--------|----|--|

$\Gamma(K^+K^-\pi^+\pi^-\pi^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{15}\Gamma_{79}/\Gamma$

| VALUE (eV) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------|-----|------|-------------|------|---------|
|------------|-----|------|-------------|------|---------|

|                        |  |      |                 |      |  |
|------------------------|--|------|-----------------|------|--|
| <b>6.5 ± 0.9 ± 1.5</b> |  | 1250 | DEL-AMO-SA..11M | BABR | $\gamma\gamma \rightarrow K^+K^-\pi^+\pi^-\pi^0$ |
|------------------------|--|------|-----------------|------|--|

$\Gamma(K^*(892)^0\bar{K}^*(892)^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{18}\Gamma_{79}/\Gamma$

| VALUE (eV) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------|-----|------|-------------|------|---------|
|------------|-----|------|-------------|------|---------|

**1.26 ± 0.24 OUR FIT**

|                          |  |          |        |    |  |
|--------------------------|--|----------|--------|----|--|
| <b>0.8 ± 0.17 ± 0.27</b> |  | 151 ± 30 | UEHARA | 08 | BELL $\gamma\gamma \rightarrow \chi_{c2} \rightarrow K^+K^-\pi^+\pi^-$ |
|--------------------------|--|----------|--------|----|--|

$\Gamma(\phi\phi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{20}\Gamma_{79}/\Gamma$

| VALUE (eV) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------|-----|------|-------------|------|---------|
|------------|-----|------|-------------|------|---------|

**0.59 ± 0.05 OUR FIT**

|                           |  |         |                  |     |   |
|---------------------------|--|---------|------------------|-----|---|
| <b>0.62 ± 0.07 ± 0.05</b> |  | 89 ± 11 | <sup>1</sup> LIU | 12B | BELL $\gamma\gamma \rightarrow 2(K^+K^-)$ |
|---------------------------|--|---------|------------------|-----|---|

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

|                    |  |            |        |    |   |
|--------------------|--|------------|--------|----|---|
| 0.58 ± 0.18 ± 0.16 |  | 26.5 ± 8.1 | UEHARA | 08 | BELL $\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(K^+K^-)$ |
|--------------------|--|------------|--------|----|---|

<sup>1</sup>Supersedes UEHARA 08. Using  $B(\phi \rightarrow K^+K^-) = (48.9 \pm 0.5)\%$ .

$\Gamma(\omega\omega) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{21}\Gamma_{79}/\Gamma$

| VALUE (eV) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------|-----|------|-------------|------|---------|
|------------|-----|------|-------------|------|---------|

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

|       |  |    |                  |     |  |
|-------|--|----|------------------|-----|--|
| <0.64 |  | 90 | <sup>1</sup> LIU | 12B | BELL $\gamma\gamma \rightarrow 2(\pi^+\pi^-\pi^0)$ |
|-------|--|----|------------------|-----|--|

<sup>1</sup>Using  $B(\omega \rightarrow \pi^+\pi^-\pi^0) = (89.2 \pm 0.7)\%$ .

$\Gamma(\omega\phi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{23}\Gamma_{79}/\Gamma$

| VALUE (eV) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------|-----|------|-------------|------|---------|
|------------|-----|------|-------------|------|---------|

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

|       |  |    |                  |     |   |
|-------|--|----|------------------|-----|---|
| <0.04 |  | 90 | <sup>1</sup> LIU | 12B | BELL $\gamma\gamma \rightarrow K^+K^-\pi^+\pi^-\pi^0$ |
|-------|--|----|------------------|-----|---|

<sup>1</sup>Using  $B(\phi \rightarrow K^+K^-) = (48.9 \pm 0.5)\%$  and  $B(\omega \rightarrow \pi^+\pi^-\pi^0) = (89.2 \pm 0.7)\%$ .

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{24}\Gamma_{79}/\Gamma$

| VALUE (eV) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------|-----|------|-------------|------|---------|
|------------|-----|------|-------------|------|---------|

**1.23 ± 0.08 OUR FIT**

**1.18 ± 0.25 OUR AVERAGE**

|                    |  |         |                     |    |   |
|--------------------|--|---------|---------------------|----|---|
| 1.44 ± 0.54 ± 0.47 |  | 34 ± 13 | <sup>1</sup> UEHARA | 09 | BELL 10.6 $e^+e^- \rightarrow e^+e^-\pi^0\pi^0$ |
|--------------------|--|---------|---------------------|----|---|

|                    |  |         |                       |    |   |
|--------------------|--|---------|-----------------------|----|---|
| 1.14 ± 0.21 ± 0.17 |  | 54 ± 10 | <sup>2</sup> NAKAZAWA | 05 | BELL 10.6 $e^+e^- \rightarrow e^+e^-\pi^+\pi^-$ |
|--------------------|--|---------|-----------------------|----|---|

<sup>1</sup>We multiplied the measurement by 3 to convert from  $\pi^0\pi^0$  to  $\pi\pi$ . Interference with the continuum included.

<sup>2</sup>We have multiplied  $\pi^+\pi^-$  measurement by 3/2 to obtain  $\pi\pi$ .

$$\Gamma(\rho^0 \pi^+ \pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{25}\Gamma_{79}/\Gamma$$

| VALUE (eV)             | EVTS      | DOCUMENT ID | TECN    | COMMENT   |
|------------------------|-----------|-------------|---------|---|
| <b>2.0±0.9 OUR FIT</b> |           |             |         |   |
| <b>3.2±1.9±0.5</b>     | 986 ± 578 | UEHARA      | 08 BELL | $\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(\pi^+ \pi^-)$ |

$$\Gamma(\eta\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{28}\Gamma_{79}/\Gamma$$

| VALUE (eV)            | EVTS | DOCUMENT ID         | TECN     | COMMENT                                  |
|-----------------------|------|---------------------|----------|--|
| <b>0.53±0.22±0.09</b> | 8    | <sup>1</sup> UEHARA | 10A BELL | 10.6 $e^+e^- \rightarrow e^+e^-\eta\eta$ |

<sup>1</sup> Interference with the continuum not included.

$$\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{29}\Gamma_{79}/\Gamma$$

| VALUE (eV)               | EVTS   | DOCUMENT ID | TECN    | COMMENT                                  |
|--------------------------|--------|-------------|---------|--|
| <b>0.56±0.04 OUR FIT</b> |        |             |         |  |
| <b>0.44±0.11±0.07</b>    | 33 ± 8 | NAKAZAWA    | 05 BELL | 10.6 $e^+e^- \rightarrow e^+e^- K^+ K^-$ |

$$\Gamma(K_S^0 K_S^0) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{30}\Gamma_{79}/\Gamma$$

| VALUE (eV)                                      | EVTS | DOCUMENT ID         | TECN    | COMMENT                                |
|---|------|---------------------|---------|--|
| <b>0.291±0.025 OUR FIT</b>                      |      |                     |         |  |
| <b>0.27 <math>^{+0.07}_{-0.06}</math> ±0.03</b> | 53   | <sup>1</sup> UEHARA | 13 BELL | $\gamma\gamma \rightarrow K_S^0 K_S^0$ |

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

|                  |        |      |          |                                      |
|------------------|--------|------|----------|--------------------------------------|
| 0.31 ±0.05 ±0.03 | 38 ± 7 | CHEN | 07B BELL | $e^+e^- \rightarrow e^+e^-\chi_{c2}$ |
|------------------|--------|------|----------|--------------------------------------|

<sup>1</sup> Supersedes CHEN 07B.

$$\Gamma(\bar{K}^0 K^+ \pi^- + \text{c.c.}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{31}\Gamma_{79}/\Gamma$$

| VALUE (eV)               | EVTS | DOCUMENT ID                  | TECN | COMMENT  |
|--------------------------|------|------------------------------|------|--|
| <b>0.71±0.11 OUR FIT</b> |      |                              |      |  |
| <b>1.20±0.33±0.13</b>    | 126  | <sup>1</sup> DEL-AMO-SA..11M | BABR | $\gamma\gamma \rightarrow K_S^0 K^\pm \pi^\mp$ |

<sup>1</sup> We have multiplied  $\bar{K}^0 K \pi$  by 2/3 to obtain  $\bar{K}^0 K^+ \pi^- + \text{c.c.}$

$$\Gamma(K^+ K^- K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{39}\Gamma_{79}/\Gamma$$

| VALUE (eV)               | EVTS     | DOCUMENT ID | TECN    | COMMENT   |
|--------------------------|----------|-------------|---------|---|
| <b>0.91±0.12 OUR FIT</b> |          |             |         |   |
| <b>1.10±0.21±0.15</b>    | 126 ± 24 | UEHARA      | 08 BELL | $\gamma\gamma \rightarrow \chi_{c2} \rightarrow 2(K^+ K^-)$ |

$$\Gamma(\eta_c(1S) \pi^+ \pi^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}} \quad \Gamma_{74}\Gamma_{79}/\Gamma$$

| VALUE (eV)      | CL% | DOCUMENT ID | TECN      | COMMENT                                     |
|-----------------|-----|-------------|-----------|---|
| <b>&lt;15.7</b> | 90  | LEES        | 12AE BABR | $e^+e^- \rightarrow e^+e^-\pi^+\pi^-\eta_c$ |

## $\chi_{c2}(1P)$ BRANCHING RATIOS

### HADRONIC DECAYS

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

| VALUE                        | DOCUMENT ID |
|------------------------------|-------------|
| <b>0.0107±0.0010 OUR FIT</b> |             |

$\Gamma(\rho^0 \pi^+ \pi^-) / \Gamma(2(\pi^+ \pi^-))$  $\Gamma_{25} / \Gamma_1$ 

| VALUE                      | DOCUMENT ID  | TECN | COMMENT                                 |
|----------------------------|--------------|------|---|
| <b>0.36 ± 0.15 OUR FIT</b> |              |      |   |
| <b>0.31 ± 0.17</b>         | TANENBAUM 78 | MRK1 | $\psi(2S) \rightarrow \gamma \chi_{c2}$ |

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

| VALUE (%)                 | EVTS  | DOCUMENT ID     | TECN     | COMMENT                                      |
|---------------------------|-------|-----------------|----------|--|
| <b>1.91 ± 0.24 ± 0.07</b> | 903.5 | <sup>1</sup> HE | 08B CLEO | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |

<sup>1</sup> HE 08B reports  $1.87 \pm 0.07 \pm 0.22 \pm 0.13$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- \pi^0 \pi^0) / \Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(\rho^+ \pi^- \pi^0 + \text{c.c.}) / \Gamma_{\text{total}}$  $\Gamma_4 / \Gamma$ 

| VALUE (%)                 | EVTS   | DOCUMENT ID       | TECN     | COMMENT                                      |
|---------------------------|--------|-------------------|----------|--|
| <b>2.28 ± 0.35 ± 0.08</b> | 1031.9 | <sup>1,2</sup> HE | 08B CLEO | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |

<sup>1</sup> HE 08B reports  $2.23 \pm 0.11 \pm 0.32 \pm 0.16$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \rho^+ \pi^- \pi^0 + \text{c.c.}) / \Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Calculated by us. We have added the values from HE 08B for  $\rho^+ \pi^- \pi^0$  and  $\rho^- \pi^+ \pi^0$  decays assuming uncorrelated statistical and fully correlated systematic uncertainties.

 $\Gamma(4\pi^0) / \Gamma_{\text{total}}$  $\Gamma_5 / \Gamma$ 

| VALUE (units $10^{-3}$ )  | EVTS | DOCUMENT ID          | TECN     | COMMENT   |
|---------------------------|------|----------------------|----------|---|
| <b>1.16 ± 0.15 ± 0.04</b> | 1164 | <sup>1</sup> ABLIKIM | 11A BES3 | $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$ |

<sup>1</sup> ABLIKIM 11A reports  $(1.21 \pm 0.05 \pm 0.16) \times 10^{-3}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow 4\pi^0) / \Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(K^+ K^- \pi^0 \pi^0) / \Gamma_{\text{total}}$  $\Gamma_6 / \Gamma$ 

| VALUE (%)                 | EVTS | DOCUMENT ID     | TECN     | COMMENT                                      |
|---------------------------|------|-----------------|----------|--|
| <b>0.22 ± 0.04 ± 0.01</b> | 76.9 | <sup>1</sup> HE | 08B CLEO | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |

<sup>1</sup> HE 08B reports  $0.21 \pm 0.03 \pm 0.03 \pm 0.01$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \pi^0 \pi^0) / \Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.}) / \Gamma_{\text{total}}$  $\Gamma_7 / \Gamma$ 

| VALUE (%)                 | EVTS  | DOCUMENT ID     | TECN     | COMMENT                                      |
|---------------------------|-------|-----------------|----------|--|
| <b>1.44 ± 0.20 ± 0.05</b> | 211.6 | <sup>1</sup> HE | 08B CLEO | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |



<sup>1</sup>HE 08B reports  $1.41 \pm 0.11 \pm 0.16 \pm 0.10$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(\rho^- K^+ \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_8/\Gamma$**

| VALUE (%)             | EVTS | DOCUMENT ID     | TECN     | COMMENT                                      |
|-----------------------|------|-----------------|----------|--|
| <b>0.43±0.13±0.01</b> | 62.9 | <sup>1</sup> HE | 08B CLEO | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |

<sup>1</sup>HE 08B reports  $0.42 \pm 0.11 \pm 0.06 \pm 0.03$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \rho^- K^+ \bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(K^*(892)^0 K^- \pi^+ \rightarrow K^- \pi^+ K^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_9/\Gamma$**

| VALUE (%)             | EVTS | DOCUMENT ID     | TECN     | COMMENT                                      |
|-----------------------|------|-----------------|----------|--|
| <b>0.31±0.08±0.01</b> | 38.7 | <sup>1</sup> HE | 08B CLEO | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |

<sup>1</sup>HE 08B reports  $0.30 \pm 0.07 \pm 0.04 \pm 0.02$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0 K^- \pi^+ \rightarrow K^- \pi^+ K^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(K^*(892)^0 \bar{K}^0 \pi^0 \rightarrow K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_{10}/\Gamma$**

| VALUE (%)             | EVTS | DOCUMENT ID     | TECN     | COMMENT                                      |
|-----------------------|------|-----------------|----------|--|
| <b>0.40±0.09±0.01</b> | 63.0 | <sup>1</sup> HE | 08B CLEO | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |

<sup>1</sup>HE 08B reports  $0.39 \pm 0.07 \pm 0.05 \pm 0.03$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0 \bar{K}^0 \pi^0 \rightarrow K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(K^*(892)^- K^+ \pi^0 \rightarrow K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_{11}/\Gamma$**

| VALUE (%)             | EVTS | DOCUMENT ID     | TECN     | COMMENT                                      |
|-----------------------|------|-----------------|----------|--|
| <b>0.39±0.08±0.01</b> | 51.1 | <sup>1</sup> HE | 08B CLEO | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |

<sup>1</sup>HE 08B reports  $0.38 \pm 0.07 \pm 0.04 \pm 0.03$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^- K^+ \pi^0 \rightarrow K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(K^*(892)^+ \bar{K}^0 \pi^- \rightarrow K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_{12}/\Gamma$**

| VALUE (%)             | EVTS | DOCUMENT ID     | TECN     | COMMENT                                      |
|-----------------------|------|-----------------|----------|--|
| <b>0.31±0.08±0.01</b> | 39.3 | <sup>1</sup> HE | 08B CLEO | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |

<sup>1</sup> HE 08B reports  $0.30 \pm 0.07 \pm 0.04 \pm 0.02$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^+ \bar{K}^0 \pi^- \rightarrow K^+ \pi^- \bar{K}^0 \pi^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(K^+ K^- \eta \pi^0)/\Gamma_{\text{total}}$**   **$\Gamma_{13}/\Gamma$**

| <u>VALUE (%)</u>         | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                               |
|--------------------------|-------------|--------------------|-------------|--|
| <b>0.133±0.046±0.005</b> | 22.9        | <sup>1</sup> HE    | 08B CLEO    | $e^+ e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |

<sup>1</sup> HE 08B reports  $0.13 \pm 0.04 \pm 0.02 \pm 0.01$  % from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \eta \pi^0)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(K^+ K^- \pi^+ \pi^-)/\Gamma_{\text{total}}$**   **$\Gamma_{14}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u> |
|---|--------------------|
| <b>8.9±1.0 OUR FIT</b>                    |                    |

**$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$**   **$\Gamma_{15}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>   | <u>TECN</u> | <u>COMMENT</u>  |
|---|-------------|----------------------|-------------|---|
| <b>11.69±0.13±1.31</b>                    | 11k         | <sup>1</sup> ABLIKIM | 13B BES3    | $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$ |

<sup>1</sup> Using  $1.06 \times 10^8$   $\psi(2S)$  mesons and  $\text{B}(\psi(2S) \rightarrow \chi_{c2} \gamma) = (8.72 \pm 0.34)\%$ .

**$\Gamma(K_S^0 K^\pm \pi^\mp \pi^+ \pi^-)/\Gamma_{\text{total}}$**   **$\Gamma_{16}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>   | <u>TECN</u> | <u>COMMENT</u>  |
|---|-------------|----------------------|-------------|---|
| <b>7.30±0.11±0.75</b>                     | 4.5k        | <sup>1</sup> ABLIKIM | 13B BES3    | $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$ |

<sup>1</sup> Using  $1.06 \times 10^8$   $\psi(2S)$  mesons and  $\text{B}(\psi(2S) \rightarrow \chi_{c2} \gamma) = (8.72 \pm 0.34)\%$ .

**$\Gamma(K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma(K^+ K^- \pi^+ \pi^-)$**   **$\Gamma_{17}/\Gamma_{14}$**

| <u>VALUE</u>             | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                          |
|--------------------------|--------------------|-------------|---|
| <b>0.25±0.13 OUR FIT</b> |                    |             |   |
| <b>0.25±0.13</b>         | TANENBAUM 78       | MRK1        | $\psi(2S) \rightarrow \gamma \chi_{c2}$ |

**$\Gamma(K^+ \bar{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma_{\text{total}}$**   **$\Gamma_{17}/\Gamma$**

| <u>VALUE (units <math>10^{-4}</math>)</u> | <u>DOCUMENT ID</u> |
|---|--------------------|
| <b>22±11 OUR FIT</b>                      |                    |

**$\Gamma(K^*(892)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}}$**   **$\Gamma_{18}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u> |
|---|--------------------|
| <b>2.4±0.5 OUR FIT</b>                    |                    |

**$\Gamma(3(\pi^+ \pi^-))/\Gamma_{\text{total}}$**   **$\Gamma_{19}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u>                       | <u>TECN</u> | <u>COMMENT</u>                          |
|---|--|-------------|---|
| <b>8.6±1.8 OUR EVALUATION</b>             | Treating systematic error as correlated. |             |   |
| <b>8.6±1.8 OUR AVERAGE</b>                |  |             |   |
| 8.6±0.9±1.6                               | <sup>1</sup> BAI                         | 99B BES     | $\psi(2S) \rightarrow \gamma \chi_{c2}$ |
| 8.7±5.9±0.4                               | <sup>1</sup> TANENBAUM                   | 78 MRK1     | $\psi(2S) \rightarrow \gamma \chi_{c2}$ |

<sup>1</sup> Rescaled by us using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (8.3 \pm 0.4)\%$  and  $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$ . Multiplied by a factor of 2 to convert from  $K_S^0 K^+\pi^-$  to  $K^0 K^+\pi^-$  decay.

| $\Gamma(\phi\phi)/\Gamma_{\text{total}}$  | $\Gamma_{20}/\Gamma$ |
|---|----------------------|
| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u>   |
| <b>1.12±0.10 OUR FIT</b>                  |                      |

| $\Gamma(\omega\omega)/\Gamma_{\text{total}}$ | $\Gamma_{21}/\Gamma$ |
|--|----------------------|
| <u>VALUE (units <math>10^{-3}</math>)</u>    | <u>EVTS</u>          |
| <u>DOCUMENT ID</u>                           | <u>TECN</u>          |
| <u>COMMENT</u>                               |                      |
| <b>0.88±0.11 OUR AVERAGE</b>                 |                      |

|                 |            |                      |          |  |
|-----------------|------------|----------------------|----------|--|
| 0.85±0.10±0.03  | 762        | <sup>1</sup> ABLIKIM | 11K BES3 | $\psi(2S) \rightarrow \gamma$ hadrons                          |
| 1.8 ± 0.6 ± 0.1 | 27.7 ± 7.4 | <sup>2</sup> ABLIKIM | 05N BES2 | $\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma 6\pi$ |

<sup>1</sup> ABLIKIM 11K reports  $(8.9 \pm 0.3 \pm 1.1) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \omega\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> ABLIKIM 05N reports  $[\Gamma(\chi_{c2}(1P) \rightarrow \omega\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))] = (0.165 \pm 0.044 \pm 0.032) \times 10^{-3}$  which we divide by our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

| $\Gamma(\omega K^+ K^-)/\Gamma_{\text{total}}$ | $\Gamma_{22}/\Gamma$ |                      |          |   |
|--|----------------------|----------------------|----------|---|
| <u>VALUE (units <math>10^{-3}</math>)</u>      | <u>EVTS</u>          |                      |          |   |
| <u>DOCUMENT ID</u>                             | <u>TECN</u>          |                      |          |   |
| <u>COMMENT</u>                                 |                      |                      |          |   |
| <b>0.73±0.04±0.08</b>                          | 512                  | <sup>1</sup> ABLIKIM | 13B BES3 | $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$ |

<sup>1</sup> Using  $1.06 \times 10^8$   $\psi(2S)$  mesons and  $B(\psi(2S) \rightarrow \chi_{c2}\gamma) = (8.72 \pm 0.34)\%$ .

| $\Gamma(\omega\phi)/\Gamma_{\text{total}}$ | $\Gamma_{23}/\Gamma$ |                      |          |                                       |
|--|----------------------|----------------------|----------|---------------------------------------|
| <u>VALUE (units <math>10^{-5}</math>)</u>  | <u>CL%</u>           |                      |          |                                       |
| <u>DOCUMENT ID</u>                         | <u>TECN</u>          |                      |          |                                       |
| <u>COMMENT</u>                             |                      |                      |          |                                       |
| <1.9                                       | 90                   | <sup>1</sup> ABLIKIM | 11K BES3 | $\psi(2S) \rightarrow \gamma$ hadrons |

<sup>1</sup> ABLIKIM 11K reports  $< 2 \times 10^{-5}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \omega\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

| $\Gamma(\pi\pi)/\Gamma_{\text{total}}$    | $\Gamma_{24}/\Gamma$ |
|---|----------------------|
| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u>   |
| <b>2.33±0.12 OUR FIT</b>                  |                      |

| $\Gamma(\rho^0\pi^+\pi^-)/\Gamma_{\text{total}}$ | $\Gamma_{25}/\Gamma$ |
|--|----------------------|
| <u>VALUE (units <math>10^{-4}</math>)</u>        | <u>DOCUMENT ID</u>   |
| <b>38±16 OUR FIT</b>                             |                      |

| $\Gamma(\pi^+\pi^-\eta)/\Gamma_{\text{total}}$ | $\Gamma_{26}/\Gamma$ |                    |         |   |
|--|----------------------|--------------------|---------|---|
| <u>VALUE (units <math>10^{-3}</math>)</u>      | <u>CL%</u>           |                    |         |   |
| <u>DOCUMENT ID</u>                             | <u>TECN</u>          |                    |         |   |
| <u>COMMENT</u>                                 |                      |                    |         |   |
| <b>0.50±0.13±0.02</b>                          |                      | <sup>1</sup> ATHAR | 07 CLEO | $\psi(2S) \rightarrow \gamma h^+ h^- h^0$ |

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

|      |    |                      |          |  |
|------|----|----------------------|----------|--|
| <1.5 | 90 | <sup>2</sup> ABLIKIM | 06R BES2 | $\psi(2S) \rightarrow \gamma\chi_{c2}$ |
|------|----|----------------------|----------|--|

<sup>1</sup> ATHAR 07 reports  $(0.49 \pm 0.12 \pm 0.06) \times 10^{-3}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- \eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> ABLIKIM 06R reports  $< 1.7 \times 10^{-3}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- \eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

**$\Gamma(\pi^+ \pi^- \eta')/\Gamma_{\text{total}}$**   **$\Gamma_{27}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                                 |
|---|--------------------|-------------|--|
| <b>0.52±0.19±0.02</b>                     | <sup>1</sup> ATHAR | 07          | CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$ |

<sup>1</sup> ATHAR 07 reports  $(0.51 \pm 0.18 \pm 0.06) \times 10^{-3}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+ \pi^- \eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(\eta\eta)/\Gamma_{\text{total}}$**   **$\Gamma_{28}/\Gamma$**

| <u>VALUE (units <math>10^{-4}</math>)</u> | <u>DOCUMENT ID</u> |
|---|--------------------|
| <b>5.7±0.5 OUR FIT</b>                    |                    |

**$\Gamma(K^+ K^-)/\Gamma_{\text{total}}$**   **$\Gamma_{29}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u> |
|---|--------------------|
| <b>1.05±0.07 OUR FIT</b>                  |                    |

**$\Gamma(K_S^0 K_S^0)/\Gamma_{\text{total}}$**   **$\Gamma_{30}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u> |
|---|--------------------|
| <b>0.55±0.04 OUR FIT</b>                  |                    |

**$\Gamma(K_S^0 K_S^0)/\Gamma(\pi\pi)$**   **$\Gamma_{30}/\Gamma_{24}$**

| <u>VALUE</u>               | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|----------------------------|--------------------|-------------|----------------|
| <b>0.235±0.019 OUR FIT</b> |                    |             |                |

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

|                          |                     |     |  |
|--------------------------|---------------------|-----|--|
| $0.27 \pm 0.07 \pm 0.04$ | <sup>1,2</sup> CHEN | 07B | BELL $e^+ e^- \rightarrow e^+ e^- \chi_{c2}$ |
|--------------------------|---------------------|-----|--|

<sup>1</sup> Using  $\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$  from the  $\pi^+ \pi^-$  measurement of NAKAZAWA 05 rescaled by 3/2 to convert to  $\pi\pi$ .

<sup>2</sup> Not independent from other measurements.

**$\Gamma(K_S^0 K_S^0)/\Gamma(K^+ K^-)$**   **$\Gamma_{30}/\Gamma_{29}$**

| <u>VALUE</u>             | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------------------|--------------------|-------------|----------------|
| <b>0.52±0.05 OUR FIT</b> |                    |             |                |

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

|                          |                     |     |  |
|--------------------------|---------------------|-----|--|
| $0.70 \pm 0.21 \pm 0.12$ | <sup>1,2</sup> CHEN | 07B | BELL $e^+ e^- \rightarrow e^+ e^- \chi_{c2}$ |
|--------------------------|---------------------|-----|--|

<sup>1</sup> Using  $\Gamma(K^+ K^-) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$  from NAKAZAWA 05.

<sup>2</sup> Not independent from other measurements.

$\Gamma(K^+ K^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{32}/\Gamma$ 

| VALUE (units $10^{-3}$ )  | CL% | DOCUMENT ID        | TECN | COMMENT  |
|---------------------------|-----|--------------------|------|--|
| <b>0.32 ± 0.08 ± 0.01</b> |     | <sup>1</sup> ATHAR | 07   | CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$ |

<sup>1</sup> ATHAR 07 reports  $(0.31 \pm 0.07 \pm 0.04) \times 10^{-3}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(K^+ K^- \eta)/\Gamma_{\text{total}}$   $\Gamma_{33}/\Gamma$ 

| VALUE (units $10^{-3}$ ) | CL% | DOCUMENT ID        | TECN | COMMENT  |
|--------------------------|-----|--------------------|------|--|
| <b>&lt;0.34</b>          | 90  | <sup>1</sup> ATHAR | 07   | CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$ |

<sup>1</sup> ATHAR 07 reports  $< 0.33 \times 10^{-3}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- \eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

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

| VALUE (units $10^{-4}$ ) | EVTS | DOCUMENT ID          | TECN | COMMENT   |
|--------------------------|------|----------------------|------|---|
| <b>1.94 ± 0.34</b>       | 107  | <sup>1</sup> ABLIKIM | 14J  | BES3 $\psi(2S) \rightarrow \gamma K^+ K^- \eta'(958)$ |

<sup>1</sup> Derived using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (8.72 \pm 0.34)\%$ . Uncertainty includes both statistical and systematic contributions combined in quadrature.

 $\Gamma(\eta\eta')/\Gamma_{\text{total}}$   $\Gamma_{35}/\Gamma$ 

| VALUE (units $10^{-4}$ ) | CL% | EVTS          | DOCUMENT ID        | TECN | COMMENT                                      |
|--------------------------|-----|---------------|--------------------|------|--|
| <b>&lt;0.6</b>           | 90  | $3.3 \pm 8.0$ | <sup>1</sup> ASNER | 09   | CLEO $\psi(2S) \rightarrow \gamma \eta\eta'$ |

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

|      |    |  |                    |    |  |
|------|----|--|--------------------|----|--|
| <2.4 | 90 |  | <sup>2</sup> ADAMS | 07 | CLEO $\psi(2S) \rightarrow \gamma \chi_{c2}$ |
|------|----|--|--------------------|----|--|

<sup>1</sup> ASNER 09 reports  $< 0.6 \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \eta\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

<sup>2</sup> Superseded by ASNER 09. ADAMS 07 reports  $< 2.3 \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \eta\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

 $\Gamma(\eta'\eta')/\Gamma_{\text{total}}$   $\Gamma_{36}/\Gamma$ 

| VALUE (units $10^{-4}$ ) | CL% | EVTS       | DOCUMENT ID        | TECN | COMMENT                                       |
|--------------------------|-----|------------|--------------------|------|---|
| <b>&lt;1.0</b>           | 90  | $12 \pm 7$ | <sup>1</sup> ASNER | 09   | CLEO $\psi(2S) \rightarrow \gamma \eta'\eta'$ |

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

|      |    |  |                    |    |  |
|------|----|--|--------------------|----|--|
| <3.2 | 90 |  | <sup>2</sup> ADAMS | 07 | CLEO $\psi(2S) \rightarrow \gamma \chi_{c2}$ |
|------|----|--|--------------------|----|--|

<sup>1</sup> ASNER 09 reports  $< 1.0 \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \eta'\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

<sup>2</sup> Superseded by ASNER 09. ADAMS 07 reports  $< 3.1 \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \eta'\eta')/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 0.0933 \pm 0.0014 \pm 0.0061$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

$\Gamma(\pi^+\pi^-K_S^0K_S^0)/\Gamma_{\text{total}}$   $\Gamma_{37}/\Gamma$

| VALUE (units $10^{-3}$ ) | EVTS    | DOCUMENT ID          | TECN     | COMMENT                                |
|--------------------------|---------|----------------------|----------|--|
| <b>2.3±0.6±0.1</b>       | 57 ± 11 | <sup>1</sup> ABLIKIM | 050 BES2 | $\psi(2S) \rightarrow \gamma\chi_{c2}$ |

<sup>1</sup> ABLIKIM 050 reports  $[\Gamma(\chi_{c2}(1P) \rightarrow \pi^+\pi^-K_S^0K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  =  $(0.207 \pm 0.039 \pm 0.033) \times 10^{-3}$  which we divide by our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^+K^-K_S^0K_S^0)/\Gamma_{\text{total}}$   $\Gamma_{38}/\Gamma$

| VALUE (units $10^{-4}$ ) | CL% | EVTS      | DOCUMENT ID          | TECN     | COMMENT                              |
|--------------------------|-----|-----------|----------------------|----------|--------------------------------------|
| <b>&lt;4</b>             | 90  | 2.3 ± 2.2 | <sup>1</sup> ABLIKIM | 050 BES2 | $e^+e^- \rightarrow \chi_{c2}\gamma$ |

<sup>1</sup> ABLIKIM 050 reports  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-K_S^0K_S^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  <  $3.5 \times 10^{-5}$  which we divide by our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

$\Gamma(K^+K^-K^+K^-)/\Gamma_{\text{total}}$   $\Gamma_{39}/\Gamma$

| VALUE (units $10^{-3}$ ) | DOCUMENT ID |
|--------------------------|-------------|
| <b>1.73±0.21 OUR FIT</b> |             |

$\Gamma(K^+K^-\phi)/\Gamma_{\text{total}}$   $\Gamma_{40}/\Gamma$

| VALUE (units $10^{-3}$ ) | EVTS | DOCUMENT ID          | TECN     | COMMENT                                 |
|--------------------------|------|----------------------|----------|---|
| <b>1.48±0.31±0.05</b>    | 52   | <sup>1</sup> ABLIKIM | 06T BES2 | $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$ |

<sup>1</sup> ABLIKIM 06T reports  $(1.67 \pm 0.26 \pm 0.24) \times 10^{-3}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\bar{K}^0K^+\pi^-\phi + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_{41}/\Gamma$

| VALUE (units $10^{-3}$ ) | DOCUMENT ID | TECN     | COMMENT                                |
|--------------------------|-------------|----------|--|
| <b>4.83±0.32±0.66</b>    | ABLIKIM     | 15M BES3 | $\psi(2S) \rightarrow \gamma\chi_{c2}$ |

$\Gamma(K^+K^-\pi^0\phi)/\Gamma_{\text{total}}$   $\Gamma_{42}/\Gamma$

| VALUE (units $10^{-3}$ ) | DOCUMENT ID | TECN     | COMMENT                                |
|--------------------------|-------------|----------|--|
| <b>2.74±0.16±0.44</b>    | ABLIKIM     | 15M BES3 | $\psi(2S) \rightarrow \gamma\chi_{c2}$ |

$\Gamma(\phi\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{43}/\Gamma$

| VALUE (units $10^{-3}$ ) | EVTS | DOCUMENT ID          | TECN     | COMMENT   |
|--------------------------|------|----------------------|----------|---|
| <b>0.93±0.06±0.10</b>    | 408  | <sup>1</sup> ABLIKIM | 13B BES3 | $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$ |

<sup>1</sup> Using  $1.06 \times 10^8$   $\psi(2S)$  mesons and  $B(\psi(2S) \rightarrow \chi_{c2}\gamma) = (8.72 \pm 0.34)\%$ .

$\Gamma(p\bar{p})/\Gamma_{\text{total}}$   $\Gamma_{44}/\Gamma$

| VALUE (units $10^{-4}$ ) | DOCUMENT ID |
|--------------------------|-------------|
| <b>0.75±0.04 OUR FIT</b> |             |

**$\Gamma(p\bar{p}\pi^0)/\Gamma_{\text{total}}$**   **$\Gamma_{45}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u>  | <u>TECN</u> | <u>COMMENT</u>                                 |
|---|---------------------|-------------|--|
| <b>0.49±0.04 OUR AVERAGE</b>              |                     |             |  |
| 0.49±0.04±0.02                            | <sup>1</sup> ONYISI | 10          | CLE3 $\psi(2S) \rightarrow \gamma p\bar{p}X$   |
| 0.45±0.09±0.02                            | <sup>2</sup> ATHAR  | 07          | CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$ |

<sup>1</sup> ONYISI 10 reports  $(4.83 \pm 0.25 \pm 0.35 \pm 0.31) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> ATHAR 07 reports  $(0.44 \pm 0.08 \pm 0.05) \times 10^{-3}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(p\bar{p}\eta)/\Gamma_{\text{total}}$**   **$\Gamma_{46}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u>  | <u>TECN</u> | <u>COMMENT</u>                                 |
|---|---------------------|-------------|--|
| <b>0.182±0.026 OUR AVERAGE</b>            |                     |             |  |
| 0.180±0.027±0.006                         | <sup>1</sup> ONYISI | 10          | CLE3 $\psi(2S) \rightarrow \gamma p\bar{p}X$   |
| 0.19 ±0.07 ±0.01                          | <sup>2</sup> ATHAR  | 07          | CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$ |

<sup>1</sup> ONYISI 10 reports  $(1.76 \pm 0.23 \pm 0.14 \pm 0.11) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> ATHAR 07 reports  $(0.19 \pm 0.07 \pm 0.02) \times 10^{-3}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\eta)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(p\bar{p}\omega)/\Gamma_{\text{total}}$**   **$\Gamma_{47}/\Gamma$**

| <u>VALUE (units <math>10^{-3}</math>)</u> | <u>DOCUMENT ID</u>  | <u>TECN</u> | <u>COMMENT</u>                               |
|---|---------------------|-------------|--|
| <b>0.38±0.04±0.01</b>                     | <sup>1</sup> ONYISI | 10          | CLE3 $\psi(2S) \rightarrow \gamma p\bar{p}X$ |

<sup>1</sup> ONYISI 10 reports  $(3.68 \pm 0.35 \pm 0.26 \pm 0.24) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

**$\Gamma(p\bar{p}\phi)/\Gamma_{\text{total}}$**   **$\Gamma_{48}/\Gamma$**

| <u>VALUE (units <math>10^{-5}</math>)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>   | <u>TECN</u> | <u>COMMENT</u>                                     |
|---|-------------|----------------------|-------------|--|
| <b>2.9±0.9±0.1</b>                        | 24 ± 7      | <sup>1</sup> ABLIKIM | 11F         | BES3 $\psi(2S) \rightarrow \gamma p\bar{p}K^+ K^-$ |

<sup>1</sup> ABLIKIM 11F reports  $(3.04 \pm 0.85 \pm 0.43) \times 10^{-5}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p}\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\rho\bar{p}\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{49}/\Gamma$

| VALUE (units $10^{-3}$ ) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-------------|------|---------|
|--------------------------|-------------|------|---------|

**1.32±0.34 OUR EVALUATION** Treating systematic error as correlated.

**1.3 ±0.4 OUR AVERAGE** Error includes scale factor of 1.3.

|                |                  |     |  |
|----------------|------------------|-----|--|
| 1.17±0.19±0.30 | <sup>1</sup> BAI | 99B | BES $\psi(2S) \rightarrow \gamma\chi_{c2}$ |
|----------------|------------------|-----|--|

|                |                        |    |   |
|----------------|------------------------|----|---|
| 2.64±1.03±0.14 | <sup>1</sup> TANENBAUM | 78 | MRK1 $\psi(2S) \rightarrow \gamma\chi_{c2}$ |
|----------------|------------------------|----|---|

<sup>1</sup> Rescaled by us using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (8.3 \pm 0.4)\%$  and  $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.6 \pm 0.5)\%$ . Multiplied by a factor of 2 to convert from  $K_S^0 K^+\pi^-$  to  $K^0 K^+\pi^-$  decay.

$\Gamma(\rho\bar{p}\pi^0\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{50}/\Gamma$

| VALUE (%) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-----------|------|-------------|------|---------|
|-----------|------|-------------|------|---------|

|                          |      |                 |     |  |
|--------------------------|------|-----------------|-----|--|
| <b>0.082±0.024±0.003</b> | 29.2 | <sup>1</sup> HE | 08B | CLEO $e^+e^- \rightarrow \gamma h^+ h^- h^0 h^0$ |
|--------------------------|------|-----------------|-----|--|

<sup>1</sup> HE 08B reports  $0.08 \pm 0.02 \pm 0.01 \pm 0.01\%$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \rho\bar{p}\pi^0\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\rho\bar{p}K^+K^-(\text{non-resonant}))/\Gamma_{\text{total}}$   $\Gamma_{51}/\Gamma$

| VALUE (units $10^{-4}$ ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

|                       |          |                      |     |   |
|-----------------------|----------|----------------------|-----|---|
| <b>2.00±0.33±0.07</b> | 131 ± 12 | <sup>1</sup> ABLIKIM | 11F | BES3 $\psi(2S) \rightarrow \gamma\rho\bar{p}K^+K^-$ |
|-----------------------|----------|----------------------|-----|---|

<sup>1</sup> ABLIKIM 11F reports  $(2.08 \pm 0.19 \pm 0.30) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \rho\bar{p}K^+K^-(\text{non-resonant}))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\rho\bar{p}K_S^0K_S^0)/\Gamma_{\text{total}}$   $\Gamma_{52}/\Gamma$

| VALUE (units $10^{-4}$ ) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|---------|
|--------------------------|-----|-------------|------|---------|

|                |    |                      |     |   |
|----------------|----|----------------------|-----|---|
| <b>&lt;7.9</b> | 90 | <sup>1</sup> ABLIKIM | 06D | BES2 $\psi(2S) \rightarrow \chi_{c2}\gamma$ |
|----------------|----|----------------------|-----|---|

<sup>1</sup> Using  $B(\psi(2S) \rightarrow \chi_{c2}\gamma) = (9.3 \pm 0.6)\%$ .

$\Gamma(\rho\bar{n}\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{53}/\Gamma$

| VALUE (units $10^{-4}$ ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

**8.9±1.0 OUR AVERAGE**

|             |      |                      |     |  |
|-------------|------|----------------------|-----|--|
| 8.8±1.0±0.3 | 3309 | <sup>1</sup> ABLIKIM | 12J | BES3 $\psi(2S) \rightarrow \gamma\rho\bar{n}\pi^-$ |
|-------------|------|----------------------|-----|--|

|              |  |                      |     |  |
|--------------|--|----------------------|-----|--|
| 10.6±3.6±0.4 |  | <sup>2</sup> ABLIKIM | 06i | BES2 $\psi(2S) \rightarrow \gamma\rho\pi^-X$ |
|--------------|--|----------------------|-----|--|

<sup>1</sup> ABLIKIM 12J reports  $[\Gamma(\chi_{c2}(1P) \rightarrow \rho\bar{n}\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  =  $(0.80 \pm 0.02 \pm 0.09) \times 10^{-4}$  which we divide by our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> ABLIKIM 06i reports  $[\Gamma(\chi_{c2}(1P) \rightarrow \rho\bar{n}\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  =  $(0.97 \pm 0.20 \pm 0.26) \times 10^{-4}$  which we divide by our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.



$\Gamma(\bar{p}n\pi^+)/\Gamma_{\text{total}}$   $\Gamma_{54}/\Gamma$ 

| <u>VALUE (units <math>10^{-4}</math>)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>   | <u>TECN</u> | <u>COMMENT</u>                             |
|---|-------------|----------------------|-------------|--|
| <b>9.3±0.8±0.3</b>                        | 3732        | <sup>1</sup> ABLIKIM | 12J BES3    | $\psi(2S) \rightarrow \gamma\bar{p}n\pi^+$ |

<sup>1</sup> ABLIKIM 12J reports  $[\Gamma(\chi_{c2}(1P) \rightarrow \bar{p}n\pi^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))] = (0.85 \pm 0.02 \pm 0.07) \times 10^{-4}$  which we divide by our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(\rho\bar{n}\pi^-\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{55}/\Gamma$ 

| <u>VALUE (units <math>10^{-4}</math>)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>   | <u>TECN</u> | <u>COMMENT</u>                                     |
|---|-------------|----------------------|-------------|--|
| <b>22.7±1.8±0.8</b>                       | 2128        | <sup>1</sup> ABLIKIM | 12J BES3    | $\psi(2S) \rightarrow \gamma\rho\bar{n}\pi^-\pi^0$ |

<sup>1</sup> ABLIKIM 12J reports  $[\Gamma(\chi_{c2}(1P) \rightarrow \rho\bar{n}\pi^-\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))] = (2.07 \pm 0.06 \pm 0.15) \times 10^{-4}$  which we divide by our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(\bar{p}n\pi^+\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{56}/\Gamma$ 

| <u>VALUE (units <math>10^{-4}</math>)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>   | <u>TECN</u> | <u>COMMENT</u>                                  |
|---|-------------|----------------------|-------------|---|
| <b>22.1±1.9±0.8</b>                       | 2352        | <sup>1</sup> ABLIKIM | 12J BES3    | $\psi(2S) \rightarrow \gamma\bar{p}n\pi^+\pi^0$ |

<sup>1</sup> ABLIKIM 12J reports  $[\Gamma(\chi_{c2}(1P) \rightarrow \bar{p}n\pi^+\pi^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))] = (2.01 \pm 0.06 \pm 0.16) \times 10^{-4}$  which we divide by our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$   $\Gamma_{57}/\Gamma$ 

| <u>VALUE (units <math>10^{-4}</math>)</u> | <u>DOCUMENT ID</u> |
|---|--------------------|
| <b>1.92±0.16 OUR FIT</b>                  |                    |

 $\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{58}/\Gamma$ 

| <u>VALUE (units <math>10^{-5}</math>)</u> | <u>CL%</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>   | <u>TECN</u> | <u>COMMENT</u>  |
|---|------------|-------------|----------------------|-------------|---|
| <b>131±16±5</b>                           |            | 371         | <sup>1</sup> ABLIKIM | 12i BES3    | $\psi(2S) \rightarrow \gamma\Lambda\bar{\Lambda}\pi^+\pi^-$ |

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

<350 90 <sup>2</sup> ABLIKIM 06D BES2  $\psi(2S) \rightarrow \chi_{c2}\gamma$

<sup>1</sup> ABLIKIM 12i reports  $(137.0 \pm 7.6 \pm 15.7) \times 10^{-5}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Using  $B(\psi(2S) \rightarrow \chi_{c2}\gamma) = (9.3 \pm 0.6)\%$ .

 $\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^- \text{ (non-resonant)})/\Gamma_{\text{total}}$   $\Gamma_{59}/\Gamma$ 

| <u>VALUE (units <math>10^{-5}</math>)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>   | <u>TECN</u> | <u>COMMENT</u>  |
|---|-------------|----------------------|-------------|---|
| <b>69±16±2</b>                            | 36          | <sup>1</sup> ABLIKIM | 12i BES3    | $\psi(2S) \rightarrow \gamma\Lambda\bar{\Lambda}\pi^+\pi^-$ |

<sup>1</sup> ABLIKIM 12i reports  $(71.8 \pm 14.5 \pm 8.2) \times 10^{-5}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Lambda\bar{\Lambda}\pi^+\pi^- \text{ (non-resonant)})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(\Sigma(1385)^+\bar{\Lambda}\pi^- + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{60}/\Gamma$$

| VALUE (units $10^{-5}$ ) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|---------|
|--------------------------|-----|-------------|------|---------|

|               |    |                      |     |   |
|---------------|----|----------------------|-----|---|
| <b>&lt;40</b> | 90 | <sup>1</sup> ABLIKIM | 12I | BES3 $\psi(2S) \rightarrow \gamma \Sigma(1385)^+\bar{\Lambda}\pi^-$ |
|---------------|----|----------------------|-----|---|

<sup>1</sup> ABLIKIM 12I reports  $< 42 \times 10^{-5}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma(1385)^+\bar{\Lambda}\pi^- + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

$$\Gamma(\Sigma(1385)^-\bar{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{61}/\Gamma$$

| VALUE (units $10^{-5}$ ) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|---------|
|--------------------------|-----|-------------|------|---------|

|               |    |                      |     |   |
|---------------|----|----------------------|-----|---|
| <b>&lt;60</b> | 90 | <sup>1</sup> ABLIKIM | 12I | BES3 $\psi(2S) \rightarrow \gamma \Sigma(1385)^-\bar{\Lambda}\pi^+$ |
|---------------|----|----------------------|-----|---|

<sup>1</sup> ABLIKIM 12I reports  $< 61 \times 10^{-5}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma(1385)^-\bar{\Lambda}\pi^+ + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

$$\Gamma(K^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{62}/\Gamma$$

| VALUE (units $10^{-4}$ ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

**8.1±0.6 OUR AVERAGE**

|             |    |                        |     |  |
|-------------|----|------------------------|-----|--|
| 8.0±0.6±0.3 | 5k | <sup>1,2</sup> ABLIKIM | 13D | BES3 $\psi(2S) \rightarrow \gamma \Lambda\bar{p}K^+$ |
|-------------|----|------------------------|-----|--|

|             |  |                    |    |  |
|-------------|--|--------------------|----|--|
| 8.7±1.7±0.3 |  | <sup>3</sup> ATHAR | 07 | CLEO $\psi(2S) \rightarrow \gamma h^+ h^- h^0$ |
|-------------|--|--------------------|----|--|

<sup>1</sup> ABLIKIM 13D reports  $(8.4 \pm 0.3 \pm 0.6) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Using  $B(\Lambda \rightarrow p\pi^-) = 63.9\%$ .

<sup>3</sup> ATHAR 07 reports  $(8.5 \pm 1.4 \pm 1.0) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+\bar{p}\Lambda + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(K^+\bar{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}} \quad \Gamma_{63}/\Gamma$$

| VALUE (units $10^{-4}$ ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

|                    |         |                      |     |   |
|--------------------|---------|----------------------|-----|---|
| <b>2.9±0.7±0.1</b> | 79 ± 13 | <sup>1</sup> ABLIKIM | 11F | BES3 $\psi(2S) \rightarrow \gamma p\bar{p}K^+K^-$ |
|--------------------|---------|----------------------|-----|---|

<sup>1</sup> ABLIKIM 11F reports  $(3.06 \pm 0.50 \pm 0.54) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow K^+\bar{p}\Lambda(1520) + \text{c.c.})/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(\Lambda(1520)\bar{\Lambda}(1520))/\Gamma_{\text{total}} \quad \Gamma_{64}/\Gamma$$

| VALUE (units $10^{-4}$ ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

|                    |        |                      |     |   |
|--------------------|--------|----------------------|-----|---|
| <b>4.8±1.5±0.2</b> | 29 ± 7 | <sup>1</sup> ABLIKIM | 11F | BES3 $\psi(2S) \rightarrow \gamma p\bar{p}K^+K^-$ |
|--------------------|--------|----------------------|-----|---|

<sup>1</sup> ABLIKIM 11F reports  $(5.05 \pm 1.29 \pm 0.93) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Lambda(1520)\bar{\Lambda}(1520))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

### $\Gamma(\Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}$ $\Gamma_{65}/\Gamma$

| VALUE (units $10^{-4}$ ) | CL% | EVTS | DOCUMENT ID          | TECN     | COMMENT   |
|--------------------------|-----|------|----------------------|----------|---|
| <b>&lt;0.6</b>           | 90  |      | <sup>1</sup> ABLIKIM | 13H BES3 | $\psi(2S) \rightarrow \gamma\Sigma^0\bar{\Sigma}^0$ |

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

|      |    |               |                   |         |   |
|------|----|---------------|-------------------|---------|---|
| <0.8 | 90 | $7.5 \pm 3.4$ | <sup>2</sup> NAIK | 08 CLEO | $\psi(2S) \rightarrow \gamma\Sigma^0\bar{\Sigma}^0$ |
|------|----|---------------|-------------------|---------|---|

<sup>1</sup> ABLIKIM 13H reports  $< 0.65 \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

<sup>2</sup> NAIK 08 reports  $< 0.75 \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

### $\Gamma(\Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}$ $\Gamma_{66}/\Gamma$

| VALUE (units $10^{-4}$ ) | CL% | EVTS          | DOCUMENT ID       | TECN    | COMMENT   |
|--------------------------|-----|---------------|-------------------|---------|---|
| <b>&lt;0.7</b>           | 90  | $4.0 \pm 3.5$ | <sup>1</sup> NAIK | 08 CLEO | $\psi(2S) \rightarrow \gamma\Sigma^+\bar{\Sigma}^-$ |

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

|      |    |  |                      |          |   |
|------|----|--|----------------------|----------|---|
| <0.8 | 90 |  | <sup>2</sup> ABLIKIM | 13H BES3 | $\psi(2S) \rightarrow \gamma\Sigma^+\bar{\Sigma}^-$ |
|------|----|--|----------------------|----------|---|

<sup>1</sup> NAIK 08 reports  $< 0.67 \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

<sup>2</sup> ABLIKIM 13H reports  $< 0.88 \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

### $\Gamma(\Sigma(1385)^+\bar{\Sigma}(1385)^-)/\Gamma_{\text{total}}$ $\Gamma_{67}/\Gamma$

| VALUE (units $10^{-5}$ ) | CL% | DOCUMENT ID          | TECN     | COMMENT   |
|--------------------------|-----|----------------------|----------|---|
| <b>&lt;16</b>            | 90  | <sup>1</sup> ABLIKIM | 12I BES3 | $\psi(2S) \rightarrow \gamma\Sigma(1385)^+\bar{\Sigma}(1385)^-$ |

<sup>1</sup> ABLIKIM 12I reports  $< 17 \times 10^{-5}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma(1385)^+\bar{\Sigma}(1385)^-)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

### $\Gamma(\Sigma(1385)^-\bar{\Sigma}(1385)^+)/\Gamma_{\text{total}}$ $\Gamma_{68}/\Gamma$

| VALUE (units $10^{-5}$ ) | CL% | DOCUMENT ID          | TECN     | COMMENT   |
|--------------------------|-----|----------------------|----------|---|
| <b>&lt;8</b>             | 90  | <sup>1</sup> ABLIKIM | 12I BES3 | $\psi(2S) \rightarrow \gamma\Sigma(1385)^-\bar{\Sigma}(1385)^+$ |

<sup>1</sup> ABLIKIM 12I reports  $< 8.5 \times 10^{-5}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Sigma(1385)^-\bar{\Sigma}(1385)^+)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.72 \pm 0.34) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

$\Gamma(K^- \Lambda \Xi^+ + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_{69}/\Gamma$ 

| VALUE (units $10^{-4}$ )                   | EVTS | DOCUMENT ID          | TECN     | COMMENT   |
|--|------|----------------------|----------|---|
| <b><math>1.84 \pm 0.33 \pm 0.06</math></b> | 51   | <sup>1</sup> ABLIKIM | 15I BES3 | $\psi(2S) \rightarrow \gamma K^- \Lambda \Xi^+ + \text{c.c.}$ |

<sup>1</sup> ABLIKIM 15I reports  $[\Gamma(\chi_{c2}(1P) \rightarrow K^- \Lambda \Xi^+ + \text{c.c.})/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))] = (1.68 \pm 0.26 \pm 0.15) \times 10^{-5}$  which we divide by our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(\Xi^0 \Xi^0)/\Gamma_{\text{total}}$   $\Gamma_{70}/\Gamma$ 

| VALUE (units $10^{-4}$ )    | CL% | EVTS          | DOCUMENT ID       | TECN    | COMMENT                                   |
|-----------------------------|-----|---------------|-------------------|---------|---|
| <b><math>&lt;1.1</math></b> | 90  | $2.9 \pm 1.7$ | <sup>1</sup> NAIK | 08 CLEO | $\psi(2S) \rightarrow \gamma \Xi^0 \Xi^0$ |

<sup>1</sup> NAIK 08 reports  $< 1.06 \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Xi^0 \Xi^0)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

 $\Gamma(\Xi^- \Xi^+)/\Gamma_{\text{total}}$   $\Gamma_{71}/\Gamma$ 

| VALUE (units $10^{-4}$ )                   | CL% | EVTS       | DOCUMENT ID       | TECN    | COMMENT                                   |
|--|-----|------------|-------------------|---------|---|
| <b><math>1.48 \pm 0.33 \pm 0.05</math></b> |     | $29 \pm 5$ | <sup>1</sup> NAIK | 08 CLEO | $\psi(2S) \rightarrow \gamma \Xi^+ \Xi^-$ |

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

$< 3.7$  90 <sup>2</sup> ABLIKIM 06D BES2  $\psi(2S) \rightarrow \chi_{c2} \gamma$

<sup>1</sup> NAIK 08 reports  $(1.45 \pm 0.30 \pm 0.15) \times 10^{-4}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \Xi^- \Xi^+)/\Gamma_{\text{total}}] \times [\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))]$  assuming  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.33 \pm 0.14 \pm 0.61) \times 10^{-2}$ , which we rescale to our best value  $\text{B}(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (9.11 \pm 0.31) \times 10^{-2}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

<sup>2</sup> Using  $\text{B}(\psi(2S) \rightarrow \chi_{c2} \gamma) = (9.3 \pm 0.6)\%$ .

 $\Gamma(J/\psi(1S) \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{72}/\Gamma$ 

| VALUE                         | CL% | DOCUMENT ID | TECN    | COMMENT   |
|-------------------------------|-----|-------------|---------|---|
| <b><math>&lt;0.015</math></b> | 90  | BARATE      | 81 SPEC | 190 GeV $\pi^- \text{Be} \rightarrow 2\pi 2\mu$ |

 $\Gamma(\pi^0 \eta_c)/\Gamma_{\text{total}}$   $\Gamma_{73}/\Gamma$ 

| VALUE                                      | CL% | DOCUMENT ID          | TECN     | COMMENT  |
|--|-----|----------------------|----------|--|
| <b><math>&lt;3.2 \times 10^{-3}</math></b> | 90  | <sup>1</sup> ABLIKIM | 15N BES3 | $\psi(2S) e^+ e^- \rightarrow \gamma \pi^0 \eta_c$ |

<sup>1</sup> Using  $\text{B}(\eta_c \rightarrow K_S^0 K^\pm \pi^\mp) \times \text{B}(K_S^0 \rightarrow \pi^+ \pi^-) \times \text{B}(\pi^0 \rightarrow \gamma \gamma) = (1.66 \pm 0.11) \times 10^{-2}$ .

 $\Gamma(\eta_c(1S) \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{74}/\Gamma$ 

| VALUE                                       | CL% | DOCUMENT ID            | TECN     | COMMENT   |
|---|-----|------------------------|----------|---|
| <b><math>&lt;0.54 \times 10^{-2}</math></b> | 90  | <sup>1,2</sup> ABLIKIM | 13B BES3 | $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$ |

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

$<1.2 \times 10^{-2}$  90 <sup>1,3</sup> ABLIKIM 13B BES3  $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$

<sup>1</sup> Using  $1.06 \times 10^8$   $\psi(2S)$  mesons and  $\text{B}(\psi(2S) \rightarrow \chi_{c2} \gamma) = (8.72 \pm 0.34)\%$ .

<sup>2</sup> From the  $\eta_c \rightarrow K_S^0 K^\pm \pi^\mp$  decays.

<sup>3</sup> From the  $\eta_c \rightarrow K^+ K^- \pi^0$  decays.

$\Gamma(\eta_c(1S)\pi^+\pi^-)/\Gamma(\bar{K}^0 K^+\pi^- + \text{c.c.})$   $\Gamma_{74}/\Gamma_{31}$ 

| VALUE | CL% | DOCUMENT ID       | TECN      | COMMENT                                     |
|-------|-----|-------------------|-----------|---|
| <16.4 | 90  | <sup>1</sup> LEES | 12AE BABR | $e^+e^- \rightarrow e^+e^-\pi^+\pi^-\eta_c$ |

<sup>1</sup>We divided the reported limit by 2 to take into account the  $K_L^0 K^+\pi^-$  mode.

## ————— RADIATIVE DECAYS —————

 $\Gamma(\gamma J/\psi(1S))/\Gamma_{\text{total}}$   $\Gamma_{75}/\Gamma$ 

| VALUE                      | DOCUMENT ID | TECN | COMMENT |
|----------------------------|-------------|------|---------|
| <b>0.192±0.007 OUR FIT</b> |             |      |         |

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

|                   |                   |          |   |
|-------------------|-------------------|----------|---|
| 0.199±0.005±0.012 | <sup>1</sup> ADAM | 05A CLEO | $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$ |
|-------------------|-------------------|----------|---|

<sup>1</sup>Uses  $B(\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma\gamma J/\psi)$  from ADAM 05A and  $B(\psi(2S) \rightarrow \gamma\chi_{c2})$  from ATHAR 04.

 $\Gamma(\gamma\rho^0)/\Gamma_{\text{total}}$   $\Gamma_{76}/\Gamma$ 

| VALUE (units $10^{-6}$ ) | CL% | EVTS    | DOCUMENT ID          | TECN     | COMMENT                                   |
|--------------------------|-----|---------|----------------------|----------|---|
| <20                      | 90  | 13 ± 11 | <sup>1</sup> ABLIKIM | 11E BES3 | $\psi(2S) \rightarrow \gamma\gamma\rho^0$ |

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

|     |    |            |                      |          |   |
|-----|----|------------|----------------------|----------|---|
| <40 | 90 | 17.2 ± 6.8 | <sup>2</sup> BENNETT | 08A CLEO | $\psi(2S) \rightarrow \gamma\gamma\rho^0$ |
|-----|----|------------|----------------------|----------|---|

<sup>1</sup>ABLIKIM 11E reports  $< 20.8 \times 10^{-6}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\rho^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

<sup>2</sup>BENNETT 08A reports  $< 50 \times 10^{-6}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\rho^0)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

 $\Gamma(\gamma\omega)/\Gamma_{\text{total}}$   $\Gamma_{77}/\Gamma$ 

| VALUE (units $10^{-6}$ ) | CL% | EVTS  | DOCUMENT ID          | TECN     | COMMENT                                   |
|--------------------------|-----|-------|----------------------|----------|---|
| <6                       | 90  | 1 ± 6 | <sup>1</sup> ABLIKIM | 11E BES3 | $\psi(2S) \rightarrow \gamma\gamma\omega$ |

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

|    |    |           |                      |          |   |
|----|----|-----------|----------------------|----------|---|
| <6 | 90 | 0.0 ± 1.8 | <sup>2</sup> BENNETT | 08A CLEO | $\psi(2S) \rightarrow \gamma\gamma\omega$ |
|----|----|-----------|----------------------|----------|---|

<sup>1</sup>ABLIKIM 11E reports  $< 6.1 \times 10^{-6}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

<sup>2</sup>BENNETT 08A reports  $< 7.0 \times 10^{-6}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\omega)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

 $\Gamma(\gamma\phi)/\Gamma_{\text{total}}$   $\Gamma_{78}/\Gamma$ 

| VALUE (units $10^{-6}$ ) | CL% | EVTS  | DOCUMENT ID          | TECN     | COMMENT                                 |
|--------------------------|-----|-------|----------------------|----------|---|
| < 8                      | 90  | 5 ± 5 | <sup>1</sup> ABLIKIM | 11E BES3 | $\psi(2S) \rightarrow \gamma\gamma\phi$ |

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

|     |    |           |                      |          |   |
|-----|----|-----------|----------------------|----------|---|
| <12 | 90 | 1.3 ± 2.5 | <sup>2</sup> BENNETT | 08A CLEO | $\psi(2S) \rightarrow \gamma\gamma\phi$ |
|-----|----|-----------|----------------------|----------|---|

<sup>1</sup>ABLIKIM 11E reports  $< 8.1 \times 10^{-6}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

<sup>2</sup> BENNETT 08A reports  $< 13 \times 10^{-6}$  from a measurement of  $[\Gamma(\chi_{c2}(1P) \rightarrow \gamma\phi)/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))]$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4) \times 10^{-2}$ , which we rescale to our best value  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = 9.11 \times 10^{-2}$ .

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$   $\Gamma_{79}/\Gamma$   
VALUE (units  $10^{-4}$ ) DOCUMENT ID  
**2.74 ± 0.14 OUR FIT**

$\Gamma(\gamma\gamma)/\Gamma(\gamma J/\psi(1S))$   $\Gamma_{79}/\Gamma_{75}$   
VALUE (units  $10^{-3}$ ) DOCUMENT ID TECN COMMENT  
**1.43 ± 0.08 OUR FIT**  
**0.99 ± 0.18** <sup>1</sup> AMBROGIANI 00B E835  $\bar{p}p \rightarrow \chi_{c2} \rightarrow \gamma\gamma, \gamma J/\psi$

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

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}} \times \Gamma(p\bar{p})/\Gamma_{\text{total}}$   $\Gamma_{79}/\Gamma \times \Gamma_{44}/\Gamma$   
VALUE (units  $10^{-8}$ ) DOCUMENT ID TECN COMMENT  
**2.06 ± 0.16 OUR FIT**  
**1.7 ± 0.4 OUR AVERAGE**  
 1.60 ± 0.42 ARMSTRONG 93 E760  $\bar{p}p \rightarrow \gamma\gamma X$   
 9.9 ± 4.5 BAGLIN 87B SPEC  $\bar{p}p \rightarrow \gamma\gamma X$

### $\chi_{c2}(1P)$ CROSS-PARTICLE BRANCHING RATIOS

$\Gamma(\chi_{c2}(1P) \rightarrow K^+K^-\pi^+\pi^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$   $\Gamma_{14}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$   
VALUE (units  $10^{-3}$ ) DOCUMENT ID TECN COMMENT  
**2.34 ± 0.26 OUR FIT**  
**2.5 ± 0.9 OUR AVERAGE** Error includes scale factor of 2.3.  
 1.90 ± 0.14 ± 0.44 BAI 99B BES  $\psi(2S) \rightarrow \gamma\chi_{c2}$   
 3.8 ± 0.67 <sup>1</sup> TANENBAUM 78 MRK1  $\psi(2S) \rightarrow \gamma\chi_{c2}$

<sup>1</sup> The reported value is derived using  $B(\psi(2S) \rightarrow \pi^+\pi^-J/\psi) \times B(J/\psi \rightarrow \ell^+\ell^-) = (4.6 \pm 0.7)\%$ . Calculated by us using  $B(J/\psi \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$ .

$\Gamma(\chi_{c2}(1P) \rightarrow K^*(892)^0\bar{K}^*(892)^0)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}}$   $\Gamma_{18}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$   
VALUE (units  $10^{-4}$ ) DOCUMENT ID TECN COMMENT  
**2.2 ± 0.4 OUR FIT**  
**3.11 ± 0.36 ± 0.48** ABLIKIM 04H BES2  $\psi(2S) \rightarrow \gamma\chi_{c2}$

$\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)$   $\Gamma_{44}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$   
VALUE (units  $10^{-5}$ ) DOCUMENT ID TECN COMMENT  
**1.98 ± 0.10 OUR FIT**  
**1.4 ± 1.1** <sup>1</sup> BAI 98i BES  $\psi(2S) \rightarrow \gamma\chi_{c2} \rightarrow \gamma\bar{p}p$

<sup>1</sup> Calculated by us. The value for  $B(\chi_{c2} \rightarrow p\bar{p})$  reported in BAI 98i is derived using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$  and  $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$  [BAI 98D].

$$\Gamma(\chi_{c2}(1P) \rightarrow p\bar{p})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}} \quad \Gamma_{44}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma\psi(2S)$$

| VALUE (units $10^{-6}$ )  | EVTS  | DOCUMENT ID       | TECN     | COMMENT  |
|---|---|-------------------|----------|--|
| <b>6.85±0.33 OUR FIT</b>  |   |                   |          |  |
| <b>7.1 ±0.5 OUR AVERAGE</b> Error includes scale factor of 1.2. |   |                   |          |  |
| 7.3 ±0.4 ±0.3   | 405   | ABLIKIM           | 13V BES3 | $\psi(2S) \rightarrow \gamma p\bar{p}$                                 |
| 7.2 ±0.7 ±0.4   | 121 ± 12  | <sup>1</sup> NAIK | 08 CLEO  | $\psi(2S) \rightarrow \gamma p\bar{p}$                                 |
| 4.4 $\begin{smallmatrix} +1.6 \\ -1.4 \end{smallmatrix}$ ±0.6   | 14.3 $\begin{smallmatrix} +5.2 \\ -4.7 \end{smallmatrix}$ | BAI               | 04F BES  | $\psi(2S) \rightarrow \gamma\chi_{c2}(1P) \rightarrow \gamma p\bar{p}$ |

<sup>1</sup> Calculated by us. NAIK 08 reports  $B(\chi_{c2} \rightarrow p\bar{p}) = (7.7 \pm 0.8 \pm 0.4 \pm 0.5) \times 10^{-5}$  using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$ .

$$\Gamma(\chi_{c2}(1P) \rightarrow \Lambda\bar{\Lambda})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}} \quad \Gamma_{57}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma\psi(2S)$$

| VALUE (units $10^{-6}$ )    | EVTS   | DOCUMENT ID          | TECN     | COMMENT   |
|-----------------------------|--------|----------------------|----------|---|
| <b>17.5±1.3 OUR FIT</b>     |        |                      |          |   |
| <b>17.4±1.4 OUR AVERAGE</b> |        |                      |          |   |
| 18.2±1.4±0.9                | 207    | <sup>1</sup> ABLIKIM | 13H BES3 | $\psi(2S) \rightarrow \gamma\Lambda\bar{\Lambda}$ |
| 15.9±2.1±1.0                | 71 ± 9 | <sup>2</sup> NAIK    | 08 CLEO  | $\psi(2S) \rightarrow \gamma\Lambda\bar{\Lambda}$ |

<sup>1</sup> Calculated by us. ABLIKIM 13H reports  $B(\chi_{c2} \rightarrow \Lambda\bar{\Lambda}) = (20.8 \pm 1.6 \pm 2.3) \times 10^{-5}$  from a measurement of  $B(\chi_{c2} \rightarrow \Lambda\bar{\Lambda}) \times B(\psi(2S) \rightarrow \gamma\chi_{c2})$  assuming  $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (8.74 \pm 0.35)\%$ .

<sup>2</sup> Calculated by us. NAIK 08 reports  $B(\chi_{c2} \rightarrow \Lambda\bar{\Lambda}) = (17.0 \pm 2.2 \pm 1.1 \pm 1.1) \times 10^{-5}$  using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$ .

$$\Gamma(\chi_{c2}(1P) \rightarrow \Lambda\bar{\Lambda})/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \quad \Gamma_{57}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}$$

| VALUE (units $10^{-5}$ )                                      | EVTS   | DOCUMENT ID      | TECN    | COMMENT   |
|---|--|------------------|---------|---|
| <b>5.1±0.4 OUR FIT</b>  |  |                  |         |   |
| 7.1 $\begin{smallmatrix} +3.1 \\ -2.9 \end{smallmatrix}$ ±1.3 | 8.3 $\begin{smallmatrix} +3.7 \\ -3.4 \end{smallmatrix}$ | <sup>1</sup> BAI | 03E BES | $\psi(2S) \rightarrow \gamma\Lambda\bar{\Lambda}$ |

<sup>1</sup> BAI 03E reports  $[B(\chi_{c2} \rightarrow \Lambda\bar{\Lambda}) B(\psi(2S) \rightarrow \gamma\chi_{c2}) / B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-)] \times [B^2(\Lambda \rightarrow \pi^-\rho) / B(J/\psi \rightarrow p\bar{p})] = (1.33  $\begin{smallmatrix} +0.59 \\ -0.55 \end{smallmatrix}$  ± 0.25)\%$ . We calculate from this measurement the presented value using  $B(\Lambda \rightarrow \pi^-\rho) = (63.9 \pm 0.5)\%$  and  $B(J/\psi \rightarrow p\bar{p}) = (2.17 \pm 0.07) \times 10^{-3}$ .

$$\Gamma(\chi_{c2}(1P) \rightarrow \pi\pi)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P))/\Gamma_{\text{total}} \quad \Gamma_{24}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma\psi(2S)$$

| VALUE (units $10^{-4}$ )     | EVTS | DOCUMENT ID          | TECN     | COMMENT   |
|------------------------------|------|----------------------|----------|---|
| <b>2.12±0.08 OUR FIT</b>     |      |                      |          |   |
| <b>2.17±0.09 OUR AVERAGE</b> |      |                      |          |   |
| 2.19±0.05±0.15               | 4.5k | <sup>1</sup> ABLIKIM | 10A BES3 | $e^+e^- \rightarrow \psi(2S) \rightarrow \gamma\chi_{c2}$ |
| 2.23±0.06±0.10               | 2.5k | <sup>2</sup> ASNER   | 09 CLEO  | $\psi(2S) \rightarrow \gamma\pi^+\pi^-$                   |
| 1.90±0.08±0.20               | 0.8k | <sup>3</sup> ASNER   | 09 CLEO  | $\psi(2S) \rightarrow \gamma\pi^0\pi^0$                   |

<sup>1</sup> Calculated by us. ABLIKIM 10A reports  $B(\chi_{c2} \rightarrow \pi^0\pi^0) = (0.88 \pm 0.02 \pm 0.06 \pm 0.04) \times 10^{-3}$  using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (8.3 \pm 0.4)\%$ . We have multiplied the  $\pi^0\pi^0$  measurement by 3 to obtain  $\pi\pi$ .

<sup>2</sup> Calculated by us. ASNER 09 reports  $B(\chi_{c2} \rightarrow \pi^+ \pi^-) = (1.59 \pm 0.04 \pm 0.07 \pm 0.10) \times 10^{-3}$  using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$ . We have multiplied the  $\pi^+ \pi^-$  measurement by 3/2 to obtain  $\pi\pi$ .

<sup>3</sup> Calculated by us. ASNER 09 reports  $B(\chi_{c2} \rightarrow \pi^0 \pi^0) = (0.68 \pm 0.03 \pm 0.07 \pm 0.04) \times 10^{-3}$  using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$ . We have multiplied the  $\pi^0 \pi^0$  measurement by 3 to obtain  $\pi\pi$ .

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \pi\pi)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}{\Gamma_{24}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

| VALUE (units $10^{-3}$ )      | EVTS     | DOCUMENT ID      | TECN    | COMMENT                                   |
|-------------------------------|----------|------------------|---------|---|
| <b>0.615±0.023 OUR FIT</b>    |          |                  |         |   |
| <b>0.54 ±0.06 OUR AVERAGE</b> |          |                  |         |   |
| 0.66 ±0.18 ±0.37              | 21 ± 6   | <sup>1</sup> BAI | 03C BES | $\psi(2S) \rightarrow \gamma \pi^0 \pi^0$ |
| 0.54 ±0.05 ±0.04              | 185 ± 16 | <sup>2</sup> BAI | 98I BES | $\psi(2S) \rightarrow \gamma \pi^+ \pi^-$ |

<sup>1</sup> We have multiplied  $\pi^0 \pi^0$  measurement by 3 to obtain  $\pi\pi$ .

<sup>2</sup> Calculated by us. The value for  $B(\chi_{c2} \rightarrow \pi^+ \pi^-)$  reported by BAI 98I is derived using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (7.8 \pm 0.8)\%$  and  $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = (32.4 \pm 2.6)\%$  [BAI 98D]. We have multiplied  $\pi^+ \pi^-$  measurement by 3/2 to obtain  $\pi\pi$ .

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \eta\eta)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{28}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

| VALUE (units $10^{-4}$ )  | CL% | EVTS | DOCUMENT ID          | TECN     | COMMENT   |
|---|-----|------|----------------------|----------|---|
| <b>0.52±0.04 OUR FIT</b>  |     |      |                      |          |   |
| <b>0.52±0.04 OUR AVERAGE</b>  |     |      |                      |          |   |
| 0.54±0.03±0.04  |     | 386  | <sup>1</sup> ABLIKIM | 10A BES3 | $e^+ e^- \rightarrow \psi(2S) \rightarrow \gamma \chi_{c2}$ |
| 0.47±0.05±0.05  |     | 156  | ASNER                | 09 CLEO  | $\psi(2S) \rightarrow \gamma \eta \eta$                     |
| • • • We do not use the following data for averages, fits, limits, etc. • • • |     |      |                      |          |   |
| < 0.44  | 90  |      | <sup>2</sup> ADAMS   | 07 CLEO  | $\psi(2S) \rightarrow \gamma \chi_{c2}$                     |
| < 3   | 90  |      | BAI                  | 03C BES  | $\psi(2S) \rightarrow \gamma \eta \eta \rightarrow 5\gamma$ |
| 0.62±0.31±0.19  |     |      | LEE                  | 85 CBAL  | $\psi(2S) \rightarrow \text{photons}$                       |

<sup>1</sup> Calculated by us. ABLIKIM 10A reports  $B(\chi_{c2} \rightarrow \eta\eta) = (0.65 \pm 0.04 \pm 0.05 \pm 0.03) \times 10^{-3}$  using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (8.3 \pm 0.4)\%$ .

<sup>2</sup> Superseded by ASNER 09.

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}}{\Gamma_{29}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{\psi(2S)}}$$

| VALUE (units $10^{-5}$ ) | EVTS | DOCUMENT ID        | TECN    | COMMENT                               |
|--------------------------|------|--------------------|---------|---------------------------------------|
| <b>9.6±0.6 OUR FIT</b>   |      |                    |         |                                       |
| <b>10.5±0.3±0.6</b>      | 1.6k | <sup>1</sup> ASNER | 09 CLEO | $\psi(2S) \rightarrow \gamma K^+ K^-$ |

<sup>1</sup> Calculated by us. ASNER 09 reports  $B(\chi_{c2} \rightarrow K^+ K^-) = (1.13 \pm 0.03 \pm 0.06 \pm 0.07) \times 10^{-3}$  using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$ .

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^-)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)}{\Gamma_{29}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

| VALUE (units $10^{-3}$ )   | EVTS     | DOCUMENT ID      | TECN    | COMMENT                               |
|----------------------------|----------|------------------|---------|---------------------------------------|
| <b>0.277±0.017 OUR FIT</b> |          |                  |         |                                       |
| <b>0.190±0.034±0.019</b>   | 115 ± 13 | <sup>1</sup> BAI | 98I BES | $\psi(2S) \rightarrow \gamma K^+ K^-$ |



<sup>1</sup> Calculated by us. The value for  $B(\chi_{c2} \rightarrow K^+ K^-)$  reported by BAI 98I is derived using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (7.8 \pm 0.8)\%$  and  $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = (32.4 \pm 2.6)\%$  [BAI 98D].

$$\Gamma(\chi_{c2}(1P) \rightarrow K_S^0 K_S^0) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}} \times \Gamma_{30} / \Gamma \times \Gamma_{134}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

| VALUE (units $10^{-5}$ )     | EVTS     | DOCUMENT ID        | TECN | COMMENT  |
|------------------------------|----------|--------------------|------|--|
| <b>5.0 ± 0.4 OUR FIT</b>     |          |                    |      |  |
| <b>5.0 ± 0.4 OUR AVERAGE</b> |          |                    |      |  |
| 4.9 ± 0.3 ± 0.3              | 373 ± 20 | <sup>1</sup> ASNER | 09   | CLEO $\psi(2S) \rightarrow \gamma K_S^0 K_S^0$ |
| 5.72 ± 0.76 ± 0.63           | 65       | ABLIKIM            | 050  | BES2 $\psi(2S) \rightarrow \gamma K_S^0 K_S^0$ |

<sup>1</sup> Calculated by us. ASNER 09 reports  $B(\chi_{c2} \rightarrow K_S^0 K_S^0) = (0.53 \pm 0.03 \pm 0.03 \pm 0.03) \times 10^{-3}$  using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$ .

$$\Gamma(\chi_{c2}(1P) \rightarrow K_S^0 K_S^0) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) \times \Gamma_{30} / \Gamma \times \Gamma_{134}^{\psi(2S)} / \Gamma_{11}^{\psi(2S)}$$

| VALUE (units $10^{-5}$ )  | DOCUMENT ID      | TECN | COMMENT                                       |
|---------------------------|------------------|------|---|
| <b>14.5 ± 1.1 OUR FIT</b> |                  |      |   |
| <b>14.7 ± 4.1 ± 3.3</b>   | <sup>1</sup> BAI | 99B  | BES $\psi(2S) \rightarrow \gamma K_S^0 K_S^0$ |

<sup>1</sup> Calculated by us. The value of  $B(\chi_{c2} \rightarrow K_S^0 K_S^0)$  reported by BAI 99B was derived using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) = (7.8 \pm 0.8)\%$  and  $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = (32.4 \pm 2.6)\%$  [BAI 98D].

$$\Gamma(\chi_{c2}(1P) \rightarrow \bar{K}^0 K^+ \pi^- + \text{c.c.}) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}} \times \Gamma_{31} / \Gamma \times \Gamma_{134}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

| VALUE (units $10^{-4}$ )       | EVTS | DOCUMENT ID          | TECN | COMMENT  |
|--------------------------------|------|----------------------|------|--|
| <b>1.22 ± 0.17 OUR FIT</b>     |      |                      |      |  |
| <b>1.15 ± 0.18 OUR AVERAGE</b> |      |                      |      |  |
| 1.21 ± 0.19 ± 0.09             | 37   | <sup>1</sup> ATHAR   | 07   | CLEO $\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$ |
| 0.97 ± 0.32 ± 0.13             | 28   | <sup>2</sup> ABLIKIM | 06R  | BES2 $\psi(2S) \rightarrow \gamma K_S^0 K^\pm \pi^\mp$ |

<sup>1</sup> Calculated by us. ATHAR 07 reports  $B(\chi_{c2} \rightarrow \bar{K}^0 K^+ \pi^- + \text{c.c.}) = (1.3 \pm 0.2 \pm 0.1 \pm 0.1) \times 10^{-3}$  using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (9.33 \pm 0.14 \pm 0.61)\%$ .

<sup>2</sup> Calculated by us. ABLIKIM 06R reports  $B(\chi_{c2} \rightarrow K_S^0 K^\pm \pi^\mp) = (0.6 \pm 0.2 \pm 0.1) \times 10^{-3}$  using  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) = (8.1 \pm 0.6)\%$ . We have multiplied by 2 to obtain  $\bar{K}^0 K^+ \pi^- + \text{c.c.}$  from  $K_S^0 K^\pm \pi^\mp$ .

$$\Gamma(\chi_{c2}(1P) \rightarrow 2(\pi^+ \pi^-)) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) \times \Gamma_1 / \Gamma \times \Gamma_{134}^{\psi(2S)} / \Gamma_{11}^{\psi(2S)}$$

| VALUE (units $10^{-3}$ )     | DOCUMENT ID            | TECN | COMMENT                                      |
|------------------------------|------------------------|------|--|
| <b>2.83 ± 0.27 OUR FIT</b>   |                        |      |  |
| <b>3.1 ± 1.0 OUR AVERAGE</b> |                        |      | Error includes scale factor of 2.5.          |
| 2.3 ± 0.1 ± 0.5              | <sup>1</sup> BAI       | 99B  | BES $\psi(2S) \rightarrow \gamma \chi_{c2}$  |
| 4.3 ± 0.6                    | <sup>2</sup> TANENBAUM | 78   | MRK1 $\psi(2S) \rightarrow \gamma \chi_{c2}$ |

<sup>1</sup> Calculated by us. The value for  $B(\chi_{c2} \rightarrow 2\pi^+ 2\pi^-)$  reported in BAI 99B is derived using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}) = (7.8 \pm 0.8)\%$  and  $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6)\%$  [BAI 98D].

<sup>2</sup> The value for  $B(\psi(2S) \rightarrow \gamma\chi_{c2}) \times B(\chi_{c2} \rightarrow 2\pi^+\pi^-)$  reported in TANENBAUM 78 is derived using  $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times B(J/\psi(1S)\ell^+\ell^-) = (4.6 \pm 0.7)\%$ . Calculated by us using  $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$ .

$$\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- K^+ K^-) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) / \Gamma_{\text{total}} \\ \Gamma_{39} / \Gamma \times \Gamma_{134}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

| VALUE (units $10^{-4}$ ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

**1.57±0.19 OUR FIT**

**1.76±0.16±0.24**      160      <sup>1</sup> ABLIKIM      06T      BES2       $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

<sup>1</sup> Calculated by us. The value of  $B(\chi_{c2} \rightarrow 2K^+ 2K^-)$  reported by ABLIKIM 06T was derived using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4)\%$ .

$$\Gamma(\chi_{c2}(1P) \rightarrow K^+ K^- K^+ K^-) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) / \\ \Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \quad \Gamma_{39} / \Gamma \times \Gamma_{134}^{\psi(2S)} / \Gamma_{11}^{\psi(2S)}$$

| VALUE (units $10^{-4}$ ) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-------------|------|---------|
|--------------------------|-------------|------|---------|

**4.6±0.5 OUR FIT**

**3.6±0.6±0.6**      <sup>1</sup> BAI      99B      BES       $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

<sup>1</sup> Calculated by us. The value of  $B(\chi_{c2} \rightarrow 2K^+ 2K^-)$  reported by BAI 99B was derived using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (7.8 \pm 0.8)\%$  and  $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$  [BAI 98D].

$$\Gamma(\chi_{c2}(1P) \rightarrow \phi\phi) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) / \Gamma_{\text{total}} \\ \Gamma_{20} / \Gamma \times \Gamma_{134}^{\psi(2S)} / \Gamma_{\psi(2S)}$$

| VALUE (units $10^{-4}$ ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

**1.02±0.08 OUR FIT**

**0.98±0.13 OUR AVERAGE**      Error includes scale factor of 1.3.

0.94±0.03±0.10      849      <sup>1</sup> ABLIKIM      11K      BES3       $\psi(2S) \rightarrow \gamma$  hadrons

1.38±0.24±0.23      41      <sup>2</sup> ABLIKIM      06T      BES2       $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

<sup>1</sup> Calculated by us. The value of  $B(\chi_{c2} \rightarrow \phi\phi)$  reported by ABLIKIM 11K was derived using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.74 \pm 0.35)\%$ .

<sup>2</sup> Calculated by us. The value of  $B(\chi_{c2} \rightarrow \phi\phi)$  reported by ABLIKIM 06T was derived using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (8.1 \pm 0.4)\%$ .

$$\Gamma(\chi_{c2}(1P) \rightarrow \phi\phi) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) / \Gamma(\psi(2S) \rightarrow \\ J/\psi(1S)\pi^+\pi^-) \quad \Gamma_{20} / \Gamma \times \Gamma_{134}^{\psi(2S)} / \Gamma_{11}^{\psi(2S)}$$

| VALUE (units $10^{-4}$ ) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-------------|------|---------|
|--------------------------|-------------|------|---------|

**2.95±0.24 OUR FIT**

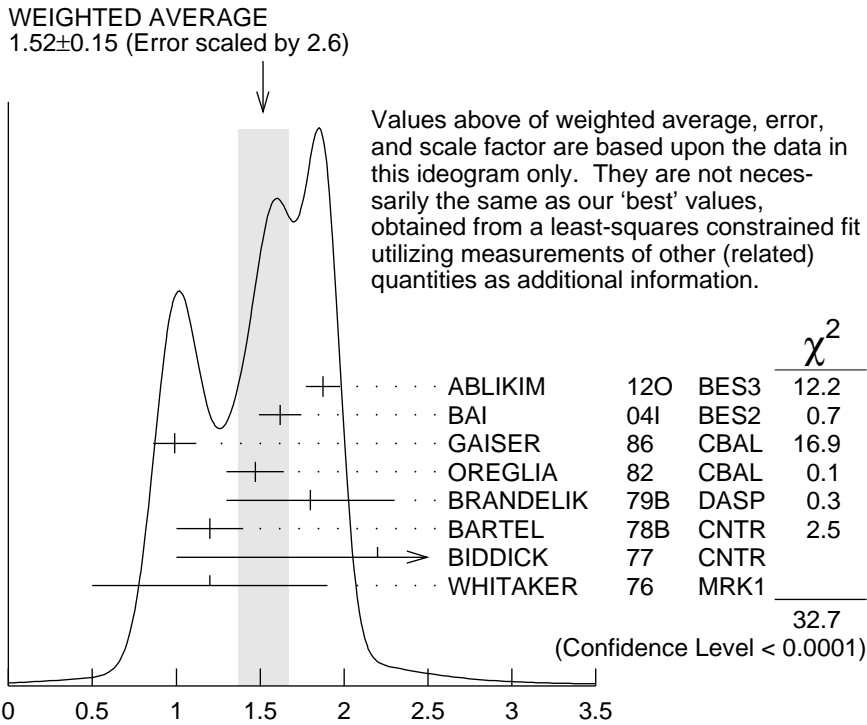
**4.8 ±1.3 ±1.3**      <sup>1</sup> BAI      99B      BES       $\psi(2S) \rightarrow \gamma 2K^+ 2K^-$

<sup>1</sup> Calculated by us. The value of  $B(\chi_{c2} \rightarrow \phi\phi)$  reported by BAI 99B was derived using  $B(\psi(2S) \rightarrow \gamma\chi_{c2}(1P)) = (7.8 \pm 0.8)\%$  and  $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = (32.4 \pm 2.6)\%$  [BAI 98D].

$$\frac{\Gamma(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S))}{\Gamma_{\text{total}}} \times \frac{\Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))}{\Gamma_{\text{total}}} \times \frac{\Gamma_{75}}{\Gamma} \times \frac{\Gamma_{134}^{\psi(2S)}}{\Gamma_{\psi(2S)}}$$

| VALUE (units $10^{-2}$ )  | EVTS  | DOCUMENT ID            | TECN | COMMENT  |
|---|-------|------------------------|------|--|
| <b>1.75 ± 0.04</b>  |       |                        |      | <b>OUR FIT</b>   |
| <b>1.52 ± 0.15</b>  |       |                        |      | <b>OUR AVERAGE</b> Error includes scale factor of 2.6. See the ideogram below. |
| 1.874 ± 0.007 ± 0.102   | 76k   | ABLIKIM                | 120  | BES3 $\psi(2S) \rightarrow \gamma \chi_{c2}$                                   |
| 1.62 ± 0.04 ± 0.12  | 5.8k  | BAI                    | 04I  | BES2 $\psi(2S) \rightarrow J/\psi \gamma \gamma$                               |
| 0.99 ± 0.10 ± 0.08  |       | GAISER                 | 86   | CBAL $\psi(2S) \rightarrow \gamma X$   |
| 1.47 ± 0.17   |       | <sup>1</sup> OREGLIA   | 82   | CBAL $\psi(2S) \rightarrow \gamma \chi_{c2}$                                   |
| 1.8 ± 0.5   |       | <sup>2</sup> BRANDELIK | 79B  | DASP $\psi(2S) \rightarrow \gamma \chi_{c2}$                                   |
| 1.2 ± 0.2   |       | <sup>2</sup> BARTEL    | 78B  | CNTR $\psi(2S) \rightarrow \gamma \chi_{c2}$                                   |
| 2.2 ± 1.2   |       | <sup>3</sup> BIDDICK   | 77   | CNTR $e^+ e^- \rightarrow \gamma X$  |
| 1.2 ± 0.7   |       | <sup>1</sup> WHITAKER  | 76   | MRK1 $e^+ e^-$   |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● |       |                        |      |  |
| 1.95 ± 0.02 ± 0.07  | 12.4k | <sup>4</sup> MENDEZ    | 08   | CLEO $\psi(2S) \rightarrow \gamma \chi_{c2}$                                   |
| 1.85 ± 0.04 ± 0.07  | 1.9k  | <sup>5</sup> ADAM      | 05A  | CLEO Repl. by MENDEZ 08  |

- <sup>1</sup> Recalculated by us using  $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1181 \pm 0.0020$ .
- <sup>2</sup> Recalculated by us using  $B(J/\psi(1S) \rightarrow \mu^+ \mu^-) = 0.0588 \pm 0.0010$ .
- <sup>3</sup> Assumes isotropic gamma distribution.
- <sup>4</sup> Not independent from other measurements of MENDEZ 08.
- <sup>5</sup> Not independent from other values reported by ADAM 05A.



$\Gamma(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)) / \Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P)) / \Gamma_{\text{total}}$  (units  $10^{-2}$ )

$$\Gamma(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S) \text{ anything})$$

$$\frac{\Gamma_{75}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_9^{\psi(2S)}}{\Gamma_{75}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_9^{\psi(2S)} + \Gamma_{11}^{\psi(2S)} + \Gamma_{12}^{\psi(2S)} + \Gamma_{13}^{\psi(2S)} + 0.339\Gamma_{133}^{\psi(2S)} + 0.192\Gamma_{134}^{\psi(2S)}}$$

| VALUE (units 10 <sup>-2</sup> ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------------|------|-------------|------|---------|
| <b>2.87±0.07 OUR FIT</b>        |      |             |      |         |

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

|                |       |                     |     |      |   |
|----------------|-------|---------------------|-----|------|---|
| 3.12±0.03±0.09 | 12.4k | <sup>1</sup> MENDEZ | 08  | CLEO | $\psi(2S) \rightarrow \gamma \chi_{c2}$ |
| 3.11±0.07±0.07 | 1.9k  | ADAM                | 05A | CLEO | Repl. by MENDEZ 08                      |

<sup>1</sup> Not independent from other measurements of MENDEZ 08.

$$\Gamma(\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S))/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-)$$

$$\frac{\Gamma_{75}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}{\Gamma_{75}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma_{11}^{\psi(2S)}}$$

| VALUE (units 10 <sup>-2</sup> ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------------|------|-------------|------|---------|
| <b>5.08±0.12 OUR FIT</b>        |      |             |      |         |

**5.53±0.17 OUR AVERAGE**

|                |       |                      |     |      |   |
|----------------|-------|----------------------|-----|------|---|
| 5.56±0.05±0.16 | 12.4k | MENDEZ               | 08  | CLEO | $\psi(2S) \rightarrow \gamma \chi_{c2}$ |
| 6.0 ±2.8       | 1.3k  | <sup>1</sup> ABLIKIM | 04B | BES  | $\psi(2S) \rightarrow J/\psi X$         |
| 3.9 ±1.2       |       | <sup>2</sup> HIMEL   | 80  | MRK2 | $\psi(2S) \rightarrow \gamma \chi_{c2}$ |

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

|                |      |                   |     |      |                    |
|----------------|------|-------------------|-----|------|--------------------|
| 5.52±0.13±0.13 | 1.9k | <sup>3</sup> ADAM | 05A | CLEO | Repl. by MENDEZ 08 |
|----------------|------|-------------------|-----|------|--------------------|

<sup>1</sup> From a fit to the  $J/\psi$  recoil mass spectra.

<sup>2</sup> The value for  $B(\psi(2S) \rightarrow \gamma \chi_{c2}) \times B(\chi_{c2} \rightarrow \gamma J/\psi(1S))$  reported in HIMEL 80 is derived using  $B(\psi(2S) \rightarrow J/\psi(1S) \pi^+ \pi^-) = (33 \pm 3)\%$  and  $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.138 \pm 0.018$ . Calculated by us using  $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = (0.1181 \pm 0.0020)$ .

<sup>3</sup> Not independent from other values reported by ADAM 05A.

$$\Gamma(\chi_{c2}(1P) \rightarrow \gamma \gamma)/\Gamma_{\text{total}} \times \Gamma(\psi(2S) \rightarrow \gamma \chi_{c2}(1P))/\Gamma_{\text{total}}$$

$$\frac{\Gamma_{79}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma^{\psi(2S)}}{\Gamma_{79}/\Gamma \times \Gamma_{134}^{\psi(2S)}/\Gamma^{\psi(2S)}}$$

| VALUE (units 10 <sup>-5</sup> ) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------------|------|-------------|------|---------|
| <b>2.50±0.13 OUR FIT</b>        |      |             |      |         |

**2.78±0.18 OUR AVERAGE**

|                |      |                      |     |      |   |
|----------------|------|----------------------|-----|------|---|
| 2.81±0.17±0.15 | 1.1k | <sup>1</sup> ABLIKIM | 12A | BES3 | $\psi(2S) \rightarrow \gamma \chi_{c2} \rightarrow 3\gamma$ |
| 2.68±0.28±0.15 | 0.3k | ECKLUND              | 08A | CLEO | $\psi(2S) \rightarrow \gamma \chi_{c2} \rightarrow 3\gamma$ |
| 7.0 ±2.1 ±2.0  |      | LEE                  | 85  | CBAL | $\psi(2S) \rightarrow \gamma \chi_{c2}$                     |

<sup>1</sup> ABLIKIM 12A measures the ratio of two-photon partial widths for the helicity  $\lambda = 0$  and helicity  $\lambda = 2$  components to be  $f_{0/2} = \frac{\Gamma^{\lambda=0}}{\Gamma^{\lambda=2}} = 0.00 \pm 0.02 \pm 0.02$ .

$$\Gamma(\chi_{c2}(1P) \rightarrow \gamma \gamma)/\Gamma(\chi_{c0}(1P) \rightarrow \gamma \gamma)$$

$$\frac{\Gamma_{79}/\Gamma^{\chi_{c0}(1P)}}{\Gamma_{89}}$$

| VALUE                          | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|------|-------------|------|---------|
| <b>0.273±0.035 OUR AVERAGE</b> |      |             |      |         |

|                   |      |                      |     |      |   |
|-------------------|------|----------------------|-----|------|---|
| 0.271±0.029±0.030 | 1.9k | <sup>1</sup> ABLIKIM | 12A | BES3 | $\psi(2S) \rightarrow \gamma \chi_{cJ} \rightarrow 3\gamma$ |
| 0.278±0.050±0.036 | 0.5k | <sup>1</sup> ECKLUND | 08A | CLEO | $\psi(2S) \rightarrow \gamma \chi_{cJ} \rightarrow 3\gamma$ |

<sup>1</sup> Not independent from the values of  $\Gamma(\chi_{c0}, \chi_{c2})$  and  $B(\psi(2S) \rightarrow \chi_{c0}, \chi_{c2})$ .

## MULTIPOLE AMPLITUDES IN $\chi_{c2}(1P) \rightarrow \gamma J/\psi(1S)$ RADIATIVE DECAY

$a_2 = M2/\sqrt{E1^2 + M2^2 + E3^2}$  Magnetic quadrupole fractional transition amplitude

| VALUE (units $10^{-2}$ )  | EVTS  | DOCUMENT ID             | TECN     | COMMENT   |
|---|-------|-------------------------|----------|---|
| <b>-10.0 ± 1.5 OUR AVERAGE</b>  |       |                         |          |   |
| - 9.3 ± 1.6 ± 0.3   | 19.8k | <sup>1</sup> ARTUSO     | 09 CLEO  | $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$                       |
| - 9.3 <sup>+</sup> <sub>-</sub> 3.9 <sup>+</sup> <sub>4.1</sub> ± 0.6 | 5.9k  | <sup>2</sup> AMBROGIANI | 02 E835  | $p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$             |
| -14 ± 6   | 1.9k  | <sup>2</sup> ARMSTRONG  | 93E E760 | $p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$             |
| -33.3 <sup>+</sup> <sub>-</sub> 11.6 <sub>29.2</sub>                  | 441   | <sup>2</sup> OREGLIA    | 82 CBAL  | $\psi(2S) \rightarrow \chi_{c1}\gamma \rightarrow J/\psi\gamma\gamma$ |

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

- 7.9 ± 1.9 ± 0.3 19.8k <sup>3</sup> ARTUSO 09 CLEO  $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

<sup>1</sup> From a fit with floating  $M2$  amplitudes  $a_2$  and  $b_2$ , and fixed  $E3$  amplitudes  $a_3=b_3=0$ .

<sup>2</sup> Assuming  $a_3=0$ .

<sup>3</sup> From a fit with floating  $M2$  and  $E3$  amplitudes  $a_2$ ,  $b_2$ , and  $a_3$ , and  $b_3$ .

$a_3 = E3/\sqrt{E1^2 + M2^2 + E3^2}$  Electric octupole fractional transition amplitude

| VALUE (units $10^{-2}$ )  | EVTS  | DOCUMENT ID         | TECN     | COMMENT   |
|---|-------|---------------------|----------|---|
| <b>1.6 ± 1.3 OUR AVERAGE</b>  |       |                     |          |   |
| 1.7 ± 1.4 ± 0.3   | 19.8k | <sup>1</sup> ARTUSO | 09 CLEO  | $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$           |
| 2.0 <sup>+</sup> <sub>-</sub> 5.5 <sup>+</sup> <sub>4.4</sub> ± 0.9 | 5908  | AMBROGIANI          | 02 E835  | $p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$ |
| 0 <sup>+</sup> <sub>-</sub> 6 <sub>5</sub>                          | 1904  | ARMSTRONG           | 93E E760 | $p\bar{p} \rightarrow \chi_{c2} \rightarrow J/\psi\gamma$ |

<sup>1</sup> From a fit with floating  $M2$  and  $E3$  amplitudes  $a_2$ ,  $b_2$ , and  $a_3$ , and  $b_3$ .

## MULTIPOLE AMPLITUDES IN $\psi(2S) \rightarrow \gamma\chi_{c2}(1P)$ RADIATIVE DECAY

$b_2 = M2/\sqrt{E1^2 + M2^2 + E3^2}$  Magnetic quadrupole fractional transition amplitude

| VALUE (units $10^{-2}$ )                                    | EVTS  | DOCUMENT ID          | TECN     | COMMENT  |
|---|-------|----------------------|----------|--|
| <b>2.2 ± 1.8 OUR AVERAGE</b>                                |       |                      |          |  |
| Error includes scale factor of 1.7. See the ideogram below. |       |                      |          |  |
| 4.6 ± 1.0 ± 1.3   | 13.8k | <sup>1</sup> ABLIKIM | 11I BES3 | $\psi(2S) \rightarrow \gamma\pi^+\pi^-, \gamma K^+K^-$ |
| 0.2 ± 1.5 ± 0.4   | 19.8k | <sup>2</sup> ARTUSO  | 09 CLEO  | $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$        |
| - 5.1 <sup>+</sup> <sub>-</sub> 5.4 <sub>3.6</sub>          | 721   | <sup>1</sup> ABLIKIM | 04I BES2 | $\psi(2S) \rightarrow \gamma\pi^+\pi^-, \gamma K^+K^-$ |
| 13.2 <sup>+</sup> <sub>-</sub> 9.8 <sub>7.5</sub>           | 441   | <sup>3</sup> OREGLIA | 82 CBAL  | $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$        |

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

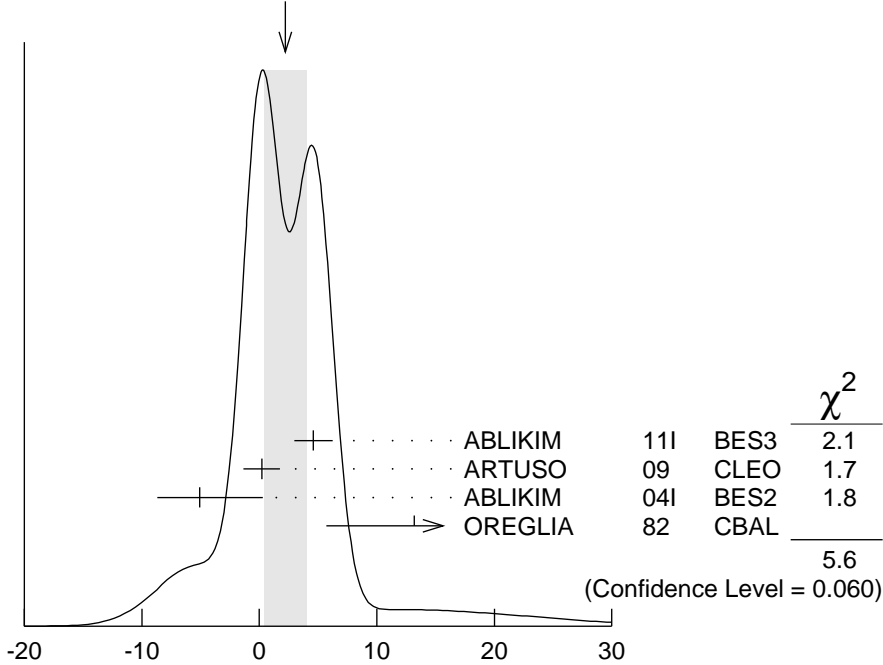
1.0 ± 1.3 ± 0.3 19.8k <sup>3</sup> ARTUSO 09 CLEO  $\psi(2S) \rightarrow \gamma\gamma\ell^+\ell^-$

<sup>1</sup> From a fit with floating  $M2$  and  $E3$  amplitudes  $b_2$  and  $b_3$ .

<sup>2</sup> From a fit with floating  $M2$  and  $E3$  amplitudes  $a_2$ ,  $b_2$ , and  $a_3$ , and  $b_3$ .

<sup>3</sup> From a fit with floating  $M2$  amplitudes  $a_2$  and  $b_2$ , and fixed  $E3$  amplitudes  $a_3=b_3=0$ .

WEIGHTED AVERAGE  
 $2.2 \pm 1.8$  (Error scaled by 1.7)



$b_2 = M2 / \sqrt{E1^2 + M2^2 + E3^2}$  Magnetic quadrupole fractional transition amplitude (units  $10^{-2}$ )

$b_3 = E3 / \sqrt{E1^2 + M2^2 + E3^2}$  Electric octupole fractional transition amplitude

| VALUE (units $10^{-2}$ )                     | EVTS  | DOCUMENT ID          | TECN     | COMMENT   |
|--|-------|----------------------|----------|---|
| <b><math>-0.3 \pm 1.0</math> OUR AVERAGE</b> |       |                      |          |   |
| $1.5 \pm 0.8 \pm 1.8$                        | 13.8k | <sup>1</sup> ABLIKIM | 11I BES3 | $\psi(2S) \rightarrow \gamma \pi^+ \pi^-, \gamma K^+ K^-$ |
| $-0.8 \pm 1.2 \pm 0.2$                       | 19.8k | ARTUSO               | 09 CLEO  | $\psi(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$        |
| $-2.7^{+4.3}_{-2.9}$                         | 721   | <sup>1</sup> ABLIKIM | 04I BES2 | $\psi(2S) \rightarrow \gamma \pi^+ \pi^-, \gamma K^+ K^-$ |

<sup>1</sup> From a fit with floating  $M2$  and  $E3$  amplitudes  $b_2$  and  $b_3$ .

### MULTIPOLE AMPLITUDE RATIOS IN RADIATIVE DECAYS $\psi(2S) \rightarrow \gamma \chi_{c2}(1P)$ and $\chi_{c2} \rightarrow \gamma J/\psi(1S)$

$b_2/a_2$  Magnetic quadrupole transition amplitude ratio

| VALUE (units $10^{-2}$ )            | EVTS  | DOCUMENT ID         | TECN    | COMMENT  |
|-------------------------------------|-------|---------------------|---------|--|
| <b><math>-11^{+14}_{-15}</math></b> | 19.8k | <sup>1</sup> ARTUSO | 09 CLEO | $\psi(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$ |

<sup>1</sup> Statistical and systematic errors combined. From a fit with floating  $M2$  amplitudes  $a_2$  and  $b_2$ , and fixed  $E3$  amplitudes  $a_3 = b_3 = 0$ . Not independent of values for  $a_2(\chi_{c2}(1P))$  and  $b_2(\chi_{c2}(1P))$  from ARTUSO 09.

$\chi_{c2}(1P)$  REFERENCES

|               |      |                  |                                  |                     |
|---------------|------|------------------|----------------------------------|---------------------|
| ABLIKIM       | 15I  | PR D91 092006    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 15M  | PR D91 112008    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 15N  | PR D91 112018    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 14J  | PR D89 074030    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 13B  | PR D87 012002    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 13D  | PR D87 012007    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 13H  | PR D87 032007    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 13V  | PR D88 112001    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| UEHARA        | 13   | PTEP 2013 123C01 | S. Uehara <i>et al.</i>          | (BELLE Collab.)     |
| ABLIKIM       | 12A  | PR D85 112008    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 12I  | PR D86 052004    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 12J  | PR D86 052011    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 12O  | PRL 109 172002   | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| LEES          | 12AE | PR D86 092005    | J.P. Lees <i>et al.</i>          | (BABAR Collab.)     |
| LIU           | 12B  | PRL 108 232001   | Z.Q. Liu <i>et al.</i>           | (BELLE Collab.)     |
| ABLIKIM       | 11A  | PR D83 012006    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 11E  | PR D83 112005    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 11F  | PR D83 112009    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 11I  | PR D84 092006    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ABLIKIM       | 11K  | PRL 107 092001   | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| DEL-AMO-SA... | 11M  | PR D84 012004    | P. del Amo Sanchez <i>et al.</i> | (BABAR Collab.)     |
| ABLIKIM       | 10A  | PR D81 052005    | M. Ablikim <i>et al.</i>         | (BES III Collab.)   |
| ONYISI        | 10   | PR D82 011103    | P.U.E. Onyisi <i>et al.</i>      | (CLEO Collab.)      |
| UEHARA        | 10A  | PR D82 114031    | S. Uehara <i>et al.</i>          | (BELLE Collab.)     |
| ARTUSO        | 09   | PR D80 112003    | M. Artuso <i>et al.</i>          | (CLEO Collab.)      |
| ASNER         | 09   | PR D79 072007    | D.M. Asner <i>et al.</i>         | (CLEO Collab.)      |
| UEHARA        | 09   | PR D79 052009    | S. Uehara <i>et al.</i>          | (BELLE Collab.)     |
| BENNETT       | 08A  | PRL 101 151801   | J.V. Bennett <i>et al.</i>       | (CLEO Collab.)      |
| ECKLUND       | 08A  | PR D78 091501    | K.M. Ecklund <i>et al.</i>       | (CLEO Collab.)      |
| HE            | 08B  | PR D78 092004    | Q. He <i>et al.</i>              | (CLEO Collab.)      |
| MENDEZ        | 08   | PR D78 011102    | H. Mendez <i>et al.</i>          | (CLEO Collab.)      |
| NAIK          | 08   | PR D78 031101    | P. Naik <i>et al.</i>            | (CLEO Collab.)      |
| UEHARA        | 08   | EPJ C53 1        | S. Uehara <i>et al.</i>          | (BELLE Collab.)     |
| ADAMS         | 07   | PR D75 071101    | G.S. Adams <i>et al.</i>         | (CLEO Collab.)      |
| ATHAR         | 07   | PR D75 032002    | S.B. Athar <i>et al.</i>         | (CLEO Collab.)      |
| CHEN          | 07B  | PL B651 15       | W.T. Chen <i>et al.</i>          | (BELLE Collab.)     |
| ABLIKIM       | 06D  | PR D73 052006    | M. Ablikim <i>et al.</i>         | (BES Collab.)       |
| ABLIKIM       | 06I  | PR D74 012004    | M. Ablikim <i>et al.</i>         | (BES Collab.)       |
| ABLIKIM       | 06R  | PR D74 072001    | M. Ablikim <i>et al.</i>         | (BES Collab.)       |
| ABLIKIM       | 06T  | PL B642 197      | M. Ablikim <i>et al.</i>         | (BES Collab.)       |
| DOBBS         | 06   | PR D73 071101    | S. Dobbs <i>et al.</i>           | (CLEO 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.)       |
| 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.) |
| NAKAZAWA      | 05   | PL B615 39       | H. Nakazawa <i>et al.</i>        | (BELLE Collab.)     |
| ABLIKIM       | 04B  | PR D70 012003    | M. Ablikim <i>et al.</i>         | (BES Collab.)       |
| ABLIKIM       | 04H  | PR D70 092003    | M. Ablikim <i>et al.</i>         | (BES Collab.)       |
| ABLIKIM       | 04I  | PR D70 092004    | M. Ablikim <i>et al.</i>         | (BES 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.)       |
| BAI           | 04I  | PR D70 012006    | J.Z. Bai <i>et al.</i>           | (BES 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.)       |
| ABE           | 02T  | PL B540 33       | K. Abe <i>et al.</i>             | (BELLE Collab.)     |
| AMBROGIANI    | 02   | PR D65 052002    | M. Ambrogiani <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.) |
| ACCIARRI      | 99E  | PL B453 73       | M. Acciarri <i>et al.</i>        | (L3 Collab.)        |
| BAI           | 99B  | PR D60 072001    | J.Z. Bai <i>et al.</i>           | (BES Collab.)       |
| ACKER...,K... | 98   | PL B439 197      | K. Ackerstaff <i>et al.</i>      | (OPAL 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.)       |
| DOMINICK      | 94   | PR D50 4265      | J. Dominick <i>et al.</i>        | (CLEO Collab.)      |
| ARMSTRONG     | 93   | PRL 70 2988      | T.A. Armstrong <i>et al.</i>     | (FNAL E760 Collab.) |
| ARMSTRONG     | 93E  | PR D48 3037      | T.A. Armstrong <i>et al.</i>     | (FNAL-E760 Collab.) |

|           |     |               |                              |                                 |
|-----------|-----|---------------|------------------------------|---------------------------------|
| BAUER     | 93  | PL B302 345   | D.A. Bauer <i>et al.</i>     | (TPC Collab.)                   |
| ARMSTRONG | 92  | NP B373 35    | T.A. Armstrong <i>et al.</i> | (FNAL, FERR, GENO+)             |
| Also      |     | PRL 68 1468   | T.A. Armstrong <i>et al.</i> | (FNAL, FERR, GENO+)             |
| BAGLIN    | 87B | PL B187 191   | C. Baglin <i>et al.</i>      | (R704 Collab.)                  |
| BAGLIN    | 86B | PL B172 455   | C. Baglin                    | (LAPP, CERN, GENO, LYON, OSLO+) |
| GAISER    | 86  | PR D34 711    | J. Gaiser <i>et al.</i>      | (Crystal Ball Collab.)          |
| LEE       | 85  | SLAC 282      | R.A. Lee                     | (SLAC)                          |
| LEMOIGNE  | 82  | PL 113B 509   | Y. Lemoigne <i>et al.</i>    | (SACL, LOIC, SHMP+)             |
| OREGLIA   | 82  | PR D25 2259   | M.J. Oreglia <i>et al.</i>   | (SLAC, CIT, HARV+)              |
| Also      |     | Private Comm. | M.J. Oreglia                 | (EFI)                           |
| BARATE    | 81  | PR D24 2994   | R. Barate <i>et al.</i>      | (SACL, LOIC, SHMP, CERN+)       |
| HIMEL     | 80  | PRL 44 920    | T. Himel <i>et al.</i>       | (LBL, SLAC)                     |
| Also      |     | Private Comm. | G. Trilling                  | (LBL, UCB)                      |
| 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+)              |
| WHITAKER  | 76  | PRL 37 1596   | J.S. Whitaker <i>et al.</i>  | (SLAC, LBL)                     |

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