$J/\psi(1S)$

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

$J/\psi(1S)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3096.87±0.04 OUR AVERAGE					
3096.89±0.09	502	[1] ARTAMONOV	00	OLYA	$e^+e^- \to$ hadrons
3096.87±0.03±0.03		ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
3096.95±0.1 ±0.3	193	BAGLIN	87	SPEC	$\overline{p}p \to e^+e^-X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3097.5 ±0.3		GRIBUSHIN	96	FMPS	515 π^- Be $\to 2\mu X$
3098.4 ±2.0	38k	LEMOIGNE	82	GOLI	190 π^- Be $\to 2\mu$
3096.93±0.09	502	[2] ZHOLENTZ	80	REDE	e^+e^-
3097.0 ±1		[3] BRANDELIK	79C	DASP	e^+e^-

[1] Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85).

[2] Superseded by ARTAMONOV 00.

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

$J/\psi(1S)$ WIDTH

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
87 ± 5 OUR AVERAGE				
84.4± 8.9	BAI	95B	BES	e^+e^-
99 ±12 ±6	ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$
$85.5^{+\ 6.1}_{-\ 5.8}$	[4] HSUEH	92	RVUE	See Υ mini-review

[4] Using data from COFFMAN 92, BALDINI-CELIO 75, BOYARSKI 75, ESPOSITO 75B, BRANDELIK 79C.

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

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	hadrons	(87.7 ±0.5) %	
Γ_2	virtual $\gamma \to$ hadrons	(17.0 ±2.0) %	
Γ_3	e^+e^-	(5.93±0.10) %	
Γ_4	$\mu^+\mu^-$	(5.88±0.10) %	

Decays involving hadronic resonances

Γ_5	$\rho\pi$		(1.27 ± 0.09) %	
Γ_6	$\rho^0\pi^0$		(4.2 ± 0.5) × 10^{-3}	
Γ_7	$a_2(1320)\rho$		(1.09 ± 0.22) %	
Γ_8	$\omega\pi^+\pi^+\pi^-\pi^-$		(8.5 ± 3.4) × 10^{-3}	
Γ_9	$\omega\pi^+\pi^-$		(7.2 ± 1.0) × 10^{-3}	
Γ_{10}	$\omega f_2(1270)$		(4.3 ± 0.6) × 10^{-3}	
Γ_{11}	$K^*(892)^0\overline{K}_2^*(1430)^0$ + c.c.		(6.7 ± 2.6) × 10^{-3}	
Γ_{12}	$\omega K^*(892)\overline{K}$ + c.c.		(5.3 ± 2.0) × 10^{-3}	
Γ_{13}	$K^+\overline{K}^*(892)^-$ + c.c.		(5.0 ± 0.4) × 10^{-3}	
Γ_{14}	$K^0\overline{K}^*(892)^0$ + c.c.		(4.2 ± 0.4) × 10^{-3}	
Γ_{15}	$K_1(1400)^\pm K^\mp$		(3.8 ± 1.4) × 10^{-3}	
Γ_{16}	$\omega\pi^0\pi^0$		(3.4 ± 0.8) × 10^{-3}	
Γ_{17}	$b_1(1235)^\pm\pi^\mp$	[a]	(3.0 ± 0.5) × 10^{-3}	
Γ_{18}	$\omega K^\pm K_S^0\pi^\mp$	[a]	(2.9 ± 0.7) × 10^{-3}	
Γ_{19}	$b_1(1235)^0\pi^0$		(2.3 ± 0.6) × 10^{-3}	
Γ_{20}	$\phi K^*(892)\overline{K}$ + c.c.		(2.04 ± 0.28) × 10^{-3}	
Γ_{21}	$\omega K\overline{K}$		(1.9 ± 0.4) × 10^{-3}	
Γ_{22}	$\omega f_0(1710) \rightarrow \omega K\overline{K}$		(4.8 ± 1.1) × 10^{-4}	
Γ_{23}	$\phi 2(\pi^+\pi^-)$		(1.60 ± 0.32) × 10^{-3}	
Γ_{24}	$\Delta(1232)^{++}\overline{p}\pi^-$		(1.6 ± 0.5) × 10^{-3}	
Γ_{25}	$\omega\eta$		(1.58 ± 0.16) × 10^{-3}	
Γ_{26}	$\phi K\overline{K}$		(1.48 ± 0.22) × 10^{-3}	
Γ_{27}	$\phi f_0(1710) \rightarrow \phi K\overline{K}$		(3.6 ± 0.6) × 10^{-4}	
Γ_{28}	$p\overline{p}\omega$		(1.30 ± 0.25) × 10^{-3}	S=1.3
Γ_{29}	$\Delta(1232)^{++}\overline{\Delta}(1232)^{--}$		(1.10 ± 0.29) × 10^{-3}	
Γ_{30}	$\Sigma(1385)^-\overline{\Sigma}(1385)^+$ (or c.c.)	[a]	(1.03 ± 0.13) × 10^{-3}	
Γ_{31}	$p\overline{p}\eta'(958)$		(9 ± 4) × 10^{-4}	S=1.7
Γ_{32}	$\phi f_2'(1525)$		(8 ± 4) × 10^{-4}	S=2.7
Γ_{33}	$\phi\pi^+\pi^-$		(8.0 ± 1.2) × 10^{-4}	
Γ_{34}	$\phi K^\pm K_S^0\pi^\mp$	[a]	(7.2 ± 0.9) × 10^{-4}	
Γ_{35}	$\omega f_1(1420)$		(6.8 ± 2.4) × 10^{-4}	
Γ_{36}	$\phi\eta$		(6.5 ± 0.7) × 10^{-4}	
Γ_{37}	$\Xi(1530)^-\overline{\Xi}^+$		(5.9 ± 1.5) × 10^{-4}	
Γ_{38}	$pK^-\overline{\Sigma}(1385)^0$		(5.1 ± 3.2) × 10^{-4}	
Γ_{39}	$\omega\pi^0$		(4.2 ± 0.6) × 10^{-4}	S=1.4
Γ_{40}	$\phi\eta'(958)$		(3.3 ± 0.4) × 10^{-4}	
Γ_{41}	$\phi f_0(980)$		(3.2 ± 0.9) × 10^{-4}	S=1.9
Γ_{42}	$\Xi(1530)^0\overline{\Xi}^0$		(3.2 ± 1.4) × 10^{-4}	
Γ_{43}	$\Sigma(1385)^-\overline{\Sigma}^+$ (or c.c.)	[a]	(3.1 ± 0.5) × 10^{-4}	
Γ_{44}	$\phi f_1(1285)$		(2.6 ± 0.5) × 10^{-4}	S=1.1
Γ_{45}	$\rho\eta$		(1.93 ± 0.23) × 10^{-4}	

Γ_{46}	$\omega\eta'(958)$			$(\ 1.67\pm0.25)\times10^{-4}$		
Γ_{47}	$\omega f_0(980)$			$(\ 1.4\ \pm0.5\ )\times10^{-4}$		
Γ_{48}	$\rho\eta'(958)$			$(\ 1.05\pm0.18)\times10^{-4}$		
Γ_{49}	$p\overline{p}\phi$			$(\ 4.5\ \pm1.5\ )\times10^{-5}$		
Γ_{50}	$a_2(1320)^{\pm}\pi^{\mp}$	[a]	$<$	4.3	$\times10^{-3}$	CL=90%
Γ_{51}	$K\overline{K}_2^*(1430)+$ c.c.		$<$	4.0	$\times10^{-3}$	CL=90%
Γ_{52}	$K_1(1270)^{\pm}K^{\mp}$		$<$	3.0	$\times10^{-3}$	CL=90%
Γ_{53}	$K_2^*(1430)^0\overline{K}_2^*(1430)^0$		$<$	2.9	$\times10^{-3}$	CL=90%
Γ_{54}	$K^*(892)^0\overline{K}^*(892)^0$		$<$	5	$\times10^{-4}$	CL=90%
Γ_{55}	$\phi f_2(1270)$		$<$	3.7	$\times10^{-4}$	CL=90%
Γ_{56}	$p\overline{p}\rho$		$<$	3.1	$\times10^{-4}$	CL=90%
Γ_{57}	$\phi\eta(1440)\rightarrow\ \ \phi\eta\pi\pi$		$<$	2.5	$\times10^{-4}$	CL=90%
Γ_{58}	$\omega f_2'(1525)$		$<$	2.2	$\times10^{-4}$	CL=90%
Γ_{59}	$\Sigma(1385)^0\overline{\Lambda}$		$<$	2	$\times10^{-4}$	CL=90%
Γ_{60}	$\Delta(1232)^+\overline{p}$		$<$	1	$\times10^{-4}$	CL=90%
Γ_{61}	$\Sigma^0\overline{\Lambda}$		$<$	9	$\times10^{-5}$	CL=90%
Γ_{62}	$\phi\pi^0$		$<$	6.8	$\times10^{-6}$	CL=90%

Decays into stable hadrons

Γ_{63}	$2(\pi^+\pi^-)\pi^0$			$(\ 3.37\pm0.26)$ %		
Γ_{64}	$3(\pi^+\pi^-)\pi^0$			$(\ 2.9\ \pm0.6\ )$ %		
Γ_{65}	$\pi^+\pi^-\pi^0$			$(\ 1.50\pm0.20)$ %		
Γ_{66}	$\pi^+\pi^-\pi^0K^+K^-$			$(\ 1.20\pm0.30)$ %		
Γ_{67}	$4(\pi^+\pi^-)\pi^0$			$(\ 9.0\ \pm3.0\ )\times10^{-3}$		
Γ_{68}	$\pi^+\pi^-K^+K^-$			$(\ 7.2\ \pm2.3\ )\times10^{-3}$		
Γ_{69}	$K\overline{K}\pi$			$(\ 6.1\ \pm1.0\ )\times10^{-3}$		
Γ_{70}	$p\overline{p}\pi^+\pi^-$			$(\ 6.0\ \pm0.5\ )\times10^{-3}$		S=1.3
Γ_{71}	$2(\pi^+\pi^-)$			$(\ 4.0\ \pm1.0\ )\times10^{-3}$		
Γ_{72}	$3(\pi^+\pi^-)$			$(\ 4.0\ \pm2.0\ )\times10^{-3}$		
Γ_{73}	$n\overline{n}\pi^+\pi^-$			$(\ 4\ \ \pm4\ \ )\times10^{-3}$		
Γ_{74}	$\Sigma^0\overline{\Sigma}^0$			$(\ 1.27\pm0.17)\times10^{-3}$		
Γ_{75}	$2(\pi^+\pi^-)K^+K^-$			$(\ 3.1\ \pm1.3\ )\times10^{-3}$		
Γ_{76}	$p\overline{p}\pi^+\pi^-\pi^0$	[b]		$(\ 2.3\ \pm0.9\ )\times10^{-3}$		S=1.9
Γ_{77}	$p\overline{p}$			$(\ 2.12\pm0.10)\times10^{-3}$		
Γ_{78}	$p\overline{p}\eta$			$(\ 2.09\pm0.18)\times10^{-3}$		
Γ_{79}	$p\overline{n}\pi^-$			$(\ 2.00\pm0.10)\times10^{-3}$		
Γ_{80}	$n\overline{n}$			$(\ 2.2\ \pm0.4\ )\times10^{-3}$		
Γ_{81}	$\Xi\overline{\Xi}$			$(\ 1.8\ \pm0.4\ )\times10^{-3}$		S=1.8
Γ_{82}	$\Lambda\overline{\Lambda}$			$(\ 1.30\pm0.12)\times10^{-3}$		S=1.1
Γ_{83}	$p\overline{p}\pi^0$			$(\ 1.09\pm0.09)\times10^{-3}$		
Γ_{84}	$\Lambda\overline{\Sigma}^-\pi^+$ (or c.c.)	[a]		$(\ 1.06\pm0.12)\times10^{-3}$		

Γ_{85}	$p K^- \overline{\Lambda}$		$(8.9 \pm 1.6) \times 10^{-4}$	
Γ_{86}	$2(K^+ K^-)$		$(7.0 \pm 3.0) \times 10^{-4}$	
Γ_{87}	$p K^- \overline{\Sigma}^0$		$(2.9 \pm 0.8) \times 10^{-4}$	
Γ_{88}	$K^+ K^-$		$(2.37 \pm 0.31) \times 10^{-4}$	
Γ_{89}	$\Lambda \overline{\Lambda} \pi^0$		$(2.2 \pm 0.6) \times 10^{-4}$	
Γ_{90}	$\pi^+ \pi^-$		$(1.47 \pm 0.23) \times 10^{-4}$	
Γ_{91}	$K_S^0 K_L^0$		$(1.08 \pm 0.14) \times 10^{-4}$	
Γ_{92}	$\Lambda \overline{\Sigma} +$ c.c.		$< 1.5 \times 10^{-4}$	CL=90%
Γ_{93}	$K_S^0 K_S^0$		$< 5.2 \times 10^{-6}$	CL=90%

Radiative decays

Γ_{94}	$\gamma \eta_c(1S)$		(1.3 ± 0.4) %	
Γ_{95}	$\gamma \pi^+ \pi^- 2\pi^0$		$(8.3 \pm 3.1) \times 10^{-3}$	
Γ_{96}	$\gamma \eta \pi \pi$		$(6.1 \pm 1.0) \times 10^{-3}$	
Γ_{97}	$\gamma \eta(1440) \to \gamma K \overline{K} \pi$	[c]	$(9.1 \pm 1.8) \times 10^{-4}$	
Γ_{98}	$\gamma \eta(1440) \to \gamma \gamma \rho^0$		$(6.4 \pm 1.4) \times 10^{-5}$	
Γ_{99}	$\gamma \eta(1440) \to \gamma \eta \pi^+ \pi^-$		$(3.0 \pm 0.5) \times 10^{-4}$	
Γ_{100}	$\gamma \rho \rho$		$(4.5 \pm 0.8) \times 10^{-3}$	
Γ_{101}	$\gamma \eta_2(1870) \to \gamma \pi^+ \pi^-$		$(6.2 \pm 2.4) \times 10^{-4}$	
Γ_{102}	$\gamma \eta'(958)$		$(4.31 \pm 0.30) \times 10^{-3}$	
Γ_{103}	$\gamma 2\pi^+ 2\pi^-$		$(2.8 \pm 0.5) \times 10^{-3}$	S=1.9
Γ_{104}	$\gamma K^+ K^- \pi^+ \pi^-$		$(2.1 \pm 0.6) \times 10^{-3}$	
Γ_{105}	$\gamma f_4(2050)$		$(2.7 \pm 0.7) \times 10^{-3}$	
Γ_{106}	$\gamma \omega \omega$		$(1.59 \pm 0.33) \times 10^{-3}$	
Γ_{107}	$\gamma \eta(1440) \to \gamma \rho^0 \rho^0$		$(1.7 \pm 0.4) \times 10^{-3}$	S=1.3
Γ_{108}	$\gamma f_2(1270)$		$(1.38 \pm 0.14) \times 10^{-3}$	
Γ_{109}	$\gamma f_0(1710) \to \gamma K \overline{K}$		$(8.5 \, {}^{+1.2}_{-0.9}) \times 10^{-4}$	S=1.2
Γ_{110}	$\gamma f_0(1710) \to \gamma \pi \pi$			
Γ_{111}	$\gamma \eta$		$(8.6 \pm 0.8) \times 10^{-4}$	
Γ_{112}	$\gamma f_1(1420) \to \gamma K \overline{K} \pi$		$(8.3 \pm 1.5) \times 10^{-4}$	
Γ_{113}	$\gamma f_1(1285)$		$(6.1 \pm 0.9) \times 10^{-4}$	
Γ_{114}	$\gamma f_1(1510) \to \gamma \eta \pi^+ \pi^-$		$(4.5 \pm 1.2) \times 10^{-4}$	
Γ_{115}	$\gamma f_2'(1525)$		$(4.7 \, {}^{+0.7}_{-0.5}) \times 10^{-4}$	
Γ_{116}	$\gamma f_2(1950) \to \gamma K^*(892) \overline{K}^*(892)$		$(7.0 \pm 2.2) \times 10^{-4}$	
Γ_{117}	$\gamma K^*(892) \overline{K}^*(892)$		$(4.0 \pm 1.3) \times 10^{-3}$	
Γ_{118}	$\gamma \phi \phi$		$(4.0 \pm 1.2) \times 10^{-4}$	S=2.1
Γ_{119}	$\gamma p \overline{p}$		$(3.8 \pm 1.0) \times 10^{-4}$	
Γ_{120}	$\gamma \eta(2225)$		$(2.9 \pm 0.6) \times 10^{-4}$	
Γ_{121}	$\gamma \eta(1760) \to \gamma \rho^0 \rho^0$		$(1.3 \pm 0.9) \times 10^{-4}$	

Γ_{122}	$\gamma\pi^0$	$(\ 3.9\ \pm 1.3\ )\times 10^{-5}$		
Γ_{123}	$\gamma p\overline{p}\pi^+\pi^-$	$<\ 7.9\ \times 10^{-4}$		CL=90%
Γ_{124}	$\gamma\gamma$	$<\ 5\ \times 10^{-4}$		CL=90%
Γ_{125}	$\gamma\Lambda\overline{\Lambda}$	$<\ 1.3\ \times 10^{-4}$		CL=90%
Γ_{126}	3γ	$<\ 5.5\ \times 10^{-5}$		CL=90%
Γ_{127}	$\gamma f_0(2200)$			
Γ_{128}	$\gamma f_J(2220)$	$>\ 2.50\ \times 10^{-3}$		CL=99.9%
Γ_{129}	$\gamma f_J(2220)\ \rightarrow\ \gamma\pi\pi$	$(\ 8\ \ \pm 4\ \ )\times 10^{-5}$		
Γ_{130}	$\gamma f_J(2220)\ \rightarrow\ \gamma K\overline{K}$	$(\ 8.1\ \pm 3.0\ )\times 10^{-5}$		
Γ_{131}	$\gamma f_J(2220)\ \rightarrow\ \gamma p\overline{p}$	$(\ 1.5\ \pm 0.8\ )\times 10^{-5}$		
Γ_{132}	$\gamma f_0(1500)$	$<(\ 5.7\ \pm 0.8\ )\times 10^{-4}$		
Γ_{133}	γe^+e^-	$(\ 8.8\ \pm 1.4\ )\times 10^{-3}$		

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

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

[*c*] See the "Note on the $\eta(1440)$" in the $\eta(1440)$ Particle Listings.

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

Γ(hadrons) Γ_1

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • 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^-

Γ(virtual $\gamma\rightarrow$ hadrons) Γ_2

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
12 ±2	[5] BOYARSKI	75	MRK1	e^+e^-

[5] Included in Γ(hadrons).

$\Gamma(e^+e^-)$ Γ_3

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
5.26±0.37 OUR EVALUATION				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.14±0.39	BAI	95B	BES	e^+e^-
$5.36^{+0.29}_{-0.28}$	[6] HSUEH	92	RVUE	See Υ mini-review
4.72±0.35	ALEXANDER	89	RVUE	See Υ mini-review
4.4 ±0.6	[6] BRANDELIK	79C	DASP	e^+e^-
4.6 ±0.8	[7] BALDINI-...	75	FRAG	e^+e^-
4.8 ±0.6	BOYARSKI	75	MRK1	e^+e^-
4.6 ±1.0	ESPOSITO	75B	FRAM	e^+e^-

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

[7] Assuming equal partial widths for e^+e^- and $\mu^+\mu^-$.

$\Gamma(\mu^+\mu^-)$ Γ_4

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • 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_{124}

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<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.

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_3/\Gamma$

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4 ±0.8	[8] BALDINI-...	75	FRAG	e^+e^-
3.9±0.8	[8] ESPOSITO	75B	FRAM	e^+e^-

$\Gamma(e^+e^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_3\Gamma_3/\Gamma$

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.35±0.02	BRANDELIK	79C	DASP	e^+e^-
0.32±0.07	[8] BALDINI-...	75	FRAG	e^+e^-
0.34±0.09	[8] ESPOSITO	75B	FRAM	e^+e^-
0.36±0.10	[8] FORD	75	SPEC	e^+e^-

$\Gamma(\mu^+\mu^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_4\Gamma_3/\Gamma$

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.51±0.09	DASP	75	DASP	e^+e^-
0.38±0.05	[8] ESPOSITO	75B	FRAM	e^+e^-

$\Gamma(p\overline{p}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{77}\Gamma_3/\Gamma$

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
9.7±1.7	[9] ARMSTRONG	93B	E760	$\overline{p}p \rightarrow e^+e^-$

[8] Data redundant with branching ratios or partial widths above.
[9] Using $\Gamma_{\text{total}} = 85.5^{+6.1}_{-5.8}$ MeV.

$J/\psi(1S)$ BRANCHING RATIOS

For the first four branching ratios, see also the partial widths, and (partial widths) $\times\ \Gamma(e^+e^-)/\Gamma_{\rm total}$ above.

$\Gamma(\text{hadrons})/\Gamma_{\rm total}$ Γ_1/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.877±0.005 OUR AVERAGE				
0.878±0.005	BAI	95B	BES	e^+e^-
0.86 ±0.02	BOYARSKI	75	MRK1	e^+e^-

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.17 ±0.02	[10] BOYARSKI	75	MRK1	e^+e^-

[10] Included in $\Gamma(\text{hadrons})/\Gamma_{\rm total}$.

$\Gamma(e^+e^-)/\Gamma_{\rm total}$ Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0593±0.0010 OUR AVERAGE				
0.0590±0.0005±0.0010	BAI	98D	BES	$\psi(2S)\rightarrow J/\psi\pi^+\pi^-$
0.0609±0.0033	BAI	95B	BES	e^+e^-
0.0592±0.0015±0.0020	COFFMAN	92	MRK3	$\psi(2S)\rightarrow J/\psi\pi^+\pi^-$
0.069 ±0.009	BOYARSKI	75	MRK1	e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma_{\rm total}$ Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0588±0.0010 OUR AVERAGE				
0.0584±0.0006±0.0010	BAI	98D	BES	$\psi(2S)\rightarrow J/\psi\pi^+\pi^-$
0.0608±0.0033	BAI	95B	BES	e^+e^-
0.0590±0.0015±0.0019	COFFMAN	92	MRK3	$\psi(2S)\rightarrow J/\psi\pi^+\pi^-$
0.069 ±0.009	BOYARSKI	75	MRK1	e^+e^-

$\Gamma(e^+e^-)/\Gamma(\mu^+\mu^-)$ Γ_3/Γ_4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
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^-

HADRONIC DECAYS

$\Gamma(\rho\pi)/\Gamma_{total}$ Γ_5/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0127±0.0009 OUR AVERAGE					
0.0121±0.0020		BAI	96D	BES	$e^+e^- \to \rho\pi$
0.0142±0.0001±0.0019		COFFMAN	88	MRK3	e^+e^-
0.013 ±0.003	150	FRANKLIN	83	MRK2	e^+e^-
0.016 ±0.004	183	ALEXANDER	78	PLUT	e^+e^-
0.0133±0.0021		BRANDELIK	78B	DASP	e^+e^-
0.010 ±0.002	543	BARTEL	76	CNTR	e^+e^-
0.013 ±0.003	153	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(\rho^0\pi^0)/\Gamma(\rho\pi)$ Γ_6/Γ_5

VALUE	DOCUMENT ID		TECN	COMMENT
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^-

$\Gamma(a_2(1320)\rho)/\Gamma_{total}$ Γ_7/Γ

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

$\Gamma(\omega\pi^+\pi^+\pi^-\pi^-)/\Gamma_{total}$ Γ_8/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
85±34	140	VANNUCCI	77	MRK1	$e^+e^- \to 3(\pi^+\pi^-)\pi^0$

$\Gamma(\omega\pi^+\pi^-)/\Gamma_{total}$ Γ_9/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.2±1.0 OUR AVERAGE					
7.0±1.6	18058	AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+\pi^-)\pi^0$
7.8±1.6	215	BURMESTER	77D	PLUT	e^+e^-
6.8±1.9	348	VANNUCCI	77	MRK1	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

$\Gamma(\omega\pi^+\pi^-)/\Gamma(2(\pi^+\pi^-)\pi^0)$ Γ_9/Γ_{63}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.3	[11] JEAN-MARIE	76	MRK1	e^+e^-

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

$\Gamma(K^*(892)^0\overline{K}_2^*(1430)^0 + \text{c.c.})/\Gamma_{total}$ Γ_{11}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
67±26	40	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^- K^+K^-$

$\Gamma(\omega K^*(892)\overline{K} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
53±14±14	530± 140	BECKER	87	MRK3	$e^+e^- \to$ hadrons

$\Gamma(\omega f_2(1270))/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
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	$e^+e^- \to 2(\pi^+\pi^-)\pi^0$

$\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{13}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.0 ±0.4 OUR AVERAGE					
4.57±0.17±0.70	2285	JOUSSET	90	DM2	$J/\psi \to$ hadrons
5.26±0.13±0.53		COFFMAN	88	MRK3	$J/\psi \to K^\pm K^0_S \pi^\mp$, $K^+K^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.6 ±0.6	24	FRANKLIN	83	MRK2	$J/\psi \to K^+K^-\pi^0$
3.2 ±0.6	48	VANNUCCI	77	MRK1	$J/\psi \to K^\pm K^0_S \pi^\mp$
4.1 ±1.2	39	BRAUNSCH...	76	DASP	$J/\psi \to K^\pm X$

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{14}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.2 ±0.4 OUR AVERAGE					
3.96±0.15±0.60	1192	JOUSSET	90	DM2	$J/\psi \to$ hadrons
4.33±0.12±0.45		COFFMAN	88	MRK3	$J/\psi \to K^\pm K^0_S \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.7 ±0.6	45	VANNUCCI	77	MRK1	$J/\psi \to K^\pm K^0_S \pi^\mp$

$\Gamma(K^0\overline{K}^*(892)^0 + \text{c.c.})/\Gamma(K^+\overline{K}^*(892)^- + \text{c.c.})$ Γ_{14}/Γ_{13}

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

$\Gamma(K_1(1400)^\pm K^\mp)/\Gamma_{\text{total}}$ Γ_{15}/Γ

VALUE (units 10^{-3})		DOCUMENT ID		TECN	COMMENT
3.8±0.8±1.2	[12]	BAI	99C	BES	e^+e^-

[12] Assuming B($K_1(1400) \to K^*\pi$)=0.94 ± 0.06

$\Gamma(\omega\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_{16}/Γ

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

$\Gamma(b_1(1235)^{\pm}\pi^{\mp})/\Gamma_{total}$ Γ_{17}/Γ

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

$\Gamma(\omega K^{\pm}K^0_S\pi^{\mp})/\Gamma_{total}$ Γ_{18}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
29.5±1.4±7.0	879±41	BECKER	87	MRK3	$e^+e^- \to$ hadrons

$\Gamma(b_1(1235)^0\pi^0)/\Gamma_{total}$ Γ_{19}/Γ

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

$\Gamma(\phi K^*(892)\overline{K}+\text{c.c.})/\Gamma_{total}$ Γ_{20}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
20.4±2.8 OUR AVERAGE					
20.7±2.4±3.0		FALVARD	88	DM2	$J/\psi \to$ hadrons
20 ±3 ±3	155±20	BECKER	87	MRK3	$e^+e^- \to$ hadrons

$\Gamma(\omega K\overline{K})/\Gamma_{total}$ Γ_{21}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
19 ± 4 OUR AVERAGE					
19.8± 2.1±3.9		[13] FALVARD	88	DM2	$J/\psi \to$ hadrons
16 ±10	22	FELDMAN	77	MRK1	e^+e^-

[13] Addition of ωK^+K^- and $\omega K^0\overline{K}^0$ branching ratios.

$\Gamma(\omega f_0(1710) \to \omega K\overline{K})/\Gamma_{total}$ Γ_{22}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.8±1.1±0.3	[14,15] FALVARD	88	DM2	$J/\psi \to$ hadrons

[14] Includes unknown branching fraction $f_0(1710) \to K\overline{K}$.
[15] Addition of $f_0(1710) \to K^+K^-$ and $f_0(1710) \to K^0\overline{K}^0$ branching ratios.

$\Gamma(\phi 2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{23}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
16.0±1.0±3.0	FALVARD	88	DM2	$J/\psi \to$ hadrons

$\Gamma(\Delta(1232)^{++}\overline{p}\pi^-)/\Gamma_{total}$ Γ_{24}/Γ

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

$\Gamma(\omega\eta)/\Gamma_{total}$ Γ_{25}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.58±0.16 OUR AVERAGE					
1.43±0.10±0.21	378	JOUSSET	90	DM2	$J/\psi \to$ hadrons
1.71±0.08±0.20		COFFMAN	88	MRK3	$e^+e^- \to 3\pi\eta$

$\Gamma(\phi K\overline{K})/\Gamma_{total}$ Γ_{26}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
14.8±2.2 OUR AVERAGE					
14.6±0.8±2.1		[16] FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons
18 ±8	14	FELDMAN	77	MRK1	e^+e^-

[16] Addition of ϕK^+K^- and $\phi K^0\overline{K}^0$ branching ratios.

$\Gamma(\phi f_0(1710) \rightarrow \phi K\overline{K})/\Gamma_{total}$ Γ_{27}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.6±0.2±0.6	[17,18] FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons

[17] Including interference with $f_2'(1525)$.

[18] Includes unknown branching fraction $f_0(1710) \rightarrow K\overline{K}$.

$\Gamma(p\overline{p}\omega)/\Gamma_{total}$ Γ_{28}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.30±0.25 OUR AVERAGE Error includes scale factor of 1.3.					
1.10±0.17±0.18	486	EATON	84	MRK2	e^+e^-
1.6 ±0.3	77	PERUZZI	78	MRK1	e^+e^-

$\Gamma(\Delta(1232)^{++}\overline{\Delta}(1232)^{--})/\Gamma_{total}$ Γ_{29}/Γ

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

$\Gamma(\Sigma(1385)^-\overline{\Sigma}(1385)^+ (\text{or c.c.}))/\Gamma_{total}$ Γ_{30}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.03±0.13 OUR AVERAGE					
1.00±0.04±0.21	631± 25	HENRARD	87	DM2	$e^+e^- \rightarrow \Sigma^{*-}$
1.19±0.04±0.25	754± 27	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	$e^+e^- \rightarrow \Sigma^{*+}$

$\Gamma(p\overline{p}\eta'(958))/\Gamma_{total}$ Γ_{31}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.9 ±0.4 OUR AVERAGE Error includes scale factor of 1.7.					
0.68±0.23±0.17	19	EATON	84	MRK2	e^+e^-
1.8 ±0.6	19	PERUZZI	78	MRK1	e^+e^-

$\Gamma(\phi f_2'(1525))/\Gamma_{total}$ Γ_{32}/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		[19,20] FALVARD	88	DM2	$J/\psi \rightarrow$ hadrons
4.8±1.8	46	[19] GIDAL	81	MRK2	$J/\psi \rightarrow K^+K^-K^+K^-$

[19] Re-evaluated using $B(f_2'(1525) \rightarrow K\overline{K}) = 0.713$.

[20] Including interference with $f_0(1710)$.

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{33}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.80±0.12 OUR AVERAGE					
0.78±0.03±0.12		FALVARD	88	DM2	$J/\psi \to$ hadrons
2.1 ±0.9	23	FELDMAN	77	MRK1	e^+e^-

$\Gamma(\phi K^\pm K_S^0 \pi^\mp)/\Gamma_{total}$ Γ_{34}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.2±0.9 OUR AVERAGE					
7.4±0.9±1.1		FALVARD	88	DM2	$J/\psi \to$ hadrons
7 ±0.6±1.0	163± 15	BECKER	87	MRK3	$e^+e^- \to$ hadrons

$\Gamma(\omega f_1(1420))/\Gamma_{total}$ Γ_{35}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{6.8^{+1.9}_{-1.6}\pm1.7}$	111^{+31}_{-26}	BECKER	87	MRK3	$e^+e^- \to$ hadrons

$\Gamma(\phi\eta)/\Gamma_{total}$ Γ_{36}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.65 ±0.07 OUR AVERAGE					
0.64 ±0.04 ±0.11	346	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.661±0.045±0.078		COFFMAN	88	MRK3	$e^+e^- \to K^+K^-\eta$

$\Gamma(\Xi(1530)^-\overline{\Xi}^+)/\Gamma_{total}$ Γ_{37}/Γ

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

$\Gamma(pK^-\overline{\Sigma}(1385)^0)/\Gamma_{total}$ Γ_{38}/Γ

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

$\Gamma(\omega\pi^0)/\Gamma_{total}$ Γ_{39}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.42 ±0.06 OUR AVERAGE	Error includes scale factor of 1.4.				
0.360±0.028±0.054	222	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.482±0.019±0.064		COFFMAN	88	MRK3	$e^+e^- \to \pi^0\pi^+\pi^-\pi^0$

$\Gamma(\phi\eta'(958))/\Gamma_{total}$ Γ_{40}/Γ

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.33 ±0.04 OUR AVERAGE						
0.41 ±0.03 ±0.08		167	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.308±0.034±0.036			COFFMAN	88	MRK3	$e^+e^- \to K^+K^-\eta'$

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

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

$\Gamma(\phi f_0(980))/\Gamma_{total}$ Γ_{41}/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±0.4±0.8		[21] FALVARD	88	DM2	$J/\psi \to$ hadrons
2.6±0.6	50	[21] GIDAL	81	MRK2	$J/\psi \to K^+ K^- K^+ K^-$

[21] Assuming B($f_0(980) \to \pi\pi$) = 0.78.

$\Gamma(\Xi(1530)^0 \overline{\Xi}^0)/\Gamma_{total}$ Γ_{42}/Γ

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

$\Gamma(\Sigma(1385)^- \overline{\Sigma}^+ (\text{or c.c.}))/\Gamma_{total}$ Γ_{43}/Γ

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	$e^+ e^- \to \Sigma^{*-}$
0.34±0.04±0.07	77 ± 9	HENRARD	87	DM2	$e^+ e^- \to \Sigma^{*+}$
0.29±0.11±0.10	26	EATON	84	MRK2	$e^+ e^- \to \Sigma^{*-}$
0.31±0.11±0.11	28	EATON	84	MRK2	$e^+ e^- \to \Sigma^{*+}$

$\Gamma(\phi f_1(1285))/\Gamma_{total}$ Γ_{44}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.6±0.5 OUR AVERAGE	Error includes scale factor of 1.1.				
3.2±0.6±0.4		JOUSSET	90	DM2	$J/\psi \to \phi 2(\pi^+ \pi^-)$
2.1±0.5±0.4	25	[22] JOUSSET	90	DM2	$J/\psi \to \phi \eta \pi^+ \pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.6±0.2±0.1	16 ± 6	BECKER	87	MRK3	$J/\psi \to \phi K \overline{K} \pi$

[22] We attrribute to the $f_1(1285)$ the signal observed in the $\pi^+ \pi^- \eta$ invariant mass distribution at 1297 Mev.

$\Gamma(\rho\eta)/\Gamma_{total}$ Γ_{45}/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	$J/\psi \to$ hadrons
0.193±0.013±0.029		COFFMAN	88	MRK3	$e^+ e^- \to \pi^+ \pi^- \eta$

$\Gamma(\omega\eta'(958))/\Gamma_{total}$ Γ_{46}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.167±0.025 OUR AVERAGE					
$0.18\ ^{+0.10}_{-0.08}\ \pm 0.03$	6	JOUSSET	90	DM2	$J/\psi \to$ hadrons
0.166±0.017±0.019		COFFMAN	88	MRK3	$e^+ e^- \to 3\pi\eta'$

$\Gamma(\omega f_0(980))/\Gamma_{total}$ Γ_{47}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
1.41±0.27±0.47	[23] AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+ \pi^-)\pi^0$

[23] Assuming B($f_0(980) \to \pi\pi$) = 0.78.

$\Gamma(\rho\eta'(958))/\Gamma_{total}$ — Γ_{48}/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	$J/\psi \to$ hadrons
0.114±0.014±0.016		COFFMAN	88	MRK3	$J/\psi \to \pi^+\pi^-\eta'$

$\Gamma(p\overline{p}\phi)/\Gamma_{total}$ — Γ_{49}/Γ

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

$\Gamma(a_2(1320)^{\pm}\pi^{\mp})/\Gamma_{total}$ — Γ_{50}/Γ

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

$\Gamma(K\overline{K}_2^*(1430)+\text{c.c.})/\Gamma_{total}$ — Γ_{51}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<40	90	VANNUCCI	77	MRK1	$e^+e^- \to K^0\overline{K}_2^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<66	90	BRAUNSCH...	76	DASP	$e^+e^- \to K^{\pm}\overline{K}_2^{*\mp}$

$\Gamma(K_1(1270)^{\pm}K^{\mp})/\Gamma_{total}$ — Γ_{52}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3.0	90	[24] BAI	99C	BES	e^+e^-

[24] Assuming B($K_1(1270) \to K\rho$)=0.42 ± 0.06

$\Gamma(K_2^*(1430)^0\overline{K}_2^*(1430)^0)/\Gamma_{total}$ — Γ_{53}/Γ

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

$\Gamma(K^*(892)^0\overline{K}^*(892)^0)/\Gamma_{total}$ — Γ_{54}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^- K^+K^-$

$\Gamma(\phi f_2(1270))/\Gamma_{total}$ — Γ_{55}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.7	90	VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^- K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.5	90	FALVARD	88	DM2	$J/\psi \to$ hadrons

$\Gamma(p\overline{p}\rho)/\Gamma_{total}$ — Γ_{56}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.31	90	EATON	84	MRK2	$e^+e^- \to$ hadronsγ

$\Gamma(\phi\eta(1440) \to \phi\eta\pi\pi)/\Gamma_{total}$ — Γ_{57}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.5	90	[25] FALVARD	88	DM2	$J/\psi \to$ hadrons

[25] Includes unknown branching fraction $\eta(1440) \to \eta\pi\pi$.

$\Gamma(\omega f_2'(1525))/\Gamma_{total}$ — Γ_{58}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<2.2	90	[26] VANNUCCI	77	MRK1	$e^+e^- \to \pi^+\pi^-\pi^0 K^+K^-$

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

<2.8	90	[26] FALVARD	88	DM2	$J/\psi \to$ hadrons

[26] Re-evaluated assuming $B(f_2'(1525) \to K\overline{K}) = 0.713$.

$\Gamma(\Sigma(1385)^0\overline{\Lambda})/\Gamma_{total}$ — Γ_{59}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.2	90	HENRARD	87	DM2	e^+e^-

$\Gamma(\Delta(1232)^+\overline{p})/\Gamma_{total}$ — Γ_{60}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.1	90	HENRARD	87	DM2	e^+e^-

$\Gamma(\Sigma^0\overline{\Lambda})/\Gamma_{total}$ — Γ_{61}/Γ

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

$\Gamma(\phi\pi^0)/\Gamma_{total}$ — Γ_{62}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.068	90	COFFMAN	88	MRK3	$e^+e^- \to K^+K^-\pi^0$

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{63}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0337±0.0026 OUR AVERAGE					
0.0325±0.0049	46055	AUGUSTIN	89	DM2	$J/\psi \to 2(\pi^+\pi^-)\pi^0$
0.0317±0.0042	147	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons
0.0364±0.0052	1500	BURMESTER	77D	PLUT	e^+e^-
0.04 ±0.01	675	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{64}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.029±0.006 OUR AVERAGE					
0.028±0.009	11	FRANKLIN	83	MRK2	$e^+e^- \to$ hadrons
0.029±0.007	181	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{65}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.015 ±0.002	168	FRANKLIN	83	MRK2	e^+e^-

$\Gamma(\pi^+\pi^-\pi^0 K^+ K^-)/\Gamma_{total}$ Γ_{66}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.012 ±0.003	309	VANNUCCI	77	MRK1	e^+e^-

$\Gamma(4(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ Γ_{67}/Γ

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

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

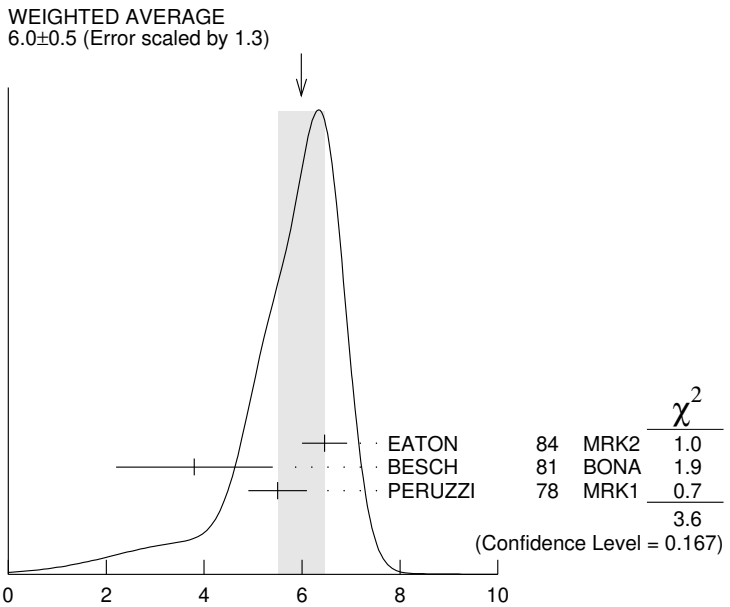
VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
72±23	205	VANNUCCI	77	MRK1	e^+e^-

$\Gamma(K\overline{K}\pi)/\Gamma_{total}$ Γ_{69}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
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	$e^+e^- \rightarrow K^0_S K^\pm\pi^\mp$

$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{70}/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^-



$\Gamma(p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ (units 10^{-3})

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ Γ_{71}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.004 ±0.001	76	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ Γ_{72}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
40±20	32	JEAN-MARIE	76	MRK1	e^+e^-

$\Gamma(n\bar{n}\pi^+\pi^-)/\Gamma_{total}$ Γ_{73}/Γ

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

$\Gamma(\Sigma^0\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{74}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.27±0.17 OUR AVERAGE					
1.06±0.04±0.23	884±30	PALLIN	87	DM2	$e^+e^- \to \Sigma^0\overline{\Sigma}^0$
1.58±0.16±0.25	90	EATON	84	MRK2	$e^+e^- \to \Sigma^0\overline{\Sigma}^0$
1.3 ±0.4	52	PERUZZI	78	MRK1	$e^+e^- \to \Sigma^0\overline{\Sigma}^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.4 ±2.6	3	BESCH	81	BONA	$e^+e^- \to \Sigma^+\overline{\Sigma}^-$

$\Gamma(2(\pi^+\pi^-)K^+K^-)/\Gamma_{total}$ Γ_{75}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
31±13	30	VANNUCCI	77	MRK1	e^+e^-

$\Gamma(p\bar{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{76}/Γ

Including $p\bar{p}\pi^+\pi^-\gamma$ 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^-

$\Gamma(p\bar{p})/\Gamma_{total}$ Γ_{77}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.12±0.10 OUR AVERAGE					
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	[27] 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^-

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

$\Gamma(p\bar{p}\eta)/\Gamma_{total}$ Γ_{78}/Γ

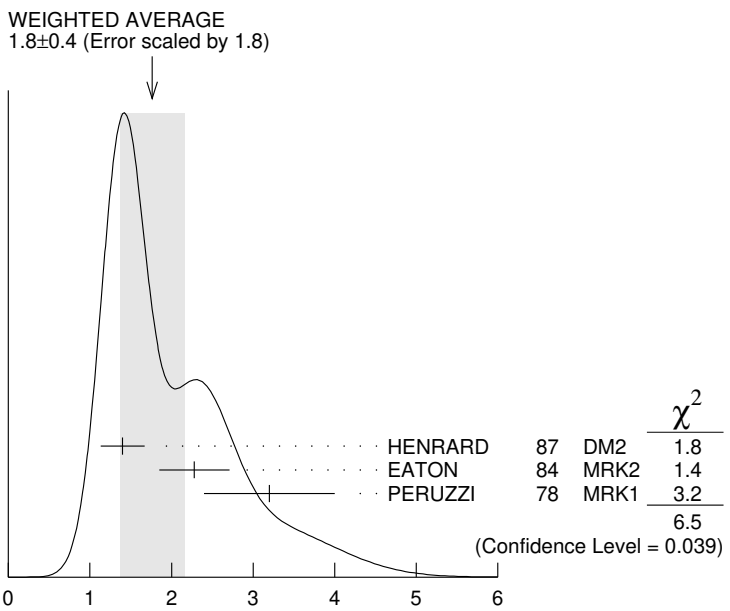
VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.09±0.18 OUR AVERAGE					
2.03±0.13±0.15	826	EATON	84	MRK2	e^+e^-
2.5 ±1.2		BRANDELIK	79C	DASP	e^+e^-
2.3 ±0.4	197	PERUZZI	78	MRK1	e^+e^-

$\Gamma(p\bar{n}\pi^-)/\Gamma_{total}$ Γ_{79}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.00±0.10 OUR AVERAGE					
2.02±0.07±0.16	1288	EATON	84	MRK2	$e^+e^- \to p\pi^-$
1.93±0.07±0.16	1191	EATON	84	MRK2	$e^+e^- \to \bar{p}\pi^+$
1.7 ±0.7	32	BESCH	81	BONA	$e^+e^- \to p\pi^-$
1.6 ±1.2	5	BESCH	81	BONA	$e^+e^- \to \bar{p}\pi^+$
2.16±0.29	194	PERUZZI	78	MRK1	$e^+e^- \to p\pi^-$
2.04±0.27	204	PERUZZI	78	MRK1	$e^+e^- \to \bar{p}\pi^+$

$\Gamma(\Xi\bar{\Xi})/\Gamma_{total}$ Γ_{81}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.8 ±0.4 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.					
1.40±0.12±0.24	132±11	HENRARD	87	DM2	$e^+e^- \to \Xi^-\bar{\Xi}^+$
2.28±0.16±0.40	194	EATON	84	MRK2	$e^+e^- \to \Xi^-\bar{\Xi}^+$
3.2 ±0.8	71	PERUZZI	78	MRK1	e^+e^-



$\Gamma(n\overline{n})/\Gamma_{total}$ Γ_{80}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.22 ±0.04 OUR AVERAGE					
0.231±0.049	79	BALDINI	98	FENI	e^+e^-
0.18 ±0.09		BESCH	78	BONA	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.190±0.055	40	ANTONELLI	93	SPEC	e^+e^-

$\Gamma(\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{82}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.30±0.12 OUR AVERAGE Error includes scale factor of 1.1.					
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^-

$\Gamma(p\overline{p}\pi^0)/\Gamma_{total}$ Γ_{83}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.09±0.09 OUR AVERAGE					
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^-

$\Gamma(\Lambda\overline{\Sigma}^-\pi^+ (\text{or c.c.}))/\Gamma_{total}$ Γ_{84}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.06±0.12 OUR AVERAGE					
0.90±0.06±0.16	225±15	HENRARD	87	DM2	$e^+e^- \to \Lambda\overline{\Sigma}^+\pi^-$
1.11±0.06±0.20	342±18	HENRARD	87	DM2	$e^+e^- \to \Lambda\overline{\Sigma}^-\pi^+$
1.53±0.17±0.38	135	EATON	84	MRK2	$e^+e^- \to \Lambda\overline{\Sigma}^+\pi^-$
1.38±0.21±0.35	118	EATON	84	MRK2	$e^+e^- \to \Lambda\overline{\Sigma}^-\pi^+$

$\Gamma(pK^-\overline{\Lambda})/\Gamma_{total}$ Γ_{85}/Γ

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

$\Gamma(2(K^+K^-))/\Gamma_{total}$ Γ_{86}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
7 ±3	VANNUCCI	77	MRK1	e^+e^-

$\Gamma(pK^-\overline{\Sigma}^0)/\Gamma_{total}$ Γ_{87}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.29±0.06±0.05	90	EATON	84	MRK2	e^+e^-

$\Gamma(K^+K^-)/\Gamma_{total}$ Γ_{88}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.37±0.31 OUR AVERAGE					
2.39±0.24±0.22	107	BALTRUSAIT...85D		MRK3	e^+e^-
2.2 ±0.9	6	BRANDELIK	79C	DASP	e^+e^-

$\Gamma(\Lambda\overline{\Lambda}\pi^0)/\Gamma_{total}$ Γ_{89}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.22±0.06 OUR AVERAGE					
0.23±0.07±0.08	11	BAI	98G	BES	e^+e^-
0.22±0.05±0.05	19 ± 4	HENRARD	87	DM2	e^+e^-

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_{90}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.47±0.23 OUR AVERAGE					
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^-

$\Gamma(K_S^0K_L^0)/\Gamma_{total}$ Γ_{91}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.08±0.14 OUR AVERAGE					
1.18±0.12±0.18		JOUSSET	90	DM2	$J/\psi \rightarrow$ hadrons
1.01±0.16±0.09	74	BALTRUSAIT...85D		MRK3	e^+e^-

$\Gamma(\Lambda\overline{\Sigma}+\text{c.c.})/\Gamma_{total}$ Γ_{92}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.15	90	PERUZZI	78	MRK1	$e^+e^- \rightarrow \Lambda X$

$\Gamma(K_S^0K_S^0)/\Gamma_{total}$ Γ_{93}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.052	90	[28] BALTRUSAIT...85C		MRK3	e^+e^-

[28] Forbidden by *CP*.

RADIATIVE DECAYS

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ Γ_{94}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0127±0.0036		GAISER	86	CBAL	$J/\psi \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	16	BALTRUSAIT...84		MRK3	$J/\psi \rightarrow 2\phi\gamma$

$\Gamma(\gamma\pi^+\pi^-2\pi^0)/\Gamma_{total}$ Γ_{95}/Γ

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.3±0.2±3.1	[29] BALTRUSAIT...86B		MRK3	$J/\psi \rightarrow 4\pi\gamma$

[29] 4π mass less than 2.0 GeV.

$\Gamma(\gamma\eta\pi\pi)/\Gamma_{total}$ Γ_{96}/Γ

VALUE (units 10^{-3})	*DOCUMENT ID*		*TECN*	*COMMENT*
6.1 ±1.0 OUR AVERAGE				
5.85±0.3±1.05	[30] EDWARDS	83B	CBAL	$J/\psi \to \eta\pi^+\pi^-$
7.8 ±1.2±2.4	[30] EDWARDS	83B	CBAL	$J/\psi \to \eta 2\pi^0$

[30] Broad enhancement at 1700 MeV.

$\Gamma(\gamma\eta(1440) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ Γ_{97}/Γ

VALUE (units 10^{-3})	*DOCUMENT ID*		*TECN*	*COMMENT*
0.91±0.18 OUR AVERAGE				
0.83±0.13±0.18	[31,32] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$
$1.03^{+0.21}_{-0.18}{}^{+0.26}_{-0.19}$	[31,33] BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.78±0.21±0.33	[31,34] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$
3.8 ±0.3 ±0.6	[31] AUGUSTIN	90	DM2	$J/\psi \to \gamma K\overline{K}\pi$
$0.66^{+0.17}_{-0.16}{}^{+0.24}_{-0.15}$	[31,35] BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$
4.0 ±0.7 ±1.0	[31] EDWARDS	82E	CBAL	$J/\psi \to K^+K^-\pi^0\gamma$
4.3 ±1.7	[31,36] SCHARRE	80	MRK2	e^+e^-

[31] Includes unknown branching fraction $\eta(1440) \to K\overline{K}\pi$.
[32] From fit to the $K^*(892)K$ 0^{-+} partial wave.
[33] From $K^*(890)K$ final state.
[34] From fit to the $a_0(980)\pi$ 0^{-+} partial wave.
[35] From $a_0(980)\pi$ final state.
[36] Corrected for spin-zero hypothesis for $\eta(1440)$.

$\Gamma(\gamma\eta(1440) \to \gamma\gamma\rho^0)/\Gamma_{total}$ Γ_{98}/Γ

VALUE (units 10^{-5})	*DOCUMENT ID*		*TECN*	*COMMENT*
6.4±1.2±0.7	[37] COFFMAN	90	MRK3	$J/\psi \to \gamma\gamma\pi^+\pi^-$

[37] Includes unknown branching fraction $\eta(1440) \to \gamma\rho^0$.

$\Gamma(\gamma\eta(1440) \to \gamma\eta\pi^+\pi^-)/\Gamma_{total}$ Γ_{99}/Γ

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3.0 ±0.5 OUR AVERAGE					
2.6 ±0.7 ±0.4		BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$
3.38±0.33±0.64		[38] BOLTON	92B	MRK3	$J/\psi \to \gamma\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.0 ±0.6 ±1.1	261	[39] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$

[38] Via $a_0(980)\pi$.
[39] Includes unknown branching fraction to $\eta\pi^+\pi^-$.

$\Gamma(\gamma\rho\rho)/\Gamma_{total}$ Γ_{100}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
4.5 ±0.8 OUR AVERAGE					
4.7 ±0.3 ±0.9		[40] BALTRUSAIT...86B		MRK3	$J/\psi \to 4\pi\gamma$
3.75±1.05±1.20		[41] BURKE	82	MRK2	$J/\psi \to 4\pi\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.09	90	[42] BISELLO	89B		$J/\psi \to 4\pi\gamma$

[40] 4π mass less than 2.0 GeV.
[41] 4π mass less than 2.0 GeV, $2\rho^0$ corrected to 2ρ by factor of 3.
[42] 4π mass in the range 2.0–25 GeV.

$\Gamma(\gamma\eta_2(1870) \to \gamma\pi^+\pi^-)/\Gamma_{total}$ Γ_{101}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
6.2±2.2±0.9	BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$

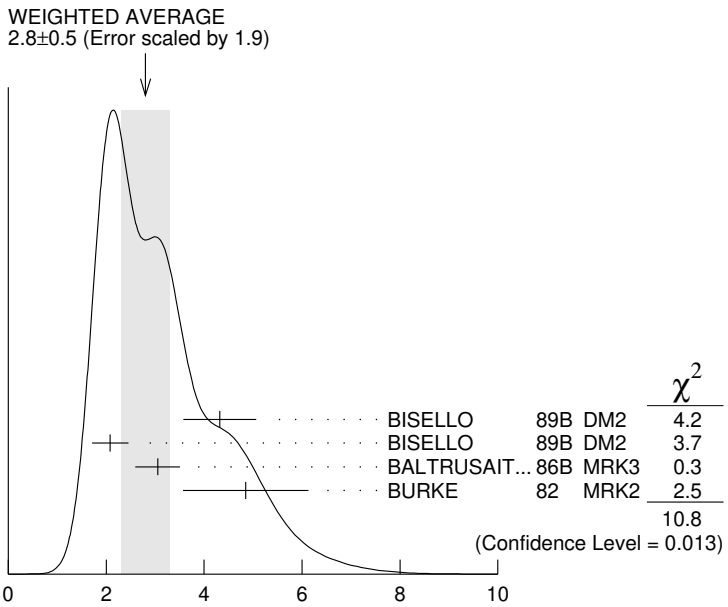
$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ Γ_{102}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.31±0.30 OUR AVERAGE					
4.50±0.14±0.53		BOLTON	92B	MRK3	$J/\psi \to \gamma\pi^+\pi^-\eta$, $\eta \to \gamma\gamma$
4.30±0.31±0.71		BOLTON	92B	MRK3	$J/\psi \to \gamma\pi^+\pi^-\eta$, $\eta \to \pi^+\pi^-\pi^0$
4.04±0.16±0.85	622	AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$
4.39±0.09±0.66	2420	AUGUSTIN	90	DM2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
4.1 ±0.3 ±0.6		BLOOM	83	CBAL	$e^+e^- \to 3\gamma +$ hadronsγ
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.9 ±1.1	6	BRANDELIK	79C	DASP	$e^+e^- \to 3\gamma$
2.4 ±0.7	57	BARTEL	76	CNTR	$e^+e^- \to 2\gamma\rho$

$\Gamma(\gamma 2\pi^+ 2\pi^-)/\Gamma_{total}$ Γ_{103}/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	[43] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$
2.08±0.13±0.35	[44] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$
3.05±0.08±0.45	[44] BALTRUSAIT...86B		MRK3	$J/\psi \to 4\pi\gamma$
4.85±0.45±1.20	[45] BURKE	82	MRK2	e^+e^-

[43] 4π mass less than 3.0 GeV.
[44] 4π mass less than 2.0 GeV.
[45] 4π mass less than 2.5 GeV.



$\Gamma\left(\gamma 2\pi^+ 2\pi^-\right)/\Gamma_{\text{total}}$ (units 10^{-3})

$\Gamma\left(\gamma K^+ K^- \pi^+ \pi^-\right)/\Gamma_{\text{total}}$ Γ_{104}/Γ

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

$\Gamma\left(\gamma f_4(2050)\right)/\Gamma_{\text{total}}$ Γ_{105}/Γ

VALUE (units 10^{-3})	*DOCUMENT ID*		*TECN*	*COMMENT*
2.7±0.5±0.5	[46] BALTRUSAIT...87		MRK3	$J/\psi \rightarrow \gamma \pi^+ \pi^-$

[46] Assuming branching fraction $f_4(2050) \rightarrow \pi\pi/$ total = 0.167.

$\Gamma\left(\gamma\omega\omega\right)/\Gamma_{\text{total}}$ Γ_{106}/Γ

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.59±0.33 OUR AVERAGE					
1.41±0.2 ±0.42	120±17	BISELLO	87	SPEC	$e^+ e^-$, hadronsγ
1.76±0.09±0.45		BALTRUSAIT...85C		MRK3	$e^+ e^- \rightarrow$ hadronsγ

$\Gamma\left(\gamma\eta(1440) \rightarrow \gamma\rho^0\rho^0\right)/\Gamma_{\text{total}}$ Γ_{107}/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	[47,48] BISELLO	89B	DM2	$J/\psi \rightarrow 4\pi\gamma$

[47] Estimated by us from various fits.
[48] Includes unknown branching fraction to $\rho^0\rho^0$.

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ Γ_{108}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1.38±0.14 OUR AVERAGE						
1.33±0.05±0.20		[49] AUGUSTIN	87	DM2		$J/\psi \to \gamma\pi^+\pi^-$
1.36±0.09±0.23		[49] BALTRUSAIT...	87	MRK3		$J/\psi \to \gamma\pi^+\pi^-$
1.48±0.25±0.30	178	EDWARDS	82B	CBAL		$e^+e^- \to 2\pi^0\gamma$
2.0 ±0.7	35	ALEXANDER	78	PLUT	0	e^+e^-
1.2 ±0.6	30	[50] BRANDELIK	78B	DASP		$e^+e^- \to \pi^+\pi^-\gamma$

[49] Estimated using B($f_2(1270) \to \pi\pi$)=0.843 ± 0.012. The errors do not contain the uncertainty in the $f_2(1270)$ decay.

[50] Restated by us to take account of spread of E1, M2, E3 transitions.

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{109}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
$8.5^{+1.2}_{-0.9}$ OUR AVERAGE Error includes scale factor of 1.2.					
$5.0\pm0.8^{+1.8}_{-0.4}$		[51,52] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
9.2±1.4±1.4		[52] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$
10.4±1.2±1.6		[52] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$
9.6±1.2±1.8		[52] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.6\pm0.2^{+0.6}_{-0.2}$		[52,53] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
< 0.8	90	[54] BISELLO	89B		$J/\psi \to 4\pi\gamma$
1.6±0.4±0.3		[55] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$
3.8±1.6		[56] EDWARDS	82D	CBAL	$e^+e^- \to \eta\eta\gamma$

[51] Assuming $J^P = 2^+$ for $f_0(1710)$.

[52] Includes unknown branching fraction to K^+K^- or $K^0_S K^0_S$. We have multiplied K^+K^- measurement by 2, and $K^0_S K^0_S$ by 4 to obtain $K\overline{K}$ result.

[53] Assuming $J^P = 0^+$ for $f_0(1710)$.

[54] Includes unknown branching fraction to $\rho^0\rho^0$.

[55] Includes unknown branching fraction to $\pi^+\pi^-$.

[56] Includes unknown branching fraction to $\eta\eta$.

$\Gamma(\gamma f_0(1710) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{110}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2.5±1.6±0.8	BAI	98H BES	$J/\psi \to \gamma\pi^0\pi^0$

$\Gamma(\gamma\eta)/\Gamma_{total}$ Γ_{111}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
0.86±0.08 OUR AVERAGE				
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^-

$\Gamma(\gamma f_1(1420) \to \gamma K\overline{K}\pi)/\Gamma_{total}$ — Γ_{112}/Γ

VALUE (units 10^{-3})		DOCUMENT ID		TECN	COMMENT
0.83±0.15 OUR AVERAGE					
0.76±0.15±0.21	[57,58]	AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$
$0.87\pm0.14^{+0.14}_{-0.11}$	[57]	BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$

[57] Included unknown branching fraction $f_1(1420) \to K\overline{K}\pi$.
[58] From fit to the $K^*(892)K$ 1^{++} partial wave.

$\Gamma(\gamma f_1(1285))/\Gamma_{total}$ — Γ_{113}/Γ

VALUE (units 10^{-3})		DOCUMENT ID		TECN	COMMENT
0.61 ±0.09 OUR AVERAGE					
0.45 ±0.09 ±0.17	[59]	BAI	99	BES	$J/\psi \to \gamma\eta\pi^+\pi^-$
0.625±0.063±0.103	[60]	BOLTON	92	MRK3	$J/\psi \to \gamma f_1(1285)$
0.70 ±0.08 ±0.16	[61]	BOLTON	92B	MRK3	$J/\psi \to \gamma\eta\pi^+\pi^-$

[59] Assuming $\Gamma(f_1(1285) \to \eta\pi\pi)/\Gamma_{total} = 0.5 \pm 0.18$.
[60] Obtained summing the sequential decay channels
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to \pi\pi\pi\pi) = (1.44 \pm 0.39 \pm 0.27) \times 10^{-4}$;
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to a_0(980)\pi, a_0(980) \to \eta\pi) = (3.90 \pm 0.42 \pm 0.87) \times 10^{-4}$;
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to a_0(980)\pi, a_0(980) \to K\overline{K}) = (0.66 \pm 0.26 \pm 0.29) \times 10^{-4}$;
$B(J/\psi \to \gamma f_1(1285), f_1(1285) \to \gamma\rho^0) = (0.25 \pm 0.07 \pm 0.03) \times 10^{-4}$.
[61] Using $B(f_1(1285) \to a_0(980)\pi) = 0.37$, and including unknown branching ratio for $a_0(980) \to \eta\pi$.

$\Gamma(\gamma f_1(1510) \to \gamma\eta\pi^+\pi^-)/\Gamma_{total}$ — Γ_{114}/Γ

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

$\Gamma(\gamma f_2'(1525))/\Gamma_{total}$ — Γ_{115}/Γ

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.47^{+0.07}_{-0.05}}$ **OUR AVERAGE**						
$0.36\pm0.04^{+0.14}_{-0.04}$			[62] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
0.56±0.14±0.09			[62] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$
0.45±0.04±0.09			[62] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$
0.68±0.16±0.14			[62] BALTRUSAIT..	87	MRK3	$J/\psi \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.34	90	4	[63] BRANDELIK	79C	DASP	$e^+e^- \to \pi^+\pi^-\gamma$
<0.23	90	3	ALEXANDER	78	PLUT	$e^+e^- \to K^+K^-\gamma$

[62] Using $B(f_2'(1525) \to K\overline{K}) = 0.888$.
[63] Assuming isotropic production and decay of the $f_2'(1525)$ and isospin.

$\Gamma(\gamma f_2(1950) \to \gamma K^*(892)\overline{K}^*(892))/\Gamma_{total}$ Γ_{116}/Γ

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

$\Gamma(\gamma K^*(892)\overline{K}^*(892))/\Gamma_{total}$ Γ_{117}/Γ

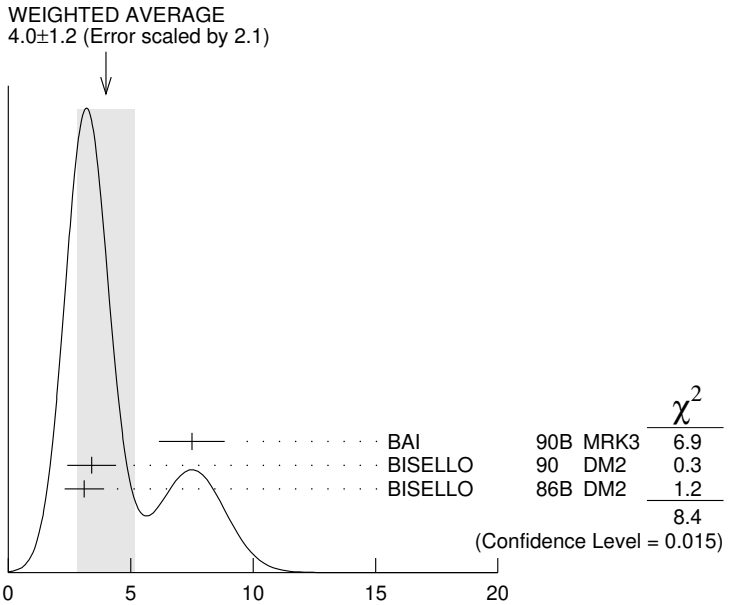
VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4.0±0.3±1.3	320	[64] BAI	00B	BES	$J/\psi \to \gamma K^+ K^0 \pi^+ \pi^-$

[64] Summed over all charges.

$\Gamma(\gamma\phi\phi)/\Gamma_{total}$ Γ_{118}/Γ

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±0.6±1.2	168	BAI	90B	MRK3	$J/\psi \to \gamma 4K$
3.4±0.8±0.6	33 ± 7	[65] BISELLO	90	DM2	$J/\psi \to \gamma K^+ K^- K^0_S K^0_L$
3.1±0.7±0.4		[65] BISELLO	86B	DM2	$J/\psi \to \gamma K^+ K^- K^+ K^-$

[65] $\phi\phi$ mass less than 2.9 GeV, η_c excluded.



$\Gamma(\gamma p\overline{p})/\Gamma_{total}$ Γ_{119}/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^-

$\Gamma(\gamma\eta(2225))/\Gamma_{total}$ Γ_{120}/Γ

VALUE (units 10^{-3})		DOCUMENT ID		TECN	COMMENT
0.29±0.06 OUR AVERAGE					
0.33±0.08±0.05	[66]	BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^+K^-$
0.27±0.06±0.06	[66]	BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^0_SK^0_L$
$0.24^{+0.15}_{-0.10}$	[67,68]	BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[66] Includes unknown branching fraction to $\phi\phi$.
[67] Estimated by us from various fits.
[68] Includes unknown branching fraction to $\rho^0\rho^0$.

$\Gamma(\gamma\eta(1760)\to\gamma\rho^0\rho^0)/\Gamma_{total}$ Γ_{121}/Γ

VALUE (units 10^{-3})		DOCUMENT ID		TECN	COMMENT
0.13±0.09	[69,70]	BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

[69] Estimated by us from various fits.
[70] Includes unknown branching fraction to $\rho^0\rho^0$.

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ Γ_{122}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
0.039±0.013 OUR AVERAGE					
0.036±0.011±0.007		BLOOM	83	CBAL	e^+e^-
0.073±0.047	10	BRANDELIK	79C	DASP	e^+e^-

$\Gamma(\gamma p\overline{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_{123}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.79	90	EATON	84	MRK2	e^+e^-

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_{124}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	BARTEL	77	CNTR	e^+e^-

$\Gamma(\gamma\Lambda\overline{\Lambda})/\Gamma_{total}$ Γ_{125}/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^-

$\Gamma(3\gamma)/\Gamma_{total}$ Γ_{126}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.055	90	PARTRIDGE	80	CBAL	e^+e^-

$\Gamma(\gamma f_0(2200))/\Gamma_{total}$ Γ_{127}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.5	[71] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$

[71] Includes unknown branching fraction to $K^0_S K^0_S$.

$\Gamma(\gamma f_J(2220))/\Gamma_{total}$ Γ_{128}/Γ

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
>250	99.9		[72] HASAN	96	SPEC	$\overline{p}p \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
>300			[73] BAI	96B	BES	$e^+e^- \to \gamma\overline{p}p,\ K\overline{K}$
< 2.3	95		[74] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$
< 1.6	95		[74] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$
$12.4^{+6.4}_{-5.2}\pm2.8$		23	[74] BALTRUSAIT..	86D	MRK3	$J/\psi \to \gamma K^0_S K^0_S$
$8.4^{+3.4}_{-2.8}\pm1.6$		93	[74] BALTRUSAIT..	86D	MRK3	$J/\psi \to \gamma K^+K^-$

[72] Using BAI 96B.
[73] Using BARNES 93.
[74] Includes unknown branching fraction to K^+K^- or $K^0_S K^0_S$.

$\Gamma(\gamma f_J(2220) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{129}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
0.84±0.26±0.30	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.4 ±0.8 ±0.4	BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$

$\Gamma(\gamma f_J(2220) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{130}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
8.1±3.0 OUR AVERAGE				
6.6±2.9±2.4	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^+K^-$
10.8±4.0±3.2	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$

$\Gamma(\gamma f_J(2220) \to \gamma p\overline{p})/\Gamma_{total}$ Γ_{131}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.5±0.6±0.5	BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma p\overline{p}$

$\Gamma(\gamma f_0(1500))/\Gamma_{total}$ Γ_{132}/Γ

VALUE (units 10^{-4})		*DOCUMENT ID*		*TECN*	*COMMENT*
$>5.7\pm0.8$	[75,76]	BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$

[75] Including unknown branching ratio for $f_0(1500) \to \pi^+\pi^-\pi^+\pi^-$.
[76] Assuming that $f_0(1500)$ decays only to two S-wave dipions.

$\Gamma(\gamma e^+ e^-)/\Gamma_{total}$ Γ_{133}/Γ

VALUE (units 10^{-3})	*DOCUMENT ID*		*TECN*	*COMMENT*
$8.8\pm1.3\pm0.4$	[77] ARMSTRONG	96	E760	$\overline{p}p \to e^+e^-\gamma$

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

$J/\psi(1S)$ REFERENCES

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BAI	98G	PL B424 213	J.Z. Bai *et al.*	(BES Collab.)
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BALDINI	98	PL B444 111	R. Baldini *et al.*	(FENICE Collab.)
ARMSTRONG	96	PR D54 7067	T.A. Armstrong *et al.*	(E760 Collab.)
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AUGUSTIN	90	PR D42 10	J.E. Augustin *et al.*	(DM2 Collab.)
BAI	90B	PRL 65 1309	Z. Bai *et al.*	(Mark III Collab.)
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BISELLO	89B	PR D39 701	G. Busetto *et al.*	(DM2 Collab.)
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KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)
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ALEXANDER	78	PL 72B 493	G. Alexander *et al.*	(DESY, HAMB, SIEG+)
BESCH	78	PL 78B 347	H.J. Besch *et al.*	(BONN, DESY, MANZ)
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