

$J/\psi(1S)$

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

 $J/\psi(1S)$ MASS

| <u>VALUE (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|------------------------|-------------|--|
| 3096.900±0.006 OUR AVERAGE | | | | |
| 3096.66 ±0.19 ±0.02 | 6.1k | ¹ AAIJ | 15BI LHCb | $pp \rightarrow J/\psi X$ |
| 3096.900±0.002±0.006 | | ² ANASHIN | 15 KEDR | $e^+e^- \rightarrow \text{hadrons}$ |
| 3096.89 ±0.09 | 502 | ³ ARTAMONOV | 00 OLYA | $e^+e^- \rightarrow \text{hadrons}$ |
| 3096.91 ±0.03 ±0.01 | | ⁴ ARMSTRONG | 93B E760 | $\bar{p}p \rightarrow e^+e^-$ |
| 3096.95 ±0.1 ±0.3 | 193 | BAGLIN | 87 SPEC | $\bar{p}p \rightarrow e^+e^- X$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| 3096.917±0.010±0.007 | | AULCHENKO | 03 KEDR | $e^+e^- \rightarrow \text{hadrons}$ |
| 3097.5 ±0.3 | | GRIBUSHIN | 96 FMPS | 515 $\pi^- \text{Be} \rightarrow 2\mu X$ |
| 3098.4 ±2.0 | 38k | LEMOIGNE | 82 GOLI | 185 $\pi^- \text{Be} \rightarrow \gamma\mu^+\mu^- A$ |
| 3096.93 ±0.09 | 502 | ⁵ ZHOLENTZ | 80 REDE | e^+e^- |
| 3097.0 ±1 | | ⁶ BRANDELIK | 79C DASP | e^+e^- |

¹ From a sample of $\eta_c(1S)$ and J/ψ produced in b -hadron decays.² Supersedes AULCHENKO 03.³ Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85).⁴ Mass central value and systematic error recalculated by us according to Eq. (16) in ARMSTRONG 93B, using the value for the $\psi(2S)$ mass from AULCHENKO 03.⁵ Superseded by ARTAMONOV 00.⁶ From a simultaneous fit to e^+e^- , $\mu^+\mu^-$ and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$. **$J/\psi(1S)$ WIDTH**

| <u>VALUE (keV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|------------------------|-------------|---|
| 92.9± 2.8 OUR AVERAGE Error includes scale factor of 1.1. | | | | |
| 96.1± 3.2 | 13k | ¹ ADAMS | 06A CLEO | $e^+e^- \rightarrow \mu^+\mu^- \gamma$ |
| 84.4± 8.9 | | BAI | 95B BES | e^+e^- |
| 91 ±11 ±6 | | ² ARMSTRONG | 93B E760 | $\bar{p}p \rightarrow e^+e^-$ |
| 85.5 ⁺ ₋ 6.1 5.8 | | ³ HSUEH | 92 RVUE | See Υ mini-review |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| 94.1± 2.7 | | ⁴ ANASHIN | 10 KEDR | 3.097 $e^+e^- \rightarrow e^+e^-, \mu^+\mu^-$ |
| 93.7± 3.5 | 7.8k | ¹ AUBERT | 04 BABR | $e^+e^- \rightarrow \mu^+\mu^- \gamma$ |

¹ Calculated by us from the reported values of $\Gamma(e^+e^-) \times B(\mu^+\mu^-)$ using $B(e^+e^-) = (5.94 \pm 0.06)\%$ and $B(\mu^+\mu^-) = (5.93 \pm 0.06)\%$.² The initial-state radiation correction reevaluated by ANDREOTTI 07 in its Ref. [4].³ Using data from COFFMAN 92, BALDINI-CELIO 75, BOYARSKI 75, ESPOSITO 75B, BRANDELIK 79C.⁴ Assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$ and using $\Gamma(e^+e^-)/\Gamma_{\text{total}} = (5.94 \pm 0.06)\%$.

$J/\psi(1S)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) | Scale factor/ Confidence level |
|---|--|-----------------------------------|
| Γ_1 hadrons | (87.7 \pm 0.5) % | |
| Γ_2 virtual $\gamma \rightarrow$ hadrons | (13.50 \pm 0.30) % | |
| Γ_3 $g g g$ | (64.1 \pm 1.0) % | |
| Γ_4 $\gamma g g$ | (8.8 \pm 1.1) % | |
| Γ_5 $e^+ e^-$ | (5.971 \pm 0.032) % | |
| Γ_6 $e^+ e^- \gamma$ | [a] (8.8 \pm 1.4) $\times 10^{-3}$ | |
| Γ_7 $\mu^+ \mu^-$ | (5.961 \pm 0.033) % | |

Decays involving hadronic resonances

| | | |
|--|--|-------|
| Γ_8 $\rho \pi$ | (1.69 \pm 0.15) % | S=2.4 |
| Γ_9 $\rho^0 \pi^0$ | (5.6 \pm 0.7) $\times 10^{-3}$ | |
| Γ_{10} $a_2(1320) \rho$ | (1.09 \pm 0.22) % | |
| Γ_{11} $\omega \pi^+ \pi^+ \pi^- \pi^-$ | (8.5 \pm 3.4) $\times 10^{-3}$ | |
| Γ_{12} $\omega \pi^+ \pi^- \pi^0$ | (4.0 \pm 0.7) $\times 10^{-3}$ | |
| Γ_{13} $\omega \pi^+ \pi^-$ | (8.6 \pm 0.7) $\times 10^{-3}$ | S=1.1 |
| Γ_{14} $\omega f_2(1270)$ | (4.3 \pm 0.6) $\times 10^{-3}$ | |
| Γ_{15} $K^*(892)^0 \bar{K}^*(892)^0$ | (2.3 \pm 0.7) $\times 10^{-4}$ | |
| Γ_{16} $K^*(892)^\pm K^*(892)^\mp$ | (1.00 $^{+0.22}_{-0.40}$) $\times 10^{-3}$ | |
| Γ_{17} $K^*(892)^\pm K^*(800)^\mp$ | (1.1 $^{+1.0}_{-0.6}$) $\times 10^{-3}$ | |
| Γ_{18} $\eta K^*(892)^0 \bar{K}^*(892)^0$ | (1.15 \pm 0.26) $\times 10^{-3}$ | |
| Γ_{19} $K^*(892)^0 \bar{K}_2^*(1430)^0 + c.c.$ | (6.0 \pm 0.6) $\times 10^{-3}$ | |
| Γ_{20} $K^*(892)^0 \bar{K}_2^*(1770)^0 + c.c. \rightarrow$ $K^*(892)^0 K^- \pi^+ + c.c.$ | (6.9 \pm 0.9) $\times 10^{-4}$ | |
| Γ_{21} $\omega K^*(892) \bar{K} + c.c.$ | (6.1 \pm 0.9) $\times 10^{-3}$ | |
| Γ_{22} $K^+ K^*(892)^- + c.c.$ | (5.12 \pm 0.30) $\times 10^{-3}$ | |
| Γ_{23} $K^+ K^*(892)^- + c.c. \rightarrow$ $K^+ K^- \pi^0$ | (1.97 \pm 0.20) $\times 10^{-3}$ | |
| Γ_{24} $K^+ K^*(892)^- + c.c. \rightarrow$ $K^0 K^\pm \pi^\mp + c.c.$ | (3.0 \pm 0.4) $\times 10^{-3}$ | |
| Γ_{25} $K^0 \bar{K}^*(892)^0 + c.c.$ | (4.39 \pm 0.31) $\times 10^{-3}$ | |
| Γ_{26} $K^0 \bar{K}^*(892)^0 + c.c. \rightarrow$ $K^0 K^\pm \pi^\mp + c.c.$ | (3.2 \pm 0.4) $\times 10^{-3}$ | |
| Γ_{27} $K_1(1400)^\pm K^\mp$ | (3.8 \pm 1.4) $\times 10^{-3}$ | |
| Γ_{28} $\bar{K}^*(892)^0 K^+ \pi^- + c.c.$ | seen | |
| Γ_{29} $\omega \pi^0 \pi^0$ | (3.4 \pm 0.8) $\times 10^{-3}$ | |
| Γ_{30} $b_1(1235)^\pm \pi^\mp$ | [b] (3.0 \pm 0.5) $\times 10^{-3}$ | |
| Γ_{31} $\omega K^\pm K_S^0 \pi^\mp$ | [b] (3.4 \pm 0.5) $\times 10^{-3}$ | |
| Γ_{32} $b_1(1235)^0 \pi^0$ | (2.3 \pm 0.6) $\times 10^{-3}$ | |
| Γ_{33} $\eta K^\pm K_S^0 \pi^\mp$ | [b] (2.2 \pm 0.4) $\times 10^{-3}$ | |
| Γ_{34} $\phi K^*(892) \bar{K} + c.c.$ | (2.18 \pm 0.23) $\times 10^{-3}$ | |

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|---------------|---|-----|----------------------------------|--------|
| Γ_{35} | $\omega K\bar{K}$ | | $(1.70 \pm 0.32) \times 10^{-3}$ | |
| Γ_{36} | $\omega f_0(1710) \rightarrow \omega K\bar{K}$ | | $(4.8 \pm 1.1) \times 10^{-4}$ | |
| Γ_{37} | $\phi 2(\pi^+\pi^-)$ | | $(1.66 \pm 0.23) \times 10^{-3}$ | |
| Γ_{38} | $\Delta(1232)^{++} \bar{p}\pi^-$ | | $(1.6 \pm 0.5) \times 10^{-3}$ | |
| Γ_{39} | $\omega\eta$ | | $(1.74 \pm 0.20) \times 10^{-3}$ | S=1.6 |
| Γ_{40} | $\phi K\bar{K}$ | | $(1.83 \pm 0.24) \times 10^{-3}$ | S=1.5 |
| Γ_{41} | $\phi f_0(1710) \rightarrow \phi K\bar{K}$ | | $(3.6 \pm 0.6) \times 10^{-4}$ | |
| Γ_{42} | $\phi f_2(1270)$ | | $(7.2 \pm 1.3) \times 10^{-4}$ | |
| Γ_{43} | $\Delta(1232)^{++} \bar{\Delta}(1232)^{--}$ | | $(1.10 \pm 0.29) \times 10^{-3}$ | |
| Γ_{44} | $\Sigma(1385)^- \bar{\Sigma}(1385)^+ \text{ (or c.c.)}$ | [b] | $(1.10 \pm 0.12) \times 10^{-3}$ | |
| Γ_{45} | $\phi f_2'(1525)$ | | $(8 \pm 4) \times 10^{-4}$ | S=2.7 |
| Γ_{46} | $\phi\pi^+\pi^-$ | | $(9.4 \pm 0.9) \times 10^{-4}$ | S=1.2 |
| Γ_{47} | $\phi\pi^0\pi^0$ | | $(5.6 \pm 1.6) \times 10^{-4}$ | |
| Γ_{48} | $\phi K^\pm K_S^0 \pi^\mp$ | [b] | $(7.2 \pm 0.8) \times 10^{-4}$ | |
| Γ_{49} | $\omega f_1(1420)$ | | $(6.8 \pm 2.4) \times 10^{-4}$ | |
| Γ_{50} | $\phi\eta$ | | $(7.5 \pm 0.8) \times 10^{-4}$ | S=1.5 |
| Γ_{51} | $\Xi^0 \Xi^0$ | | $(1.20 \pm 0.24) \times 10^{-3}$ | |
| Γ_{52} | $\Xi(1530)^- \Xi^+$ | | $(5.9 \pm 1.5) \times 10^{-4}$ | |
| Γ_{53} | $\rho K^- \bar{\Sigma}(1385)^0$ | | $(5.1 \pm 3.2) \times 10^{-4}$ | |
| Γ_{54} | $\omega\pi^0$ | | $(4.5 \pm 0.5) \times 10^{-4}$ | S=1.4 |
| Γ_{55} | $\phi\eta'(958)$ | | $(4.0 \pm 0.7) \times 10^{-4}$ | S=2.1 |
| Γ_{56} | $\phi f_0(980)$ | | $(3.2 \pm 0.9) \times 10^{-4}$ | S=1.9 |
| Γ_{57} | $\phi f_0(980) \rightarrow \phi\pi^+\pi^-$ | | $(1.8 \pm 0.4) \times 10^{-4}$ | |
| Γ_{58} | $\phi f_0(980) \rightarrow \phi\pi^0\pi^0$ | | $(1.7 \pm 0.7) \times 10^{-4}$ | |
| Γ_{59} | $\phi\pi^0 f_0(980) \rightarrow \phi\pi^0\pi^+\pi^-$ | | $(4.5 \pm 1.0) \times 10^{-6}$ | |
| Γ_{60} | $\phi\pi^0 f_0(980) \rightarrow \phi\pi^0\rho^0\pi^0$ | | $(1.7 \pm 0.6) \times 10^{-6}$ | |
| Γ_{61} | $\eta\phi f_0(980) \rightarrow \eta\phi\pi^+\pi^-$ | | $(3.2 \pm 1.0) \times 10^{-4}$ | |
| Γ_{62} | $\phi a_0(980)^0 \rightarrow \phi\eta\pi^0$ | | $(5 \pm 4) \times 10^{-6}$ | |
| Γ_{63} | $\Xi(1530)^0 \Xi^0$ | | $(3.2 \pm 1.4) \times 10^{-4}$ | |
| Γ_{64} | $\Sigma(1385)^- \bar{\Sigma}^+ \text{ (or c.c.)}$ | [b] | $(3.1 \pm 0.5) \times 10^{-4}$ | |
| Γ_{65} | $\phi f_1(1285)$ | | $(2.6 \pm 0.5) \times 10^{-4}$ | |
| Γ_{66} | $\phi f_1(1285) \rightarrow \phi\pi^0 f_0(980) \rightarrow \phi\pi^0\pi^+\pi^-$ | | $(9.4 \pm 2.8) \times 10^{-7}$ | |
| Γ_{67} | $\phi f_1(1285) \rightarrow \phi\pi^0 f_0(980) \rightarrow \phi\pi^0\pi^0\pi^0$ | | $(2.1 \pm 2.2) \times 10^{-7}$ | |
| Γ_{68} | $\eta\pi^+\pi^-$ | | $(4.0 \pm 1.7) \times 10^{-4}$ | |
| Γ_{69} | $\eta\rho$ | | $(1.93 \pm 0.23) \times 10^{-4}$ | |
| Γ_{70} | $\omega\eta'(958)$ | | $(1.82 \pm 0.21) \times 10^{-4}$ | |
| Γ_{71} | $\omega f_0(980)$ | | $(1.4 \pm 0.5) \times 10^{-4}$ | |
| Γ_{72} | $\rho\eta'(958)$ | | $(1.05 \pm 0.18) \times 10^{-4}$ | |
| Γ_{73} | $a_2(1320)^\pm \pi^\mp$ | [b] | $< 4.3 \times 10^{-3}$ | CL=90% |
| Γ_{74} | $K\bar{K}_2^*(1430) + \text{c.c.}$ | | $< 4.0 \times 10^{-3}$ | CL=90% |
| Γ_{75} | $K_1(1270)^\pm K^\mp$ | | $< 3.0 \times 10^{-3}$ | CL=90% |
| Γ_{76} | $K_2^*(1430)^0 \bar{K}_2^*(1430)^0$ | | $< 2.9 \times 10^{-3}$ | CL=90% |

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|---------------|--|--|--------|
| Γ_{77} | $\phi\pi^0$ | 3×10^{-6} or 1×10^{-7} | |
| Γ_{78} | $\phi\eta(1405) \rightarrow \phi\eta\pi^+\pi^-$ | $(2.0 \pm 1.0) \times 10^{-5}$ | |
| Γ_{79} | $\omega f'_2(1525)$ | $< 2.2 \times 10^{-4}$ | CL=90% |
| Γ_{80} | $\omega X(1835) \rightarrow \omega\rho\bar{p}$ | $< 3.9 \times 10^{-6}$ | CL=95% |
| Γ_{81} | $\phi X(1835) \rightarrow \phi\eta\pi^+\pi^-$ | $< 2.8 \times 10^{-4}$ | CL=90% |
| Γ_{82} | $\phi X(1870) \rightarrow \phi\eta\pi^+\pi^-$ | $< 6.13 \times 10^{-5}$ | CL=90% |
| Γ_{83} | $\eta\phi(2170) \rightarrow \eta\phi f_0(980) \rightarrow \eta\phi\pi^+\pi^-$ | $(1.2 \pm 0.4) \times 10^{-4}$ | |
| Γ_{84} | $\eta\phi(2170) \rightarrow \eta K^*(892)^0 \bar{K}^*(892)^0$ | $< 2.52 \times 10^{-4}$ | CL=90% |
| Γ_{85} | $\Sigma(1385)^0 \bar{\Lambda} + \text{c.c.}$ | $< 8.2 \times 10^{-6}$ | CL=90% |
| Γ_{86} | $\Delta(1232)^+ \bar{p}$ | $< 1 \times 10^{-4}$ | CL=90% |
| Γ_{87} | $\Lambda(1520) \bar{\Lambda} + \text{c.c.} \rightarrow \gamma \Lambda \bar{\Lambda}$ | $< 4.1 \times 10^{-6}$ | CL=90% |
| Γ_{88} | $\Theta(1540) \bar{\Theta}(1540) \rightarrow K_S^0 p K^- \bar{n} + \text{c.c.}$ | $< 1.1 \times 10^{-5}$ | CL=90% |
| Γ_{89} | $\Theta(1540) K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n}$ | $< 2.1 \times 10^{-5}$ | CL=90% |
| Γ_{90} | $\Theta(1540) K_S^0 \bar{p} \rightarrow K_S^0 \bar{p} K^+ n$ | $< 1.6 \times 10^{-5}$ | CL=90% |
| Γ_{91} | $\bar{\Theta}(1540) K^+ n \rightarrow K_S^0 \bar{p} K^+ n$ | $< 5.6 \times 10^{-5}$ | CL=90% |
| Γ_{92} | $\bar{\Theta}(1540) K_S^0 p \rightarrow K_S^0 p K^- \bar{n}$ | $< 1.1 \times 10^{-5}$ | CL=90% |
| Γ_{93} | $\Sigma^0 \bar{\Lambda}$ | $< 9 \times 10^{-5}$ | CL=90% |

Decays into stable hadrons

| | | | |
|----------------|------------------------------|------------------------------------|--------|
| Γ_{94} | $2(\pi^+\pi^-)\pi^0$ | $(4.1 \pm 0.5) \%$ | S=2.4 |
| Γ_{95} | $3(\pi^+\pi^-)\pi^0$ | $(2.9 \pm 0.6) \%$ | |
| Γ_{96} | $\pi^+\pi^-\pi^0$ | $(2.11 \pm 0.07) \%$ | S=1.5 |
| Γ_{97} | $\pi^+\pi^-\pi^0 K^+ K^-$ | $(1.79 \pm 0.29) \%$ | S=2.2 |
| Γ_{98} | $4(\pi^+\pi^-)\pi^0$ | $(9.0 \pm 3.0) \times 10^{-3}$ | |
| Γ_{99} | $\pi^+\pi^- K^+ K^-$ | $(6.6 \pm 0.5) \times 10^{-3}$ | |
| Γ_{100} | $\pi^+\pi^- K^+ K^- \eta$ | $(1.84 \pm 0.28) \times 10^{-3}$ | |
| Γ_{101} | $\pi^0\pi^0 K^+ K^-$ | $(2.45 \pm 0.31) \times 10^{-3}$ | |
| Γ_{102} | $K\bar{K}\pi$ | $(6.1 \pm 1.0) \times 10^{-3}$ | |
| Γ_{103} | $2(\pi^+\pi^-)$ | $(3.57 \pm 0.30) \times 10^{-3}$ | |
| Γ_{104} | $3(\pi^+\pi^-)$ | $(4.3 \pm 0.4) \times 10^{-3}$ | |
| Γ_{105} | $2(\pi^+\pi^-\pi^0)$ | $(1.62 \pm 0.21) \%$ | |
| Γ_{106} | $2(\pi^+\pi^-)\eta$ | $(2.29 \pm 0.24) \times 10^{-3}$ | |
| Γ_{107} | $3(\pi^+\pi^-)\eta$ | $(7.2 \pm 1.5) \times 10^{-4}$ | |
| Γ_{108} | $\rho\bar{p}$ | $(2.120 \pm 0.029) \times 10^{-3}$ | |
| Γ_{109} | $\rho\bar{p}\pi^0$ | $(1.19 \pm 0.08) \times 10^{-3}$ | S=1.1 |
| Γ_{110} | $\rho\bar{p}\pi^+\pi^-$ | $(6.0 \pm 0.5) \times 10^{-3}$ | S=1.3 |
| Γ_{111} | $\rho\bar{p}\pi^+\pi^-\pi^0$ | [c] $(2.3 \pm 0.9) \times 10^{-3}$ | S=1.9 |
| Γ_{112} | $\rho\bar{p}\eta$ | $(2.00 \pm 0.12) \times 10^{-3}$ | |
| Γ_{113} | $\rho\bar{p}\rho$ | $< 3.1 \times 10^{-4}$ | CL=90% |
| Γ_{114} | $\rho\bar{p}\omega$ | $(9.8 \pm 1.0) \times 10^{-4}$ | S=1.3 |
| Γ_{115} | $\rho\bar{p}\eta'(958)$ | $(2.1 \pm 0.4) \times 10^{-4}$ | |

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|----------------|--|------------------------------------|--------|
| Γ_{116} | $p\bar{p}a_0(980) \rightarrow p\bar{p}\pi^0\eta$ | $(6.8 \pm 1.8) \times 10^{-5}$ | |
| Γ_{117} | $p\bar{p}\phi$ | $(4.5 \pm 1.5) \times 10^{-5}$ | |
| Γ_{118} | $n\bar{n}$ | $(2.09 \pm 0.16) \times 10^{-3}$ | |
| Γ_{119} | $n\bar{n}\pi^+\pi^-$ | $(4 \pm 4) \times 10^{-3}$ | |
| Γ_{120} | $\Sigma^+\bar{\Sigma}^-$ | $(1.50 \pm 0.24) \times 10^{-3}$ | |
| Γ_{121} | $\Sigma^0\bar{\Sigma}^0$ | $(1.29 \pm 0.09) \times 10^{-3}$ | |
| Γ_{122} | $2(\pi^+\pi^-)K^+K^-$ | $(4.7 \pm 0.7) \times 10^{-3}$ | S=1.3 |
| Γ_{123} | $p\bar{n}\pi^-$ | $(2.12 \pm 0.09) \times 10^{-3}$ | |
| Γ_{124} | $nN(1440)$ | seen | |
| Γ_{125} | $nN(1520)$ | seen | |
| Γ_{126} | $nN(1535)$ | seen | |
| Γ_{127} | $\Xi^-\bar{\Xi}^+$ | $(8.6 \pm 1.1) \times 10^{-4}$ | S=1.2 |
| Γ_{128} | $\Lambda\bar{\Lambda}$ | $(1.61 \pm 0.15) \times 10^{-3}$ | S=1.9 |
| Γ_{129} | $\Lambda\bar{\Sigma}^-\pi^+$ (or c.c.) | [b] $(8.3 \pm 0.7) \times 10^{-4}$ | S=1.2 |
| Γ_{130} | $pK^-\bar{\Lambda}$ | $(8.9 \pm 1.6) \times 10^{-4}$ | |
| Γ_{131} | $2(K^+K^-)$ | $(7.6 \pm 0.9) \times 10^{-4}$ | |
| Γ_{132} | $pK^-\bar{\Sigma}^0$ | $(2.9 \pm 0.8) \times 10^{-4}$ | |
| Γ_{133} | K^+K^- | $(2.86 \pm 0.21) \times 10^{-4}$ | |
| Γ_{134} | $K_S^0 K_L^0$ | $(2.1 \pm 0.4) \times 10^{-4}$ | S=3.2 |
| Γ_{135} | $\Lambda\bar{\Lambda}\pi^+\pi^-$ | $(4.3 \pm 1.0) \times 10^{-3}$ | |
| Γ_{136} | $\Lambda\bar{\Lambda}\eta$ | $(1.62 \pm 0.17) \times 10^{-4}$ | |
| Γ_{137} | $\Lambda\bar{\Lambda}\pi^0$ | $(3.8 \pm 0.4) \times 10^{-5}$ | |
| Γ_{138} | $\bar{\Lambda}nK_S^0 + \text{c.c.}$ | $(6.5 \pm 1.1) \times 10^{-4}$ | |
| Γ_{139} | $\pi^+\pi^-$ | $(1.47 \pm 0.14) \times 10^{-4}$ | |
| Γ_{140} | $\Lambda\bar{\Sigma}^+ + \text{c.c.}$ | $(2.83 \pm 0.23) \times 10^{-5}$ | |
| Γ_{141} | $K_S^0 K_S^0$ | $< 1 \times 10^{-6}$ | CL=95% |

Radiative decays

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|----------------|--|--|--------|
| Γ_{142} | 3γ | $(1.16 \pm 0.22) \times 10^{-5}$ | |
| Γ_{143} | 4γ | $< 9 \times 10^{-6}$ | CL=90% |
| Γ_{144} | 5γ | $< 1.5 \times 10^{-5}$ | CL=90% |
| Γ_{145} | $\gamma\pi^0\pi^0$ | $(1.15 \pm 0.05) \times 10^{-3}$ | |
| Γ_{146} | $\gamma\eta_c(1S)$ | $(1.7 \pm 0.4) \%$ | S=1.5 |
| Γ_{147} | $\gamma\eta_c(1S) \rightarrow 3\gamma$ | $(3.8 \pm_{-1.0}^{+1.3}) \times 10^{-6}$ | S=1.1 |
| Γ_{148} | $\gamma\pi^+\pi^-2\pi^0$ | $(8.3 \pm 3.1) \times 10^{-3}$ | |
| Γ_{149} | $\gamma\eta\pi\pi$ | $(6.1 \pm 1.0) \times 10^{-3}$ | |
| Γ_{150} | $\gamma\eta_2(1870) \rightarrow \gamma\eta\pi^+\pi^-$ | $(6.2 \pm 2.4) \times 10^{-4}$ | |
| Γ_{151} | $\gamma\eta(1405/1475) \rightarrow \gamma K\bar{K}\pi$ | [d] $(2.8 \pm 0.6) \times 10^{-3}$ | S=1.6 |
| Γ_{152} | $\gamma\eta(1405/1475) \rightarrow \gamma\gamma\rho^0$ | $(7.8 \pm 2.0) \times 10^{-5}$ | S=1.8 |
| Γ_{153} | $\gamma\eta(1405/1475) \rightarrow \gamma\eta\pi^+\pi^-$ | $(3.0 \pm 0.5) \times 10^{-4}$ | |
| Γ_{154} | $\gamma\eta(1405/1475) \rightarrow \gamma\gamma\phi$ | $< 8.2 \times 10^{-5}$ | CL=95% |
| Γ_{155} | $\gamma\rho\rho$ | $(4.5 \pm 0.8) \times 10^{-3}$ | |
| Γ_{156} | $\gamma\rho\omega$ | $< 5.4 \times 10^{-4}$ | CL=90% |
| Γ_{157} | $\gamma\rho\phi$ | $< 8.8 \times 10^{-5}$ | CL=90% |

| | | | |
|----------------|---|---|-------|
| Γ_{158} | $\gamma\eta'(958)$ | $(5.15 \pm 0.16) \times 10^{-3}$ | S=1.2 |
| Γ_{159} | $\gamma 2\pi^+ 2\pi^-$ | $(2.8 \pm 0.5) \times 10^{-3}$ | S=1.9 |
| Γ_{160} | $\gamma f_2(1270) f_2(1270)$ | $(9.5 \pm 1.7) \times 10^{-4}$ | |
| Γ_{161} | $\gamma f_2(1270) f_2(1270)$ (non resonant) | $(8.2 \pm 1.9) \times 10^{-4}$ | |
| Γ_{162} | $\gamma K^+ K^- \pi^+ \pi^-$ | $(2.1 \pm 0.6) \times 10^{-3}$ | |
| Γ_{163} | $\gamma f_4(2050)$ | $(2.7 \pm 0.7) \times 10^{-3}$ | |
| Γ_{164} | $\gamma\omega\omega$ | $(1.61 \pm 0.33) \times 10^{-3}$ | |
| Γ_{165} | $\gamma\eta(1405/1475) \rightarrow \gamma\rho^0\rho^0$ | $(1.7 \pm 0.4) \times 10^{-3}$ | S=1.3 |
| Γ_{166} | $\gamma f_2(1270)$ | $(1.64 \pm 0.12) \times 10^{-3}$ | S=1.3 |
| Γ_{167} | $\gamma f_0(1370) \rightarrow \gamma K \bar{K}$ | $(4.2 \pm 1.5) \times 10^{-4}$ | |
| Γ_{168} | $\gamma f_0(1710) \rightarrow \gamma K \bar{K}$ | $(1.00^{+0.11}_{-0.09}) \times 10^{-3}$ | S=1.5 |
| Γ_{169} | $\gamma f_0(1710) \rightarrow \gamma\pi\pi$ | $(3.8 \pm 0.5) \times 10^{-4}$ | |
| Γ_{170} | $\gamma f_0(1710) \rightarrow \gamma\omega\omega$ | $(3.1 \pm 1.0) \times 10^{-4}$ | |
| Γ_{171} | $\gamma f_0(1710) \rightarrow \gamma\eta\eta$ | $(2.4^{+1.2}_{-0.7}) \times 10^{-4}$ | |
| Γ_{172} | $\gamma\eta$ | $(1.104 \pm 0.034) \times 10^{-3}$ | |
| Γ_{173} | $\gamma f_1(1420) \rightarrow \gamma K \bar{K} \pi$ | $(7.9 \pm 1.3) \times 10^{-4}$ | |
| Γ_{174} | $\gamma f_1(1285)$ | $(6.1 \pm 0.8) \times 10^{-4}$ | |
| Γ_{175} | $\gamma f_1(1510) \rightarrow \gamma\eta\pi^+\pi^-$ | $(4.5 \pm 1.2) \times 10^{-4}$ | |
| Γ_{176} | $\gamma f_2'(1525)$ | $(5.7^{+0.8}_{-0.5}) \times 10^{-4}$ | S=1.5 |
| Γ_{177} | $\gamma f_2'(1525) \rightarrow \gamma\eta\eta$ | $(3.4 \pm 1.4) \times 10^{-5}$ | |
| Γ_{178} | $\gamma f_2(1640) \rightarrow \gamma\omega\omega$ | $(2.8 \pm 1.8) \times 10^{-4}$ | |
| Γ_{179} | $\gamma f_2(1910) \rightarrow \gamma\omega\omega$ | $(2.0 \pm 1.4) \times 10^{-4}$ | |
| Γ_{180} | $\gamma f_0(1800) \rightarrow \gamma\omega\phi$ | $(2.5 \pm 0.6) \times 10^{-4}$ | |
| Γ_{181} | $\gamma f_2(1810) \rightarrow \gamma\eta\eta$ | $(5.4^{+3.5}_{-2.4}) \times 10^{-5}$ | |
| Γ_{182} | $\gamma f_2(1950) \rightarrow \gamma K^*(892) \bar{K}^*(892)$ | $(7.0 \pm 2.2) \times 10^{-4}$ | |
| Γ_{183} | $\gamma K^*(892) \bar{K}^*(892)$ | $(4.0 \pm 1.3) \times 10^{-3}$ | |
| Γ_{184} | $\gamma\phi\phi$ | $(4.0 \pm 1.2) \times 10^{-4}$ | S=2.1 |
| Γ_{185} | $\gamma p\bar{p}$ | $(3.8 \pm 1.0) \times 10^{-4}$ | |
| Γ_{186} | $\gamma\eta(2225)$ | $(3.3 \pm 0.5) \times 10^{-4}$ | |
| Γ_{187} | $\gamma\eta(1760) \rightarrow \gamma\rho^0\rho^0$ | $(1.3 \pm 0.9) \times 10^{-4}$ | |
| Γ_{188} | $\gamma\eta(1760) \rightarrow \gamma\omega\omega$ | $(1.98 \pm 0.33) \times 10^{-3}$ | |
| Γ_{189} | $\gamma X(1835) \rightarrow \gamma\pi^+\pi^-\eta'$ | $(2.6 \pm 0.4) \times 10^{-4}$ | |
| Γ_{190} | $\gamma X(1835) \rightarrow \gamma p\bar{p}$ | $(7.7^{+1.5}_{-0.9}) \times 10^{-5}$ | |
| Γ_{191} | $\gamma X(1835) \rightarrow \gamma K_S^0 K_S^0 \eta$ | $(3.3^{+2.0}_{-1.3}) \times 10^{-5}$ | |
| Γ_{192} | $\gamma X(1840) \rightarrow \gamma 3(\pi^+\pi^-)$ | $(2.4^{+0.7}_{-0.8}) \times 10^{-5}$ | |
| Γ_{193} | $\gamma(K\bar{K}\pi) [J^{PC} = 0^{-+}]$ | $(7 \pm 4) \times 10^{-4}$ | S=2.1 |
| Γ_{194} | $\gamma\pi^0$ | $(3.49^{+0.33}_{-0.30}) \times 10^{-5}$ | |

| | | | | |
|----------------|---|---|------------------|--------|
| Γ_{195} | $\gamma p \bar{p} \pi^+ \pi^-$ | < 7.9 | $\times 10^{-4}$ | CL=90% |
| Γ_{196} | $\gamma \Lambda \bar{\Lambda}$ | < 1.3 | $\times 10^{-4}$ | CL=90% |
| Γ_{197} | $\gamma f_0(2100) \rightarrow \gamma \eta \eta$ | $(1.13 \begin{smallmatrix} +0.60 \\ -0.30 \end{smallmatrix})$ | $\times 10^{-4}$ | |
| Γ_{198} | $\gamma f_0(2100) \rightarrow \gamma \pi \pi$ | (6.2 ± 1.0) | $\times 10^{-4}$ | |
| Γ_{199} | $\gamma f_0(2200)$ | | | |
| Γ_{200} | $\gamma f_0(2200) \rightarrow \gamma K \bar{K}$ | (5.9 ± 1.3) | $\times 10^{-4}$ | |
| Γ_{201} | $\gamma f_J(2220)$ | | | |
| Γ_{202} | $\gamma f_J(2220) \rightarrow \gamma \pi \pi$ | < 3.9 | $\times 10^{-5}$ | CL=90% |
| Γ_{203} | $\gamma f_J(2220) \rightarrow \gamma K \bar{K}$ | < 4.1 | $\times 10^{-5}$ | CL=90% |
| Γ_{204} | $\gamma f_J(2220) \rightarrow \gamma p \bar{p}$ | (1.5 ± 0.8) | $\times 10^{-5}$ | |
| Γ_{205} | $\gamma f_2(2340) \rightarrow \gamma \eta \eta$ | $(5.6 \begin{smallmatrix} +2.4 \\ -2.2 \end{smallmatrix})$ | $\times 10^{-5}$ | |
| Γ_{206} | $\gamma f_0(1500) \rightarrow \gamma \pi \pi$ | (1.09 ± 0.24) | $\times 10^{-4}$ | |
| Γ_{207} | $\gamma f_0(1500) \rightarrow \gamma \eta \eta$ | $(1.7 \begin{smallmatrix} +0.6 \\ -1.4 \end{smallmatrix})$ | $\times 10^{-5}$ | |
| Γ_{208} | $\gamma A \rightarrow \gamma \text{invisible}$ | [e] < 6.3 | $\times 10^{-6}$ | CL=90% |
| Γ_{209} | $\gamma A^0 \rightarrow \gamma \mu^+ \mu^-$ | [f] < 2.1 | $\times 10^{-5}$ | CL=90% |

Dalitz decays

| | | | | |
|----------------|----------------------|---------------------|------------------|--|
| Γ_{210} | $\pi^0 e^+ e^-$ | (7.6 ± 1.4) | $\times 10^{-7}$ | |
| Γ_{211} | $\eta e^+ e^-$ | (1.16 ± 0.09) | $\times 10^{-5}$ | |
| Γ_{212} | $\eta'(958) e^+ e^-$ | (5.81 ± 0.35) | $\times 10^{-5}$ | |

Weak decays

| | | | | |
|----------------|--|---------|------------------|--------|
| Γ_{213} | $D^- e^+ \nu_e + \text{c.c.}$ | < 1.2 | $\times 10^{-5}$ | CL=90% |
| Γ_{214} | $\bar{D}^0 e^+ e^- + \text{c.c.}$ | < 1.1 | $\times 10^{-5}$ | CL=90% |
| Γ_{215} | $D_s^- e^+ \nu_e + \text{c.c.}$ | < 1.3 | $\times 10^{-6}$ | CL=90% |
| Γ_{216} | $D_s^{*-} e^+ \nu_e + \text{c.c.}$ | < 1.8 | $\times 10^{-6}$ | CL=90% |
| Γ_{217} | $D^- \pi^+ + \text{c.c.}$ | < 7.5 | $\times 10^{-5}$ | CL=90% |
| Γ_{218} | $\bar{D}^0 \bar{K}^0 + \text{c.c.}$ | < 1.7 | $\times 10^{-4}$ | CL=90% |
| Γ_{219} | $\bar{D}^0 \bar{K}^{*0} + \text{c.c.}$ | < 2.5 | $\times 10^{-6}$ | CL=90% |
| Γ_{220} | $D_s^- \pi^+ + \text{c.c.}$ | < 1.3 | $\times 10^{-4}$ | CL=90% |
| Γ_{221} | $D_s^- \rho^+ + \text{c.c.}$ | < 1.3 | $\times 10^{-5}$ | CL=90% |

Charge conjugation (C), Parity (P), Lepton Family number (LF) violating modes

| | | | | | |
|----------------|--------------------|----|---------|------------------|--------|
| Γ_{222} | $\gamma \gamma$ | C | < 2.7 | $\times 10^{-7}$ | CL=90% |
| Γ_{223} | $\gamma \phi$ | C | < 1.4 | $\times 10^{-6}$ | CL=90% |
| Γ_{224} | $e^\pm \mu^\mp$ | LF | < 1.6 | $\times 10^{-7}$ | CL=90% |
| Γ_{225} | $e^\pm \tau^\mp$ | LF | < 8.3 | $\times 10^{-6}$ | CL=90% |
| Γ_{226} | $\mu^\pm \tau^\mp$ | LF | < 2.0 | $\times 10^{-6}$ | CL=90% |

Other decays

| | | | | |
|----------------|-----------|-------|------------------|--------|
| Γ_{227} | invisible | < 7 | $\times 10^{-4}$ | CL=90% |
|----------------|-----------|-------|------------------|--------|

[a] For $E_\gamma > 100$ MeV.

[b] The value is for the sum of the charge states or particle/antiparticle states indicated.

[c] Includes $p\bar{p}\pi^+\pi^-\gamma$ and excludes $p\bar{p}\eta$, $p\bar{p}\omega$, $p\bar{p}\eta'$.

[d] See the “Note on the $\eta(1405)$ ” in the $\eta(1405)$ Particle Listings.

[e] For a narrow state A with mass less than 960 MeV.

[f] For a narrow scalar or pseudoscalar A^0 with mass 0.21–3.0 GeV.

$J/\psi(1S)$ PARTIAL WIDTHS

$\Gamma(\text{hadrons})$

Γ_1

| <u>VALUE (keV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|--------------------|-------------|----------------|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 74.1 ± 8.1 | BAI | 95B | BES e^+e^- |
| 59 ± 24 | BALDINI-... | 75 | FRAG e^+e^- |
| 59 ± 14 | BOYARSKI | 75 | MRK1 e^+e^- |
| 50 ± 25 | ESPOSITO | 75B | FRAM e^+e^- |

$\Gamma(e^+e^-)$

Γ_5

| <u>VALUE (keV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------------|-------------|--|
| 5.55±0.14±0.02 OUR EVALUATION | | | | |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| 5.71 ± 0.16 | 13k | ¹ ADAMS | 06A | CLEO $e^+e^- \rightarrow \mu^+\mu^-\gamma$ |
| 5.57 ± 0.19 | 7.8k | ¹ AUBERT | 04 | BABR $e^+e^- \rightarrow \mu^+\mu^-\gamma$ |
| 5.14 ± 0.39 | | BAI | 95B | BES e^+e^- |
| $5.36^{+0.29}_{-0.28}$ | | ² HSUEH | 92 | RVUE See Υ mini-review |
| 4.72 ± 0.35 | | ALEXANDER | 89 | RVUE See Υ mini-review |
| 4.4 ± 0.6 | | ² BRANDELIK | 79C | DASP e^+e^- |
| 4.6 ± 0.8 | | ³ BALDINI-... | 75 | FRAG e^+e^- |
| 4.8 ± 0.6 | | BOYARSKI | 75 | MRK1 e^+e^- |
| 4.6 ± 1.0 | | ESPOSITO | 75B | FRAM e^+e^- |

¹ Calculated by us from the reported values of $\Gamma(e^+e^-) \times B(\mu^+\mu^-)$ using $B(\mu^+\mu^-) = (5.93 \pm 0.06)\%$.

² From a simultaneous fit to e^+e^- , $\mu^+\mu^-$, and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$.

³ Assuming equal partial widths for e^+e^- and $\mu^+\mu^-$.

$\Gamma(\mu^+\mu^-)$

Γ_7

| <u>VALUE (keV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|--------------------|-------------|----------------|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 5.13 ± 0.52 | BAI | 95B | BES e^+e^- |
| 4.8 ± 0.6 | BOYARSKI | 75 | MRK1 e^+e^- |
| 5 ± 1 | ESPOSITO | 75B | FRAM e^+e^- |

$\Gamma(\gamma\gamma)$

Γ_{222}

| <u>VALUE (eV)</u> | <u>CL%</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|-------------------|------------|--------------------|-------------|----------------|
| <5.4 | 90 | BRANDELIK | 79C | DASP e^+e^- |

$J/\psi(1S) \Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

This combination of a partial width with the partial width into e^+e^- and with the total width is obtained from the integrated cross section into channel_i in the e^+e^- annihilation.

 $\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_1\Gamma_5/\Gamma$

| VALUE (keV) | DOCUMENT ID | TECN | COMMENT |
|---|--------------------------|------|---------------|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 4 ± 0.8 | ¹ BALDINI-... | 75 | FRAG e^+e^- |
| 3.9 ± 0.8 | ¹ ESPOSITO | 75B | FRAM e^+e^- |
| ¹ Data redundant with branching ratios or partial widths above. | | | |

 $\Gamma(e^+e^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_5\Gamma_5/\Gamma$

| VALUE (eV) | DOCUMENT ID | TECN | COMMENT |
|---|--------------------------|------|--|
| 332.3 ± 6.4 ± 4.8 | ANASHIN | 10 | KEDR $3.097 e^+e^- \rightarrow e^+e^-$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 350 ± 20 | BRANDELIK | 79C | DASP e^+e^- |
| 320 ± 70 | ¹ BALDINI-... | 75 | FRAG e^+e^- |
| 340 ± 90 | ¹ ESPOSITO | 75B | FRAM e^+e^- |
| 360 ± 100 | ¹ FORD | 75 | SPEC e^+e^- |
| ¹ Data redundant with branching ratios or partial widths above. | | | |

 $\Gamma(\mu^+\mu^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_7\Gamma_5/\Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|--------------------|-----------------------|------|--|
| 334 ± 5 | OUR AVERAGE | | | |
| 331.8 ± 5.2 ± 6.3 | | ANASHIN | 10 | KEDR $3.097 e^+e^- \rightarrow \mu^+\mu^-$ |
| 338.4 ± 5.8 ± 7.1 | 13k | ADAMS | 06A | CLEO $e^+e^- \rightarrow \mu^+\mu^-\gamma$ |
| 330.1 ± 7.7 ± 7.3 | 7.8k | AUBERT | 04 | BABR $e^+e^- \rightarrow \mu^+\mu^-\gamma$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| 510 ± 90 | | DASP | 75 | DASP e^+e^- |
| 380 ± 50 | | ¹ ESPOSITO | 75B | FRAM e^+e^- |
| ¹ Data redundant with branching ratios or partial widths above. | | | | |

 $\Gamma(\omega\pi^+\pi^-\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{12}\Gamma_5/\Gamma$

| VALUE (10^{-2} keV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------|------|-------------|------|--|
| 2.2 ± 0.3 ± 0.2 | 170 | AUBERT | 06D | BABR $10.6 e^+e^- \rightarrow \omega\pi^+\pi^-\pi^0\gamma$ |

 $\Gamma(\omega\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{13}\Gamma_5/\Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-------------------------|------|---------------------|------|---|
| 53.6 ± 5.0 ± 0.4 | 788 | ¹ AUBERT | 07AU | BABR $10.6 e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$ |

¹ AUBERT 07AU reports $[\Gamma(J/\psi(1S) \rightarrow \omega\pi^+\pi^-) \times \Gamma(J/\psi(1S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] \times [B(\omega(782) \rightarrow \pi^+\pi^-\pi^0)] = 47.8 \pm 3.1 \pm 3.2$ eV which we divide by our best value $B(\omega(782) \rightarrow \pi^+\pi^-\pi^0) = (89.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^0 \bar{K}_2^*(1430)^0 + \text{c.c.}) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{19} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------|----------|-----------------|------|--|
| 33±4±1 | 317 ± 23 | 1,2 AUBERT 07AK | BABR | 10.6 e ⁺ e ⁻ → π ⁺ π ⁻ K ⁺ K ⁻ γ |

¹ Dividing by 2/3 to take into account that B(K*⁰ → K⁺π⁻) = 2/3.

² AUBERT 07AK reports [Γ(J/ψ(1S) → K*(892)⁰ $\bar{K}_2^*(1430)^0 + \text{c.c.}) \times \Gamma(J/\psi(1S) \rightarrow e^+ e^-) / \Gamma_{\text{total}}]$ × [B(K₂^{*}(1430) → Kπ)] = 16.4 ± 1.1 ± 1.4 eV which we divide by our best value B(K₂^{*}(1430) → Kπ) = (49.9 ± 1.2) × 10⁻². Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^0 \bar{K}_2(1770)^0 + \text{c.c.} \rightarrow K^*(892)^0 K^- \pi^+ + \text{c.c.}) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{20} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------|----------|--------------------------|------|--|
| 3.8±0.4±0.3 | 110 ± 14 | ¹ AUBERT 07AK | BABR | 10.6 e ⁺ e ⁻ → π ⁺ π ⁻ K ⁺ K ⁻ γ |

¹ Dividing by 2/3 to take into account that B(K*⁰ → K⁺π⁻) = 2/3.

$\Gamma(K^+ K^*(892)^- + \text{c.c.}) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{22} \Gamma_5 / \Gamma$

| VALUE (eV) | DOCUMENT ID | TECN | COMMENT |
|---------------------|-------------|------|--|
| 29.0±1.7±1.3 | AUBERT 08S | BABR | 10.6 e ⁺ e ⁻ → K ⁺ K*(892) ⁻ γ |

$\Gamma(K^+ K^*(892)^- + \text{c.c.} \rightarrow K^+ K^- \pi^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{23} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------|------|-------------|------|---|
| 10.96±0.85±0.70 | 155 | AUBERT 08S | BABR | 10.6 e ⁺ e ⁻ → K ⁺ K ⁻ π ⁰ γ |

$\Gamma(K^+ K^*(892)^- + \text{c.c.} \rightarrow K^0 K^\pm \pi^\mp + \text{c.c.}) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{24} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------|------|-------------|------|--|
| 16.76±1.70±1.00 | 89 | AUBERT 08S | BABR | 10.6 e ⁺ e ⁻ → K _S ⁰ K [±] π [∓] γ |

$\Gamma(K^0 \bar{K}^*(892)^0 + \text{c.c.}) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{25} \Gamma_5 / \Gamma$

| VALUE (eV) | DOCUMENT ID | TECN | COMMENT |
|---------------------|-------------|------|--|
| 26.6±2.5±1.5 | AUBERT 08S | BABR | 10.6 e ⁺ e ⁻ → K ⁰ $\bar{K}^*(892)^0$ γ |

$\Gamma(K^0 \bar{K}^*(892)^0 + \text{c.c.} \rightarrow K^0 K^\pm \pi^\mp + \text{c.c.}) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{26} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------|------|-------------|------|--|
| 17.70±1.70±1.00 | 94 | AUBERT 08S | BABR | 10.6 e ⁺ e ⁻ → K _S ⁰ K [±] π [∓] γ |

$\Gamma(\omega K \bar{K}) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{35} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-----------------------|------|--------------------------|------|---|
| 3.70±1.98±0.03 | 24 | ¹ AUBERT 07AU | BABR | 10.6 e ⁺ e ⁻ → ωK ⁺ K ⁻ γ |

¹ AUBERT 07AU reports [Γ(J/ψ(1S) → ωK \bar{K}) × Γ(J/ψ(1S) → e⁺e⁻) / Γ_{total}] × [B(ω(782) → π⁺π⁻π⁰)] = 3.3 ± 1.3 ± 1.2 eV which we divide by our best value B(ω(782) → π⁺π⁻π⁰) = (89.2 ± 0.7) × 10⁻². Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi 2(\pi^+ \pi^-)) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{37} \Gamma_5 / \Gamma$

| VALUE (10 ⁻² keV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|------|-------------------------|------|--|
| 0.96±0.19±0.01 | 35 | ¹ AUBERT 06D | BABR | 10.6 e ⁺ e ⁻ → φ2(π ⁺ π ⁻)γ |

¹ AUBERT 06D reports $[\Gamma(J/\psi(1S) \rightarrow \phi 2(\pi^+ \pi^-)) \times \Gamma(J/\psi(1S) \rightarrow e^+ e^-) / \Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+ K^-)] = (0.47 \pm 0.09 \pm 0.03) \times 10^{-2}$ keV which we divide by our best value $B(\phi(1020) \rightarrow K^+ K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi \pi^+ \pi^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{46} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|----------|----------------------------------|------|---|
| 4.8 ± 0.4 OUR AVERAGE | | | | |
| 4.52 ± 0.48 ± 0.04 | 254 ± 23 | ¹ SHEN 09 BELL | | 10.6 $e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \gamma$ |
| 5.33 ± 0.71 ± 0.05 | 103 | ² AUBERT, BE 06D BABR | | 10.6 $e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \gamma$ |

¹ SHEN 09 reports $4.50 \pm 0.41 \pm 0.26$ eV from a measurement of $[\Gamma(J/\psi(1S) \rightarrow \phi \pi^+ \pi^-) \times \Gamma(J/\psi(1S) \rightarrow e^+ e^-) / \Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+ K^-)]$ assuming $B(\phi(1020) \rightarrow K^+ K^-) = (49.2 \pm 0.6) \times 10^{-2}$, which we rescale to our best value $B(\phi(1020) \rightarrow K^+ K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² AUBERT, BE 06D reports $[\Gamma(J/\psi(1S) \rightarrow \phi \pi^+ \pi^-) \times \Gamma(J/\psi(1S) \rightarrow e^+ e^-) / \Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+ K^-)] = 2.61 \pm 0.30 \pm 0.18$ eV which we divide by our best value $B(\phi(1020) \rightarrow K^+ K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi \pi^0 \pi^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{47} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|----------------------------------|------|---|
| 3.15 ± 0.88 ± 0.03 | 23 | ¹ AUBERT, BE 06D BABR | | 10.6 $e^+ e^- \rightarrow K^+ K^- \pi^0 \pi^0 \gamma$ |

¹ AUBERT, BE 06D reports $[\Gamma(J/\psi(1S) \rightarrow \phi \pi^0 \pi^0) \times \Gamma(J/\psi(1S) \rightarrow e^+ e^-) / \Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+ K^-)] = 1.54 \pm 0.40 \pm 0.16$ eV which we divide by our best value $B(\phi(1020) \rightarrow K^+ K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi \eta) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{50} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------|------|-------------------------------|------|---|
| 6.1 ± 2.7 ± 0.4 | 6 | ¹ AUBERT 07AU BABR | | 10.6 $e^+ e^- \rightarrow \phi \eta \gamma$ |

¹ AUBERT 07AU quotes $\Gamma_{ee}^{J/\psi} \cdot B(J/\psi \rightarrow \phi \eta) \cdot B(\phi \rightarrow K^+ K^-) \cdot B(\eta \rightarrow 3\pi) = 0.84 \pm 0.37 \pm 0.05$ eV.

$\Gamma(\phi f_0(980) \rightarrow \phi \pi^+ \pi^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{57} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|---------|-------------------------------|------|---|
| 1.21 ± 0.23 OUR AVERAGE | | | | Error includes scale factor of 1.2. |
| 1.48 ± 0.27 ± 0.09 | 60 ± 11 | ¹ SHEN 09 BELL | | 10.6 $e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \gamma$ |
| 1.02 ± 0.24 ± 0.01 | 20 ± 5 | ² AUBERT 07AK BABR | | 10.6 $e^+ e^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$ |

¹ Multiplied by 2/3 to take into account the $\phi \pi^+ \pi^-$ mode only. Using $B(\phi \rightarrow K^+ K^-) = (49.2 \pm 0.6)\%$.

² AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow \phi f_0(980) \rightarrow \phi \pi^+ \pi^-) \times \Gamma(J/\psi(1S) \rightarrow e^+ e^-) / \Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+ K^-)] = 0.50 \pm 0.11 \pm 0.04$ eV which we divide by our best value $B(\phi(1020) \rightarrow K^+ K^-) = (48.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi f_0(980) \rightarrow \phi \pi^0 \pi^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{58} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|-----------|-------------------------------|------|--|
| 0.96 ± 0.40 ± 0.01 | 7.0 ± 2.8 | ¹ AUBERT 07AK BABR | | 10.6 e ⁺ e ⁻ → π ⁰ π ⁰ K ⁺ K ⁻ γ |
| ¹ AUBERT 07AK reports [Γ(J/ψ(1S) → φ f ₀ (980) → φ π ⁰ π ⁰) × Γ(J/ψ(1S) → e ⁺ e ⁻) / Γ _{total}] × [B(φ(1020) → K ⁺ K ⁻)] = 0.47 ± 0.19 ± 0.05 eV which we divide by our best value B(φ(1020) → K ⁺ K ⁻) = (48.9 ± 0.5) × 10 ⁻² . Our first error is their experiment's error and our second error is the systematic error from using our best value. | | | | |

$\Gamma(\eta \pi^+ \pi^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{68} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|-------------------------------|------|--|
| 2.23 ± 0.97 ± 0.03 | 9 | ¹ AUBERT 07AU BABR | | 10.6 e ⁺ e ⁻ → η π ⁺ π ⁻ γ |
| ¹ AUBERT 07AU reports [Γ(J/ψ(1S) → η π ⁺ π ⁻) × Γ(J/ψ(1S) → e ⁺ e ⁻) / Γ _{total}] × [B(η → π ⁺ π ⁻ π ⁰)] = 0.51 ± 0.22 ± 0.03 eV which we divide by our best value B(η → π ⁺ π ⁻ π ⁰) = (22.92 ± 0.28) × 10 ⁻² . Our first error is their experiment's error and our second error is the systematic error from using our best value. | | | | |

$\Gamma(K^*(892)^0 \bar{K}^*(892)^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{15} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|--------|-------------------------------|------|--|
| 1.28 ± 0.40 ± 0.11 | 25 ± 8 | ¹ AUBERT 07AK BABR | | 10.6 e ⁺ e ⁻ → π ⁺ π ⁻ K ⁺ K ⁻ γ |
| ¹ Dividing by (2/3) ² to take twice into account that B(K* ⁰ → K ⁺ π ⁻) = 2/3. | | | | |

$\Gamma(\phi f_2(1270)) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{42} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|--------|---------------------------------|------|--|
| 4.05 ± 0.73^{+0.04}_{-0.14} | 44 ± 7 | ^{1,2} AUBERT 07AK BABR | | 10.6 e ⁺ e ⁻ → π ⁺ π ⁻ K ⁺ K ⁻ γ |
| ¹ Using B(φ → (K + K) ⁻) = (49.3 ± 0.6)%. | | | | |
| ² AUBERT 07AK reports [Γ(J/ψ(1S) → φ f ₂ (1270)) × Γ(J/ψ(1S) → e ⁺ e ⁻) / Γ _{total}] × [B(f ₂ (1270) → ππ)] = 3.41 ± 0.55 ± 0.28 eV which we divide by our best value B(f ₂ (1270) → ππ) = (84.2 ^{+2.9} _{-0.9}) × 10 ⁻² . Our first error is their experiment's error and our second error is the systematic error from using our best value. | | | | |

$\Gamma(2(\pi^+ \pi^-) \pi^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{94} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------|------|------------------|------|--|
| 303 ± 5 ± 18 | 4990 | AUBERT 07AU BABR | | 10.6 e ⁺ e ⁻ → 2(π ⁺ π ⁻)π ⁰ γ |

$\Gamma(\pi^+ \pi^- \pi^0) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{96} \Gamma_5 / \Gamma$

| VALUE (keV) | DOCUMENT ID | TECN | COMMENT |
|------------------------------|-------------------|------|---|
| 0.122 ± 0.005 ± 0.008 | AUBERT,B 04N BABR | | 10.6 e ⁺ e ⁻ → π ⁺ π ⁻ π ⁰ γ |

$\Gamma(\pi^+ \pi^- \pi^0 K^+ K^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{97} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|------------------|------|---|
| 107.0 ± 4.3 ± 6.4 | 768 | AUBERT 07AU BABR | | 10.6 e ⁺ e ⁻ → K ⁺ K ⁻ π ⁺ π ⁻ π ⁰ γ |

$\Gamma(\pi^+ \pi^- K^+ K^-) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$ $\Gamma_{99} \Gamma_5 / \Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|-----------|------------------------------|------|--|
| 36.3 ± 1.3 ± 2.1 | 1586 ± 58 | AUBERT 07AK BABR | | 10.6 e ⁺ e ⁻ → π ⁺ π ⁻ K ⁺ K ⁻ γ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 33.6 ± 2.7 ± 2.7 | 233 | ¹ AUBERT 05D BABR | | 10.6 e ⁺ e ⁻ → K ⁺ K ⁻ π ⁺ π ⁻ γ |
| ¹ Superseded by AUBERT 07AK. | | | | |

$\Gamma(\pi^+\pi^-K^+K^-\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{100}\Gamma_5/\Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|---------------------|-----------|--|
| 25.9±3.9±0.1 | 73 | ¹ AUBERT | 07AU BABR | 10.6 $e^+e^- \rightarrow K^+K^-\pi^+\pi^-\eta\gamma$ |
| ¹ AUBERT 07AU reports [$\Gamma(J/\psi(1S) \rightarrow \pi^+\pi^-K^+K^-\eta) \times \Gamma(J/\psi(1S) \rightarrow e^+e^-)/\Gamma_{\text{total}}$] $\times [B(\eta \rightarrow 2\gamma)] = 10.2 \pm 1.3 \pm 0.8$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = (39.41 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. | | | | |

$\Gamma(\pi^0\pi^0K^+K^-\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{101}\Gamma_5/\Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------|----------|-------------|-----------|--|
| 13.6±1.1±1.3 | 203 ± 16 | AUBERT | 07AK BABR | 10.6 $e^+e^- \rightarrow \pi^0\pi^0K^+K^-\gamma$ |

$\Gamma(2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{103}\Gamma_5/\Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|---------------------|----------|---|
| 20.4±0.9±0.4 | | LEES | 12E BABR | 10.6 $e^+e^- \rightarrow 2\pi^+2\pi^-\gamma$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 19.5±1.4±1.3 | 270 | ¹ AUBERT | 05D BABR | 10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-)\gamma$ |
| ¹ Superseded by LEES 12E. | | | | |

$\Gamma(3(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{104}\Gamma_5/\Gamma$

| VALUE (10^{-2} keV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------|------|-------------|----------|---|
| 2.37±0.16±0.14 | 496 | AUBERT | 06D BABR | 10.6 $e^+e^- \rightarrow 3(\pi^+\pi^-)\gamma$ |

$\Gamma(2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{105}\Gamma_5/\Gamma$

| VALUE (10^{-2} keV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------|------|-------------|----------|--|
| 8.9±0.5±1.0 | 761 | AUBERT | 06D BABR | 10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-\pi^0)\gamma$ |

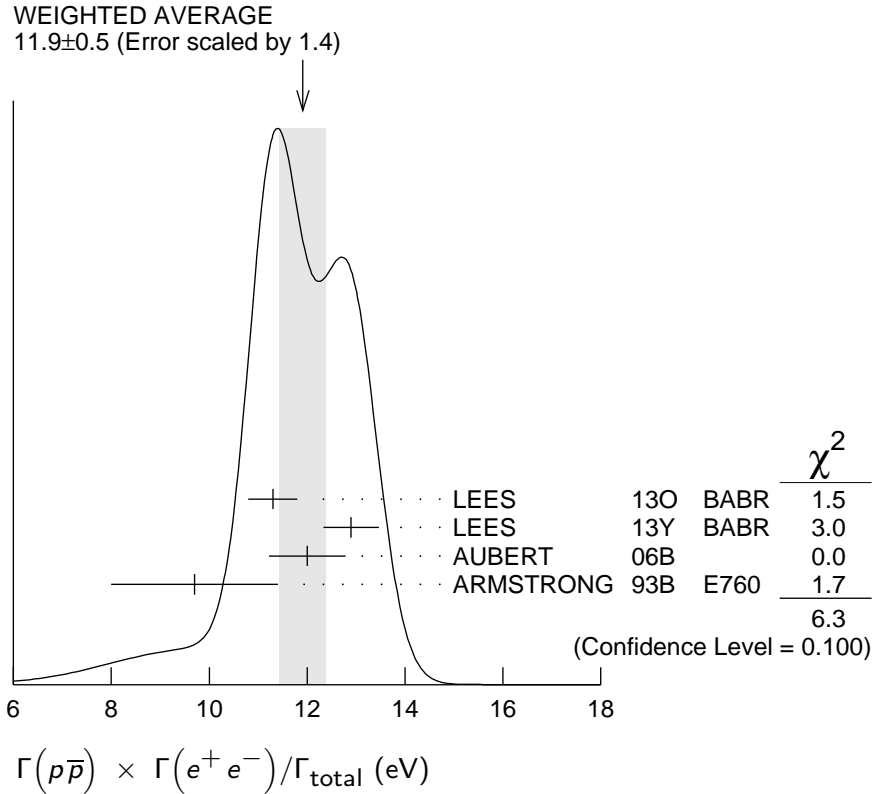
$\Gamma(2(\pi^+\pi^-\eta)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{106}\Gamma_5/\Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|---------------------|-----------|---|
| 13.1±2.4±0.1 | 85 | ¹ AUBERT | 07AU BABR | 10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-\eta)\gamma$ |
| ¹ AUBERT 07AU reports [$\Gamma(J/\psi(1S) \rightarrow 2(\pi^+\pi^-\eta)) \times \Gamma(J/\psi(1S) \rightarrow e^+e^-)/\Gamma_{\text{total}}$] $\times [B(\eta \rightarrow 2\gamma)] = 5.16 \pm 0.85 \pm 0.39$ eV which we divide by our best value $B(\eta \rightarrow 2\gamma) = (39.41 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. | | | | |

$\Gamma(p\bar{p}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{108}\Gamma_5/\Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-----------------------------|------|---|----------|-------------------------------------|
| 11.9±0.5 OUR AVERAGE | | Error includes scale factor of 1.4. See the ideogram below. | | |
| 11.3±0.4±0.3 | 821 | LEES | 13O BABR | $e^+e^- \rightarrow p\bar{p}\gamma$ |
| 12.9±0.4±0.4 | 918 | LEES | 13Y BABR | $e^+e^- \rightarrow p\bar{p}\gamma$ |
| 12.0±0.6±0.5 | 438 | AUBERT | 06B | $e^+e^- \rightarrow p\bar{p}\gamma$ |
| 9.7±1.7 | | ¹ ARMSTRONG | 93B E760 | $\bar{p}p \rightarrow e^+e^-$ |

¹ Using $\Gamma_{\text{total}} = 85.5^{+6.1}_{-5.8}$ MeV.



$\Gamma(\Sigma^0\bar{\Sigma}^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{121}\Gamma_5/\Gamma$

| VALUE (eV) | DOCUMENT ID | TECN | COMMENT |
|--------------------|-------------|-----------|--|
| 6.4±1.2±0.6 | AUBERT | 07BD BABR | 10.6 $e^+e^- \rightarrow \Sigma^0\bar{\Sigma}^0\gamma$ |

$\Gamma(2(\pi^+\pi^-)K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{122}\Gamma_5/\Gamma$

| VALUE (10 ⁻² keV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|------|-------------|----------|---|
| 2.75±0.23±0.17 | 205 | AUBERT | 06D BABR | 10.6 $e^+e^- \rightarrow K^+K^-2(\pi^+\pi^-)\gamma$ |

$\Gamma(\Lambda\bar{\Lambda}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{128}\Gamma_5/\Gamma$

| VALUE (eV) | DOCUMENT ID | TECN | COMMENT |
|---------------------|-------------|-----------|--|
| 10.7±0.9±0.7 | AUBERT | 07BD BABR | 10.6 $e^+e^- \rightarrow \Lambda\bar{\Lambda}\gamma$ |

$\Gamma(2(K^+K^-)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{131}\Gamma_5/\Gamma$

| VALUE (eV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-----------------------|----------|-------------|-----------|---|
| 4.11±0.39±0.30 | 156 ± 15 | AUBERT | 07AK BABR | 10.6 $e^+e^- \rightarrow 2(K^+K^-)\gamma$ |

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

| | | | | |
|-----------------|----|---------------------|----------|---|
| 4.0 ± 0.7 ± 0.6 | 38 | ¹ AUBERT | 05D BABR | 10.6 $e^+e^- \rightarrow 2(K^+K^-)\gamma$ |
|-----------------|----|---------------------|----------|---|

¹ Superseded by AUBERT 07AK.

$\Gamma(K^+K^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{133}\Gamma_5/\Gamma$

| <u>VALUE (eV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|-------------------|-------------|--------------------|-------------|----------------|
|-------------------|-------------|--------------------|-------------|----------------|

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

| | | | | |
|--------------------------|-----|-------------------|----------|-----------------------------------|
| $1.78 \pm 0.11 \pm 0.05$ | 462 | ¹ LEES | 15J BABR | $e^+e^- \rightarrow K^+K^-\gamma$ |
| $1.94 \pm 0.11 \pm 0.05$ | 462 | ² LEES | 15J BABR | $e^+e^- \rightarrow K^+K^-\gamma$ |
| $1.42 \pm 0.23 \pm 0.08$ | 51 | ³ LEES | 13Q BABR | $e^+e^- \rightarrow K^+K^-\gamma$ |

¹ $\sin\phi > 0$.² $\sin\phi < 0$.³ Interference with non-resonant K^+K^- production not taken into account. **$J/\psi(1S)$ BRANCHING RATIOS**For the first four branching ratios, see also the partial widths, and (partial widths) $\times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ above. $\Gamma(\text{hadrons})/\Gamma_{\text{total}}$ Γ_1/Γ

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------|--------------------|-------------|----------------|
|--------------|--------------------|-------------|----------------|

0.877 ± 0.005 OUR AVERAGE

| | | | |
|-------------------|----------|---------|----------|
| 0.878 ± 0.005 | BAI | 95B BES | e^+e^- |
| 0.86 ± 0.02 | BOYARSKI | 75 MRK1 | e^+e^- |

 $\Gamma(\text{virtual } \gamma \rightarrow \text{hadrons})/\Gamma_{\text{total}}$ Γ_2/Γ

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------|--------------------|-------------|----------------|
|--------------|--------------------|-------------|----------------|

0.135 ± 0.003 ^{1,2} SETH 04 RVUE e^+e^-

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

| | | | |
|-----------------|-----------------------|---------|----------|
| 0.17 ± 0.02 | ¹ BOYARSKI | 75 MRK1 | e^+e^- |
|-----------------|-----------------------|---------|----------|

¹ Included in $\Gamma(\text{hadrons})/\Gamma_{\text{total}}$.² Using $B(J/\psi \rightarrow \ell^+\ell^-) = (5.90 \pm 0.09)\%$ from RPP-2002 and $R = 2.28 \pm 0.04$ determined by a fit to data from BAI 00 and BAI 02C. $\Gamma(ggg)/\Gamma_{\text{total}}$ Γ_3/Γ

| <u>VALUE (units 10^{-2})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|----------------|
|---|-------------|--------------------|-------------|----------------|

64.1 ± 1.0 6 M ¹ BESSON 08 CLEO $\psi(2S) \rightarrow \pi^+\pi^- + \text{hadrons}$ ¹ Calculated using the value $\Gamma(\gamma gg)/\Gamma(ggg) = 0.137 \pm 0.001 \pm 0.016 \pm 0.004$ from BESSON 08 and the PDG 08 values of $B(\ell^+\ell^-)$, $B(\text{virtual } \gamma \rightarrow \text{hadrons})$, and $B(\gamma\eta_c)$. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(\gamma gg)/\Gamma_{\text{total}}$ measurement of BESSON 08. $\Gamma(\gamma gg)/\Gamma_{\text{total}}$ Γ_4/Γ

| <u>VALUE (units 10^{-2})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|----------------|
|---|-------------|--------------------|-------------|----------------|

8.79 ± 1.05 200 k ¹ BESSON 08 CLEO $\psi(2S) \rightarrow \pi^+\pi^-\gamma + \text{hadrons}$ ¹ Calculated using the value $\Gamma(\gamma gg)/\Gamma(ggg) = 0.137 \pm 0.001 \pm 0.016 \pm 0.004$ from BESSON 08 and the value of $\Gamma(ggg)/\Gamma_{\text{total}}$. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(ggg)/\Gamma_{\text{total}}$ measurement of BESSON 08.

$\Gamma(\gamma g g)/\Gamma(g g g)$

Γ_4/Γ_3

| <u>VALUE (units 10^{-2})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|--|
| 13.7±0.1±0.7 | 6 M | BESSION | 08 | CLEO $\psi(2S) \rightarrow \pi^+ \pi^- J/\psi$ |

$\Gamma(e^+ e^-)/\Gamma_{total}$

Γ_5/Γ

| <u>VALUE (units 10^{-2})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|--|
| 5.971±0.032 OUR AVERAGE | | | | |
| 5.983±0.007±0.037 | 720k | ABLIKIM | 13R | BES3 $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 5.945±0.067±0.042 | 15k | LI | 05C | CLEO $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 5.90 ±0.05 ±0.10 | | BAI | 98D | BES $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 6.09 ±0.33 | | BAI | 95B | BES $e^+ e^-$ |
| 5.92 ±0.15 ±0.20 | | COFFMAN | 92 | MRK3 $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 6.9 ±0.9 | | BOYARSKI | 75 | MRK1 $e^+ e^-$ |

$\Gamma(e^+ e^- \gamma)/\Gamma_{total}$

Γ_6/Γ

| <u>VALUE (units 10^{-3})</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|------------------------|-------------|---|
| 8.8±1.3±0.4 | ¹ ARMSTRONG | 96 | E760 $\bar{p} p \rightarrow e^+ e^- \gamma$ |

¹ For $E_\gamma > 100$ MeV.

$\Gamma(\mu^+ \mu^-)/\Gamma_{total}$

Γ_7/Γ

| <u>VALUE (units 10^{-2})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|--|
| 5.961±0.033 OUR AVERAGE | | | | |
| 5.973±0.007±0.038 | 770k | ABLIKIM | 13R | BES3 $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 5.960±0.065±0.050 | 17k | LI | 05C | CLEO $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 5.84 ±0.06 ±0.10 | | BAI | 98D | BES $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 6.08 ±0.33 | | BAI | 95B | BES $e^+ e^-$ |
| 5.90 ±0.15 ±0.19 | | COFFMAN | 92 | MRK3 $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 6.9 ±0.9 | | BOYARSKI | 75 | MRK1 $e^+ e^-$ |

$\Gamma(e^+ e^-)/\Gamma(\mu^+ \mu^-)$

Γ_5/Γ_7

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|------------------------|-------------|---|
| 1.0016±0.0031 OUR AVERAGE | | | |
| 1.0022±0.0044±0.0048 | ¹ AULCHENKO | 14 | KEDR $3.097 e^+ e^- \rightarrow e^+ e^-, \mu^+ \mu^-$ |
| 1.0017±0.0017±0.0033 | ² ABLIKIM | 13R | BES3 $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 1.002 ±0.021 ±0.013 | ³ ANASHIN | 10 | KEDR $3.097 e^+ e^- \rightarrow e^+ e^-, \mu^+ \mu^-$ |
| 0.997 ±0.012 ±0.006 | LI | 05C | CLEO $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| 1.011 ±0.013 ±0.016 | BAI | 98D | BES $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| 1.00 ±0.07 | BAI | 95B | BES $e^+ e^-$ |
| 1.00 ±0.05 | BOYARSKI | 75 | MRK1 $e^+ e^-$ |
| 0.91 ±0.15 | ESPOSITO | 75B | FRAM $e^+ e^-$ |
| 0.93 ±0.10 | FORD | 75 | SPEC $e^+ e^-$ |

¹ From 235.3k $J/\psi \rightarrow e^+ e^-$ and 156.6k $J/\psi \rightarrow \mu^+ \mu^-$ observed events.

² Not independent of the corresponding measurements of $\Gamma(e^+ e^-)/\Gamma_{total}$ and $\Gamma(\mu^+ \mu^-)/\Gamma_{total}$.

³ Not independent of the corresponding measurements of $\Gamma(e^+ e^-) \times \Gamma(e^+ e^-)/\Gamma_{total}$ and $\Gamma(\mu^+ \mu^-) \times \Gamma(e^+ e^-)/\Gamma_{total}$.

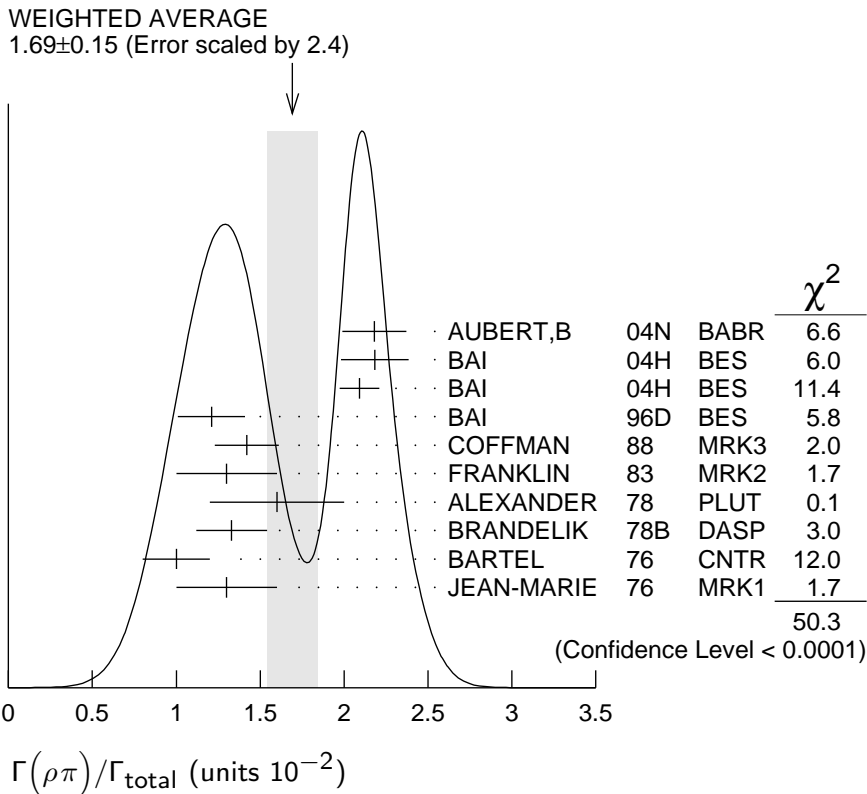
————— HADRONIC DECAYS —————

$\Gamma(\rho\pi)/\Gamma_{\text{total}}$

Γ_8/Γ

| VALUE (units 10^{-2}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|------|---|----------|--|
| 1.69 ± 0.15 OUR AVERAGE | | Error includes scale factor of 2.4. See the ideogram below. | | |
| 2.18 ± 0.19 | | 1,2 AUBERT,B | 04N BABR | $10.6 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \gamma$ |
| 2.184 ± 0.005 ± 0.201 | 220k | 2,3 BAI | 04H BES | $e^+ e^- \rightarrow J/\psi \rightarrow \pi^+ \pi^- \pi^0$ |
| 2.091 ± 0.021 ± 0.116 | | 2,4 BAI | 04H BES | $\psi(2S) \rightarrow \pi^+ \pi^- J/\psi$ |
| 1.21 ± 0.20 | | BAI | 96D BES | $e^+ e^- \rightarrow \rho\pi$ |
| 1.42 ± 0.01 ± 0.19 | | COFFMAN | 88 MRK3 | $e^+ e^-$ |
| 1.3 ± 0.3 | 150 | FRANKLIN | 83 MRK2 | $e^+ e^-$ |
| 1.6 ± 0.4 | 183 | ALEXANDER | 78 PLUT | $e^+ e^-$ |
| 1.33 ± 0.21 | | BRANDELIK | 78B DASP | $e^+ e^-$ |
| 1.0 ± 0.2 | 543 | BARTEL | 76 CNTR | $e^+ e^-$ |
| 1.3 ± 0.3 | 153 | JEAN-MARIE | 76 MRK1 | $e^+ e^-$ |

- ¹ From the ratio of $\Gamma(e^+ e^-) B(\pi^+ \pi^- \pi^0)$ and $\Gamma(e^+ e^-) B(\mu^+ \mu^-)$ (AUBERT 04).
- ² Not independent of their $B(\pi^+ \pi^- \pi^0)$.
- ³ From $J/\psi \rightarrow \pi^+ \pi^- \pi^0$ events directly.
- ⁴ Obtained comparing the rates for $\pi^+ \pi^- \pi^0$ and $\mu^+ \mu^-$, using J/ψ events produced via $\psi(2S) \rightarrow \pi^+ \pi^- J/\psi$ and with $B(J/\psi \rightarrow \mu^+ \mu^-) = 5.88 \pm 0.10\%$.



$\Gamma(\rho^0\pi^0)/\Gamma(\rho\pi)$ Γ_9/Γ_8

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|--------------------|-------------|----------------|
| 0.328±0.005±0.027 | COFFMAN | 88 | MRK3 e^+e^- |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| 0.35 ±0.08 | ALEXANDER | 78 | PLUT e^+e^- |
| 0.32 ±0.08 | BRANDELIK | 78B | DASP e^+e^- |
| 0.39 ±0.11 | BARTEL | 76 | CNTR e^+e^- |
| 0.37 ±0.09 | JEAN-MARIE | 76 | MRK1 e^+e^- |

 $\Gamma(a_2(1320)\rho)/\Gamma_{\text{total}}$ Γ_{10}/Γ

| <u>VALUE (units 10⁻³)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------------------------------|-------------|--------------------|-------------|--|
| 10.9±2.2 OUR AVERAGE | | | | |
| 11.7±0.7±2.5 | 7584 | AUGUSTIN | 89 | DM2 $J/\psi \rightarrow \rho^0\rho^\pm\pi^\mp$ |
| 8.4±4.5 | 36 | VANNUCCI | 77 | MRK1 $e^+e^- \rightarrow 2(\pi^+\pi^-)\pi^0$ |

 $\Gamma(\omega\pi^+\pi^+\pi^-\pi^-)/\Gamma_{\text{total}}$ Γ_{11}/Γ

| <u>VALUE (units 10⁻⁴)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------------------------------|-------------|--------------------|-------------|--|
| 85±34 | 140 | VANNUCCI | 77 | MRK1 $e^+e^- \rightarrow 3(\pi^+\pi^-)\pi^0$ |

 $\Gamma(\omega\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{12}/Γ

| <u>VALUE (units 10⁻²)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--|-------------|---------------------|-------------|--|
| 0.40±0.06±0.04 | 170 | ¹ AUBERT | 06D | BABR 10.6 $e^+e^- \rightarrow \omega\pi^+\pi^-\pi^0\gamma$ |
| ¹ Using $\Gamma(J/\psi \rightarrow e^+e^-) = 5.52 \pm 0.14 \pm 0.04$ keV. | | | | |

 $\Gamma(\omega\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{13}/Γ

| <u>VALUE (units 10⁻³)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|---------------------|-------------|---|
| 8.6±0.7 OUR AVERAGE | | | | Error includes scale factor of 1.1. |
| 9.7±0.6±0.6 | 788 | ¹ AUBERT | 07AU | BABR 10.6 $e^+e^- \rightarrow \omega\pi^+\pi^-\gamma$ |
| 7.0±1.6 | 18058 | AUGUSTIN | 89 | DM2 $J/\psi \rightarrow 2(\pi^+\pi^-)\pi^0$ |
| 7.8±1.6 | 215 | BURMESTER | 77D | PLUT e^+e^- |
| 6.8±1.9 | 348 | VANNUCCI | 77 | MRK1 $e^+e^- \rightarrow 2(\pi^+\pi^-)\pi^0$ |
| ¹ AUBERT 07AU quotes $\Gamma_{ee}^{J/\psi} \cdot B(J/\psi \rightarrow \omega\pi^+\pi^-) \cdot B(\omega \rightarrow 3\pi) = 47.8 \pm 3.1 \pm 3.2$ eV. | | | | |

 $\Gamma(\omega f_2(1270))/\Gamma_{\text{total}}$ Γ_{14}/Γ

| <u>VALUE (units 10⁻³)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|--|
| 4.3±0.6 OUR AVERAGE | | | | |
| 4.3±0.2±0.6 | 5860 | AUGUSTIN | 89 | DM2 e^+e^- |
| 4.0±1.6 | 70 | BURMESTER | 77D | PLUT e^+e^- |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 1.9±0.8 | 81 | VANNUCCI | 77 | MRK1 $e^+e^- \rightarrow 2(\pi^+\pi^-)\pi^0$ |

$\Gamma(K^*(892)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}}$ Γ_{15}/Γ

| VALUE (units 10^{-4}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|--------|--------------------------|------|--|
| 2.3 ± 0.7 ± 0.1 | | 25 ± 8 | ¹ AUBERT 07AK | BABR | 10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$ |

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

<5 90 VANNUCCI 77 MRK1 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-$
¹ AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow K^*(892)^0 \bar{K}^*(892)^0)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = (1.28 \pm 0.40 \pm 0.11) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^\pm K^*(892)^\mp)/\Gamma_{\text{total}}$ Γ_{16}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|-------------|----------|--|
| 1.00 ± 0.19^{+0.11}_{-0.32} | 323 | ABLIKIM | 10E BES2 | $J/\psi \rightarrow K^\pm K_S^0 \pi^\mp \pi^0$ |

$\Gamma(K^*(892)^\pm K^*(800)^\mp)/\Gamma_{\text{total}}$ Γ_{17}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|-------------|----------|--|
| 1.09 ± 0.18^{+0.94}_{-0.54} | 655 | ABLIKIM | 10E BES2 | $J/\psi \rightarrow K^\pm K_S^0 \pi^\mp \pi^0$ |

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

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|-------------|----------|---|
| 1.15 ± 0.13 ± 0.22 | 209 | ABLIKIM | 10C BES2 | $J/\psi \rightarrow \eta K^+ \pi^- K^- \pi^+$ |

$\Gamma(K^*(892)^0 \bar{K}_2^*(1430)^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{19}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|------|-------------|------|---------|
| 6.0 ± 0.6 OUR AVERAGE | | | | |

5.9 ± 0.6 ± 0.2 317 ± 23 ^{1,2} AUBERT 07AK BABR 10.6 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-\gamma$
 6.7 ± 2.6 40 VANNUCCI 77 MRK1 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-$

¹ Using $B(K_2^*(1430)^0 \rightarrow K\pi) = (49.9 \pm 1.2)\%$.

² AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow K^*(892)^0 \bar{K}_2^*(1430)^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = (32.9 \pm 2.3 \pm 2.7) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\omega K^*(892) \bar{K} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{21}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|-----------|-------------|----------|---|
| 61 ± 9 OUR AVERAGE | | | | |
| 62.0 ± 6.8 ± 10.6 | 899 ± 98 | ABLIKIM | 08E BES2 | $J/\psi \rightarrow \omega K_S^0 K^\pm \pi^\mp$ |
| 65.3 ± 10.2 ± 13.5 | 176 ± 28 | ABLIKIM | 08E BES2 | $J/\psi \rightarrow \omega K^+ K^- \pi^0$ |
| 53 ± 14 ± 14 | 530 ± 140 | BECKER | 87 MRK3 | $e^+e^- \rightarrow \text{hadrons}$ |

$$\Gamma(K^+ K^*(892)^- + \text{c.c.})/\Gamma_{\text{total}} \qquad \Gamma_{22}/\Gamma$$

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|---------------------|----------|---|
| 5.12±0.30 OUR AVERAGE | | | | |
| 5.2 ±0.4 ±0.1 | | ¹ AUBERT | 08S BABR | 10.6 $e^+e^- \rightarrow K^+ K^*(892)^- \gamma$ |
| 4.57±0.17±0.70 | 2285 | JOUSSET | 90 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 5.26±0.13±0.53 | | COFFMAN | 88 MRK3 | $J/\psi \rightarrow K^\pm K_S^0 \pi^\mp$, $K^+ K^- \pi^0$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 2.6 ±0.6 | 24 | FRANKLIN | 83 MRK2 | $J/\psi \rightarrow K^+ K^- \pi^0$ |
| 3.2 ±0.6 | 48 | VANNUCCI | 77 MRK1 | $J/\psi \rightarrow K^\pm K_S^0 \pi^\mp$ |
| 4.1 ±1.2 | 39 | BRAUNSCH... | 76 DASP | $J/\psi \rightarrow K^\pm X$ |

¹ AUBERT 08S reports $[\Gamma(J/\psi(1S) \rightarrow K^+ K^*(892)^- + \text{c.c.})/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (29.0 \pm 1.7 \pm 1.3) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(K^+ K^*(892)^- + \text{c.c.} \rightarrow K^+ K^- \pi^0)/\Gamma_{\text{total}} \qquad \Gamma_{23}/\Gamma$$

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|---------------------|----------|--|
| 1.97±0.20±0.05 | | | | |
| | 155 | ¹ AUBERT | 08S BABR | 10.6 $e^+e^- \rightarrow K^+ K^- \pi^0 \gamma$ |
| ¹ AUBERT 08S reports $[\Gamma(J/\psi(1S) \rightarrow K^+ K^*(892)^- + \text{c.c.} \rightarrow K^+ K^- \pi^0)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (10.96 \pm 0.85 \pm 0.70) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. | | | | |

$$\Gamma(K^+ K^*(892)^- + \text{c.c.} \rightarrow K^0 K^\pm \pi^\mp + \text{c.c.})/\Gamma_{\text{total}} \qquad \Gamma_{24}/\Gamma$$

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|---------------------|----------|--|
| 3.0±0.4±0.1 | | | | |
| | 89 | ¹ AUBERT | 08S BABR | 10.6 $e^+e^- \rightarrow K_S^0 K^\pm \pi^\mp \gamma$ |
| ¹ AUBERT 08S reports $[\Gamma(J/\psi(1S) \rightarrow K^+ K^*(892)^- + \text{c.c.} \rightarrow K^0 K^\pm \pi^\mp + \text{c.c.})/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (16.76 \pm 1.70 \pm 1.00) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. | | | | |

$$\Gamma(K^0 \bar{K}^*(892)^0 + \text{c.c.})/\Gamma_{\text{total}} \qquad \Gamma_{25}/\Gamma$$

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|---------------------|----------|---|
| 4.39±0.31 OUR AVERAGE | | | | |
| 4.8 ±0.5 ±0.1 | | ¹ AUBERT | 08S BABR | 10.6 $e^+e^- \rightarrow K^0 \bar{K}^*(892)^0 \gamma$ |
| 3.96±0.15±0.60 | 1192 | JOUSSET | 90 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 4.33±0.12±0.45 | | COFFMAN | 88 MRK3 | $J/\psi \rightarrow K^\pm K_S^0 \pi^\mp$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 2.7 ±0.6 | 45 | VANNUCCI | 77 MRK1 | $J/\psi \rightarrow K^\pm K_S^0 \pi^\mp$ |

¹ AUBERT 08S reports $[\Gamma(J/\psi(1S) \rightarrow K^0 \bar{K}^*(892)^0 + \text{c.c.})/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (26.6 \pm 2.5 \pm 1.5) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^0 \bar{K}^*(892)^0 + \text{c.c.})/\Gamma(K^+ K^*(892)^- + \text{c.c.})$ **Γ_{25}/Γ_{22}**

| VALUE | DOCUMENT ID | TECN | COMMENT |
|---------------------------|-------------|------|--|
| 0.82 ± 0.05 ± 0.09 | COFFMAN | 88 | MRK3 $J/\psi \rightarrow K \bar{K}^*(892) + \text{c.c.}$ |

$\Gamma(K^0 \bar{K}^*(892)^0 + \text{c.c.} \rightarrow K^0 K^\pm \pi^\mp + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{26}/Γ**

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|---------------------|------|--|
| 3.2 ± 0.4 ± 0.1 | 94 | ¹ AUBERT | 08S | BABR $10.6 e^+ e^- \rightarrow K_S^0 K^\pm \pi^\mp \gamma$ |

¹ AUBERT 08S reports $[\Gamma(J/\psi(1S) \rightarrow K^0 \bar{K}^*(892)^0 + \text{c.c.} \rightarrow K^0 K^\pm \pi^\mp + \text{c.c.})/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (17.70 \pm 1.70 \pm 1.00) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{\text{total}}$ **Γ_{27}/Γ**

| VALUE (units 10^{-3}) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------------------|------|---------------|
| 3.8 ± 0.8 ± 1.2 | ¹ BAI | 99C | BES $e^+ e^-$ |

¹ Assuming $B(K_1(1400) \rightarrow K^* \pi) = 0.94 \pm 0.06$

$\Gamma(\bar{K}^*(892)^0 K^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ **Γ_{28}/Γ**

| VALUE | DOCUMENT ID | TECN | COMMENT |
|-------------|----------------------|------|--|
| seen | ¹ ABLIKIM | 06C | BES2 $J/\psi \rightarrow \bar{K}^*(892)^0 K^+ \pi^-$ |

¹ A $K_0^*(800)$ is observed by ABLIKIM 06C in the $K^+ \pi^-$ mass spectrum of the $\bar{K}^*(892)^0 K^+ \pi^-$ final state against the $\bar{K}^*(892)$. A corresponding branching fraction of the $J/\psi(1S)$ is not presented.

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

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---|
| 3.4 ± 0.3 ± 0.7 | 509 | AUGUSTIN | 89 | DM2 $J/\psi \rightarrow \pi^+ \pi^- 3\pi^0$ |

$\Gamma(b_1(1235)^\pm \pi^\mp)/\Gamma_{\text{total}}$ **Γ_{30}/Γ**

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|-------------|------|---|
| 30 ± 5 OUR AVERAGE | | | | |
| 31 ± 6 | 4600 | AUGUSTIN | 89 | DM2 $J/\psi \rightarrow 2(\pi^+ \pi^-) \pi^0$ |
| 29 ± 7 | 87 | BURMESTER | 77D | PLUT $e^+ e^-$ |

$\Gamma(\omega K^\pm K_S^0 \pi^\mp)/\Gamma_{\text{total}}$ Γ_{31}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|-----------|-------------|----------|--------------------------------------|
| 34 ± 5 OUR AVERAGE | | | | |
| 37.7 ± 0.8 ± 5.8 | 1972 ± 41 | ABLIKIM | 08E BES2 | $e^+ e^- \rightarrow J/\psi$ |
| 29.5 ± 1.4 ± 7.0 | 879 ± 41 | BECKER | 87 MRK3 | $e^+ e^- \rightarrow \text{hadrons}$ |

$\Gamma(b_1(1235)^0 \pi^0)/\Gamma_{\text{total}}$ Γ_{32}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|--------|-----------|
| 23 ± 3 ± 5 | 229 | AUGUSTIN | 89 DM2 | $e^+ e^-$ |

$\Gamma(\eta K^\pm K_S^0 \pi^\mp)/\Gamma_{\text{total}}$ Γ_{33}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|----------|-------------|----------|------------------------------|
| 21.8 ± 2.2 ± 3.4 | 232 ± 23 | ABLIKIM | 08E BES2 | $e^+ e^- \rightarrow J/\psi$ |

$\Gamma(\phi K^*(892) \bar{K} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{34}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-------------------------------|----------|-------------|----------|---|
| 21.8 ± 2.3 OUR AVERAGE | | | | |
| 20.8 ± 2.7 ± 3.9 | 195 ± 25 | ABLIKIM | 08E BES2 | $J/\psi \rightarrow \phi K_S^0 K^\pm \pi^\mp$ |
| 29.6 ± 3.7 ± 4.7 | 238 ± 30 | ABLIKIM | 08E BES2 | $J/\psi \rightarrow \phi K^+ K^- \pi^0$ |
| 20.7 ± 2.4 ± 3.0 | | FALVARD | 88 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 20 ± 3 ± 3 | 155 ± 20 | BECKER | 87 MRK3 | $e^+ e^- \rightarrow \text{hadrons}$ |

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

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-------------------------------|------|----------------------|-----------|--|
| 17.0 ± 3.2 OUR AVERAGE | | | | |
| 13.6 ± 5.0 ± 1.0 | 24 | ¹ AUBERT | 07AU BABR | 10.6 $e^+ e^- \rightarrow \omega K^+ K^- \gamma$ |
| 19.8 ± 2.1 ± 3.9 | | ² FALVARD | 88 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 16 ± 10 | 22 | FELDMAN | 77 MRK1 | $e^+ e^-$ |

¹ AUBERT 07AU quotes $\Gamma_{ee}^{J/\psi} \cdot B(J/\psi \rightarrow \omega K^+ K^-) \cdot B(\eta \rightarrow 3\pi) = 3.3 \pm 1.3 \pm 0.2 \text{ eV}$.

² Addition of $\omega K^+ K^-$ and $\omega K^0 \bar{K}^0$ branching ratios.

$\Gamma(\omega f_0(1710) \rightarrow \omega K \bar{K})/\Gamma_{\text{total}}$ Γ_{36}/Γ

| VALUE (units 10^{-4}) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------------------------|--------|-------------------------------------|
| 4.8 ± 1.1 ± 0.3 | ^{1,2} FALVARD | 88 DM2 | $J/\psi \rightarrow \text{hadrons}$ |

¹ Includes unknown branching fraction $f_0(1710) \rightarrow K \bar{K}$.

² Addition of $f_0(1710) \rightarrow K^+ K^-$ and $f_0(1710) \rightarrow K^0 \bar{K}^0$ branching ratios.

$\Gamma(\phi 2(\pi^+ \pi^-))/\Gamma_{\text{total}}$ Γ_{37}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-------------------------------|------|---------------------|----------|---|
| 16.6 ± 2.3 OUR AVERAGE | | | | |
| 17.3 ± 3.3 ± 1.2 | 35 | ¹ AUBERT | 06D BABR | 10.6 $e^+ e^- \rightarrow \phi 2(\pi^+ \pi^-) \gamma$ |
| 16.0 ± 1.0 ± 3.0 | | FALVARD | 88 DM2 | $J/\psi \rightarrow \text{hadrons}$ |

¹ Using $\Gamma(J/\psi \rightarrow e^+ e^-) = 5.52 \pm 0.14 \pm 0.04 \text{ keV}$.

$\Gamma(\Delta(1232)^{++} \bar{p} \pi^-)/\Gamma_{\text{total}}$ Γ_{38}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|-------------|---------|-----------|
| 1.58 ± 0.23 ± 0.40 | 332 | EATON | 84 MRK2 | $e^+ e^-$ |

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

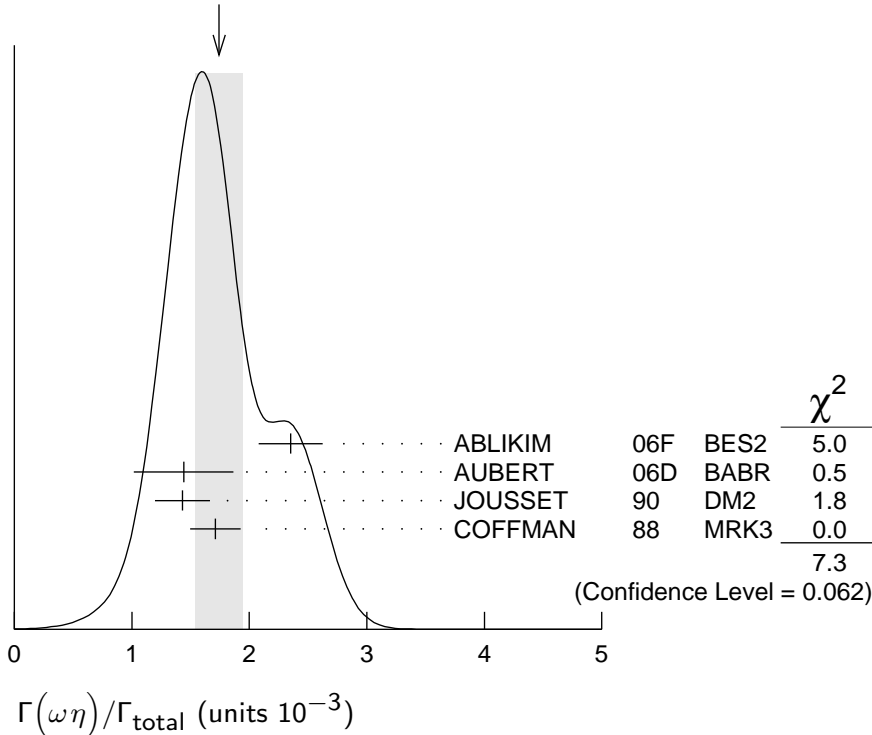
Γ_{39}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|--------------------|---|----------|--|
| 1.74 ± 0.20 | OUR AVERAGE | Error includes scale factor of 1.6. See the ideogram below. | | |
| 2.352 ± 0.273 | 5k | ¹ ABLIKIM | 06F BES2 | $J/\psi \rightarrow \omega\eta$ |
| 1.44 ± 0.40 ± 0.14 | 13 | ² AUBERT | 06D BABR | 10.6 $e^+e^- \rightarrow \omega\eta\gamma$ |
| 1.43 ± 0.10 ± 0.21 | 378 | JOUSSET | 90 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 1.71 ± 0.08 ± 0.20 | | COFFMAN | 88 MRK3 | $e^+e^- \rightarrow 3\pi\eta$ |

¹ Using $B(\eta \rightarrow 2\gamma) = (39.43 \pm 0.26)\%$, $B(\eta \rightarrow \pi^+\pi^-\pi^0) = 22.6 \pm 0.4\%$, $B(\eta \rightarrow \pi^+\pi^-\gamma) = 4.68 \pm 0.11\%$, and $B(\omega \rightarrow \pi^+\pi^-\pi^0) = (89.1 \pm 0.7)\%$.

² Using $\Gamma(J/\psi \rightarrow e^+e^-) = 5.52 \pm 0.14 \pm 0.04$ keV.

WEIGHTED AVERAGE
1.74±0.20 (Error scaled by 1.6)



$\Gamma(\phi K\bar{K})/\Gamma_{\text{total}}$

Γ_{40}/Γ

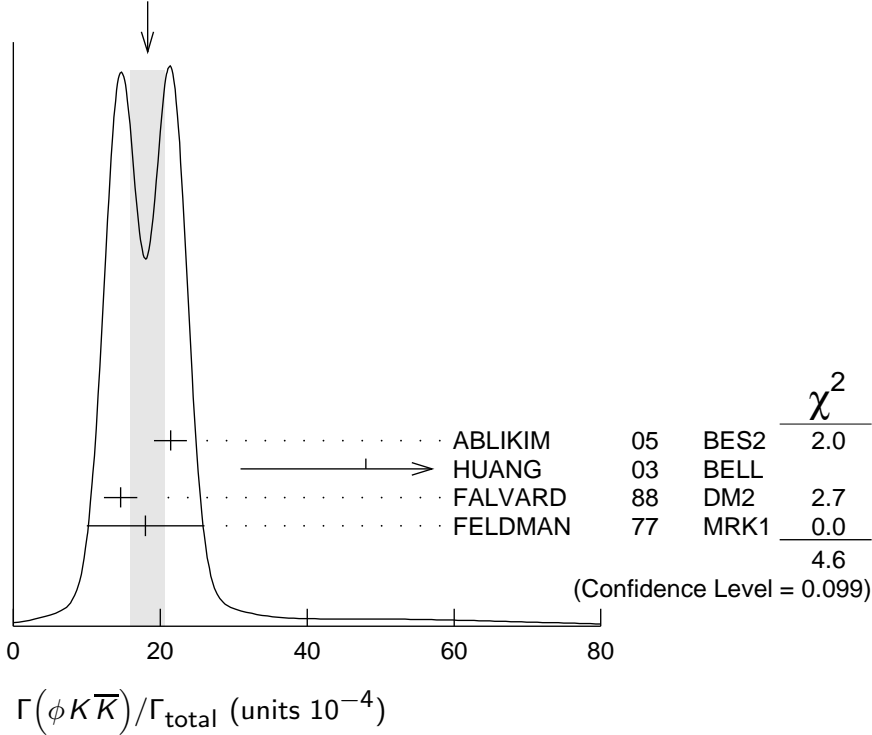
| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|----------------------|---|---------|--------------------------------------|
| 18.3 ± 2.4 | OUR AVERAGE | Error includes scale factor of 1.5. See the ideogram below. | | |
| 21.4 ± 0.4 ± 2.2 | | ABLIKIM | 05 BES2 | $J/\psi \rightarrow \phi\pi^+\pi^-$ |
| 48 $^{+20}_{-16}$ ± 6 | 9.0 $^{+3.7}_{-3.0}$ | ^{1,2} HUANG | 03 BELL | $B^+ \rightarrow (\phi K^+ K^-) K^+$ |
| 14.6 ± 0.8 ± 2.1 | | ³ FALVARD | 88 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 18 ± 8 | 14 | FELDMAN | 77 MRK1 | e^+e^- |

¹ We have multiplied K^+K^- measurement by 2 to obtain $K\bar{K}$.

² Using $B(B^+ \rightarrow J/\psi K^+) = (1.01 \pm 0.05) \times 10^{-3}$.

³ Addition of ϕK^+K^- and $\phi K^0\bar{K}^0$ branching ratios.

WEIGHTED AVERAGE
 18.3 ± 2.4 (Error scaled by 1.5)



$\Gamma(\phi f_0(1710) \rightarrow \phi K \bar{K})/\Gamma_{\text{total}}$ **Γ_{41}/Γ**

| VALUE (units 10^{-4}) | DOCUMENT ID | TECN | COMMENT |
|---|----------------|------|-------------------------------------|
| $3.6 \pm 0.2 \pm 0.6$ | 1,2 FALVARD 88 | DM2 | $J/\psi \rightarrow \text{hadrons}$ |

¹ Including interference with $f'_2(1525)$.
² Includes unknown branching fraction $f_0(1710) \rightarrow K \bar{K}$.

$\Gamma(\phi f_2(1270))/\Gamma_{\text{total}}$ **Γ_{42}/Γ**

| VALUE (units 10^{-3}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|--------|------|-------------|-----------|---|
| $0.72 \pm 0.13 \pm 0.02$ | 44 ± 7 | 1,2 | AUBERT | 07AK BABR | $10.6 e^+ e^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$ |

- • • We do not use the following data for averages, fits, limits, etc. • • •
- < 0.45 90 FALVARD 88 DM2 $J/\psi \rightarrow \text{hadrons}$
- < 0.37 90 VANNUCCI 77 MRK1 $e^+ e^- \rightarrow \pi^+ \pi^- K^+ K^-$

¹ Using $B(f_2(1270) \rightarrow \pi\pi) = (84.8^{+2.4}_{-1.2})\%$
² AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow \phi f_2(1270))/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (4.02 \pm 0.65 \pm 0.33) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Delta(1232)^{++} \bar{\Delta}(1232)^{--})/\Gamma_{\text{total}}$ **Γ_{43}/Γ**

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|-------------|------|-----------|
| $1.10 \pm 0.09 \pm 0.28$ | 233 | EATON 84 | MRK2 | $e^+ e^-$ |

$\Gamma(\Sigma(1385)^-\bar{\Sigma}(1385)^+ \text{ (or c.c.)})/\Gamma_{\text{total}}$ Γ_{44}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|------|-------------|----------|---|
| 1.10±0.12 OUR AVERAGE | | | | |
| 1.23±0.07±0.30 | 0.8k | ABLIKIM | 12P BES2 | $J/\psi \rightarrow \Sigma(1385)^-\bar{\Sigma}(1385)^+$ |
| 1.50±0.08±0.38 | 1k | ABLIKIM | 12P BES2 | $J/\psi \rightarrow \Sigma(1385)^+\bar{\Sigma}(1385)^-$ |
| 1.00±0.04±0.21 | 0.6k | HENRARD | 87 DM2 | $e^+e^- \rightarrow \Sigma^{*-}$ |
| 1.19±0.04±0.25 | 0.7k | HENRARD | 87 DM2 | $e^+e^- \rightarrow \Sigma^{*+}$ |
| 0.86±0.18±0.22 | 56 | EATON | 84 MRK2 | $e^+e^- \rightarrow \Sigma^{*-}$ |
| 1.03±0.24±0.25 | 68 | EATON | 84 MRK2 | $e^+e^- \rightarrow \Sigma^{*+}$ |

$\Gamma(\phi f_2'(1525))/\Gamma_{\text{total}}$ Γ_{45}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|------------------------|---------|-------------------------------------|
| 8 ±4 OUR AVERAGE Error includes scale factor of 2.7. | | | | |
| 12.3±0.6±2.0 | | ^{1,2} FALVARD | 88 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 4.8±1.8 | 46 | ¹ GIDAL | 81 MRK2 | $J/\psi \rightarrow K^+K^-K^+K^-$ |

¹ Re-evaluated using $B(f_2'(1525) \rightarrow K\bar{K}) = 0.713$.

² Including interference with $f_0(1710)$.

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{46}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|-----------------------------|---------|--|
| 0.94±0.09 OUR AVERAGE Error includes scale factor of 1.2. | | | | |
| 0.96±0.13 | 103 | ¹ AUBERT, BE 06D | BABR | $10.6 e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$ |
| 1.09±0.02±0.13 | | ABLIKIM | 05 BES2 | $J/\psi \rightarrow \phi\pi^+\pi^-$ |
| 0.78±0.03±0.12 | | FALVARD | 88 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 2.1 ±0.9 | 23 | FELDMAN | 77 MRK1 | e^+e^- |

¹ Derived by us. AUBERT, BE 06D measures $\Gamma(J/\psi \rightarrow e^+e^-) \times B(J/\psi \rightarrow \phi\pi^+\pi^-) \times B(\phi \rightarrow K^+K^-) = (2.61 \pm 0.30 \pm 0.18) \text{ eV}$

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

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-----------------------------|------|--|
| 0.56±0.16 | 23 | ¹ AUBERT, BE 06D | BABR | $10.6 e^+e^- \rightarrow K^+K^-\pi^0\pi^0\gamma$ |

¹ Derived by us. AUBERT, BE 06D measures $\Gamma(J/\psi \rightarrow e^+e^-) \times B(J/\psi \rightarrow \phi\pi^0\pi^0) \times B(\phi \rightarrow K^+K^-) = (1.54 \pm 0.40 \pm 0.16) \text{ eV}$

$\Gamma(\phi K^\pm K_S^0 \pi^\mp)/\Gamma_{\text{total}}$ Γ_{48}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|----------------------------|----------|-------------|----------|-------------------------------------|
| 7.2±0.8 OUR AVERAGE | | | | |
| 7.4±0.6±1.4 | 227 ± 19 | ABLIKIM | 08E BES2 | $e^+e^- \rightarrow J/\psi$ |
| 7.4±0.9±1.1 | | FALVARD | 88 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 7 ±0.6±1.0 | 163 ± 15 | BECKER | 87 MRK3 | $e^+e^- \rightarrow \text{hadrons}$ |

$\Gamma(\omega f_1(1420))/\Gamma_{\text{total}}$ Γ_{49}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|-----------------------------------|-------------|---------|-------------------------------------|
| 6.8^{+1.9}_{-1.6}±1.7 | 111 ⁺³¹ ₋₂₆ | BECKER | 87 MRK3 | $e^+e^- \rightarrow \text{hadrons}$ |

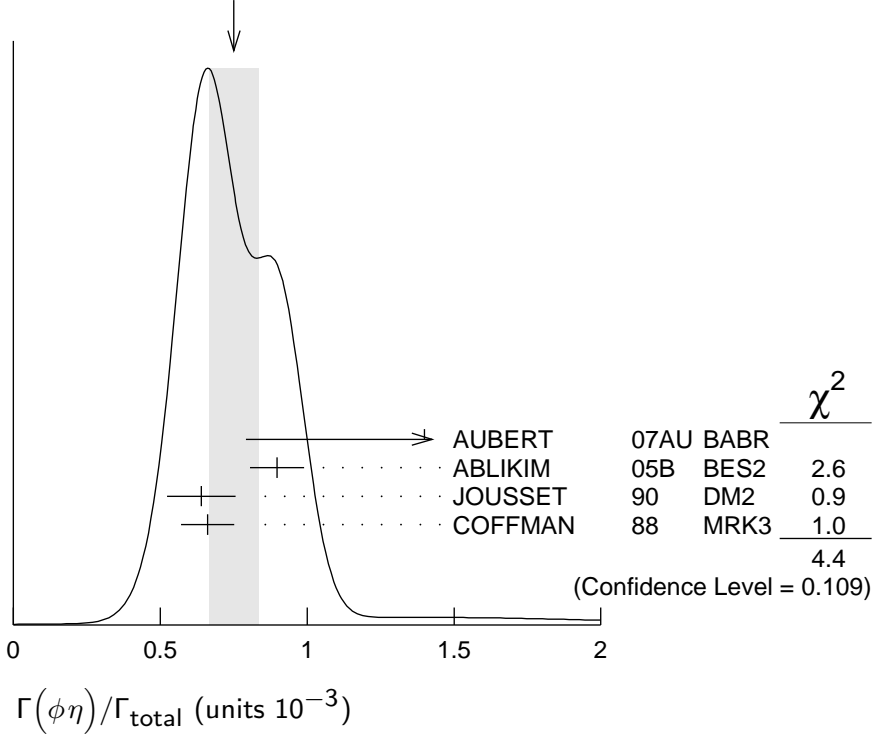
$\Gamma(\phi\eta)/\Gamma_{\text{total}}$

Γ_{50}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|--------------------|---|-----------|---|
| 0.75 ± 0.08 | OUR AVERAGE | Error includes scale factor of 1.5. See the ideogram below. | | |
| 1.4 ± 0.6 ± 0.1 | 6 | ¹ AUBERT | 07AU BABR | 10.6 $e^+e^- \rightarrow \phi\eta\gamma$ |
| 0.898 ± 0.024 ± 0.089 | | ABLIKIM | 05B BES2 | $e^+e^- \rightarrow J/\psi \rightarrow \text{hadr}$ |
| 0.64 ± 0.04 ± 0.11 | 346 | JOUSSET | 90 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 0.661 ± 0.045 ± 0.078 | | COFFMAN | 88 MRK3 | $e^+e^- \rightarrow K^+K^-\eta$ |

¹ AUBERT 07AU quotes $\Gamma_{ee}^{J/\psi} \cdot B(J/\psi \rightarrow \phi\eta) \cdot B(\phi \rightarrow K^+K^-) \cdot B(\eta \rightarrow \gamma\gamma) = 0.84 \pm 0.37 \pm 0.05 \text{ eV}$.

WEIGHTED AVERAGE
0.75 ± 0.08 (Error scaled by 1.5)



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

Γ_{51}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|-------------|----------|-----------------------------|
| 1.20 ± 0.12 ± 0.21 | 206 | ABLIKIM | 080 BES2 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(\Xi(1530)^-\Xi^+)/\Gamma_{\text{total}}$

Γ_{52}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|---------|-------------|--------|----------|
| 0.59 ± 0.09 ± 0.12 | 75 ± 11 | HENRARD | 87 DM2 | e^+e^- |

$\Gamma(pK^-\Sigma(1385)^0)/\Gamma_{\text{total}}$

Γ_{53}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|-------------|---------|----------|
| 0.51 ± 0.26 ± 0.18 | 89 | EATON | 84 MRK2 | e^+e^- |

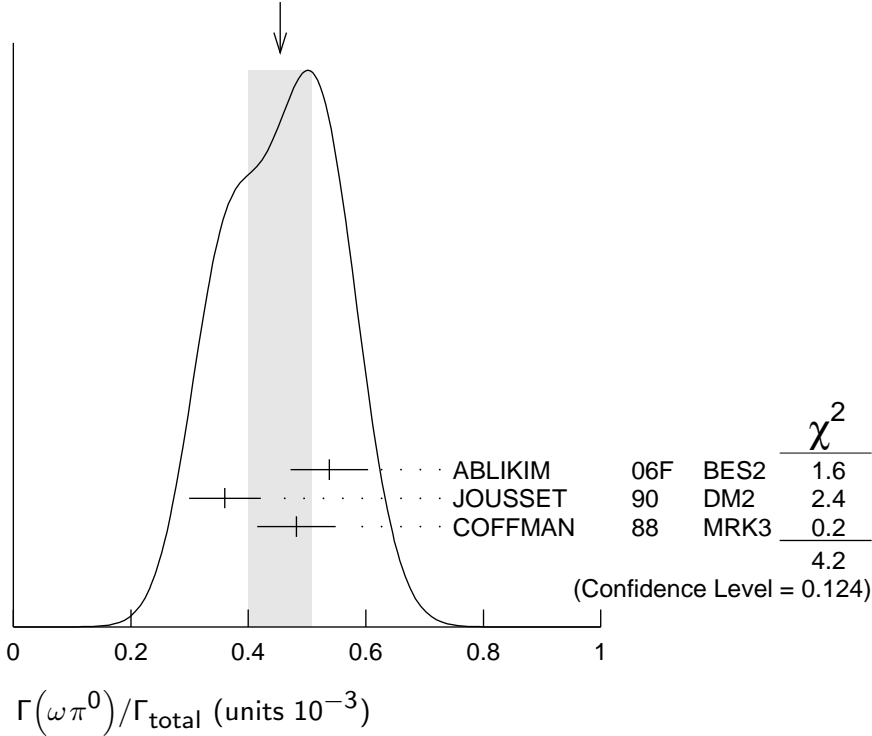
$\Gamma(\omega\pi^0)/\Gamma_{\text{total}}$

Γ_{54}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|------|---|----------|---|
| 0.45 ± 0.05 OUR AVERAGE | | Error includes scale factor of 1.4. See the ideogram below. | | |
| 0.538 ± 0.012 ± 0.065 | 2090 | ¹ ABLIKIM | 06F BES2 | $J/\psi \rightarrow \omega\pi^0$ |
| 0.360 ± 0.028 ± 0.054 | 222 | JOUSSET | 90 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 0.482 ± 0.019 ± 0.064 | | COFFMAN | 88 MRK3 | $e^+e^- \rightarrow \pi^0\pi^+\pi^-\pi^0$ |

¹ Using $B(\omega \rightarrow \pi^+\pi^-\pi^0) = (89.1 \pm 0.7)\%$.

WEIGHTED AVERAGE
0.45±0.05 (Error scaled by 1.4)



$\Gamma(\phi\eta'(958))/\Gamma_{\text{total}}$

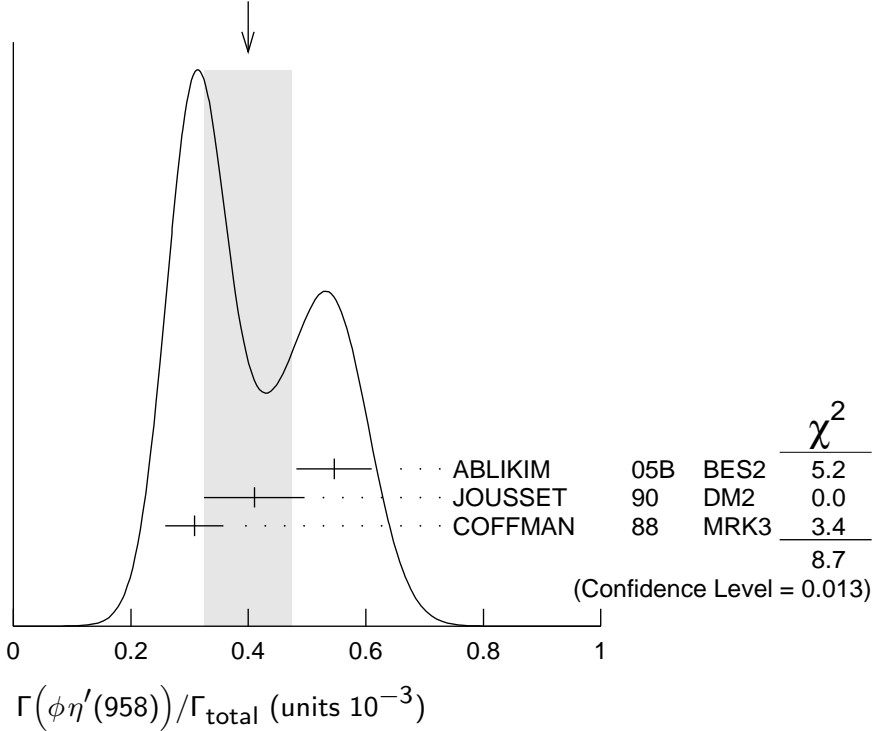
Γ_{55}/Γ

| VALUE (units 10^{-3}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|-----|------|---|----------|---|
| 0.40 ± 0.07 OUR AVERAGE | | | Error includes scale factor of 2.1. See the ideogram below. | | |
| 0.546 ± 0.031 ± 0.056 | | | ABLIKIM | 05B BES2 | $e^+e^- \rightarrow J/\psi \rightarrow \text{hadr}$ |
| 0.41 ± 0.03 ± 0.08 | 167 | | JOUSSET | 90 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 0.308 ± 0.034 ± 0.036 | | | COFFMAN | 88 MRK3 | $e^+e^- \rightarrow K^+K^-\eta'$ |

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

| | | | | |
|-------|----|----------|---------|----------|
| < 1.3 | 90 | VANNUCCI | 77 MRK1 | e^+e^- |
|-------|----|----------|---------|----------|

WEIGHTED AVERAGE
 0.40 ± 0.07 (Error scaled by 2.1)



$\Gamma(\phi f_0(980))/\Gamma_{\text{total}}$

Γ_{56}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|-------------------------------------|---------|--------------------------------------|
| 3.2 ± 0.9 OUR AVERAGE | | Error includes scale factor of 1.9. | | |
| $4.6 \pm 0.4 \pm 0.8$ | | ¹ FALVARD | 88 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 2.6 ± 0.6 | 50 | ¹ GIDAL | 81 MRK2 | $J/\psi \rightarrow K^+ K^- K^+ K^-$ |

¹ Assuming $B(f_0(980) \rightarrow \pi\pi) = 0.78$.

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

Γ_{57}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|----------------|-----------------------|-----------|---|
| $0.182 \pm 0.042 \pm 0.005$ | 19.5 ± 4.5 | ^{1,2} AUBERT | 07AK BABR | $10.6 e^+ e^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$ |

¹ Using $B(\phi \rightarrow K^+ K^-) = (49.3 \pm 0.6)\%$.

² AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow \phi f_0(980) \rightarrow \phi \pi^+ \pi^-)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (1.01 \pm 0.22 \pm 0.08) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\phi f_0(980) \rightarrow \phi \pi^0 \pi^0)/\Gamma_{\text{total}}$

Γ_{58}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---------------|-----------------------|-----------|---|
| $0.171 \pm 0.073 \pm 0.004$ | 7.0 ± 2.8 | ^{1,2} AUBERT | 07AK BABR | $10.6 e^+ e^- \rightarrow \pi^0 \pi^0 K^+ K^- \gamma$ |

¹ Using $B(\phi \rightarrow K^+ K^-) = (49.3 \pm 0.6)\%$.

² AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow \phi f_0(980) \rightarrow \phi \pi^0 \pi^0)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (0.95 \pm 0.39 \pm 0.10) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$$\Gamma(\phi\pi^0 f_0(980) \rightarrow \phi\pi^0\pi^+\pi^-)/\Gamma_{\text{total}} \quad \Gamma_{59}/\Gamma$$

| VALUE (units 10^{-6}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|--------------------------------------|
| 4.50±0.80±0.61 | 355 | ABLIKIM | 15P | BES3 $J/\psi \rightarrow K^+K^-3\pi$ |

$$\Gamma(\phi\pi^0 f_0(980) \rightarrow \phi\pi^0\rho^0\pi^0)/\Gamma_{\text{total}} \quad \Gamma_{60}/\Gamma$$

| VALUE (units 10^{-6}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|--------------------------------------|
| 1.67±0.50±0.24 | 70 | ABLIKIM | 15P | BESE $J/\psi \rightarrow K^+K^-3\pi$ |

$$\Gamma(\eta\phi f_0(980) \rightarrow \eta\phi\pi^+\pi^-)/\Gamma_{\text{total}} \quad \Gamma_{61}/\Gamma$$

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|--|
| 3.23±0.75±0.73 | 52 | ABLIKIM | 08F | BES $J/\psi \rightarrow \eta\phi f_0(980)$ |

$$\Gamma(\phi a_0(980)^0 \rightarrow \phi\eta\pi^0)/\Gamma_{\text{total}} \quad \Gamma_{62}/\Gamma$$

| VALUE (units 10^{-6}) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|----------------------|------|---|
| 5.0±2.7±2.5 | ¹ ABLIKIM | 11D | BES3 $J/\psi \rightarrow \phi\eta\pi^0$ |

¹ Assuming $a_0(980) - f_0(980)$ mixing and isospin breaking via γ^* and K^*K loops.

$$\Gamma(\Xi(1530)^0\Xi^0)/\Gamma_{\text{total}} \quad \Gamma_{63}/\Gamma$$

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|--------|-------------|------|--------------|
| 0.32±0.12±0.07 | 24 ± 9 | HENRARD | 87 | DM2 e^+e^- |

$$\Gamma(\Sigma(1385)^-\Sigma^+(\text{or c.c.}))/\Gamma_{\text{total}} \quad \Gamma_{64}/\Gamma$$

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|--------|-------------|------|---------------------------------------|
| 0.31±0.05 OUR AVERAGE | | | | |
| 0.30±0.03±0.07 | 74 ± 8 | HENRARD | 87 | DM2 $e^+e^- \rightarrow \Sigma^{*-}$ |
| 0.34±0.04±0.07 | 77 ± 9 | HENRARD | 87 | DM2 $e^+e^- \rightarrow \Sigma^{*+}$ |
| 0.29±0.11±0.10 | 26 | EATON | 84 | MRK2 $e^+e^- \rightarrow \Sigma^{*-}$ |
| 0.31±0.11±0.11 | 28 | EATON | 84 | MRK2 $e^+e^- \rightarrow \Sigma^{*+}$ |

$$\Gamma(\phi f_1(1285))/\Gamma_{\text{total}} \quad \Gamma_{65}/\Gamma$$

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|----------------------------|------|----------------------|------|---|
| 2.6±0.5 OUR AVERAGE | | | | |
| 3.4±1.8±1.5 | 1.1k | ¹ ABLIKIM | 15H | BES3 $e^+e^- \rightarrow J/\psi \rightarrow \phi\eta\pi^+\pi^-$ |
| 3.2±0.6±0.4 | | JOUSSET | 90 | DM2 $J/\psi \rightarrow \phi 2(\pi^+\pi^-)$ |
| 2.1±0.5±0.4 | 25 | ² JOUSSET | 90 | DM2 $J/\psi \rightarrow \phi\eta\pi^+\pi^-$ |

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

| | | | | |
|-------------|----|--------|----|--|
| 0.6±0.2±0.1 | 16 | BECKER | 87 | MRK3 $J/\psi \rightarrow \phi K\bar{K}\pi$ |
|-------------|----|--------|----|--|

¹ ABLIKIM 15H reports $[\Gamma(J/\psi(15) \rightarrow \phi f_1(1285))/\Gamma_{\text{total}}] \times [B(f_1(1285) \rightarrow \eta\pi^+\pi^-)] = (1.20 \pm 0.6 \pm 0.14) \times 10^{-4}$ which we divide by our best value $B(f_1(1285) \rightarrow \eta\pi^+\pi^-) = (35 \pm 15) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² We attribute to the $f_1(1285)$ the signal observed in the $\pi^+\pi^-\eta$ invariant mass distribution at 1297 MeV.

$$\Gamma(\phi f_1(1285) \rightarrow \phi\pi^0 f_0(980) \rightarrow \phi\pi^0\pi^+\pi^-)/\Gamma_{\text{total}} \quad \Gamma_{66}/\Gamma$$

| VALUE (units 10^{-7}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|--------------------------------------|
| 9.36±2.31±1.54 | 78 | ABLIKIM | 15P | BES3 $J/\psi \rightarrow K^+K^-3\pi$ |

$\Gamma(\phi f_1(1285) \rightarrow \phi \pi^0 f_0(980) \rightarrow \phi \pi^0 \pi^0 \pi^0) / \Gamma_{\text{total}}$ Γ_{67} / Γ

| VALUE (units 10^{-7}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|-------------|----------|-----------------------------------|
| 2.08 ± 1.63 ± 1.47 | 9 | ABLIKIM | 15P BES3 | $J/\psi \rightarrow K^+ K^- 3\pi$ |

$\Gamma(\eta \pi^+ \pi^-) / \Gamma_{\text{total}}$ Γ_{68} / Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|---------------------|-----------|--|
| 0.40 ± 0.17 ± 0.03 | 9 | ¹ AUBERT | 07AU BABR | $10.6 e^+ e^- \rightarrow \eta \pi^+ \pi^- \gamma$ |

¹ AUBERT 07AU quotes $\Gamma_{ee}^{J/\psi} \cdot B(J/\psi \rightarrow \eta \pi^+ \pi^-) \cdot B(\eta \rightarrow 3\pi) = 0.51 \pm 0.22 \pm 0.03$ eV.

$\Gamma(\eta \rho) / \Gamma_{\text{total}}$ Γ_{69} / Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|----------------------------------|------|-------------|---------|--|
| 0.193 ± 0.023 OUR AVERAGE | | | | |
| 0.194 ± 0.017 ± 0.029 | 299 | JOUSSET | 90 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 0.193 ± 0.013 ± 0.029 | | COFFMAN | 88 MRK3 | $e^+ e^- \rightarrow \pi^+ \pi^- \eta$ |

$\Gamma(\omega \eta'(958)) / \Gamma_{\text{total}}$ Γ_{70} / Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|----------------------|----------|-------------------------------------|
| 0.182 ± 0.021 OUR AVERAGE | | | | |
| 0.226 ± 0.043 | 218 | ¹ ABLIKIM | 06F BES2 | $J/\psi \rightarrow \omega \eta'$ |
| 0.18 ^{+0.10} _{-0.08} ± 0.03 | 6 | JOUSSET | 90 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 0.166 ± 0.017 ± 0.019 | | COFFMAN | 88 MRK3 | $e^+ e^- \rightarrow 3\pi \eta'$ |

¹ Using $B(\eta' \rightarrow \pi^+ \pi^- \eta) = (44.3 \pm 1.5)\%$, $B(\eta' \rightarrow \pi^+ \pi^- \gamma) = 29.5 \pm 1.0\%$, $B(\eta \rightarrow 2\gamma) = 39.43 \pm 0.26\%$, and $B(\omega \rightarrow \pi^+ \pi^- \pi^0) = (89.1 \pm 0.7)\%$.

$\Gamma(\omega f_0(980)) / \Gamma_{\text{total}}$ Γ_{71} / Γ

| VALUE (units 10^{-4}) | DOCUMENT ID | TECN | COMMENT |
|---------------------------|-----------------------|--------|---|
| 1.41 ± 0.27 ± 0.47 | ¹ AUGUSTIN | 89 DM2 | $J/\psi \rightarrow 2(\pi^+ \pi^-) \pi^0$ |

¹ Assuming $B(f_0(980) \rightarrow \pi\pi) = 0.78$.

$\Gamma(\rho \eta'(958)) / \Gamma_{\text{total}}$ Γ_{72} / Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|----------------------------------|------|-------------|---------|--|
| 0.105 ± 0.018 OUR AVERAGE | | | | |
| 0.083 ± 0.030 ± 0.012 | 19 | JOUSSET | 90 DM2 | $J/\psi \rightarrow \text{hadrons}$ |
| 0.114 ± 0.014 ± 0.016 | | COFFMAN | 88 MRK3 | $J/\psi \rightarrow \pi^+ \pi^- \eta'$ |

$\Gamma(a_2(1320)^\pm \pi^\mp) / \Gamma_{\text{total}}$ Γ_{73} / Γ

| VALUE (units 10^{-4}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|---------|-----------|
| <43 | 90 | BRAUNSCH... | 76 DASP | $e^+ e^-$ |

$\Gamma(K \bar{K}_2^*(1430) + \text{c.c.}) / \Gamma_{\text{total}}$ Γ_{74} / Γ

| VALUE (units 10^{-4}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|---------|--|
| <40 | 90 | VANNUCCI | 77 MRK1 | $e^+ e^- \rightarrow K^0 \bar{K}_2^{*0}$ |

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

| | | | | |
|-----|----|-------------|---------|--|
| <66 | 90 | BRAUNSCH... | 76 DASP | $e^+ e^- \rightarrow K^\pm \bar{K}_2^{*\mp}$ |
|-----|----|-------------|---------|--|

$\Gamma(K_1(1270)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{75}/Γ

| VALUE (units 10^{-3}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|------------------|------|--------------|
| <3.0 | 90 | ¹ BAI | 99C | BES e^+e^- |

¹ Assuming $B(K_1(1270) \rightarrow K\rho) = 0.42 \pm 0.06$

$\Gamma(K_2^*(1430)^0 \bar{K}_2^*(1430)^0)/\Gamma_{\text{total}}$ Γ_{76}/Γ

| VALUE (units 10^{-4}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|--|
| <29 | 90 | VANNUCCI | 77 | MRK1 $e^+e^- \rightarrow \pi^+\pi^-K^+K^-$ |

$\Gamma(\phi\pi^0)/\Gamma_{\text{total}}$ Γ_{77}/Γ

The two different fit values of ABLIKIM 15K below have the same statistical significance of 6.4σ and cannot be distinguished at this moment.

| VALUE (units 10^{-6}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|-----------------------------|-----|------------|----------------------|------|---|
| $2.94 \pm 0.16 \pm 0.16$ | | 0.8k | ¹ ABLIKIM | 15K | BES3 $e^+e^- \rightarrow J/\psi \rightarrow K^+K^-\gamma\gamma$ |
| $0.124 \pm 0.033 \pm 0.030$ | | 35 ± 9 | ² ABLIKIM | 15K | BES3 $e^+e^- \rightarrow J/\psi \rightarrow K^+K^-\gamma\gamma$ |

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

| | | | | | |
|------|----|--|----------------------|-----|---|
| <6.4 | 90 | | ³ ABLIKIM | 05B | BES2 $e^+e^- \rightarrow J/\psi \rightarrow \phi\gamma\gamma$ |
| <6.8 | 90 | | COFFMAN | 88 | MRK3 $e^+e^- \rightarrow K^+K^-\pi^0$ |

¹ Corresponding to one of the two fit solutions with $\delta = (-95.9 \pm 1.5)^\circ$ for the phase angle between the resonant $J/\psi \rightarrow \phi\pi^0$ and non-phi $J/\psi \rightarrow K^+K^-\pi^0$ contributions.

² Corresponding to one of the two fit solutions with $\delta = (-152.1 \pm 7.7)^\circ$ for the phase angle between the resonant $J/\psi \rightarrow \phi\pi^0$ and non-phi $J/\psi \rightarrow K^+K^-\pi^0$ contributions.

³ Superseded by ABLIKIM 15K.

$\Gamma(\phi\eta(1405) \rightarrow \phi\eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{78}/Γ

| VALUE (units 10^{-5}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|-----|------|----------------------|------|---|
| $2.01 \pm 0.58 \pm 0.82$ | | 172 | ¹ ABLIKIM | 15H | BES3 $e^+e^- \rightarrow J/\psi \rightarrow \phi\eta\pi^+\pi^-$ |

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

| | | | | | |
|------|----|--|----------------------|----|---|
| < 17 | 90 | | ² FALVARD | 88 | DM2 $J/\psi \rightarrow \text{hadrons}$ |
|------|----|--|----------------------|----|---|

¹ With 3.6σ significance.

² Includes unknown branching fraction $\eta(1405) \rightarrow \eta\pi\pi$.

$\Gamma(\omega f_2'(1525))/\Gamma_{\text{total}}$ Γ_{79}/Γ

| VALUE (units 10^{-4}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-----------------------|------|--|
| <2.2 | 90 | ¹ VANNUCCI | 77 | MRK1 $e^+e^- \rightarrow \pi^+\pi^-\pi^0 K^+K^-$ |

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

| | | | | | |
|------|----|--|----------------------|----|---|
| <2.8 | 90 | | ¹ FALVARD | 88 | DM2 $J/\psi \rightarrow \text{hadrons}$ |
|------|----|--|----------------------|----|---|

¹ Re-evaluated assuming $B(f_2'(1525) \rightarrow K\bar{K}) = 0.713$.

$\Gamma(\omega X(1835) \rightarrow \omega p\bar{p})/\Gamma_{\text{total}}$ Γ_{80}/Γ

| VALUE (units 10^{-6}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|--|
| <3.9 | 95 | ABLIKIM | 13P | BES3 $J/\psi \rightarrow \gamma\pi^0 p\bar{p}$ |

| $\Gamma(\phi X(1835) \rightarrow \phi \eta \pi^+ \pi^-) / \Gamma_{\text{total}}$ | | | | | Γ_{81} / Γ |
|--|------|-------------|------|---------|--|
| VALUE | CL% | DOCUMENT ID | TECN | COMMENT | |
| $< 2.8 \times 10^{-4}$ | 90 | ABLIKIM | 15H | BES3 | $e^+ e^- \rightarrow J/\psi \rightarrow \phi \eta \pi^+ \pi^-$ |
| $\Gamma(\phi X(1870) \rightarrow \phi \eta \pi^+ \pi^-) / \Gamma_{\text{total}}$ | | | | | Γ_{82} / Γ |
| VALUE | CL% | DOCUMENT ID | TECN | COMMENT | |
| $< 6.13 \times 10^{-5}$ | 90 | ABLIKIM | 15H | BES3 | $e^+ e^- \rightarrow J/\psi \rightarrow \phi \eta \pi^+ \pi^-$ |
| $\Gamma(\eta \phi(2170) \rightarrow \eta \phi f_0(980) \rightarrow \eta \phi \pi^+ \pi^-) / \Gamma_{\text{total}}$ | | | | | Γ_{83} / Γ |
| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT | |
| $1.20 \pm 0.14 \pm 0.37$ | 471 | ABLIKIM | 15H | BES3 | $e^+ e^- \rightarrow J/\psi \rightarrow \phi \eta \pi^+ \pi^-$ |
| $\Gamma(\eta \phi(2170) \rightarrow \eta K^*(892)^0 \bar{K}^*(892)^0) / \Gamma_{\text{total}}$ | | | | | Γ_{84} / Γ |
| VALUE (units 10^{-4}) | CL% | DOCUMENT ID | TECN | COMMENT | |
| < 2.52 | 90 | ABLIKIM | 10C | BES2 | $J/\psi \rightarrow \eta K^+ \pi^- K^- \pi^+$ |
| $\Gamma(\Sigma(1385)^0 \bar{\Lambda} + \text{c.c.}) / \Gamma_{\text{total}}$ | | | | | Γ_{85} / Γ |
| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT | |
| < 0.82 | 90 | ABLIKIM | 13F | BES3 | $J/\psi \rightarrow p \bar{p} \pi^+ \pi^- \gamma \gamma$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| < 20 | 90 | HENRARD | 87 | DM2 | $e^+ e^-$ |
| $\Gamma(\Delta(1232)^+ \bar{p}) / \Gamma_{\text{total}}$ | | | | | Γ_{86} / Γ |
| VALUE (units 10^{-3}) | CL% | DOCUMENT ID | TECN | COMMENT | |
| < 0.1 | 90 | HENRARD | 87 | DM2 | $e^+ e^-$ |
| $\Gamma(\Lambda(1520) \bar{\Lambda} + \text{c.c.} \rightarrow \gamma \Lambda \bar{\Lambda}) / \Gamma_{\text{total}}$ | | | | | Γ_{87} / Γ |
| VALUE (units 10^{-6}) | CL% | DOCUMENT ID | TECN | COMMENT | |
| < 4.1 | 90 | ABLIKIM | 12B | BES3 | $J/\psi \rightarrow \Lambda \bar{\Lambda} \gamma$ |
| $\Gamma(\Theta(1540) \bar{\Theta}(1540) \rightarrow K_S^0 p K^- \bar{n} + \text{c.c.}) / \Gamma_{\text{total}}$ | | | | | Γ_{88} / Γ |
| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT | |
| < 1.1 | 90 | BAI | 04G | BES2 | $e^+ e^-$ |
| $\Gamma(\Theta(1540) K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n}) / \Gamma_{\text{total}}$ | | | | | Γ_{89} / Γ |
| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT | |
| < 2.1 | 90 | BAI | 04G | BES2 | $e^+ e^-$ |
| $\Gamma(\Theta(1540) K_S^0 \bar{p} \rightarrow K_S^0 \bar{p} K^+ n) / \Gamma_{\text{total}}$ | | | | | Γ_{90} / Γ |
| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT | |
| < 1.6 | 90 | BAI | 04G | BES2 | $e^+ e^-$ |
| $\Gamma(\bar{\Theta}(1540) K^+ n \rightarrow K_S^0 \bar{p} K^+ n) / \Gamma_{\text{total}}$ | | | | | Γ_{91} / Γ |
| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT | |
| < 5.6 | 90 | BAI | 04G | BES2 | $e^+ e^-$ |

$\Gamma(\overline{\Theta}(1540)K_S^0 p \rightarrow K_S^0 p K^- \overline{n})/\Gamma_{\text{total}}$ Γ_{92}/Γ

| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|----------------|
| <1.1 | 90 | BAI | 04G | BES2 $e^+ e^-$ |

$\Gamma(\Sigma^0 \overline{\Lambda})/\Gamma_{\text{total}}$ Γ_{93}/Γ

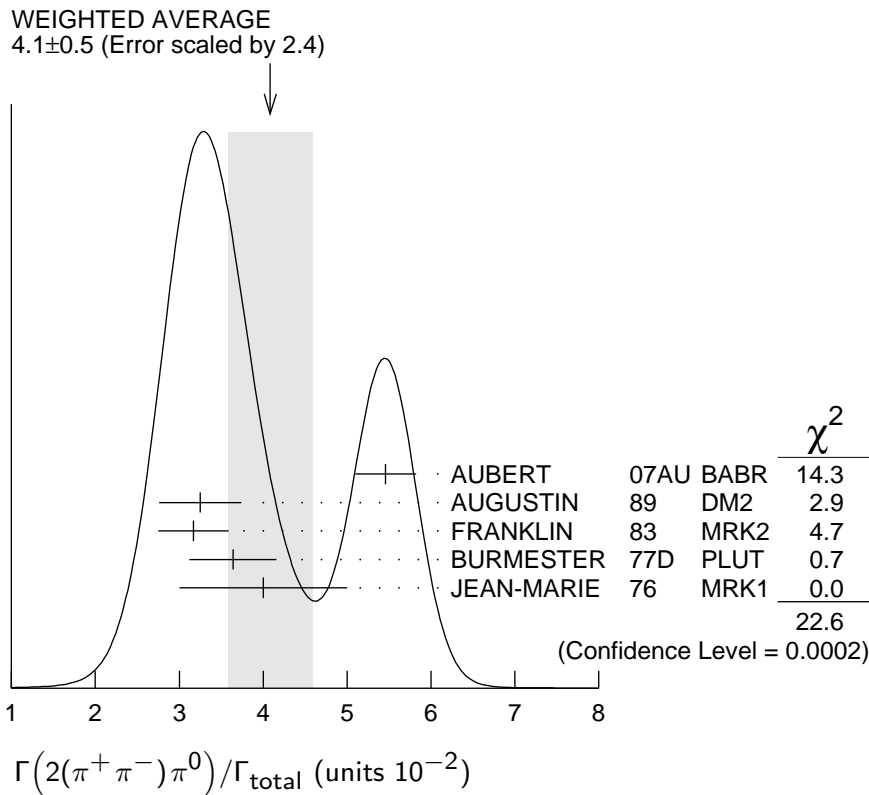
| VALUE (units 10^{-4}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|---------------|
| <0.9 | 90 | HENRARD | 87 | DM2 $e^+ e^-$ |

————— STABLE HADRONS —————

$\Gamma(2(\pi^+ \pi^-)\pi^0)/\Gamma_{\text{total}}$ Γ_{94}/Γ

| VALUE (units 10^{-2}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|-------|---|-----------|---|
| 4.1 ± 0.5 OUR AVERAGE | | Error includes scale factor of 2.4. See the ideogram below. | | |
| 5.46 ± 0.34 ± 0.14 | 4990 | ¹ AUBERT | 07AU BABR | 10.6 $e^+ e^- \rightarrow 2(\pi^+ \pi^-)\pi^0 \gamma$ |
| 3.25 ± 0.49 | 46055 | AUGUSTIN | 89 DM2 | $J/\psi \rightarrow 2(\pi^+ \pi^-)\pi^0$ |
| 3.17 ± 0.42 | 147 | FRANKLIN | 83 MRK2 | $e^+ e^- \rightarrow$ hadrons |
| 3.64 ± 0.52 | 1500 | BURMESTER | 77D PLUT | $e^+ e^-$ |
| 4 ± 1 | 675 | JEAN-MARIE | 76 MRK1 | $e^+ e^-$ |

¹AUBERT 07AU reports $[\Gamma(J/\psi(1S) \rightarrow 2(\pi^+ \pi^-)\pi^0)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = 0.303 \pm 0.005 \pm 0.018$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.



$\Gamma(\omega\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-)\pi^0)$ Γ_{13}/Γ_{94}

VALUE DOCUMENT ID TECN COMMENT

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

0.3 ¹ JEAN-MARIE 76 MRK1 e^+e^-

¹ Final state $(\pi^+\pi^-)\pi^0$ under the assumption that $\pi\pi$ is isospin 0.

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{\text{total}}$ Γ_{95}/Γ

VALUE EVTS DOCUMENT ID TECN COMMENT

0.029±0.006 OUR AVERAGE

0.028±0.009 11 FRANKLIN 83 MRK2 $e^+e^- \rightarrow$ hadrons

0.029±0.007 181 JEAN-MARIE 76 MRK1 e^+e^-

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_{96}/Γ

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

21.1 ±0.7 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.

21.37±0.04^{+0.64}_{-0.62} 1.8M ^{1,2} ABLIKIM 12H BES3 $e^+e^- \rightarrow J/\psi$

23.0 ±2.0 ±0.4 256 ³ AUBERT 07AU BABR 10.6 $e^+e^- \rightarrow J/\psi\pi^+\pi^-\gamma$

21.8 ±1.9 ^{4,5} AUBERT,B 04N BABR 10.6 $e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$

21.84±0.05±2.01 220k ^{1,5} BAI 04H BES e^+e^-

20.91±0.21±1.16 ^{5,6} BAI 04H BES e^+e^-

15 ±2 168 FRANKLIN 83 MRK2 e^+e^-

¹ From $J/\psi \rightarrow \pi^+\pi^-\pi^0$ events directly.

² The quoted systematic error includes a contribution of 1.23% (added in quadrature) from the uncertainty on the number of J/ψ events.

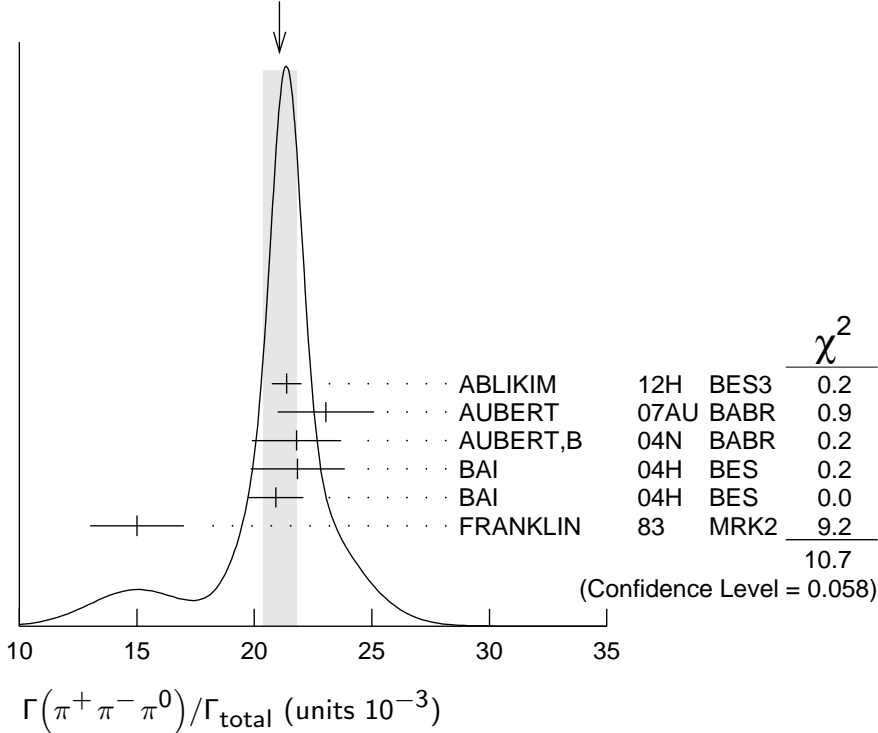
³ AUBERT 07AU reports $[\Gamma(J/\psi(1S) \rightarrow \pi^+\pi^-\pi^0)/\Gamma_{\text{total}}] \times [\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}}] = (18.6 \pm 1.2 \pm 1.1) \times 10^{-3}$ keV which we divide by our best value $\Gamma(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) \times \Gamma(\psi(2S) \rightarrow e^+e^-)/\Gamma_{\text{total}} = 0.807 \pm 0.013$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁴ From the ratio of $\Gamma(e^+e^-) B(\pi^+\pi^-\pi^0)$ and $\Gamma(e^+e^-) B(\mu^+\mu^-)$ (AUBERT 04).

⁵ Mostly $\rho\pi$, see also $\rho\pi$ subsection.

⁶ Obtained comparing the rates for $\pi^+\pi^-\pi^0$ and $\mu^+\mu^-$, using J/ψ events produced via $\psi(2S) \rightarrow \pi^+\pi^- J/\psi$ and with $B(J/\psi \rightarrow \mu^+\mu^-) = 5.88 \pm 0.10\%$.

WEIGHTED AVERAGE
 21.1 ± 0.7 (Error scaled by 1.5)



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

Γ_{97} / Γ

| VALUE (units 10^{-2}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-----------------------------------|------|---------------------|-----------|---|
| 1.79 ± 0.29 | | | | OUR AVERAGE Error includes scale factor of 2.2. |
| $1.93 \pm 0.14 \pm 0.05$ | 768 | ¹ AUBERT | 07AU BABR | $10.6 e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \pi^0 \gamma$ |
| 1.2 ± 0.3 | 309 | VANNUCCI | 77 MRK1 | $e^+ e^-$ |

¹ AUBERT 07AU reports $[\Gamma(J/\psi(1S) \rightarrow \pi^+ \pi^- \pi^0 K^+ K^-) / \Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = 0.1070 \pm 0.0043 \pm 0.0064$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

Γ_{98} / Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-------------------------------|------|-------------|---------|-----------|
| 90 ± 30 | 13 | JEAN-MARIE | 76 MRK1 | $e^+ e^-$ |

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

Γ_{99} / Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|---------------------|-----------|---|
| 6.6 ± 0.5 | | | | OUR AVERAGE |
| $6.5 \pm 0.4 \pm 0.2$ | 1.6k | ¹ AUBERT | 07AK BABR | $10.6 e^+ e^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$ |
| 7.2 ± 2.3 | 205 | VANNUCCI | 77 MRK1 | $e^+ e^-$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| $6.1 \pm 0.7 \pm 0.2$ | 233 | ² AUBERT | 05D BABR | $10.6 e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \gamma$ |

¹ AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow \pi^+ \pi^- K^+ K^-)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (36.3 \pm 1.3 \pm 2.1) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² Superseded by AUBERT 07AK. AUBERT 05D reports $[\Gamma(J/\psi(1S) \rightarrow \pi^+ \pi^- K^+ K^-)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (33.6 \pm 2.7 \pm 2.7) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^+ \pi^- K^+ K^- \eta)/\Gamma_{\text{total}}$ Γ_{100}/Γ

| <u>VALUE (units 10^{-3})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|---------------------|-------------|--|
| 1.84 ± 0.28 ± 0.05 | 73 | ¹ AUBERT | 07AU BABR | 10.6 $e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \eta \gamma$ |

¹ AUBERT 07AU reports $[\Gamma(J/\psi(1S) \rightarrow \pi^+ \pi^- K^+ K^- \eta)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (10.2 \pm 1.3 \pm 0.8) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\pi^0 \pi^0 K^+ K^-)/\Gamma_{\text{total}}$ Γ_{101}/Γ

| <u>VALUE (units 10^{-3})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|---------------------|-------------|---|
| 2.45 ± 0.31 ± 0.06 | 203 ± 16 | ¹ AUBERT | 07AK BABR | 10.6 $e^+ e^- \rightarrow \pi^0 \pi^0 K^+ K^- \gamma$ |

¹ AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow \pi^0 \pi^0 K^+ K^-)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (13.6 \pm 1.1 \pm 1.3) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K \bar{K} \pi)/\Gamma_{\text{total}}$ Γ_{102}/Γ

| <u>VALUE (units 10^{-4})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|--|
| 61 ± 10 OUR AVERAGE | | | | |
| 55.2 ± 12.0 | 25 | FRANKLIN | 83 | MRK2 $e^+ e^- \rightarrow K^+ K^- \pi^0$ |
| 78.0 ± 21.0 | 126 | VANNUCCI | 77 | MRK1 $e^+ e^- \rightarrow K_S^0 K^\pm \pi^\mp$ |

$\Gamma(2(\pi^+ \pi^-))/\Gamma_{\text{total}}$ Γ_{103}/Γ

| <u>VALUE (units 10^{-3})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|----------------------|-------------|--|
| 3.57 ± 0.30 OUR AVERAGE | | | | |
| 3.53 ± 0.12 ± 0.29 | 1107 | ¹ ABLIKIM | 05H BES2 | $e^+ e^- \rightarrow \psi(2S) \rightarrow J/\psi \pi^+ \pi^-, J/\psi \rightarrow 2(\pi^+ \pi^-)$ |
| 4.0 ± 1.0 | 76 | JEAN-MARIE | 76 | MRK1 $e^+ e^-$ |

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

3.51 ± 0.34 ± 0.09 270 ² AUBERT 05D BABR 10.6 $e^+ e^- \rightarrow 2(\pi^+ \pi^-) \gamma$

¹ Computed using $B(J/\psi \rightarrow \mu^+ \mu^-) = 0.0588 \pm 0.0010$.

² AUBERT 05D reports $[\Gamma(J/\psi(1S) \rightarrow 2(\pi^+ \pi^-))/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (19.5 \pm 1.4 \pm 1.3) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value. Superseded by LEES 12E.

$\Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_{104}/Γ

| <u>VALUE (units 10^{-4})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|---------------------|-------------|---|
| 43 ± 4 OUR AVERAGE | | | | |
| 43.0 ± 2.9 ± 2.8 | 496 | ¹ AUBERT | 06D BABR | 10.6 $e^+e^- \rightarrow 3(\pi^+\pi^-)\gamma$ |
| 40 ± 20 | 32 | JEAN-MARIE | 76 MRK1 | e^+e^- |

¹ Using $\Gamma(J/\psi \rightarrow e^+e^-) = 5.52 \pm 0.14 \pm 0.04$ keV.

$\Gamma(2(\pi^+\pi^-\pi^0))/\Gamma_{\text{total}}$ Γ_{105}/Γ

| <u>VALUE (units 10^{-2})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|---------------------|-------------|--|
| 1.62 ± 0.09 ± 0.19 | 761 | ¹ AUBERT | 06D BABR | 10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-\pi^0)\gamma$ |

¹ Using $\Gamma(J/\psi \rightarrow e^+e^-) = 5.52 \pm 0.14 \pm 0.04$ keV.

$\Gamma(2(\pi^+\pi^-\eta))/\Gamma_{\text{total}}$ Γ_{106}/Γ

| <u>VALUE (units 10^{-3})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|---------------------|-------------|---|
| 2.29 ± 0.24 OUR AVERAGE | | | | |
| 2.35 ± 0.39 ± 0.20 | 85 | ¹ AUBERT | 07AU BABR | 10.6 $e^+e^- \rightarrow 2(\pi^+\pi^-\eta)\gamma$ |
| 2.26 ± 0.08 ± 0.27 | 4839 | ABLIKIM | 05C BES2 | $e^+e^- \rightarrow 2(\pi^+\pi^-\eta)$ |

¹ AUBERT 07AU quotes $\Gamma_{ee}^{J/\psi} \cdot B(J/\psi \rightarrow 2(\pi^+\pi^-\eta)) \cdot B(\eta \rightarrow \gamma\gamma) = 5.16 \pm 0.85 \pm 0.39$ eV.

$\Gamma(3(\pi^+\pi^-\eta))/\Gamma_{\text{total}}$ Γ_{107}/Γ

| <u>VALUE (units 10^{-4})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|--|
| 7.24 ± 0.96 ± 1.11 | 616 | ABLIKIM | 05C BES2 | $e^+e^- \rightarrow 3(\pi^+\pi^-\eta)$ |

$\Gamma(\rho\bar{\rho})/\Gamma_{\text{total}}$ Γ_{108}/Γ

| <u>VALUE (units 10^{-3})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|----------------------|-------------|-------------------------------------|
| 2.120 ± 0.029 OUR AVERAGE | | | | |
| 2.112 ± 0.004 ± 0.031 | 314k | ABLIKIM | 12C BES3 | e^+e^- |
| 2.15 ± 0.16 ± 0.06 | 317 | ¹ WU | 06 BELL | $B^+ \rightarrow \rho\bar{\rho}K^+$ |
| 2.26 ± 0.01 ± 0.14 | 63316 | BAI | 04E BES2 | $e^+e^- \rightarrow J/\psi$ |
| 1.97 ± 0.22 | 99 | BALDINI | 98 FENI | e^+e^- |
| 1.91 ± 0.04 ± 0.30 | | PALLIN | 87 DM2 | e^+e^- |
| 2.16 ± 0.07 ± 0.15 | 1420 | EATON | 84 MRK2 | e^+e^- |
| 2.5 ± 0.4 | 133 | BRANDELIK | 79C DASP | e^+e^- |
| 2.0 ± 0.5 | | BESCH | 78 BONA | e^+e^- |
| 2.2 ± 0.2 | 331 | ² PERUZZI | 78 MRK1 | e^+e^- |

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

| | | | | |
|-----------|----|-----------|---------|----------|
| 2.0 ± 0.3 | 48 | ANTONELLI | 93 SPEC | e^+e^- |
|-----------|----|-----------|---------|----------|

¹ WU 06 reports $[\Gamma(J/\psi(1S) \rightarrow \rho\bar{\rho})/\Gamma_{\text{total}}] \times [B(B^+ \rightarrow J/\psi(1S)K^+)] = (2.21 \pm 0.13 \pm 0.10) \times 10^{-6}$ which we divide by our best value $B(B^+ \rightarrow J/\psi(1S)K^+) = (1.026 \pm 0.031) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² Assuming angular distribution $(1+\cos^2\theta)$.

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

Γ_{109}/Γ

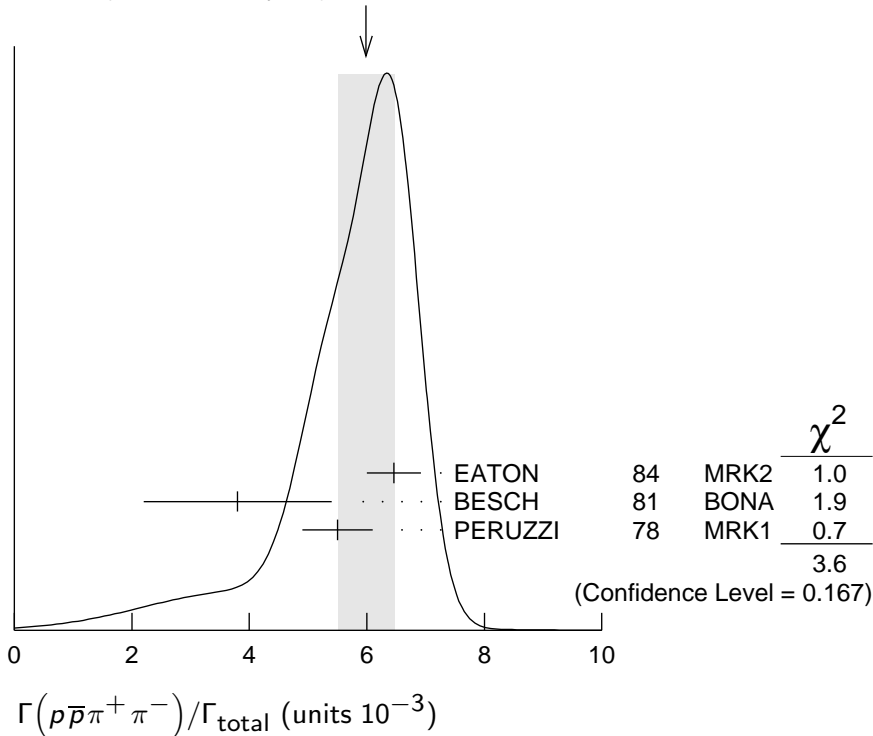
| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|------|-------------------------------------|------|---------------|
| 1.19±0.08 OUR AVERAGE | | Error includes scale factor of 1.1. | | |
| 1.33±0.02±0.11 | 11k | ABLIKIM | 09B | BES2 e^+e^- |
| 1.13±0.09±0.09 | 685 | EATON | 84 | MRK2 e^+e^- |
| 1.4 ±0.4 | | BRANDELIK | 79C | DASP e^+e^- |
| 1.00±0.15 | 109 | PERUZZI | 78 | MRK1 e^+e^- |

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

Γ_{110}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-----------------------------|------|---|------|---------------|
| 6.0 ±0.5 OUR AVERAGE | | Error includes scale factor of 1.3. See the ideogram below. | | |
| 6.46±0.17±0.43 | 1435 | EATON | 84 | MRK2 e^+e^- |
| 3.8 ±1.6 | 48 | BESCH | 81 | BONA e^+e^- |
| 5.5 ±0.6 | 533 | PERUZZI | 78 | MRK1 e^+e^- |

WEIGHTED AVERAGE
6.0±0.5 (Error scaled by 1.3)



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

Γ_{111}/Γ

Including $\rho\bar{p}\pi^+\pi^-\gamma$ and excluding ω, η, η'

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-----------------------------|------|-------------------------------------|------|---------------|
| 2.3 ±0.9 OUR AVERAGE | | Error includes scale factor of 1.9. | | |
| 3.36±0.65±0.28 | 364 | EATON | 84 | MRK2 e^+e^- |
| 1.6 ±0.6 | 39 | PERUZZI | 78 | MRK1 e^+e^- |

$\Gamma(p\bar{p}\eta)/\Gamma_{\text{total}}$ Γ_{112}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|------|-------------------------|------|----------|
| 2.00±0.12 OUR AVERAGE | | | | |
| 1.91±0.02±0.17 | 13k | ¹ ABLIKIM 09 | BES2 | e^+e^- |
| 2.03±0.13±0.15 | 826 | EATON 84 | MRK2 | e^+e^- |
| 2.5 ±1.2 | | BRANDELIK 79c | DASP | e^+e^- |
| 2.3 ±0.4 | 197 | PERUZZI 78 | MRK1 | e^+e^- |

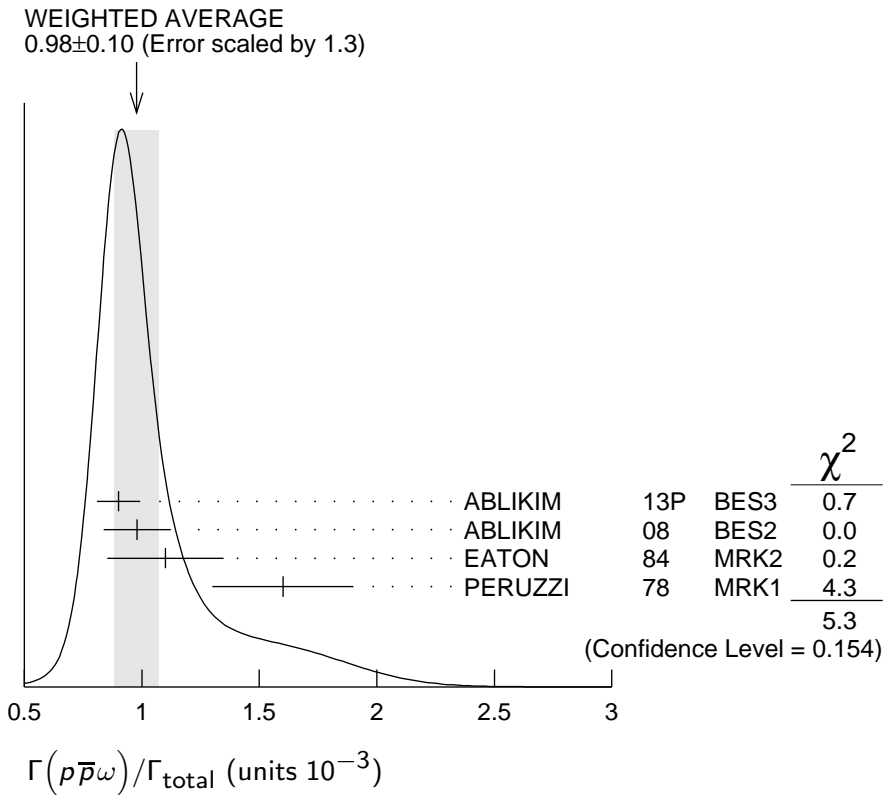
¹ From the combination of $p\bar{p}\eta \rightarrow p\bar{p}\gamma\gamma$ and $p\bar{p}\eta \rightarrow p\bar{p}\pi^+\pi^-\pi^0$ channels.

$\Gamma(p\bar{p}\rho)/\Gamma_{\text{total}}$ Γ_{113}/Γ

| VALUE (units 10^{-3}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|---|
| <0.31 | 90 | EATON 84 | MRK2 | $e^+e^- \rightarrow \text{hadrons}\gamma$ |

$\Gamma(p\bar{p}\omega)/\Gamma_{\text{total}}$ Γ_{114}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|-------------|------|----------|
| 0.98±0.10 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below. | | | | |
| 0.90±0.02±0.09 | 2670 | ABLIKIM 13P | BES3 | e^+e^- |
| 0.98±0.03±0.14 | 2449 | ABLIKIM 08 | BES2 | e^+e^- |
| 1.10±0.17±0.18 | 486 | EATON 84 | MRK2 | e^+e^- |
| 1.6 ±0.3 | 77 | PERUZZI 78 | MRK1 | e^+e^- |



$\Gamma(\rho\bar{p}\eta'(958))/\Gamma_{\text{total}}$ Γ_{115}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|----------|----------------------|---------|----------|
| 0.21 ± 0.04 OUR AVERAGE | | | | |
| 0.200 ± 0.023 ± 0.028 | 265 ± 31 | ¹ ABLIKIM | 09 BES2 | e^+e^- |
| 0.68 ± 0.23 ± 0.17 | 19 | EATON | 84 MRK2 | e^+e^- |
| 1.8 ± 0.6 | 19 | PERUZZI | 78 MRK1 | e^+e^- |

¹From the combination of $p\bar{p}\eta' \rightarrow p\bar{p}\pi^+\pi^-\eta$ and $p\bar{p}\eta' \rightarrow p\bar{p}\gamma\rho^0$ channels.

$\Gamma(\rho\bar{p}a_0(980) \rightarrow \rho\bar{p}\pi^0\eta)/\Gamma_{\text{total}}$ Γ_{116}/Γ

| VALUE (units 10^{-5}) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-------------|------|-----------------------------|
| 6.8 ± 1.2 ± 1.3 | ABLIKIM 14N | BES3 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(\rho\bar{p}\phi)/\Gamma_{\text{total}}$ Γ_{117}/Γ

| VALUE (units 10^{-4}) | DOCUMENT ID | TECN | COMMENT |
|---------------------------|-------------|------|-------------------------------------|
| 0.45 ± 0.13 ± 0.07 | FALVARD 88 | DM2 | $J/\psi \rightarrow \text{hadrons}$ |

$\Gamma(n\bar{n})/\Gamma_{\text{total}}$ Γ_{118}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|------|-------------|------|----------|
| 2.09 ± 0.16 OUR AVERAGE | | | | |
| 2.07 ± 0.01 ± 0.17 | 36k | ABLIKIM 12C | BES3 | e^+e^- |
| 2.31 ± 0.49 | 79 | BALDINI 98 | FENI | e^+e^- |
| 1.8 ± 0.9 | | BESCH 78 | BONA | e^+e^- |

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

| | | | | |
|-------------|----|--------------|------|----------|
| 1.90 ± 0.55 | 40 | ANTONELLI 93 | SPEC | e^+e^- |
|-------------|----|--------------|------|----------|

$\Gamma(n\bar{n}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{119}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|----------|
| 3.8 ± 3.6 | 5 | BESCH 81 | BONA | e^+e^- |

$\Gamma(\Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}$ Γ_{120}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|-------------|------|-----------------------------|
| 1.50 ± 0.10 ± 0.22 | 399 | ABLIKIM 08O | BES2 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(\Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{121}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|----------|--------------------------|------|--|
| 1.29 ± 0.09 OUR AVERAGE | | | | |
| 1.15 ± 0.24 ± 0.03 | | ¹ AUBERT 07BD | BABR | 10.6 $e^+e^- \rightarrow \Sigma^0\bar{\Sigma}^0\gamma$ |
| 1.33 ± 0.04 ± 0.11 | 1779 | ABLIKIM 06 | BES2 | $J/\psi \rightarrow \Sigma^0\bar{\Sigma}^0$ |
| 1.06 ± 0.04 ± 0.23 | 884 ± 30 | PALLIN 87 | DM2 | $e^+e^- \rightarrow \Sigma^0\bar{\Sigma}^0$ |
| 1.58 ± 0.16 ± 0.25 | 90 | EATON 84 | MRK2 | $e^+e^- \rightarrow \Sigma^0\bar{\Sigma}^0$ |
| 1.3 ± 0.4 | 52 | PERUZZI 78 | MRK1 | $e^+e^- \rightarrow \Sigma^0\bar{\Sigma}^0$ |

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

| | | | | |
|-----------|---|----------|------|---|
| 2.4 ± 2.6 | 3 | BESCH 81 | BONA | $e^+e^- \rightarrow \Sigma^+\bar{\Sigma}^-$ |
|-----------|---|----------|------|---|

¹AUBERT 07BD reports $[\Gamma(J/\psi(1S) \rightarrow \Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = (6.4 \pm 1.2 \pm 0.6) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(2(\pi^+\pi^-)K^+K^-)/\Gamma_{\text{total}}$ Γ_{122}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|-------------------------------------|----------|---|
| 47 ± 7 OUR AVERAGE | | Error includes scale factor of 1.3. | | |
| 49.8 ± 4.2 ± 3.4 | 205 | ¹ AUBERT | 06D BABR | 10.6 $e^+e^- \rightarrow \omega K^+K^- 2(\pi^+\pi^-)\gamma$ |
| 31 ± 13 | 30 | VANNUCCI | 77 MRK1 | e^+e^- |

¹ Using $\Gamma(J/\psi \rightarrow e^+e^-) = 5.52 \pm 0.14 \pm 0.04$ keV.

$\Gamma(p\bar{n}\pi^-)/\Gamma_{\text{total}}$ Γ_{123}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|------|-------------|----------|------------------------------------|
| 2.12 ± 0.09 OUR AVERAGE | | | | |
| 2.36 ± 0.02 ± 0.21 | 59k | ABLIKIM | 06K BES2 | $J/\psi \rightarrow p\pi^-\bar{n}$ |
| 2.47 ± 0.02 ± 0.24 | 55k | ABLIKIM | 06K BES2 | $J/\psi \rightarrow \bar{p}\pi^+n$ |
| 2.02 ± 0.07 ± 0.16 | 1288 | EATON | 84 MRK2 | $e^+e^- \rightarrow p\pi^-$ |
| 1.93 ± 0.07 ± 0.16 | 1191 | EATON | 84 MRK2 | $e^+e^- \rightarrow \bar{p}\pi^+$ |
| 1.7 ± 0.7 | 32 | BESCH | 81 BONA | $e^+e^- \rightarrow p\pi^-$ |
| 1.6 ± 1.2 | 5 | BESCH | 81 BONA | $e^+e^- \rightarrow \bar{p}\pi^+$ |
| 2.16 ± 0.29 | 194 | PERUZZI | 78 MRK1 | $e^+e^- \rightarrow p\pi^-$ |
| 2.04 ± 0.27 | 204 | PERUZZI | 78 MRK1 | $e^+e^- \rightarrow \bar{p}\pi^+$ |

$\Gamma(\Xi^-\Xi^+)/\Gamma_{\text{total}}$ Γ_{127}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|----------|-------------------------------------|----------|---------------------------------|
| 0.86 ± 0.11 OUR AVERAGE | | Error includes scale factor of 1.2. | | |
| 0.90 ± 0.03 ± 0.18 | 961 ± 35 | ABLIKIM | 12P BES2 | $J/\psi \rightarrow \Xi^-\Xi^+$ |
| 0.70 ± 0.06 ± 0.12 | 132 ± 11 | HENRARD | 87 DM2 | $e^+e^- \rightarrow \Xi^-\Xi^+$ |
| 1.14 ± 0.08 ± 0.20 | 194 | EATON | 84 MRK2 | $e^+e^- \rightarrow \Xi^-\Xi^+$ |
| 1.4 ± 0.5 | 51 | PERUZZI | 78 MRK1 | $e^+e^- \rightarrow \Xi^-\Xi^+$ |

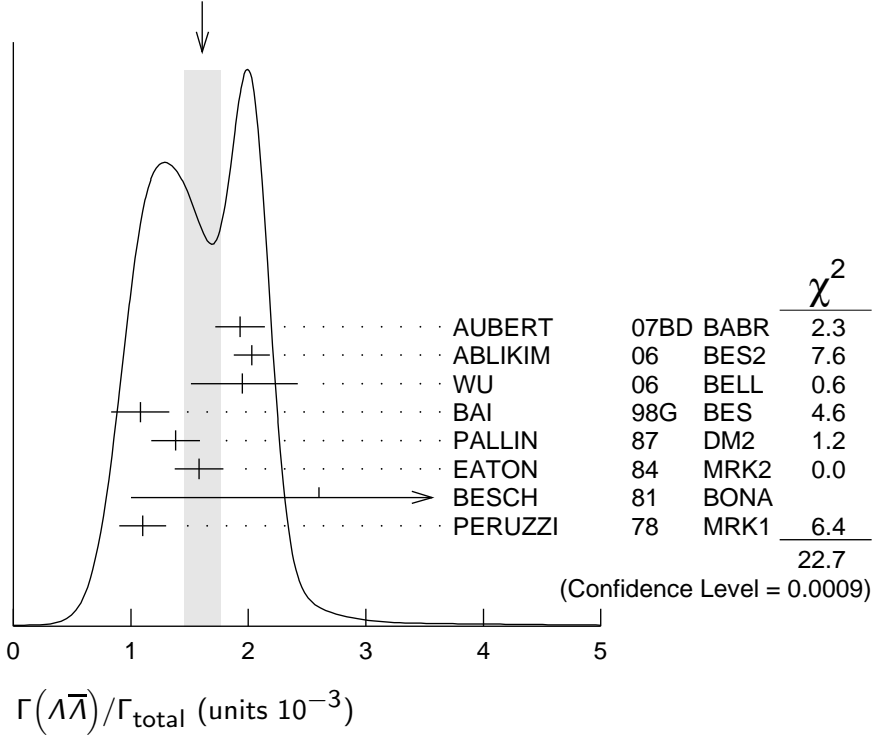
$\Gamma(\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$ Γ_{128}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------------|------|---|-----------|--|
| 1.61 ± 0.15 OUR AVERAGE | | Error includes scale factor of 1.9. See the ideogram below. | | |
| 1.93 ± 0.21 ± 0.05 | | ¹ AUBERT | 07BD BABR | 10.6 $e^+e^- \rightarrow \Lambda\bar{\Lambda}\gamma$ |
| 2.03 ± 0.03 ± 0.15 | 8887 | ABLIKIM | 06 BES2 | $J/\psi \rightarrow \Lambda\bar{\Lambda}$ |
| 1.9 $^{+0.5}_{-0.4}$ ± 0.1 | 46 | ² WU | 06 BELL | $B^+ \rightarrow \Lambda\bar{\Lambda}K^+$ |
| 1.08 ± 0.06 ± 0.24 | 631 | BAI | 98G BES | e^+e^- |
| 1.38 ± 0.05 ± 0.20 | 1847 | PALLIN | 87 DM2 | e^+e^- |
| 1.58 ± 0.08 ± 0.19 | 365 | EATON | 84 MRK2 | e^+e^- |
| 2.6 ± 1.6 | 5 | BESCH | 81 BONA | e^+e^- |
| 1.1 ± 0.2 | 196 | PERUZZI | 78 MRK1 | e^+e^- |

¹ AUBERT 07BD reports $[\Gamma(J/\psi(1S) \rightarrow \Lambda\bar{\Lambda})/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+e^-)] = (10.7 \pm 0.9 \pm 0.7) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² WU 06 reports $[\Gamma(J/\psi(1S) \rightarrow \Lambda\bar{\Lambda})/\Gamma_{\text{total}}] \times [B(B^+ \rightarrow J/\psi(1S)K^+)] = (2.00 $^{+0.34}_{-0.29}$ ± 0.34) × 10⁻⁶$ which we divide by our best value $B(B^+ \rightarrow J/\psi(1S)K^+) = (1.026 \pm 0.031) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

WEIGHTED AVERAGE
 1.61 ± 0.15 (Error scaled by 1.9)



$\Gamma(\Lambda\bar{\Lambda})/\Gamma(p\bar{p})$

$\Gamma_{128}/\Gamma_{108}$

| VALUE | DOCUMENT ID | TECN | COMMENT |
|---------------------------------|-----------------|---------|--|
| $0.90^{+0.15}_{-0.14} \pm 0.10$ | ¹ WU | 06 BELL | $B^+ \rightarrow p\bar{p}K^+, \Lambda\bar{\Lambda}K^+$ |

¹ Not independent of other $J/\psi \rightarrow \Lambda\bar{\Lambda}, p\bar{p}$ branching ratios reported by WU 06.

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

Γ_{129}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|--------------|----------------------|----------|---|
| 0.83 ± 0.07 OUR AVERAGE | | | | Error includes scale factor of 1.2. |
| $0.770 \pm 0.051 \pm 0.083$ | 335 | ¹ ABLIKIM | 07H BES2 | $e^+e^- \rightarrow \bar{\Lambda}\Sigma^+\pi^-$ |
| $0.747 \pm 0.056 \pm 0.076$ | 254 | ¹ ABLIKIM | 07H BES2 | $e^+e^- \rightarrow \Lambda\bar{\Sigma}^-\pi^+$ |
| $0.90 \pm 0.06 \pm 0.16$ | 225 ± 15 | HENRARD | 87 DM2 | $e^+e^- \rightarrow \bar{\Lambda}\Sigma^+\pi^-$ |
| $1.11 \pm 0.06 \pm 0.20$ | 342 ± 18 | HENRARD | 87 DM2 | $e^+e^- \rightarrow \Lambda\bar{\Sigma}^-\pi^+$ |
| $1.53 \pm 0.17 \pm 0.38$ | 135 | EATON | 84 MRK2 | $e^+e^- \rightarrow \bar{\Lambda}\Sigma^+\pi^-$ |
| $1.38 \pm 0.21 \pm 0.35$ | 118 | EATON | 84 MRK2 | $e^+e^- \rightarrow \Lambda\bar{\Sigma}^-\pi^+$ |

¹ Using $B(\Lambda \rightarrow \pi^- p) = 63.9\%$ and $B(\Sigma^+ \rightarrow \pi^0 p) = 51.6\%$.

$\Gamma(pK^-\bar{\Lambda})/\Gamma_{\text{total}}$

Γ_{130}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|-------------|---------|----------|
| $0.89 \pm 0.07 \pm 0.14$ | 307 | EATON | 84 MRK2 | e^+e^- |

$\Gamma(2(K^+ K^-))/\Gamma_{\text{total}}$ Γ_{131}/Γ

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

0.76±0.09 OUR AVERAGE0.74±0.09±0.02 156 ± 15 ¹ AUBERT 07AK BABR 10.6 $e^+ e^- \rightarrow 2(K^+ K^-)\gamma$ 1.4 $^{+0.5}_{-0.4} \pm 0.2$ 11.0 $^{+4.3}_{-3.5}$ ² HUANG 03 BELL $B^+ \rightarrow 2(K^+ K^-) K^+$ 0.7 ± 0.3 VANNUCCI 77 MRK1 $e^+ e^-$

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

0.72±0.17±0.02 38 ³ AUBERT 05D BABR 10.6 $e^+ e^- \rightarrow 2(K^+ K^-)\gamma$

¹ AUBERT 07AK reports $[\Gamma(J/\psi(1S) \rightarrow 2(K^+ K^-))/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (4.11 \pm 0.39 \pm 0.30) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

² Using $B(B^+ \rightarrow J/\psi K^+) = (1.01 \pm 0.05) \times 10^{-3}$.

³ Superseded by AUBERT 07AK. AUBERT 05D reports $[\Gamma(J/\psi(1S) \rightarrow 2(K^+ K^-))/\Gamma_{\text{total}}] \times [\Gamma(J/\psi(1S) \rightarrow e^+ e^-)] = (4.0 \pm 0.7 \pm 0.6) \times 10^{-3}$ keV which we divide by our best value $\Gamma(J/\psi(1S) \rightarrow e^+ e^-) = 5.55 \pm 0.14 \pm 0.02$ keV. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\Gamma(p K^- \bar{\Sigma}^0)/\Gamma_{\text{total}}$ Γ_{132}/Γ

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

0.29±0.06±0.05 90 EATON 84 MRK2 $e^+ e^-$ $\Gamma(K^+ K^-)/\Gamma_{\text{total}}$ Γ_{133}/Γ

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

2.86±0.09±0.19 1k ¹ METREVELI 12 $\psi(2S) \rightarrow \pi^+ \pi^- K^+ K^-$

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

3.22±0.20±0.12 462 ^{2,3} LEES 15J BABR $e^+ e^- \rightarrow K^+ K^- \gamma$ 3.50±0.20±0.12 462 ^{3,4} LEES 15J BABR $e^+ e^- \rightarrow K^+ K^- \gamma$ 2.39±0.24±0.22 107 ⁵ BALTRUSAIT..85D MRK3 $e^+ e^-$ 2.2 ± 0.9 6 ⁵ BRANDELIK 79C DASP $e^+ e^-$

¹ Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.

² $\sin\phi > 0$.

³ Using $\Gamma(J/\psi \rightarrow e^+ e^-) = (5.55 \pm 0.14)$ keV.

⁴ $\sin\phi < 0$.

⁵ Interference with non-resonant $K^+ K^-$ production not taken into account.

 $\Gamma(K_S^0 K_L^0)/\Gamma_{\text{total}}$ Γ_{134}/Γ

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

2.1 ± 0.4 OUR AVERAGE Error includes scale factor of 3.2.2.62±0.15±0.14 0.3k ¹ METREVELI 12 $\psi(2S) \rightarrow \pi^+ \pi^- K_S^0 K_L^0$ 1.82±0.04±0.13 2.1k ² BAI 04A BES2 $J/\psi \rightarrow K_S^0 K_L^0 \rightarrow \pi^+ \pi^- X$

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

1.18±0.12±0.18 JOUSSET 90 DM2 $J/\psi \rightarrow$ hadrons1.01±0.16±0.09 74 BALTRUSAIT..85D MRK3 $e^+ e^-$

¹ Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.

² Using $B(K_S^0 \rightarrow \pi^+ \pi^-) = 0.6868 \pm 0.0027$.

$\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{135}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|----------|----------|
| 4.30±0.13±0.99 | 2.4k | ABLIKIM | 12P BES2 | J/ψ |

$\Gamma(\Lambda\bar{\Lambda}\eta)/\Gamma_{\text{total}}$ Γ_{136}/Γ

| VALUE (units 10^{-5}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|-----------------------------|------|----------------------|----------|---|
| 16.2±1.7 OUR AVERAGE | | | | |
| 15.7±0.80±1.54 | 454 | ¹ ABLIKIM | 13F BES3 | $J/\psi \rightarrow p\bar{p}\pi^+\pi^-\gamma\gamma$ |
| 26.2±6.0 ±4.4 | 44 | ² ABLIKIM | 07H BES2 | $e^+e^- \rightarrow \psi(2S)$ |

¹ Using $B(\Lambda \rightarrow \pi^- p) = 63.9\%$ and $B(\eta \rightarrow \gamma\gamma) = 39.31\%$.

² Using $B(\Lambda \rightarrow \pi^- p) = 63.9\%$ and $B(\eta \rightarrow \gamma\gamma) = 39.4\%$.

$\Gamma(\Lambda\bar{\Lambda}\pi^0)/\Gamma_{\text{total}}$ Γ_{137}/Γ

| VALUE (units 10^{-5}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|------|----------------------|----------|---|
| 3.78±0.27±0.30 | | 323 | ¹ ABLIKIM | 13F BES3 | $J/\psi \rightarrow p\bar{p}\pi^+\pi^-\gamma\gamma$ |

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

| | | | | |
|----------|----|----------------------|----------|-------------------------------|
| < 6.4 | 90 | ² ABLIKIM | 07H BES2 | $e^+e^- \rightarrow \psi(2S)$ |
| 23 ±7 ±8 | 11 | BAI | 98G BES | e^+e^- |
| 22 ±5 ±5 | 19 | HENRARD | 87 DM2 | e^+e^- |

¹ Using $B(\Lambda \rightarrow \pi^- p) = 63.9\%$ and $B(\pi^0 \rightarrow \gamma\gamma) = 98.8\%$.

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

$\Gamma(\bar{\Lambda}nK_S^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{138}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|----------------------|----------|-----------------------------|
| 6.46±0.20±1.07 | 1058 | ¹ ABLIKIM | 08C BES2 | $e^+e^- \rightarrow J/\psi$ |

¹ Using $B(\bar{\Lambda} \rightarrow \bar{p}\pi^+) = 63.9\%$ and $B(K_S^0 \rightarrow \pi^+\pi^-) = 69.2\%$.

$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{139}/Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|------|------------------------|----------|--------------------------------------|
| 1.47±0.14 OUR AVERAGE | | | | |
| 1.47±0.13±0.13 | 140 | ¹ METREVELI | 12 | $\psi(2S) \rightarrow 2(\pi^+\pi^-)$ |
| 1.58±0.20±0.15 | 84 | BALTRUSAIT..85D | MRK3 | e^+e^- |
| 1.0 ±0.5 | 5 | BRANDELIK | 78B DASP | e^+e^- |
| 1.6 ±1.6 | 1 | VANNUCCI | 77 MRK1 | e^+e^- |

¹ Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(\Lambda\bar{\Sigma} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{140}/Γ

| VALUE (units 10^{-5}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|-----|----------|----------------------|----------|--|
| 2.83±0.23 OUR AVERAGE | | | | | |
| 2.74±0.24±0.22 | | 234 ± 21 | ¹ ABLIKIM | 12B BES3 | $J/\psi \rightarrow \Lambda\bar{\Sigma}^0$ |
| 2.92±0.22±0.24 | | 308 ± 24 | ² ABLIKIM | 12B BES3 | $J/\psi \rightarrow \bar{\Lambda}\Sigma^0$ |

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

| | | | | |
|-----|----|---------|---------|--------------------------------|
| <15 | 90 | PERUZZI | 78 MRK1 | $e^+e^- \rightarrow \Lambda X$ |
|-----|----|---------|---------|--------------------------------|

¹ ABLIKIM 12B quotes $B(J/\psi \rightarrow \Lambda\bar{\Sigma}^0)$ which we multiply by 2.

² ABLIKIM 12B quotes $B(J/\psi \rightarrow \bar{\Lambda}\Sigma^0)$ which we multiply by 2.

$\Gamma(K_S^0 K_S^0)/\Gamma_{\text{total}}$ Γ_{141}/Γ

| VALUE (units 10^{-4}) | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|------------------------------|------|--------------|
| <0.01 | 95 | ¹ BAI | 04D | BES e^+e^- |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| <0.052 | 90 | ¹ BALTRUSAIT..85C | MRK3 | e^+e^- |
| ¹ Forbidden by <i>CP</i> . | | | | |

————— RADIATIVE DECAYS —————

$\Gamma(3\gamma)/\Gamma_{\text{total}}$ Γ_{142}/Γ

| VALUE (units 10^{-6}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|-----|--------------------------------------|-------------|------|---|
| 11.6 ± 2.2 OUR AVERAGE | | | | | |
| 11.3 ± 1.8 ± 2.0 | | 113 ± 18 | ABLIKIM | 13I | BES3 $\psi(2S) \rightarrow \pi^+\pi^- J/\psi$ |
| 12 ± 3 ± 2 | | 24.2 ^{+7.2} _{-6.0} | ADAMS | 08 | CLEO $\psi(2S) \rightarrow \pi^+\pi^- J/\psi$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| <55 | 90 | | PARTRIDGE | 80 | CBAL e^+e^- |

$\Gamma(4\gamma)/\Gamma_{\text{total}}$ Γ_{143}/Γ

| VALUE (units 10^{-6}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|---|
| <9 | 90 | ADAMS | 08 | CLEO $\psi(2S) \rightarrow \pi^+\pi^- J/\psi$ |

$\Gamma(5\gamma)/\Gamma_{\text{total}}$ Γ_{144}/Γ

| VALUE (units 10^{-6}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|---|
| <15 | 90 | ADAMS | 08 | CLEO $\psi(2S) \rightarrow \pi^+\pi^- J/\psi$ |

$\Gamma(\gamma\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_{145}/Γ

| VALUE (units 10^{-3}) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|----------------------|------|--|
| 1.15 ± 0.05 | ¹ ABLIKIM | 15AE | BES3 $J/\psi \rightarrow \gamma\pi^0\pi^0$ |

¹The uncertainty is systematic as statistical is negligible.

$\Gamma(\gamma\eta_c(1S))/\Gamma_{\text{total}}$ Γ_{146}/Γ

| VALUE (units 10^{-2}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|----------|-----------------------|------|---|
| 1.7 ± 0.4 OUR AVERAGE Error includes scale factor of 1.5. | | | | |
| 2.01 ± 0.32 ± 0.02 | | ¹ MITCHELL | 09 | CLEO $e^+e^- \rightarrow \gamma X$ |
| 1.27 ± 0.36 | | GAISER | 86 | CBAL $J/\psi \rightarrow \gamma X$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| seen | | ANASHIN | 14 | KEDR $J/\psi \rightarrow \gamma\eta_c$ |
| 0.79 ± 0.20 | 273 ± 43 | ² AUBERT | 06E | BABR $B^\pm \rightarrow K^\pm X_{c\bar{c}}$ |
| seen | 16 | BALTRUSAIT..84 | MRK3 | $J/\psi \rightarrow 2\phi\gamma$ |

¹MITCHELL 09 reports $(1.98 \pm 0.09 \pm 0.30) \times 10^{-2}$ from a measurement of $[\Gamma(J/\psi(1S) \rightarrow \gamma\eta_c(1S))/\Gamma_{\text{total}}] \times [B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)]$ assuming $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (35.04 \pm 0.07 \pm 0.77) \times 10^{-2}$, which we rescale to our best value $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (34.49 \pm 0.30) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

²Calculated by the authors using an average of $B(J/\psi \rightarrow \gamma\eta_c) \times B(\eta_c \rightarrow K\bar{K}\pi)$ from BALTRUSAITIS 86, BISELLO 91, BAI 04 and $B(\eta_c \rightarrow K\bar{K}\pi) = (8.5 \pm 1.8)\%$ from AUBERT 06E.

$\Gamma(\gamma\eta_c(1S) \rightarrow 3\gamma)/\Gamma_{\text{total}}$ Γ_{147}/Γ

| VALUE (units 10^{-6}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

$3.8^{+1.3}_{-1.0}$ OUR AVERAGE Error includes scale factor of 1.1.

| | | | | |
|-----------------------------|---------------------|---------|-----|--|
| $4.5 \pm 1.2 \pm 0.6$ | 33 ± 9 | ABLIKIM | 13I | BES3 $\psi(2S) \rightarrow \pi^+ \pi^- J/\psi$ |
| $1.2^{+2.7}_{-1.1} \pm 0.3$ | $1.2^{+2.8}_{-1.1}$ | ADAMS | 08 | CLEO $\psi(2S) \rightarrow \pi^+ \pi^- J/\psi$ |

$\Gamma(\gamma\pi^+ \pi^- 2\pi^0)/\Gamma_{\text{total}}$ Γ_{148}/Γ

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

$8.3 \pm 0.2 \pm 3.1$ ¹ BALTRUSAIT ..86B MRK3 $J/\psi \rightarrow 4\pi\gamma$

¹ 4π mass less than 2.0 GeV.

$\Gamma(\gamma\eta\pi\pi)/\Gamma_{\text{total}}$ Γ_{149}/Γ

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

6.1 ± 1.0 OUR AVERAGE

| | | | |
|-------------------------|----------------------|-----|--|
| $5.85 \pm 0.3 \pm 1.05$ | ¹ EDWARDS | 83B | CBAL $J/\psi \rightarrow \eta\pi^+\pi^-$ |
| $7.8 \pm 1.2 \pm 2.4$ | ¹ EDWARDS | 83B | CBAL $J/\psi \rightarrow \eta 2\pi^0$ |

¹ Broad enhancement at 1700 MeV.

$\Gamma(\gamma\eta_2(1870) \rightarrow \gamma\eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{150}/Γ

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

$6.2 \pm 2.2 \pm 0.9$ BAI 99 BES $J/\psi \rightarrow \gamma\eta\pi^+\pi^-$

$\Gamma(\gamma\eta(1405/1475) \rightarrow \gamma K \bar{K} \pi)/\Gamma_{\text{total}}$ Γ_{151}/Γ

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

2.8 ± 0.6 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.

| | | | |
|-------------------------|------------------------|-----|---|
| $1.66 \pm 0.1 \pm 0.58$ | ^{1,2} BAI | 00D | BES $J/\psi \rightarrow \gamma K^\pm K_S^0 \pi^\mp$ |
| $3.8 \pm 0.3 \pm 0.6$ | ³ AUGUSTIN | 90 | DM2 $J/\psi \rightarrow \gamma K \bar{K} \pi$ |
| $4.0 \pm 0.7 \pm 1.0$ | ³ EDWARDS | 82E | CBAL $J/\psi \rightarrow K^+ K^- \pi^0 \gamma$ |
| 4.3 ± 1.7 | ^{3,4} SCHARRE | 80 | MRK2 $e^+ e^-$ |

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

| | | | |
|----------------------------------|---------------------------|-----|--|
| $1.78 \pm 0.21 \pm 0.33$ | ^{3,5,6} AUGUSTIN | 92 | DM2 $J/\psi \rightarrow \gamma K \bar{K} \pi$ |
| $0.83 \pm 0.13 \pm 0.18$ | ^{3,7,8} AUGUSTIN | 92 | DM2 $J/\psi \rightarrow \gamma K \bar{K} \pi$ |
| $0.66^{+0.17+0.24}_{-0.16-0.15}$ | ^{3,6,9} BAI | 90C | MRK3 $J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$ |
| $1.03^{+0.21+0.26}_{-0.18-0.19}$ | ^{3,8,10} BAI | 90C | MRK3 $J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$ |

¹ Interference with the $J/\psi(1S)$ radiative transition to the broad $K \bar{K} \pi$ pseudoscalar state around 1800 is $(0.15 \pm 0.01 \pm 0.05) \times 10^{-3}$.

² Interference with $J/\psi \rightarrow \gamma f_1(1420)$ is $(-0.03 \pm 0.01 \pm 0.01) \times 10^{-3}$.

³ Includes unknown branching fraction $\eta(1405) \rightarrow K \bar{K} \pi$.

⁴ Corrected for spin-zero hypothesis for $\eta(1405)$.

⁵ From fit to the $a_0(980)\pi 0^-+$ partial wave.

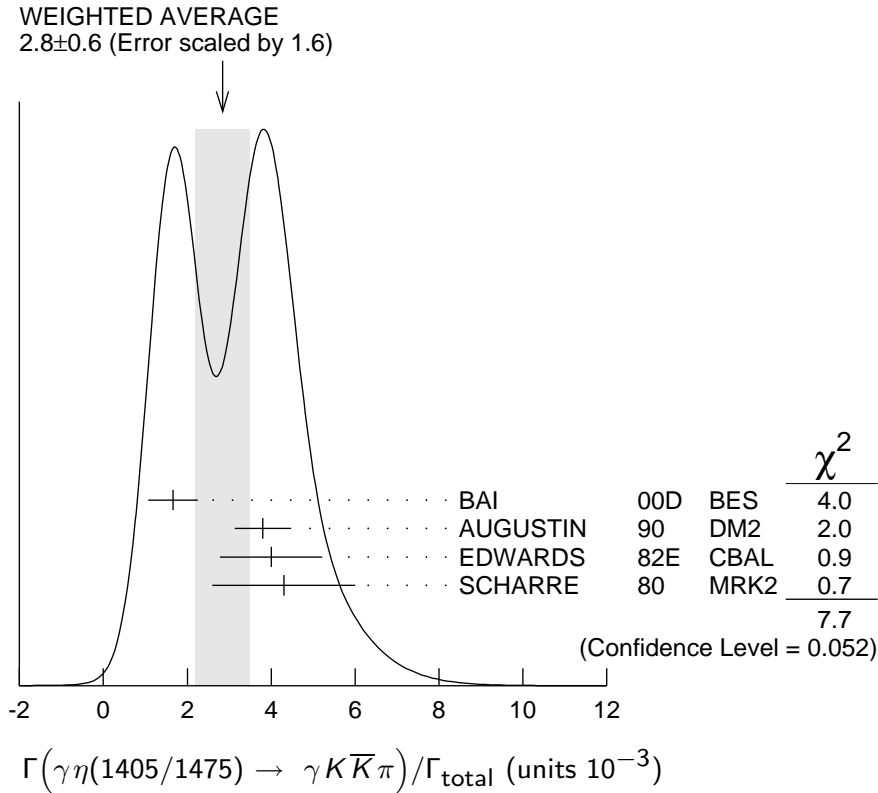
⁶ $a_0(980)\pi$ mode.

⁷ From fit to the $K^*(892)K 0^-+$ partial wave.

⁸ $K^* K$ mode.

⁹ From $a_0(980)\pi$ final state.

¹⁰ From $K^*(890)K$ final state.



$\Gamma(\gamma\eta(1405/1475) \rightarrow \gamma\gamma\rho^0) / \Gamma_{\text{total}}$ Γ_{152} / Γ

| <u>VALUE (units 10^{-4})</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------------------------------|-------------|---|
| 0.78 ± 0.20 OUR AVERAGE | Error includes scale factor of 1.8. | | |
| $1.07 \pm 0.17 \pm 0.11$ | ¹ BAI | 04J BES2 | $J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$ |
| $0.64 \pm 0.12 \pm 0.07$ | ¹ COFFMAN | 90 MRK3 | $J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$ |

¹ Includes unknown branching fraction $\eta(1405) \rightarrow \gamma\rho^0$.

$\Gamma(\gamma\eta(1405/1475) \rightarrow \gamma\eta\pi^+\pi^-) / \Gamma_{\text{total}}$ Γ_{153} / Γ

| <u>VALUE (units 10^{-4})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|---------------------|-------------|---|
| 3.0 ± 0.5 OUR AVERAGE | | | | |
| $2.6 \pm 0.7 \pm 0.4$ | | BAI | 99 BES | $J/\psi \rightarrow \gamma\eta\pi^+\pi^-$ |
| $3.38 \pm 0.33 \pm 0.64$ | | ¹ BOLTON | 92B MRK3 | $J/\psi \rightarrow \gamma\eta\pi^+\pi^-$ |

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

| | | | | |
|-----------------------|-----|-----------------------|--------|---|
| $7.0 \pm 0.6 \pm 1.1$ | 261 | ² AUGUSTIN | 90 DM2 | $J/\psi \rightarrow \gamma\eta\pi^+\pi^-$ |
|-----------------------|-----|-----------------------|--------|---|

¹ Via $a_0(980)\pi$.

² Includes unknown branching fraction to $\eta\pi^+\pi^-$.

$\Gamma(\gamma\eta(1405/1475) \rightarrow \gamma\gamma\phi) / \Gamma_{\text{total}}$ Γ_{154} / Γ

| <u>VALUE (units 10^{-4})</u> | <u>CL%</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|------------|--------------------|-------------|---|
| <0.82 | 95 | BAI | 04J BES2 | $J/\psi \rightarrow \gamma\gamma K^+ K^-$ |

$\Gamma(\gamma\rho\rho)/\Gamma_{\text{total}}$ Γ_{155}/Γ

| VALUE (units 10^{-3}) | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|------------------------------|------|--------------------------------------|
| 4.5 ± 0.8 | | OUR AVERAGE | | |
| 4.7 ± 0.3 ± 0.9 | | ¹ BALTRUSAIT..86B | MRK3 | $J/\psi \rightarrow 4\pi\gamma$ |
| 3.75 ± 1.05 ± 1.20 | | ² BURKE | 82 | MRK2 $J/\psi \rightarrow 4\pi\gamma$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| <0.09 | 90 | ³ BISELLO | 89B | $J/\psi \rightarrow 4\pi\gamma$ |
| ¹ 4π mass less than 2.0 GeV. | | | | |
| ² 4π mass less than 2.0 GeV. We have multiplied $2\rho^0$ measurement by 3 to obtain 2ρ . | | | | |
| ³ 4π mass in the range 2.0–25 GeV. | | | | |

 $\Gamma(\gamma\rho\omega)/\Gamma_{\text{total}}$ Γ_{156}/Γ

| VALUE (units 10^{-4}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|----------------------------------|
| <5.4 | 90 | ABLIKIM | 08A | BES2 $e^+e^- \rightarrow J/\psi$ |

 $\Gamma(\gamma\rho\phi)/\Gamma_{\text{total}}$ Γ_{157}/Γ

| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|----------------------------------|
| <8.8 | 90 | ABLIKIM | 08A | BES2 $e^+e^- \rightarrow J/\psi$ |

 $\Gamma(\gamma\eta'(958))/\Gamma_{\text{total}}$ Γ_{158}/Γ

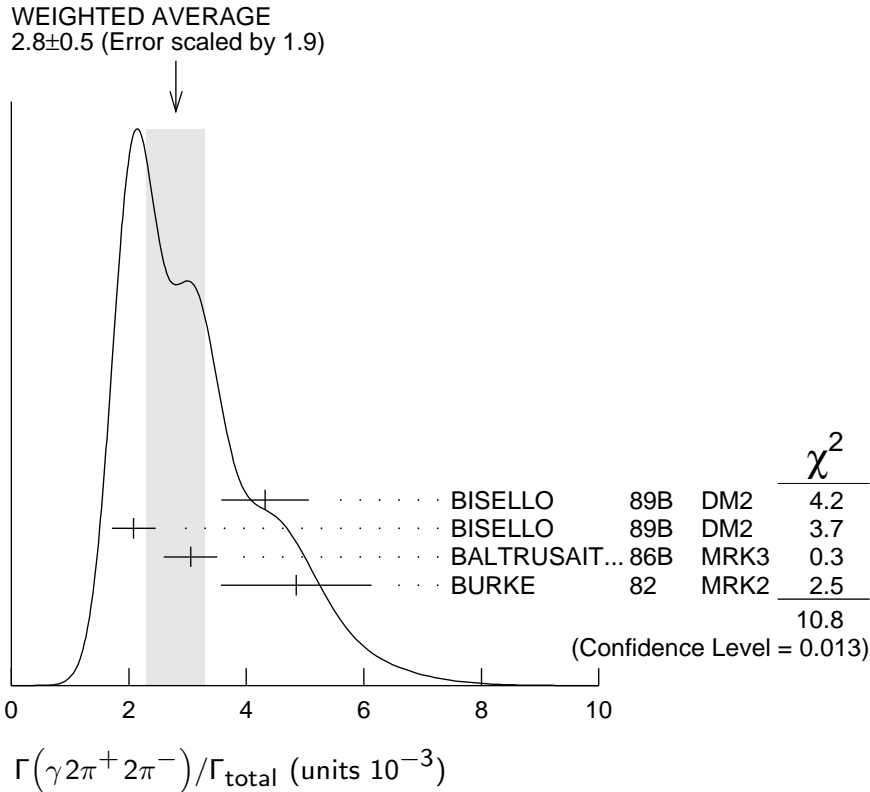
| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|----------------------|------|--|
| 5.15 ± 0.16 | | OUR AVERAGE | | |
| Error includes scale factor of 1.2. | | | | |
| 4.82 ± 0.23 ± 0.08 | | ¹ ABLIKIM | 11 | BES3 $J/\psi \rightarrow \eta'\gamma$ |
| 5.24 ± 0.12 ± 0.11 | | PEDLAR | 09 | CLE3 $J/\psi \rightarrow \eta'\gamma$ |
| 5.55 ± 0.44 | 35k | ABLIKIM | 06E | BES2 $J/\psi \rightarrow \eta'\gamma$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| 4.50 ± 0.14 ± 0.53 | | BOLTON | 92B | MRK3 $J/\psi \rightarrow \gamma\pi^+\pi^-\eta, \eta \rightarrow \gamma\gamma$ |
| 4.30 ± 0.31 ± 0.71 | | BOLTON | 92B | MRK3 $J/\psi \rightarrow \gamma\pi^+\pi^-\eta, \eta \rightarrow \pi^+\pi^-\pi^0$ |
| 4.04 ± 0.16 ± 0.85 | 622 | AUGUSTIN | 90 | DM2 $J/\psi \rightarrow \gamma\eta\pi^+\pi^-$ |
| 4.39 ± 0.09 ± 0.66 | 2420 | AUGUSTIN | 90 | DM2 $J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$ |
| 4.1 ± 0.3 ± 0.6 | | BLOOM | 83 | CBAL $e^+e^- \rightarrow 3\gamma + \text{hadrons}$ |
| 2.9 ± 1.1 | 6 | BRANDELIK | 79C | DASP $e^+e^- \rightarrow 3\gamma$ |
| 2.4 ± 0.7 | 57 | BARTEL | 76 | CNTR $e^+e^- \rightarrow 2\gamma\rho$ |

¹ ABLIKIM 11 reports $(4.84 \pm 0.03 \pm 0.24) \times 10^{-3}$ from a measurement of $[\Gamma(J/\psi(1S) \rightarrow \gamma\eta'(958))/\Gamma_{\text{total}}] / [B(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)]$ assuming $B(\eta'(958) \rightarrow \pi^+\pi^-\eta) = (43.2 \pm 0.7) \times 10^{-2}$, $B(\eta \rightarrow 2\gamma) = (39.31 \pm 0.20) \times 10^{-2}$, which we rescale to our best values $B(\eta'(958) \rightarrow \pi^+\pi^-\eta) = (42.9 \pm 0.7) \times 10^{-2}$, $B(\eta \rightarrow 2\gamma) = (39.41 \pm 0.20) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

 $\Gamma(\gamma 2\pi^+ 2\pi^-)/\Gamma_{\text{total}}$ Γ_{159}/Γ

| VALUE (units 10^{-3}) | DOCUMENT ID | TECN | COMMENT |
|---|------------------------------|------|-------------------------------------|
| 2.8 ± 0.5 | OUR AVERAGE | | |
| Error includes scale factor of 1.9. See the ideogram below. | | | |
| 4.32 ± 0.14 ± 0.73 | ¹ BISELLO | 89B | DM2 $J/\psi \rightarrow 4\pi\gamma$ |
| 2.08 ± 0.13 ± 0.35 | ² BISELLO | 89B | DM2 $J/\psi \rightarrow 4\pi\gamma$ |
| 3.05 ± 0.08 ± 0.45 | ² BALTRUSAIT..86B | MRK3 | $J/\psi \rightarrow 4\pi\gamma$ |
| 4.85 ± 0.45 ± 1.20 | ³ BURKE | 82 | MRK2 e^+e^- |

- ¹ 4π mass less than 3.0 GeV.
- ² 4π mass less than 2.0 GeV.
- ³ 4π mass less than 2.5 GeV.



$\Gamma(\gamma f_2(1270) f_2(1270)) / \Gamma_{\text{total}}$ Γ_{160} / Γ

| <u>VALUE (units 10^{-4})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|---|
| 9.5±0.7±1.6 | 646 ± 45 | ABLIKIM | 04M BES | $J/\psi \rightarrow \gamma 2\pi^+ 2\pi^-$ |

$\Gamma(\gamma f_2(1270) f_2(1270) (\text{non resonant})) / \Gamma_{\text{total}}$ Γ_{161} / Γ

| <u>VALUE (units 10^{-4})</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|----------------------|-------------|---|
| 8.2±0.8±1.7 | ¹ ABLIKIM | 04M BES | $J/\psi \rightarrow \gamma 2\pi^+ 2\pi^-$ |

¹ Subtracting contribution from intermediate $\eta_c(1S)$ decays.

$\Gamma(\gamma K^+ K^- \pi^+ \pi^-) / \Gamma_{\text{total}}$ Γ_{162} / Γ

| <u>VALUE (units 10^{-3})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|---|
| 2.1±0.1±0.6 | 1516 | BAI | 00B BES | $J/\psi \rightarrow \gamma K^+ K^0 \pi^+ \pi^-$ |

$\Gamma(\gamma f_4(2050)) / \Gamma_{\text{total}}$ Γ_{163} / Γ

| <u>VALUE (units 10^{-3})</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-----------------------------|-------------|---|
| 2.7±0.5±0.5 | ¹ BALTRUSAIT..87 | MRK3 | $J/\psi \rightarrow \gamma \pi^+ \pi^-$ |

¹ Assuming branching fraction $f_4(2050) \rightarrow \pi\pi / \text{total} = 0.167$.

| $\Gamma(\gamma\omega\omega)/\Gamma_{\text{total}}$ | | | | | Γ_{164}/Γ |
|--|----------|-----------------|----------|---|-----------------------|
| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT | |
| 1.61±0.33 OUR AVERAGE | | | | | |
| 6.0 ±4.8 ±1.8 | | ABLIKIM | 08A BES2 | $J/\psi \rightarrow \gamma\omega\pi^+\pi^-$ | |
| 1.41±0.2 ±0.42 | 120 ± 17 | BISELLO | 87 SPEC | e^+e^- , hadrons γ | |
| 1.76±0.09±0.45 | | BALTRUSAIT..85C | MRK3 | $e^+e^- \rightarrow$ hadrons γ | |

| $\Gamma(\gamma\eta(1405/1475) \rightarrow \gamma\rho^0\rho^0)/\Gamma_{\text{total}}$ | | | | | Γ_{165}/Γ |
|--|------------------------|---------|---|--|-------------------------------------|
| VALUE (units 10^{-3}) | DOCUMENT ID | TECN | COMMENT | | |
| 1.7 ±0.4 OUR AVERAGE | | | | | Error includes scale factor of 1.3. |
| 2.1 ±0.4 | BUGG | 95 MRK3 | $J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$ | | |
| 1.36±0.38 | ^{1,2} BISELLO | 89B DM2 | $J/\psi \rightarrow 4\pi\gamma$ | | |

¹ Estimated by us from various fits.

² Includes unknown branching fraction to $\rho^0\rho^0$.

| $\Gamma(\gamma f_2(1270))/\Gamma_{\text{total}}$ | | | | | Γ_{166}/Γ |
|--|------|-----------------------------|----------|--|---|
| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT | |
| 1.64±0.12 OUR AVERAGE | | | | | Error includes scale factor of 1.3. See the ideogram below. |
| 2.07±0.16 ^{+0.02} _{-0.07} | 2.4k | ^{1,2} DOBBS | 15 | $J/\psi \rightarrow \gamma\pi\pi$ | |
| 1.63±0.26 ^{+0.02} _{-0.06} | | ³ ABLIKIM | 06V BES2 | $e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$ | |
| 1.42±0.21 ^{+0.01} _{-0.05} | | ⁴ ABLIKIM | 06V BES2 | $e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^0\pi^0$ | |
| 1.33±0.05±0.20 | | ⁵ AUGUSTIN | 87 DM2 | $J/\psi \rightarrow \gamma\pi^+\pi^-$ | |
| 1.36±0.09±0.23 | | ⁵ BALTRUSAIT..87 | MRK3 | $J/\psi \rightarrow \gamma\pi^+\pi^-$ | |
| 1.48±0.25±0.30 | 178 | EDWARDS | 82B CBAL | $e^+e^- \rightarrow 2\pi^0\gamma$ | |
| 2.0 ±0.7 | 35 | ALEXANDER | 78 PLUT | e^+e^- | |
| 1.2 ±0.6 | 30 | ⁶ BRANDELIK | 78B DASP | $e^+e^- \rightarrow \pi^+\pi^-\gamma$ | |

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² DOBBS 15 reports $[\Gamma(J/\psi(1S) \rightarrow \gamma f_2(1270))/\Gamma_{\text{total}}] \times [B(f_2(1270) \rightarrow \pi\pi)] = (1.744 \pm 0.052 \pm 0.122) \times 10^{-3}$ which we divide by our best value $B(f_2(1270) \rightarrow \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

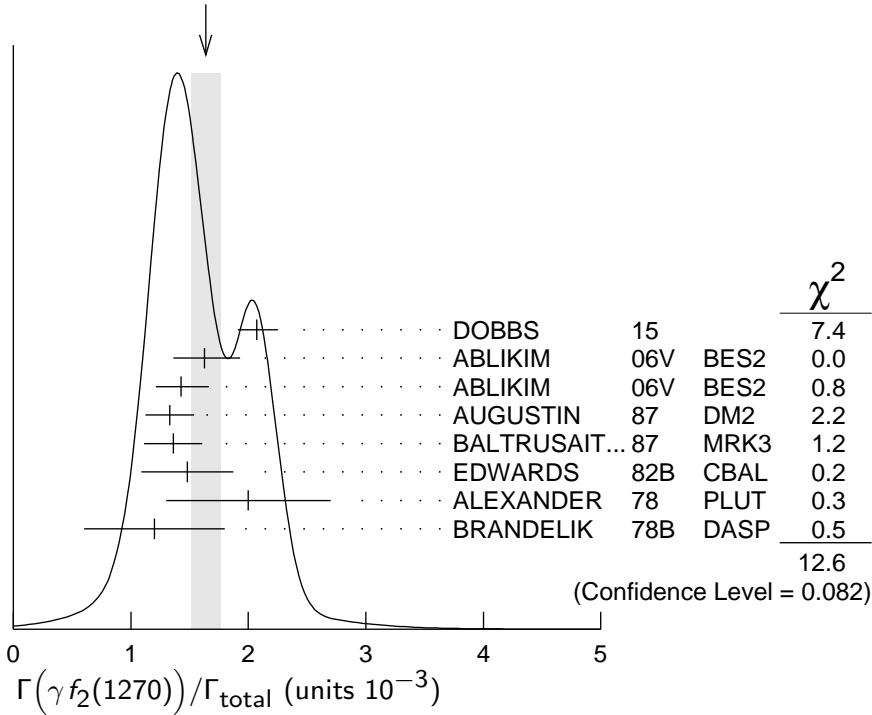
³ ABLIKIM 06V reports $[\Gamma(J/\psi(1S) \rightarrow \gamma f_2(1270))/\Gamma_{\text{total}}] \times [B(f_2(1270) \rightarrow \pi\pi)] = (1.371 \pm 0.010 \pm 0.222) \times 10^{-3}$ which we divide by our best value $B(f_2(1270) \rightarrow \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁴ ABLIKIM 06V reports $[\Gamma(J/\psi(1S) \rightarrow \gamma f_2(1270))/\Gamma_{\text{total}}] \times [B(f_2(1270) \rightarrow \pi\pi)] = (1.200 \pm 0.027 \pm 0.174) \times 10^{-3}$ which we divide by our best value $B(f_2(1270) \rightarrow \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁵ Estimated using $B(f_2(1270) \rightarrow \pi\pi) = 0.843 \pm 0.012$. The errors do not contain the uncertainty in the $f_2(1270)$ decay.

⁶ Restated by us to take account of spread of E1, M2, E3 transitions.

WEIGHTED AVERAGE
 1.64 ± 0.12 (Error scaled by 1.3)



$\Gamma(\gamma f_0(1370) \rightarrow \gamma K \bar{K}) / \Gamma_{\text{total}}$ Γ_{167} / Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | COMMENT |
|--|------|-----------------------|---------------------------------------|
| $4.19 \pm 0.73 \pm 1.34$ | 478 | ¹ DOBBS 15 | $J/\psi \rightarrow \gamma K \bar{K}$ |

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(\gamma f_0(1710) \rightarrow \gamma K \bar{K}) / \Gamma_{\text{total}}$ Γ_{168} / Γ

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

$10.0 \pm \frac{1.1}{0.9}$ OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.

| | | | |
|---------------------------------|------|----------------------------------|---|
| $11.76 \pm 0.54 \pm 0.94$ | 1.2k | ¹ DOBBS 15 | $J/\psi \rightarrow \gamma K \bar{K}$ |
| $9.62 \pm 0.29 \pm 3.51 - 1.86$ | | ² BAI 03G BES | $J/\psi \rightarrow \gamma K \bar{K}$ |
| $5.0 \pm 0.8 \pm 1.8 - 0.4$ | | ^{3,4} BAI 96C BES | $J/\psi \rightarrow \gamma K^+ K^-$ |
| $9.2 \pm 1.4 \pm 1.4$ | | ⁴ AUGUSTIN 88 DM2 | $J/\psi \rightarrow \gamma K^+ K^-$ |
| $10.4 \pm 1.2 \pm 1.6$ | | ⁴ AUGUSTIN 88 DM2 | $J/\psi \rightarrow \gamma K_S^0 K_S^0$ |
| $9.6 \pm 1.2 \pm 1.8$ | | ⁴ BALTRUSAIT..87 MRK3 | $J/\psi \rightarrow \gamma K^+ K^-$ |

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

| | | | |
|-----------------------------|----|----------------------------------|---|
| $1.6 \pm 0.2 \pm 0.6 - 0.2$ | | ^{4,5} BAI 96C BES | $J/\psi \rightarrow \gamma K^+ K^-$ |
| < 0.8 | 90 | ⁶ BISELLO 89B | $J/\psi \rightarrow 4\pi\gamma$ |
| $1.6 \pm 0.4 \pm 0.3$ | | ⁷ BALTRUSAIT..87 MRK3 | $J/\psi \rightarrow \gamma \pi^+ \pi^-$ |
| 3.8 ± 1.6 | | ⁸ EDWARDS 82D CBAL | $e^+ e^- \rightarrow \eta \eta \gamma$ |

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² Includes unknown branching ratio to $K^+ K^-$ or $K_S^0 K_S^0$.

³ Assuming $J^P = 2^+$ for $f_0(1710)$.

⁴ Includes unknown branching fraction to $K^+ K^-$ or $K_S^0 K_S^0$. We have multiplied $K^+ K^-$ measurement by 2, and $K_S^0 K_S^0$ by 4 to obtain $K\bar{K}$ result.

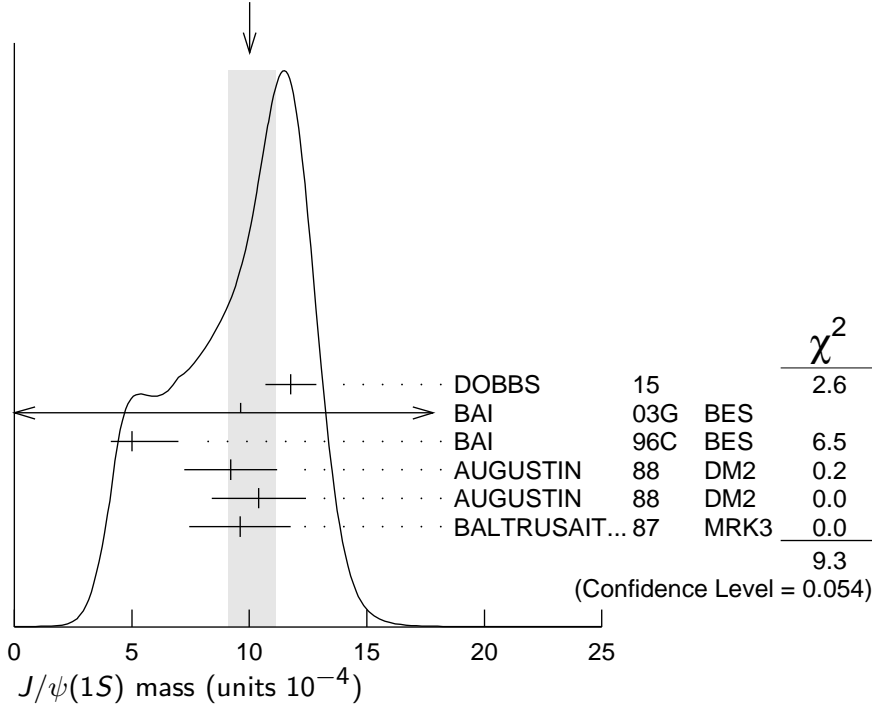
⁵ Assuming $J^P = 0^+$ for $f_0(1710)$.

⁶ Includes unknown branching fraction to $\rho^0 \rho^0$.

⁷ Includes unknown branching fraction to $\pi^+ \pi^-$.

⁸ Includes unknown branching fraction to $\eta\eta$.

WEIGHTED AVERAGE
10.0±1.1-0.9 (Error scaled by 1.5)



$\Gamma(\gamma f_0(1710) \rightarrow \gamma \pi \pi) / \Gamma_{\text{total}}$ Γ_{169} / Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|------|----------------------|----------|---|
| 3.8 ± 0.5 OUR AVERAGE | | | | |
| 3.72 ± 0.30 ± 0.43 | 483 | ¹ DOBBS | 15 | $J/\psi \rightarrow \gamma \pi \pi$ |
| 3.96 ± 0.06 ± 1.12 | | ² ABLIKIM | 06V BES2 | $e^+ e^- \rightarrow J/\psi \rightarrow \gamma \pi^+ \pi^-$ |
| 3.99 ± 0.15 ± 2.64 | | ² ABLIKIM | 06V BES2 | $e^+ e^- \rightarrow J/\psi \rightarrow \gamma \pi^0 \pi^0$ |

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

| | | | | |
|-----------------|--|-----|---------|---|
| 2.5 ± 1.6 ± 0.8 | | BAI | 98H BES | $J/\psi \rightarrow \gamma \pi^0 \pi^0$ |
|-----------------|--|-----|---------|---|

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² Including unknown branching fraction to $\pi \pi$.

$\Gamma(\gamma f_0(1710) \rightarrow \gamma \omega \omega) / \Gamma_{\text{total}}$ Γ_{170} / Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------|------|-------------|---------|---|
| 0.31 ± 0.06 ± 0.08 | 180 | ABLIKIM | 06H BES | $J/\psi \rightarrow \gamma \omega \omega$ |

$\Gamma(\gamma f_0(1710) \rightarrow \gamma \eta \eta) / \Gamma_{\text{total}}$ Γ_{171} / Γ

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|----------------------|----------|---------------------------------------|
| 2.35^{+0.13+1.24}_{-0.11-0.74} | 5.5k | ¹ ABLIKIM | 13N BES3 | $J/\psi \rightarrow \gamma \eta \eta$ |

¹ From partial wave analysis including all possible combinations of 0^{++} , 2^{++} , and 4^{++} resonances.

$\Gamma(\gamma\eta)/\Gamma_{\text{total}}$ Γ_{172}/Γ

| <u>VALUE (units 10^{-3})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|---------------------------------|
| 1.104 ± 0.034 OUR AVERAGE | | | | |
| 1.101 ± 0.029 ± 0.022 | | PEDLAR | 09 CLE3 | $J/\psi \rightarrow \eta\gamma$ |
| 1.123 ± 0.089 | 11k | ABLIKIM | 06E BES2 | $J/\psi \rightarrow \eta\gamma$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 0.88 ± 0.08 ± 0.11 | | BLOOM | 83 CBAL | e^+e^- |
| 0.82 ± 0.10 | | BRANDELIK | 79C DASP | e^+e^- |
| 1.3 ± 0.4 | 21 | BARTEL | 77 CNTR | e^+e^- |

$\Gamma(\gamma f_1(1420) \rightarrow \gamma K \bar{K} \pi)/\Gamma_{\text{total}}$ Γ_{173}/Γ

| <u>VALUE (units 10^{-3})</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------------------|-------------|---|
| 0.79 ± 0.13 OUR AVERAGE | | | |
| 0.68 ± 0.04 ± 0.24 | BAI | 00D BES | $J/\psi \rightarrow \gamma K^\pm K_S^0 \pi^\mp$ |
| 0.76 ± 0.15 ± 0.21 | ^{1,2} AUGUSTIN | 92 DM2 | $J/\psi \rightarrow \gamma K \bar{K} \pi$ |
| 0.87 ± 0.14 ^{+0.14} _{-0.11} | ¹ BAI | 90C MRK3 | $J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$ |

¹ Included unknown branching fraction $f_1(1420) \rightarrow K \bar{K} \pi$.

² From fit to the $K^*(892) K 1^{++}$ partial wave.

$\Gamma(\gamma f_1(1285))/\Gamma_{\text{total}}$ Γ_{174}/Γ

| <u>VALUE (units 10^{-3})</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|---------------------|-------------|---|
| 0.61 ± 0.08 OUR AVERAGE | | | |
| 0.69 ± 0.16 ± 0.20 | ¹ BAI | 04J BES2 | $J/\psi \rightarrow \gamma \gamma \rho^0$ |
| 0.61 ± 0.04 ± 0.21 | ² BAI | 00D BES | $J/\psi \rightarrow \gamma K^\pm K_S^0 \pi^\mp$ |
| 0.45 ± 0.09 ± 0.17 | ³ BAI | 99 BES | $J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$ |
| 0.625 ± 0.063 ± 0.103 | ⁴ BOLTON | 92 MRK3 | $J/\psi \rightarrow \gamma f_1(1285)$ |
| 0.70 ± 0.08 ± 0.16 | ⁵ BOLTON | 92B MRK3 | $J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$ |

¹ Assuming $B(f_1(1285) \rightarrow \rho^0 \gamma) = 0.055 \pm 0.013$.

² Assuming $\Gamma(f_1(1285) \rightarrow K \bar{K} \pi)/\Gamma_{\text{total}} = 0.090 \pm 0.004$.

³ Assuming $\Gamma(f_1(1285) \rightarrow \eta \pi \pi)/\Gamma_{\text{total}} = 0.5 \pm 0.18$.

⁴ Obtained summing the sequential decay channels

$$B(J/\psi \rightarrow \gamma f_1(1285), f_1(1285) \rightarrow \pi \pi \pi \pi) = (1.44 \pm 0.39 \pm 0.27) \times 10^{-4};$$

$$B(J/\psi \rightarrow \gamma f_1(1285), f_1(1285) \rightarrow a_0(980) \pi, a_0(980) \rightarrow \eta \pi) = (3.90 \pm 0.42 \pm 0.87) \times 10^{-4};$$

$$B(J/\psi \rightarrow \gamma f_1(1285), f_1(1285) \rightarrow a_0(980) \pi, a_0(980) \rightarrow K \bar{K}) = (0.66 \pm 0.26 \pm 0.29) \times 10^{-4};$$

$$B(J/\psi \rightarrow \gamma f_1(1285), f_1(1285) \rightarrow \gamma \rho^0) = (0.25 \pm 0.07 \pm 0.03) \times 10^{-4}.$$

⁵ Using $B(f_1(1285) \rightarrow a_0(980) \pi) = 0.37$, and including unknown branching ratio for $a_0(980) \rightarrow \eta \pi$.

$\Gamma(\gamma f_1(1510) \rightarrow \gamma \eta \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{175}/Γ

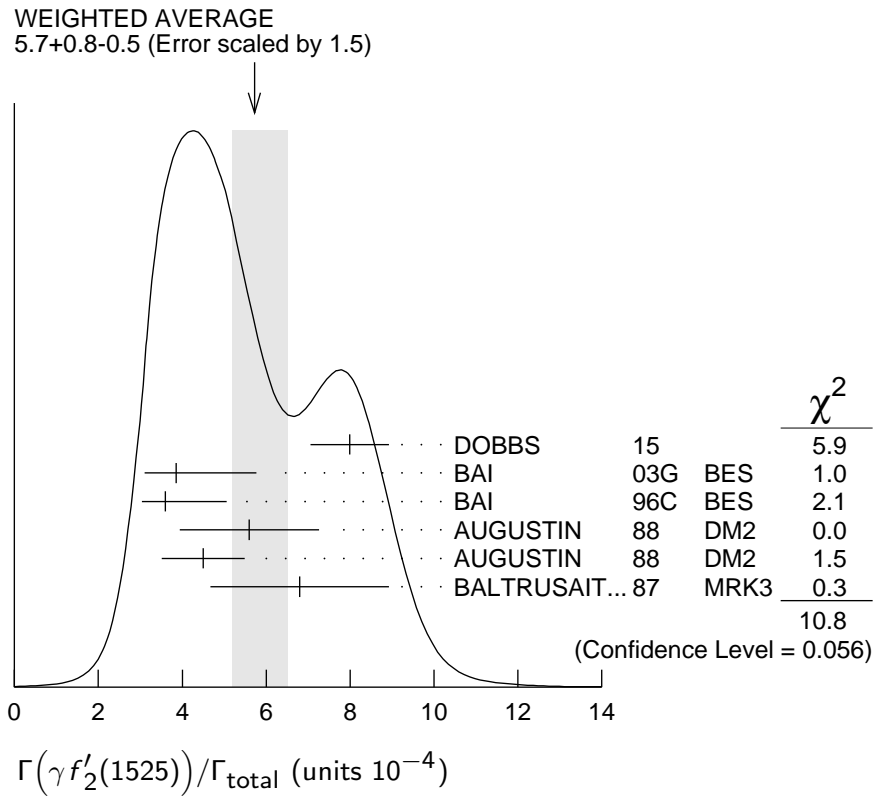
| <u>VALUE (units 10^{-4})</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|--------------------|-------------|--|
| 4.5 ± 1.0 ± 0.7 | | | |
| | BAI | 99 BES | $J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$ |

$\Gamma(\gamma f'_2(1525))/\Gamma_{\text{total}}$ Γ_{176}/Γ

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

| | | | | | |
|--|-----|-----|----------------|----------|--|
| 5.7 $^{+0.8}_{-0.5}$ OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below. | | | | | |
| 8.0 $\pm 0.9 \pm 0.2$ | 750 | 1,2 | DOBBS | 15 | $J/\psi \rightarrow \gamma K\bar{K}$ |
| 3.85 $\pm 0.17^{+1.91}_{-0.73}$ | | 3 | BAI | 03G BES | $J/\psi \rightarrow \gamma K\bar{K}$ |
| 3.6 $\pm 0.4^{+1.4}_{-0.4}$ | | 3 | BAI | 96C BES | $J/\psi \rightarrow \gamma K^+ K^-$ |
| 5.6 $\pm 1.4 \pm 0.9$ | | 3 | AUGUSTIN | 88 DM2 | $J/\psi \rightarrow \gamma K^+ K^-$ |
| 4.5 $\pm 0.4 \pm 0.9$ | | 3 | AUGUSTIN | 88 DM2 | $J/\psi \rightarrow \gamma K_S^0 K_S^0$ |
| 6.8 $\pm 1.6 \pm 1.4$ | | 3 | BALTRUSAIT..87 | MRK3 | $J/\psi \rightarrow \gamma K^+ K^-$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | | |
| <3.4 | 90 | 4 | 4 BRANDELIK | 79C DASP | $e^+ e^- \rightarrow \pi^+ \pi^- \gamma$ |
| <2.3 | 90 | 3 | ALEXANDER | 78 PLUT | $e^+ e^- \rightarrow K^+ K^- \gamma$ |

¹ Using CLEO-c data but not authored by the CLEO Collaboration.
² DOBBS 15 reports $[\Gamma(J/\psi(1S) \rightarrow \gamma f'_2(1525))/\Gamma_{\text{total}}] \times [B(f'_2(1525) \rightarrow K\bar{K})] = (7.09 \pm 0.46 \pm 0.67) \times 10^{-4}$ which we divide by our best value $B(f'_2(1525) \rightarrow K\bar{K}) = (88.7 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
³ Using $B(f'_2(1525) \rightarrow K\bar{K}) = 0.888$.
⁴ Assuming isotropic production and decay of the $f'_2(1525)$ and isospin.



$\Gamma(\gamma f_2'(1525) \rightarrow \gamma \eta \eta) / \Gamma_{\text{total}} \quad \Gamma_{177} / \Gamma$

| VALUE (units 10^{-5}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|----------------------------------|------|----------------------|----------|---------------------------------------|
| $3.42^{+0.43+1.37}_{-0.51-1.30}$ | 5.5k | ¹ ABLIKIM | 13N BES3 | $J/\psi \rightarrow \gamma \eta \eta$ |

¹ From partial wave analysis including all possible combinations of 0^{++} , 2^{++} , and 4^{++} resonances.

$\Gamma(\gamma f_2(1640) \rightarrow \gamma \omega \omega) / \Gamma_{\text{total}} \quad \Gamma_{178} / \Gamma$

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|---------|---|
| $0.28 \pm 0.05 \pm 0.17$ | 141 | ABLIKIM | 06H BES | $J/\psi \rightarrow \gamma \omega \omega$ |

$\Gamma(\gamma f_2(1910) \rightarrow \gamma \omega \omega) / \Gamma_{\text{total}} \quad \Gamma_{179} / \Gamma$

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|---------|---|
| $0.20 \pm 0.04 \pm 0.13$ | 151 | ABLIKIM | 06H BES | $J/\psi \rightarrow \gamma \omega \omega$ |

$\Gamma(\gamma f_0(1800) \rightarrow \gamma \omega \phi) / \Gamma_{\text{total}} \quad \Gamma_{180} / \Gamma$

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---------------------------------|------|-------------|----------|---|
| 2.5 ± 0.6 OUR AVERAGE | | | | |
| $2.00 \pm 0.08^{+1.38}_{-1.64}$ | 1.3k | ABLIKIM | 13J BES3 | $J/\psi \rightarrow \gamma \omega \phi$ |
| $2.61 \pm 0.27 \pm 0.65$ | 95 | ABLIKIM | 06J BES2 | $J/\psi \rightarrow \gamma \omega \phi$ |

$\Gamma(\gamma f_2(1810) \rightarrow \gamma \eta \eta) / \Gamma_{\text{total}} \quad \Gamma_{181} / \Gamma$

| VALUE (units 10^{-5}) | EVTS | DOCUMENT ID | COMMENT |
|----------------------------------|------|----------------------|---|
| $5.40^{+0.60+3.42}_{-0.67-2.35}$ | 5.5k | ¹ ABLIKIM | 13N $J/\psi \rightarrow \gamma \eta \eta$ |

¹ From partial wave analysis including all possible combinations of 0^{++} , 2^{++} , and 4^{++} resonances.

$\Gamma(\gamma f_2(1950) \rightarrow \gamma K^*(892) \bar{K}^*(892)) / \Gamma_{\text{total}} \quad \Gamma_{182} / \Gamma$

| VALUE (units 10^{-3}) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-------------|---------|---|
| $0.7 \pm 0.1 \pm 0.2$ | BAI | 00B BES | $J/\psi \rightarrow \gamma K^+ K^0 \pi^+ \pi^-$ |

$\Gamma(\gamma K^*(892) \bar{K}^*(892)) / \Gamma_{\text{total}} \quad \Gamma_{183} / \Gamma$

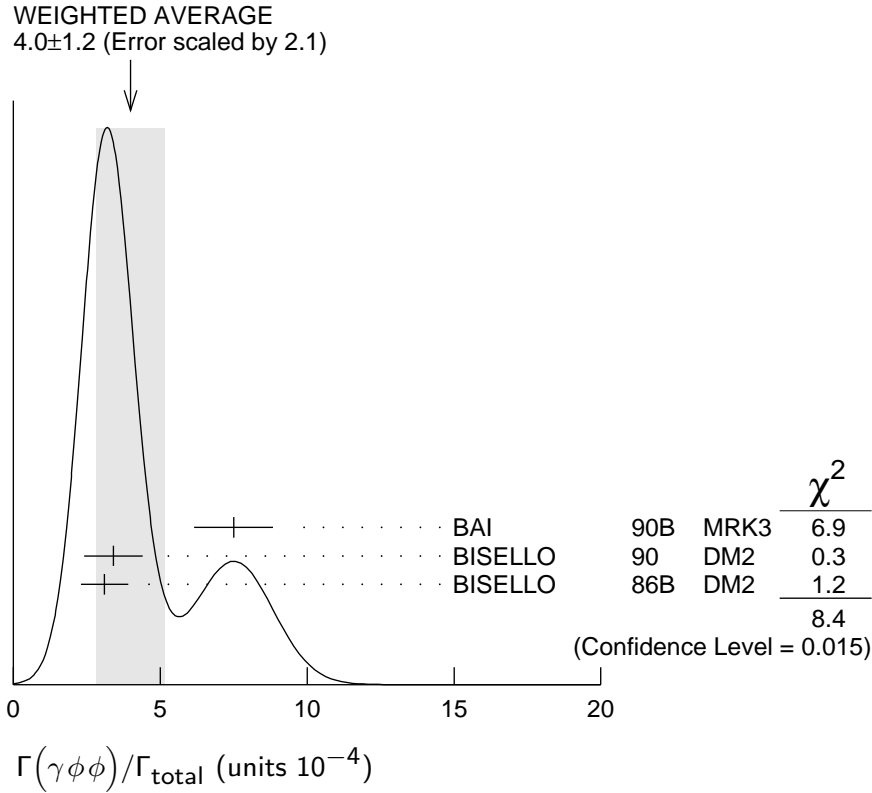
| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|------------------|---------|---|
| $4.0 \pm 0.3 \pm 1.3$ | 320 | ¹ BAI | 00B BES | $J/\psi \rightarrow \gamma K^+ K^0 \pi^+ \pi^-$ |

¹ Summed over all charges.

$\Gamma(\gamma \phi \phi) / \Gamma_{\text{total}} \quad \Gamma_{184} / \Gamma$

| VALUE (units 10^{-4}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|------------------------------|------------|----------------------|----------|---|
| 4.0 ± 1.2 OUR AVERAGE | | | | Error includes scale factor of 2.1. See the ideogram below. |
| $7.5 \pm 0.6 \pm 1.2$ | 168 | BAI | 90B MRK3 | $J/\psi \rightarrow \gamma 4K$ |
| $3.4 \pm 0.8 \pm 0.6$ | 33 ± 7 | ¹ BISELLO | 90 DM2 | $J/\psi \rightarrow \gamma K^+ K^- K_S^0 K_L^0$ |
| $3.1 \pm 0.7 \pm 0.4$ | | ¹ BISELLO | 86B DM2 | $J/\psi \rightarrow \gamma K^+ K^- K^+ K^-$ |

¹ $\phi\phi$ mass less than 2.9 GeV, η_c excluded.



$\Gamma(\gamma\rho\bar{\rho})/\Gamma_{\text{total}}$ **Γ_{185}/Γ**

| VALUE (units 10^{-3}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|-----|------|-------------|------|---------------|
| 0.38±0.07±0.07 | | 49 | EATON | 84 | MRK2 e^+e^- |
| ••• We do not use the following data for averages, fits, limits, etc. ••• | | | | | |
| <0.11 | 90 | | PERUZZI | 78 | MRK1 e^+e^- |

$\Gamma(\gamma\eta(2225))/\Gamma_{\text{total}}$ **Γ_{186}/Γ**

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|----------|------------------------|----------|---|
| 0.33±0.05 OUR AVERAGE | | | | |
| 0.44±0.04±0.08 | 196 ± 19 | ¹ ABLIKIM | 08i BES | $J/\psi \rightarrow \gamma K^+ K^- K_S^0 K_L^0$ |
| 0.33±0.08±0.05 | | ¹ BAI | 90B MRK3 | $J/\psi \rightarrow \gamma K^+ K^- K^+ K^-$ |
| 0.27±0.06±0.06 | | ¹ BAI | 90B MRK3 | $J/\psi \rightarrow \gamma K^+ K^- K_S^0 K_L^0$ |
| 0.24 ^{+0.15} _{-0.10} | | ^{2,3} BISELLO | 89B DM2 | $J/\psi \rightarrow 4\pi\gamma$ |

¹ Includes unknown branching fraction to $\phi\phi$.
² Estimated by us from various fits.
³ Includes unknown branching fraction to $\rho^0\rho^0$.

$\Gamma(\gamma\eta(1760) \rightarrow \gamma\rho^0\rho^0)/\Gamma_{\text{total}}$ **Γ_{187}/Γ**

| VALUE (units 10^{-3}) | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------------------------|---------|---------------------------------|
| 0.13±0.09 | ^{1,2} BISELLO | 89B DM2 | $J/\psi \rightarrow 4\pi\gamma$ |

¹ Estimated by us from various fits.
² Includes unknown branching fraction to $\rho^0\rho^0$.

$\Gamma(\gamma\eta(1760) \rightarrow \gamma\omega\omega)/\Gamma_{\text{total}}$ Γ_{188}/Γ

| VALUE (units 10^{-3}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|-------------|---------|---|
| $1.98 \pm 0.08 \pm 0.32$ | 1045 | ABLIKIM | 06H BES | $J/\psi \rightarrow \gamma\omega\omega$ |

$\Gamma(\gamma X(1835) \rightarrow \gamma\pi^+\pi^-\eta')/\Gamma_{\text{total}}$ Γ_{189}/Γ

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

2.6 ± 0.4 OUR AVERAGE

| | | | | |
|---------------------------------|------|----------------------|----------|--|
| $2.87 \pm 0.09^{+0.49}_{-0.52}$ | 4265 | ¹ ABLIKIM | 11C BES3 | $J/\psi \rightarrow \gamma\pi^+\pi^-\eta'$ |
| $2.2 \pm 0.4 \pm 0.4$ | 264 | ABLIKIM | 05R BES2 | $J/\psi \rightarrow \gamma\pi^+\pi^-\eta'$ |

¹ From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two unconfirmed states $\gamma X(2120)$, and $\gamma X(2370)$, for $M(p\bar{p}) < 2.8$ GeV, and accounting for backgrounds from non- η' events and $J/\psi \rightarrow \pi^0\pi^+\pi^-\eta'$.

$\Gamma(\gamma X(1835) \rightarrow \gamma p\bar{p})/\Gamma_{\text{total}}$ Γ_{190}/Γ

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

$0.77^{+0.15}_{-0.09}$ OUR AVERAGE

| | | | | |
|----------------------------------|-----|------------------------|----------|--------------------------------------|
| $0.90^{+0.04+0.27}_{-0.11-0.55}$ | | ¹ ABLIKIM | 12D BES3 | $J/\psi \rightarrow \gamma p\bar{p}$ |
| $1.14^{+0.43+0.42}_{-0.30-0.26}$ | 231 | ² ALEXANDER | 10 CLEO | $J/\psi \rightarrow \gamma p\bar{p}$ |
| $0.70 \pm 0.04^{+0.19}_{-0.08}$ | | BAI | 03F BES2 | $J/\psi \rightarrow \gamma p\bar{p}$ |

¹ From the fit including final state interaction effects in isospin 0 S -wave according to SIBIRTSEV 05A.

² From a fit of the $p\bar{p}$ mass distribution to a combination of $\gamma X(1835)$, γR with $M(R) = 2100$ MeV and $\Gamma(R) = 160$ MeV, and $\gamma p\bar{p}$ phase space, for $M(p\bar{p}) < 2.85$ GeV.

$\Gamma(\gamma X(1835) \rightarrow \gamma K_S^0 K_S^0 \eta)/\Gamma_{\text{total}}$ Γ_{191}/Γ

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

| | | | |
|--|---------|----------|--|
| $3.31^{+0.33+1.96}_{-0.30-1.29}$ | ABLIKIM | 15T BES3 | $J/\psi \rightarrow \gamma K_S^0 K_S^0 \eta$ |
|--|---------|----------|--|

$\Gamma(\gamma X(1840) \rightarrow \gamma 3(\pi^+\pi^-))/\Gamma_{\text{total}}$ Γ_{192}/Γ

| VALUE (units 10^{-5}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

| | | | | |
|---|------|---------|----------|---|
| $2.44 \pm 0.36^{+0.60}_{-0.74}$ | 0.6k | ABLIKIM | 13U BES3 | $J/\psi \rightarrow \gamma 3(\pi^+\pi^-)$ |
|---|------|---------|----------|---|

$\Gamma(\gamma(K\bar{K}\pi)[J^{PC} = 0^{-+}])/\Gamma_{\text{total}}$ Γ_{193}/Γ

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

0.7 ± 0.4 OUR AVERAGE Error includes scale factor of 2.1.

| | | | |
|--------------------------|------------------|---------|---|
| $0.58 \pm 0.03 \pm 0.20$ | ¹ BAI | 00D BES | $J/\psi \rightarrow \gamma K^\pm K_S^0 \pi^\mp$ |
| $2.1 \pm 0.1 \pm 0.7$ | ² BAI | 00D BES | $J/\psi \rightarrow \gamma K^\pm K_S^0 \pi^\mp$ |

¹ For a broad structure around 1800 MeV.

² For a broad structure around 2040 MeV.

$\Gamma(\gamma\pi^0)/\Gamma_{\text{total}}$ Γ_{194}/Γ

| VALUE (units 10^{-5}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--------------------------|------|-------------|------|---------|
|--------------------------|------|-------------|------|---------|

3.49^{+0.33}_{-0.30} OUR AVERAGE

| | | | | |
|--------------------|--|--------|----|---------------------------------------|
| 3.63 ± 0.36 ± 0.13 | | PEDLAR | 09 | CLE3 $J/\psi \rightarrow \pi^0\gamma$ |
|--------------------|--|--------|----|---------------------------------------|

| | | | | |
|--|-----|---------|-----|---------------------------------------|
| 3.13 ^{+0.65} _{-0.47} | 586 | ABLIKIM | 06E | BES2 $J/\psi \rightarrow \pi^0\gamma$ |
|--|-----|---------|-----|---------------------------------------|

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

| | | | | |
|-----------------|--|-------|----|---------------|
| 3.6 ± 1.1 ± 0.7 | | BLOOM | 83 | CBAL e^+e^- |
|-----------------|--|-------|----|---------------|

| | | | | |
|-----------|----|-----------|-----|---------------|
| 7.3 ± 4.7 | 10 | BRANDELIK | 79C | DASP e^+e^- |
|-----------|----|-----------|-----|---------------|

 $\Gamma(\gamma\rho\bar{\rho}\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{195}/Γ

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

| | | | | |
|-----------------|----|-------|----|---------------|
| <0.79 | 90 | EATON | 84 | MRK2 e^+e^- |
|-----------------|----|-------|----|---------------|

 $\Gamma(\gamma\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$ Γ_{196}/Γ

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

| | | | | |
|-----------------|----|---------|----|--------------|
| <0.13 | 90 | HENRARD | 87 | DM2 e^+e^- |
|-----------------|----|---------|----|--------------|

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

| | | | | |
|-------|----|-----|-----|--------------|
| <0.16 | 90 | BAI | 98G | BES e^+e^- |
|-------|----|-----|-----|--------------|

 $\Gamma(\gamma f_0(2100) \rightarrow \gamma\eta\eta)/\Gamma_{\text{total}}$ Γ_{197}/Γ

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

| | | | | |
|---|------|----------------------|-----|--|
| 1.13^{+0.09+0.64}_{-0.10-0.28} | 5.5k | ¹ ABLIKIM | 13N | BES3 $J/\psi \rightarrow \gamma\eta\eta$ |
|---|------|----------------------|-----|--|

¹ From partial wave analysis including all possible combinations of 0^{++} , 2^{++} , and 4^{++} resonances.

 $\Gamma(\gamma f_0(2100) \rightarrow \gamma\pi\pi)/\Gamma_{\text{total}}$ Γ_{198}/Γ

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

| | | | |
|---------------------------|-----|--------------------|--------------------------------------|
| 6.24 ± 0.48 ± 0.87 | 744 | ¹ DOBBS | 15 $J/\psi \rightarrow \gamma\pi\pi$ |
|---------------------------|-----|--------------------|--------------------------------------|

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

 $\Gamma(\gamma f_0(2200))/\Gamma_{\text{total}}$ Γ_{199}/Γ

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

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

| | | | |
|-----|-----------------------|----|---|
| 1.5 | ¹ AUGUSTIN | 88 | DM2 $J/\psi \rightarrow \gamma K_S^0 K_S^0$ |
|-----|-----------------------|----|---|

¹ Includes unknown branching fraction to $K_S^0 K_S^0$.

 $\Gamma(\gamma f_0(2200) \rightarrow \gamma K\bar{K})/\Gamma_{\text{total}}$ Γ_{200}/Γ

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

| | | | |
|---------------------------|-----|--------------------|---|
| 5.86 ± 0.49 ± 1.20 | 490 | ¹ DOBBS | 15 $J/\psi \rightarrow \gamma K\bar{K}$ |
|---------------------------|-----|--------------------|---|

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

$\Gamma(\gamma f_J(2220))/\Gamma_{\text{total}}$ Γ_{201}/Γ

| VALUE (units 10^{-5}) | CL% | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|------|------|------------------------------|------|--|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | | |
| >300 | | | ¹ BAI | 96B | BES $e^+e^- \rightarrow \gamma \bar{p}p, K\bar{K}$ |
| >250 | 99.9 | | ² HASAN | 96 | SPEC $\bar{p}p \rightarrow \pi^+\pi^-$ |
| < 2.3 | 95 | | ³ AUGUSTIN | 88 | DM2 $J/\psi \rightarrow \gamma K^+K^-$ |
| < 1.6 | 95 | | ³ AUGUSTIN | 88 | DM2 $J/\psi \rightarrow \gamma K_S^0 K_S^0$ |
| $12.4^{+6.4}_{-5.2} \pm 2.8$ | | 23 | ³ BALTRUSAIT..86D | MRK3 | $J/\psi \rightarrow \gamma K_S^0 K_S^0$ |
| $8.4^{+3.4}_{-2.8} \pm 1.6$ | | 93 | ³ BALTRUSAIT..86D | MRK3 | $J/\psi \rightarrow \gamma K^+K^-$ |

¹ Using BARNES 93.

² Using BAI 96B.

³ Includes unknown branching fraction to K^+K^- or $K_S^0 K_S^0$.

$\Gamma(\gamma f_J(2220) \rightarrow \gamma \pi \pi)/\Gamma_{\text{total}}$ Γ_{202}/Γ

| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|----------------------|------|--|
| < 3.9 | 90 | ^{1,2} DOBBS | 15 | $J/\psi \rightarrow \gamma \pi \pi$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| $14 \pm 8 \pm 4$ | | BAI | 98H | BES $J/\psi \rightarrow \gamma \pi^0 \pi^0$ |
| $8.4 \pm 2.6 \pm 3.0$ | | BAI | 96B | BES $e^+e^- \rightarrow J/\psi \rightarrow \gamma \pi^+ \pi^-$ |

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² For $\Gamma = 20/50$ MeV, the 90% CL upper limits for $\pi^+\pi^-$ and $\pi^0\pi^0$ are $2.6/5.2 \times 10^{-5}$ and $1.3/1.9 \times 10^{-5}$, respectively.

$\Gamma(\gamma f_J(2220) \rightarrow \gamma K \bar{K})/\Gamma_{\text{total}}$ Γ_{203}/Γ

| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|------------------------------|------|--|
| < 4.1 | 90 | ^{1,2} DOBBS | 15 | $J/\psi \rightarrow \gamma K \bar{K}$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| < 3.6 | | ³ DEL-AMO-SA..100 | BABR | $e^+e^- \rightarrow J/\psi \rightarrow \gamma K^+K^-$ |
| < 2.9 | | ³ DEL-AMO-SA..100 | BABR | $e^+e^- \rightarrow J/\psi \rightarrow \gamma K_S^0 K_S^0$ |
| $6.6 \pm 2.9 \pm 2.4$ | | BAI | 96B | BES $e^+e^- \rightarrow J/\psi \rightarrow \gamma K^+K^-$ |
| $10.8 \pm 4.0 \pm 3.2$ | | BAI | 96B | BES $e^+e^- \rightarrow J/\psi \rightarrow \gamma K_S^0 K_S^0$ |

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² For $\Gamma = 20/50$ MeV, the 90% CL upper limits for K^+K^- and $K_S^0 K_S^0$ are $1.7/3.1 \times 10^{-5}$ and $1.2/2.0 \times 10^{-5}$, respectively.

³ For spin 2 and helicity 0; other combinations lead to more stringent upper limits.

$\Gamma(\gamma f_J(2220) \rightarrow \gamma \rho \bar{\rho})/\Gamma_{\text{total}}$ Γ_{204}/Γ

| VALUE (units 10^{-5}) | DOCUMENT ID | TECN | COMMENT |
|---|-------------|------|--|
| $1.5 \pm 0.6 \pm 0.5$ | BAI | 96B | BES $e^+e^- \rightarrow J/\psi \rightarrow \gamma \rho \bar{\rho}$ |

$\Gamma(\gamma f_2(2340) \rightarrow \gamma \eta \eta)/\Gamma_{\text{total}}$ Γ_{205}/Γ

| VALUE (units 10^{-5}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|----------------------|------|--|
| $5.60^{+0.62+2.37}_{-0.65-2.07}$ | 5.5k | ¹ ABLIKIM | 13N | BES3 $J/\psi \rightarrow \gamma \eta \eta$ |

¹ From partial wave analysis including all possible combinations of 0^{++} , 2^{++} , and 4^{++} resonances.

$\Gamma(\gamma f_0(1500) \rightarrow \gamma \pi \pi) / \Gamma_{\text{total}}$ Γ_{206} / Γ

| <u>VALUE (units 10^{-4})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|----------------|
|---|-------------|--------------------|-------------|----------------|

1.09 ± 0.24 OUR AVERAGE

| | | | | |
|--------------------|-----|----------------------|----------|---|
| 1.21 ± 0.29 ± 0.24 | 174 | ¹ DOBBS | 15 | $J/\psi \rightarrow \gamma \pi \pi$ |
| 1.00 ± 0.03 ± 0.45 | | ² ABLIKIM | 06V BES2 | $e^+ e^- \rightarrow J/\psi \rightarrow \gamma \pi^+ \pi^-$ |
| 1.02 ± 0.09 ± 0.45 | | ² ABLIKIM | 06V BES2 | $e^+ e^- \rightarrow J/\psi \rightarrow \gamma \pi^0 \pi^0$ |

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

| | | | | |
|-----------|--|---------------------|---------|---|
| 5.7 ± 0.8 | | ^{3,4} BUGG | 95 MRK3 | $J/\psi \rightarrow \gamma \pi^+ \pi^- \pi^+ \pi^-$ |
|-----------|--|---------------------|---------|---|

¹ Using CLEO-c data but not authored by the CLEO Collaboration.

² Including unknown branching fraction to $\pi \pi$.

³ Including unknown branching ratio for $f_0(1500) \rightarrow \pi^+ \pi^- \pi^+ \pi^-$.

⁴ Assuming that $f_0(1500)$ decays only to two S -wave dipions.

$\Gamma(\gamma f_0(1500) \rightarrow \gamma \eta \eta) / \Gamma_{\text{total}}$ Γ_{207} / Γ

| <u>VALUE (units 10^{-5})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|----------------|
|---|-------------|--------------------|-------------|----------------|

| | | | | |
|---|------|----------------------|----------|---------------------------------------|
| 1.65^{+0.26+0.51}_{-0.31-1.40} | 5.5k | ¹ ABLIKIM | 13N BES3 | $J/\psi \rightarrow \gamma \eta \eta$ |
|---|------|----------------------|----------|---------------------------------------|

¹ From partial wave analysis including all possible combinations of 0^{++} , 2^{++} , and 4^{++} resonances.

**$\Gamma(\gamma A \rightarrow \gamma \text{invisible}) / \Gamma_{\text{total}}$ Γ_{208} / Γ
(narrow state A with $m_A < 960$ MeV)**

| <u>VALUE (units 10^{-6})</u> | <u>CL%</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|------------|--------------------|-------------|----------------|
|---|------------|--------------------|-------------|----------------|

| | | | | |
|-----------------|----|---------------------|---------|--|
| < 6.3 | 90 | ¹ INSLER | 10 CLEO | $e^+ e^- \rightarrow \pi^+ \pi^- J/\psi$ |
|-----------------|----|---------------------|---------|--|

¹ The limit varies with mass m_A of a narrow state A and is 4.3×10^{-6} for $m_A = 0$ MeV, reaches its largest value of 6.3×10^{-6} at $m_A = 500$ MeV, and is 3.6×10^{-6} at $m_A = 960$ MeV.

**$\Gamma(\gamma A^0 \rightarrow \gamma \mu^+ \mu^-) / \Gamma_{\text{total}}$ Γ_{209} / Γ
(narrow state A^0 with $0.2 \text{ GeV} < m_{A^0} < 3 \text{ GeV}$)**

| <u>VALUE (units 10^{-5})</u> | <u>CL%</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|------------|--------------------|-------------|----------------|
|---|------------|--------------------|-------------|----------------|

| | | | | |
|-----------------|----|----------------------|---------|---|
| < 2.1 | 90 | ¹ ABLIKIM | 12 BES3 | $J/\psi \rightarrow \gamma \mu^+ \mu^-$ |
|-----------------|----|----------------------|---------|---|

¹ For a narrow scalar or pseudoscalar, A^0 , with a mass in the range 0.21–3.00 GeV. The measured 90% CL limit as a function of m_{A^0} ranges from 4×10^{-7} to 2.1×10^{-5} .

————— DALITZ DECAYS —————

$\Gamma(\pi^0 e^+ e^-) / \Gamma_{\text{total}}$ Γ_{210} / Γ

| <u>VALUE (units 10^{-7})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|----------------|
|---|-------------|--------------------|-------------|----------------|

| | | | | |
|---------------------------|----|---------|----------|------------------------------------|
| 7.56 ± 1.32 ± 0.50 | 39 | ABLIKIM | 14i BES3 | $J/\psi \rightarrow \pi^0 e^+ e^-$ |
|---------------------------|----|---------|----------|------------------------------------|

$\Gamma(\eta e^+ e^-) / \Gamma_{\text{total}}$ Γ_{211} / Γ

| <u>VALUE (units 10^{-5})</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|--------------------|-------------|----------------|
|---|-------------|--------------------|-------------|----------------|

| | | | | |
|---------------------------|-----|----------------------|----------|-----------------------------------|
| 1.16 ± 0.07 ± 0.06 | 320 | ¹ ABLIKIM | 14i BES3 | $J/\psi \rightarrow \eta e^+ e^-$ |
|---------------------------|-----|----------------------|----------|-----------------------------------|

¹ Using both $\eta \rightarrow \gamma \gamma$ and $\eta \rightarrow \pi^+ \pi^- \pi^0$ decays.

$\Gamma(\eta'(958)e^+e^-)/\Gamma_{\text{total}}$ Γ_{212}/Γ

| VALUE (units 10^{-5}) | EVTS | DOCUMENT ID | TECN | COMMENT |
|--|------|----------------------|----------|------------------------------------|
| $5.81 \pm 0.16 \pm 0.31$ | 1.4k | ¹ ABLIKIM | 14I BES3 | $J/\psi \rightarrow \eta' e^+ e^-$ |

¹ Using both $\eta' \rightarrow \gamma\pi^+\pi^-$ and $\eta' \rightarrow \pi^+\pi^-\eta$ decays.

WEAK DECAYS

$\Gamma(D^-e^+\nu_e + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{213}/Γ

| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT |
|------------------------------|-----|-------------|----------|-----------------------------|
| < 1.2 | 90 | ABLIKIM | 06M BES2 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(\bar{D}^0e^+e^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{214}/Γ

| VALUE (units 10^{-5}) | CL% | DOCUMENT ID | TECN | COMMENT |
|------------------------------|-----|-------------|----------|-----------------------------|
| < 1.1 | 90 | ABLIKIM | 06M BES2 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(D_s^-e^+\nu_e + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{215}/Γ

| VALUE (units 10^{-6}) | CL% | DOCUMENT ID | TECN | COMMENT |
|------------------------------|-----|-------------|----------|-----------------------------|
| < 1.3 | 90 | ABLIKIM | 14R BES3 | $e^+e^- \rightarrow J/\psi$ |

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

| | | | | |
|--------|----|----------------------|----------|-----------------------------|
| < 36 | 90 | ¹ ABLIKIM | 06M BES2 | $e^+e^- \rightarrow J/\psi$ |
|--------|----|----------------------|----------|-----------------------------|

¹ Using $B(D_s^- \rightarrow \phi\pi^-) = 4.4 \pm 0.5\%$.

$\Gamma(D_s^{*-}e^+\nu_e + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{216}/Γ

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|-------------|----------|-----------------------------|
| $< 1.8 \times 10^{-6}$ | 90 | ABLIKIM | 14R BES3 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(D^-\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{217}/Γ

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|-------------|----------|-----------------------------|
| $< 7.5 \times 10^{-5}$ | 90 | ABLIKIM | 08J BES2 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(\bar{D}^0\bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{218}/Γ

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|-------------|----------|-----------------------------|
| $< 1.7 \times 10^{-4}$ | 90 | ABLIKIM | 08J BES2 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(\bar{D}^0\bar{K}^{*0} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{219}/Γ

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|-------------|----------|-----------------------------|
| $< 2.5 \times 10^{-6}$ | 90 | ABLIKIM | 14K BES3 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(D_s^-\pi^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{220}/Γ

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|-------------|----------|-----------------------------|
| $< 1.3 \times 10^{-4}$ | 90 | ABLIKIM | 08J BES2 | $e^+e^- \rightarrow J/\psi$ |

$\Gamma(D_s^-\rho^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{221}/Γ

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|-------------|----------|-----------------------------|
| $< 1.3 \times 10^{-5}$ | 90 | ABLIKIM | 14K BES3 | $e^+e^- \rightarrow J/\psi$ |

———— CHARGE CONJUGATION (C), PARITY (P), ————
 ———— LEPTON FAMILY NUMBER (LF) VIOLATING MODES ————

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ Γ_{222}/Γ

| VALUE (units 10^{-7}) | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|-----------------------|------|---|
| < 2.7 | 90 | ABLIKIM 14Q | BES3 | $\psi(2S) \rightarrow \pi^+ \pi^- J/\psi$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| < 50 | 90 | ADAMS 08 | CLEO | $\psi(2S) \rightarrow \pi^+ \pi^- J/\psi$ |
| <1600 | 90 | ¹ WICHT 08 | BELL | $B^\pm \rightarrow K^\pm \gamma \gamma$ |
| < 220 | 90 | ABLIKIM 07J | BES2 | $\psi(2S) \rightarrow J/\psi \pi^+ \pi^-$ |
| <5000 | 90 | BARTEL 77 | CNTR | $e^+ e^-$ |

¹ WICHT 08 reports $[\Gamma(J/\psi(1S) \rightarrow \gamma\gamma)/\Gamma_{\text{total}}] \times [B(B^+ \rightarrow J/\psi(1S) K^+)] < 0.16 \times 10^{-6}$ which we divide by our best value $B(B^+ \rightarrow J/\psi(1S) K^+) = 1.026 \times 10^{-3}$.

$\Gamma(\gamma\phi)/\Gamma_{\text{total}}$ Γ_{223}/Γ

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|----------------------------------|-----|-------------|------|---|
| <1.4 × 10⁻⁶ | 90 | ABLIKIM 14Q | BES3 | $\psi(2S) \rightarrow \pi^+ \pi^- J/\psi$ |

$\Gamma(e^\pm \mu^\mp)/\Gamma_{\text{total}}$ Γ_{224}/Γ

| VALUE (units 10^{-7}) | CL% | DOCUMENT ID | TECN | COMMENT |
|---|-----|-------------|------|------------------------------|
| < 1.6 | 90 | ABLIKIM 13L | BES3 | $e^+ e^- \rightarrow J/\psi$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| <11 | 90 | BAI 03D | BES | $e^+ e^- \rightarrow J/\psi$ |

$\Gamma(e^\pm \tau^\mp)/\Gamma_{\text{total}}$ Γ_{225}/Γ

| VALUE (units 10^{-6}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|------------------------------|
| <8.3 | 90 | ABLIKIM 04 | BES | $e^+ e^- \rightarrow J/\psi$ |

$\Gamma(\mu^\pm \tau^\mp)/\Gamma_{\text{total}}$ Γ_{226}/Γ

| VALUE (units 10^{-6}) | CL% | DOCUMENT ID | TECN | COMMENT |
|--------------------------|-----|-------------|------|------------------------------|
| <2.0 | 90 | ABLIKIM 04 | BES | $e^+ e^- \rightarrow J/\psi$ |

———— OTHER DECAYS ————

$\Gamma(\text{invisible})/\Gamma(e^+ e^-)$ Γ_{227}/Γ_5

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|----------------------------------|-----|-------------|------|--------------------------------|
| <6.6 × 10⁻² | 90 | LEES 13I | BABR | $B \rightarrow K^{(*)} J/\psi$ |

$\Gamma(\text{invisible})/\Gamma(\mu^+ \mu^-)$ Γ_{227}/Γ_7

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT |
|----------------------------------|-----|-------------|------|---|
| <1.2 × 10⁻² | 90 | ABLIKIM 08G | BES2 | $\psi(2S) \rightarrow \pi^+ \pi^- J/\psi$ |

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| | | | | |
|-----------|------|-------------------------|------------------------------|------------------------------|
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| AUBERT | 06B | PR D73 012005 | B. Aubert <i>et al.</i> | (BABAR Collab.) |
| AUBERT | 06D | PR D73 052003 | B. Aubert <i>et al.</i> | (BABAR Collab.) |
| AUBERT | 06E | PRL 96 052002 | B. Aubert <i>et al.</i> | (BABAR Collab.) |
| AUBERT,BE | 06D | PR D74 091103 | B. Aubert <i>et al.</i> | (BABAR Collab.) |
| WU | 06 | PRL 97 162003 | C.-H. Wu <i>et al.</i> | (BELLE Collab.) |
| ABLIKIM | 05 | PL B607 243 | M. Ablikim <i>et al.</i> | (BES Collab.) |
| ABLIKIM | 05B | PR D71 032003 | M. Ablikim <i>et al.</i> | (BES Collab.) |
| ABLIKIM | 05C | PL B610 192 | M. Ablikim <i>et al.</i> | (BES Collab.) |
| ABLIKIM | 05H | PR D72 012002 | M. Ablikim <i>et al.</i> | (BES Collab.) |
| ABLIKIM | 05R | PRL 95 262001 | M. Ablikim <i>et al.</i> | (BES Collab.) |
| AUBERT | 05D | PR D71 052001 | B. Aubert <i>et al.</i> | (BABAR Collab.) |
| LI | 05C | PR D71 111103 | Z. Li <i>et al.</i> | (CLEO Collab.) |
| SIBIRTSEV | 05A | PR D71 054010 | A. Sibirtsev, J. Haidenbauer | |
| ABLIKIM | 04 | PL B598 172 | M. Ablikim <i>et al.</i> | (BES Collab.) |
| ABLIKIM | 04M | PR D70 112008 | M. Ablikim <i>et al.</i> | (BES Collab.) |
| AUBERT | 04 | PR D69 011103 | B. Aubert <i>et al.</i> | (BABAR Collab.) |
| AUBERT,B | 04N | PR D70 072004 | B. Aubert <i>et al.</i> | (BABAR Collab.) |
| BAI | 04 | PL B578 16 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 04A | PR D69 012003 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 04D | PL B589 7 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 04E | PL B591 42 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 04G | PR D70 012004 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 04H | PR D70 012005 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 04J | PL B594 47 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| SETH | 04 | PR D69 097503 | K.K. Seth | |
| AULCHENKO | 03 | PL B573 63 | V.M. Aulchenko <i>et al.</i> | (KEDR Collab.) |
| BAI | 03D | PL B561 49 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 03F | PRL 91 022001 | J.Z. Bai <i>et al.</i> | (BES II Collab.) |
| BAI | 03G | PR D68 052003 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| HUANG | 03 | PRL 91 241802 | H.-C. Huang <i>et al.</i> | (BELLE Collab.) |
| BAI | 02C | PRL 88 101802 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| ARTAMONOV | 00 | PL B474 427 | A.S. Artamonov <i>et al.</i> | |
| BAI | 00 | PRL 84 594 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 00B | PL B472 200 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 00D | PL B476 25 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 99 | PL B446 356 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 99C | PRL 83 1918 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 98D | PR D58 092006 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 98G | PL B424 213 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 98H | PRL 81 1179 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BALDINI | 98 | PL B444 111 | R. Baldini <i>et al.</i> | (FENICE Collab.) |
| ARMSTRONG | 96 | PR D54 7067 | T.A. Armstrong <i>et al.</i> | (E760 Collab.) |
| BAI | 96B | PRL 76 3502 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 96C | PRL 77 3959 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BAI | 96D | PR D54 1221 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| GRIBUSHIN | 96 | PR D53 4723 | A. Gribushin <i>et al.</i> | (E672 Collab., E706 Collab.) |
| HASAN | 96 | PL B388 376 | A. Hasan, D.V. Bugg | (BRUN, LOQM) |
| BAI | 95B | PL B355 374 | J.Z. Bai <i>et al.</i> | (BES Collab.) |
| BUGG | 95 | PL B353 378 | D.V. Bugg <i>et al.</i> | (LOQM, PNPI, WASH) |
| ANTONELLI | 93 | PL B301 317 | A. Antonelli <i>et al.</i> | (FENICE Collab.) |
| ARMSTRONG | 93B | PR D47 772 | T.A. Armstrong <i>et al.</i> | (FNAL E760 Collab.) |
| BARNES | 93 | PL B309 469 | P.D. Barnes <i>et al.</i> | (PS185 Collab.) |
| AUGUSTIN | 92 | PR D46 1951 | J.E. Augustin, G. Cosme | (DM2 Collab.) |
| BOLTON | 92 | PL B278 495 | T. Bolton <i>et al.</i> | (Mark III Collab.) |
| BOLTON | 92B | PRL 69 1328 | T. Bolton <i>et al.</i> | (Mark III Collab.) |
| COFFMAN | 92 | PRL 68 282 | D.M. Coffman <i>et al.</i> | (Mark III Collab.) |
| HSUEH | 92 | PR D45 R2181 | S. Hsueh, S. Palestini | (FNAL, TORI) |
| BISELLO | 91 | NP B350 1 | D. Bisello <i>et al.</i> | (DM2 Collab.) |

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|---------------|-----|--------------|---------------------------------|---------------------------|
| AUGUSTIN | 90 | PR D42 10 | J.E. Augustin <i>et al.</i> | (DM2 Collab.) |
| BAI | 90B | PRL 65 1309 | Z. Bai <i>et al.</i> | (Mark III Collab.) |
| BAI | 90C | PRL 65 2507 | Z. Bai <i>et al.</i> | (Mark III Collab.) |
| BISELLO | 90 | PL B241 617 | D. Bisello <i>et al.</i> | (DM2 Collab.) |
| COFFMAN | 90 | PR D41 1410 | D.M. Coffman <i>et al.</i> | (Mark III Collab.) |
| JOUSSET | 90 | PR D41 1389 | J. Jousset <i>et al.</i> | (DM2 Collab.) |
| ALEXANDER | 89 | NP B320 45 | J.P. Alexander <i>et al.</i> | (LBL, MICH, SLAC) |
| AUGUSTIN | 89 | NP B320 1 | J.E. Augustin, G. Cosme | (DM2 Collab.) |
| BISELLO | 89B | PR D39 701 | G. Busetto <i>et al.</i> | (DM2 Collab.) |
| AUGUSTIN | 88 | PRL 60 2238 | J.E. Augustin <i>et al.</i> | (DM2 Collab.) |
| COFFMAN | 88 | PR D38 2695 | D.M. Coffman <i>et al.</i> | (Mark III Collab.) |
| FALVARD | 88 | PR D38 2706 | A. Falvard <i>et al.</i> | (CLER, FRAS, LALO+) |
| AUGUSTIN | 87 | ZPHY C36 369 | J.E. Augustin <i>et al.</i> | (LALO, CLER, FRAS+) |
| BAGLIN | 87 | NP B286 592 | C. Baglin <i>et al.</i> | (LAPP, CERN, GENO, LYON+) |
| BALTRUSAIT... | 87 | PR D35 2077 | R.M. Baltrusaitis <i>et al.</i> | (Mark III Collab.) |
| BECKER | 87 | PRL 59 186 | J.J. Becker <i>et al.</i> | (Mark III Collab.) |
| BISELLO | 87 | PL B192 239 | D. Bisello <i>et al.</i> | (PADO, CLER, FRAS+) |
| COHEN | 87 | RMP 59 1121 | E.R. Cohen, B.N. Taylor | (RISC, NBS) |
| HENRARD | 87 | NP B292 670 | P. Henrard <i>et al.</i> | (CLER, FRAS, LALO+) |
| PALLIN | 87 | NP B292 653 | D. Pallin <i>et al.</i> | (CLER, FRAS, LALO, PADO) |
| BALTRUSAIT... | 86 | PR D33 629 | R.M. Baltrusaitis <i>et al.</i> | (Mark III Collab.) |
| BALTRUSAIT... | 86B | PR D33 1222 | R.M. Baltrusaitis <i>et al.</i> | (Mark III Collab.) |
| BALTRUSAIT... | 86D | PRL 56 107 | R.M. Baltrusaitis | (CIT, UCSC, ILL, SLAC+) |
| BISELLO | 86B | PL B179 294 | D. Bisello <i>et al.</i> | (DM2 Collab.) |
| GAISER | 86 | PR D34 711 | J. Gaiser <i>et al.</i> | (Crystal Ball Collab.) |
| BALTRUSAIT... | 85C | PRL 55 1723 | R.M. Baltrusaitis <i>et al.</i> | (CIT, UCSC+) |
| BALTRUSAIT... | 85D | PR D32 566 | R.M. Baltrusaitis <i>et al.</i> | (CIT, UCSC+) |
| KURAEV | 85 | SJNP 41 466 | E.A. Kuraev, V.S. Fadin | (NOVO) |
| BALTRUSAIT... | 84 | PRL 52 2126 | Translated from YAF 41 733. | (CIT, UCSC+) |
| EATON | 84 | PR D29 804 | R.M. Baltrusaitis <i>et al.</i> | (CIT, UCSC+) |
| BLOOM | 83 | ARNS 33 143 | M.W. Eaton <i>et al.</i> | (LBL, SLAC) |
| EDWARDS | 83B | PRL 51 859 | E.D. Bloom, C. Peck | (SLAC, CIT) |
| FRANKLIN | 83 | PRL 51 963 | C. Edwards <i>et al.</i> | (CIT, HARV, PRIN+) |
| BURKE | 82 | PRL 49 632 | M.E.B. Franklin <i>et al.</i> | (LBL, SLAC) |
| EDWARDS | 82B | PR D25 3065 | D.L. Burke <i>et al.</i> | (LBL, SLAC) |
| EDWARDS | 82D | PRL 48 458 | C. Edwards <i>et al.</i> | (CIT, HARV, PRIN+) |
| Also | | ARNS 33 143 | C. Edwards <i>et al.</i> | (CIT, HARV, PRIN+) |
| EDWARDS | 82E | PRL 49 259 | E.D. Bloom, C. Peck | (SLAC, CIT) |
| LEMOIGNE | 82 | PL 113B 509 | C. Edwards <i>et al.</i> | (CIT, HARV, PRIN+) |
| BESCH | 81 | ZPHY C8 1 | Y. Lemoigne <i>et al.</i> | (SACL, LOIC, SHMP+) |
| GIDAL | 81 | PL 107B 153 | H.J. Besch <i>et al.</i> | (BONN, DESY, MANZ) |
| PARTRIDGE | 80 | PRL 44 712 | G. Gidal <i>et al.</i> | (SLAC, LBL) |
| SCHARRE | 80 | PL 97B 329 | R. Partridge <i>et al.</i> | (CIT, HARV, PRIN+) |
| ZHOLENTZ | 80 | PL 96B 214 | D.L. Scharre <i>et al.</i> | (SLAC, LBL) |
| Also | | SJNP 34 814 | A.A. Zholents <i>et al.</i> | (NOVO) |
| BRANDELIK | 79C | ZPHY C1 233 | Translated from YAF 34 1471. | (NOVO) |
| ALEXANDER | 78 | PL 72B 493 | R. Brandelik <i>et al.</i> | (DASP Collab.) |
| BESCH | 78 | PL 78B 347 | G. Alexander <i>et al.</i> | (DESY, HAMB, SIEG+) |
| BRANDELIK | 78B | PL 74B 292 | H.J. Besch <i>et al.</i> | (BONN, DESY, MANZ) |
| PERUZZI | 78 | PR D17 2901 | R. Brandelik <i>et al.</i> | (DASP Collab.) |
| BARTEL | 77 | PL 66B 489 | I. Peruzzi <i>et al.</i> | (SLAC, LBL) |
| BURMESTER | 77D | PL 72B 135 | W. Bartel <i>et al.</i> | (DESY, HEIDP) |
| FELDMAN | 77 | PRPL 33C 285 | J. Burmester <i>et al.</i> | (DESY, HAMB, SIEG+) |
| VANNUCCI | 77 | PR D15 1814 | G.J. Feldman, M.L. Perl | (LBL, SLAC) |
| BARTEL | 76 | PL 64B 483 | F. Vannucci <i>et al.</i> | (SLAC, LBL) |
| BRAUNSCH... | 76 | PL 63B 487 | W. Bartel <i>et al.</i> | (DESY, HEIDP) |
| JEAN-MARIE | 76 | PRL 36 291 | W. Braunschweig <i>et al.</i> | (DASP Collab.) |
| BALDINI-... | 75 | PL 58B 471 | B. Jean-Marie <i>et al.</i> | (SLAC, LBL) IG |
| BOYARSKI | 75 | PRL 34 1357 | R. Baldini-Celio <i>et al.</i> | (FRAS, ROMA) |
| DASP | 75 | PL 56B 491 | A.M. Boyarski <i>et al.</i> | (SLAC, LBL) JPC |
| ESPOSITO | 75B | LNC 14 73 | W. Braunschweig <i>et al.</i> | (DASP Collab.) |
| FORD | 75 | PRL 34 604 | B. Esposito <i>et al.</i> | (FRAS, NAPL, PADO+) |
| | | | R.L. Ford <i>et al.</i> | (SLAC, PENN) |