$\Upsilon(1S)$

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

$\Upsilon(1S)$ MASS

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT
9460.30±0.26 OUR AVERAGE	Error includes scale factor of 3.3.				
9460.51±0.09±0.05	[1]	ARTAMONOV	00	MD1	$e^+e^- \to$ hadrons
9459.97±0.11±0.07		MACKAY	84	REDE	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
9460.60±0.09±0.05	[2,3]	BARU	92B	REDE	$e^+e^- \to$ hadrons
9460.59±0.12		BARU	86	REDE	$e^+e^- \to$ hadrons
9460.6 ±0.4	[3,4]	ARTAMONOV	84	REDE	$e^+e^- \to$ hadrons

[1] Reanalysis of BARU 92B and ARTAMONOV 84 using new electron mass (COHEN 87).
[2] Superseding BARU 86.
[3] Superseded by ARTAMONOV 00.
[4] Value includes data of ARTAMONOV 82.

$\Upsilon(1S)$ WIDTH

VALUE (keV)	DOCUMENT ID
52.5±1.8 OUR EVALUATION	See the Note on Width Determinations of the Υ states

$\Upsilon(1S)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$\tau^+\tau^-$	$(2.67^{+0.14}_{-0.16})$ %	
Γ_2	e^+e^-	(2.38±0.11) %	
Γ_3	$\mu^+\mu^-$	(2.48±0.06) %	
	Hadronic decays		
Γ_4	$J/\psi(1S)$anything	$(1.1 \pm 0.4) \times 10^{-3}$	
Γ_5	$\rho\pi$	$< 2 \times 10^{-4}$	90%
Γ_6	$\pi^+\pi^-$	$< 5 \times 10^{-4}$	90%
Γ_7	K^+K^-	$< 5 \times 10^{-4}$	90%
Γ_8	$p\overline{p}$	$< 5 \times 10^{-4}$	90%
Γ_9	$\pi^0\pi^+\pi^-$	$< 1.84 \times 10^{-5}$	90%
Γ_{10}	$D^*(2010)^\pm$ anything		

Radiative decays

Γ_{11}	$\gamma \pi^+ \pi^-$	$(6.3 \pm 1.8) \times 10^{-5}$		
Γ_{12}	$\gamma \pi^0 \pi^0$	$(1.7 \pm 0.7) \times 10^{-5}$		
Γ_{13}	$\gamma 2h^+ 2h^-$	$(7.0 \pm 1.5) \times 10^{-4}$		
Γ_{14}	$\gamma 3h^+ 3h^-$	$(5.4 \pm 2.0) \times 10^{-4}$		
Γ_{15}	$\gamma 4h^+ 4h^-$	$(7.4 \pm 3.5) \times 10^{-4}$		
Γ_{16}	$\gamma \pi^+ \pi^- K^+ K^-$	$(2.9 \pm 0.9) \times 10^{-4}$		
Γ_{17}	$\gamma 2\pi^+ 2\pi^-$	$(2.5 \pm 0.9) \times 10^{-4}$		
Γ_{18}	$\gamma 3\pi^+ 3\pi^-$	$(2.5 \pm 1.2) \times 10^{-4}$		
Γ_{19}	$\gamma 2\pi^+ 2\pi^- K^+ K^-$	$(2.4 \pm 1.2) \times 10^{-4}$		
Γ_{20}	$\gamma \pi^+ \pi^- p \overline{p}$	$(1.5 \pm 0.6) \times 10^{-4}$		
Γ_{21}	$\gamma 2\pi^+ 2\pi^- p \overline{p}$	$(4 \pm 6) \times 10^{-5}$		
Γ_{22}	$\gamma 2K^+ 2K^-$	$(2.0 \pm 2.0) \times 10^{-5}$		
Γ_{23}	$\gamma \eta'(958)$	< 1.3	$\times 10^{-3}$	90%
Γ_{24}	$\gamma \eta$	< 3.5	$\times 10^{-4}$	90%
Γ_{25}	$\gamma f'_2(1525)$	< 1.4	$\times 10^{-4}$	90%
Γ_{26}	$\gamma f_2(1270)$	$(8 \pm 4) \times 10^{-5}$		
Γ_{27}	$\gamma \eta(1440)$	< 8.2	$\times 10^{-5}$	90%
Γ_{28}	$\gamma f_0(1710) \to \gamma K \overline{K}$	< 2.6	$\times 10^{-4}$	90%
Γ_{29}	$\gamma f_0(2200) \to \gamma K^+ K^-$	< 2	$\times 10^{-4}$	90%
Γ_{30}	$\gamma f_J(2220) \to \gamma K^+ K^-$	< 1.5	$\times 10^{-5}$	90%
Γ_{31}	$\gamma \eta(2225) \to \gamma \phi \phi$	< 3	$\times 10^{-3}$	90%
Γ_{32}	γX X = pseudoscalar with $m <$ 7.2 GeV)	< 3	$\times 10^{-5}$	90%
Γ_{33}	$\gamma X \overline{X}$ $X \overline{X}$ = vectors with $m <$ 3.1 GeV)	< 1	$\times 10^{-3}$	90%

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

$\Gamma(e^+e^-) \times \Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_3/\Gamma$

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
31.2±1.6±1.7	KOBEL	92	CBAL	$e^+e^- \to \mu^+\mu^-$

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_0\Gamma_2/\Gamma$

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
1.216±0.027 OUR AVERAGE				
1.187±0.023±0.031	[5] BARU	92B	MD1	$e^+e^- \to$ hadrons
1.23 ±0.02 ±0.05	[5] JAKUBOWSKI	88	CBAL	$e^+e^- \to$ hadrons
1.37 ±0.06 ±0.09	[6] GILES	84B	CLEO	$e^+e^- \to$ hadrons
1.23 ±0.08 ±0.04	[6] ALBRECHT	82	DASP	$e^+e^- \to$ hadrons
1.13 ±0.07 ±0.11	[6] NICZYPORUK	82	LENA	$e^+e^- \to$ hadrons
1.09 ±0.25	[6] BOCK	80	CNTR	$e^+e^- \to$ hadrons
1.35 ±0.14	[7] BERGER	79	PLUT	$e^+e^- \to$ hadrons

[5] Radiative corrections evaluated following KURAEV 85.
[6] Radiative corrections reevaluated by BUCHMUELLER 88 following KURAEV 85.
[7] Radiative corrections reevaluated by ALEXANDER 89 using $B(\mu\mu) = 0.026$.

$\Upsilon(1S)$ PARTIAL WIDTHS

$\Gamma(e^+e^-)$ — Γ_2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
1.32±0.04±0.03	[8] ALBRECHT	95E	ARG	$e^+e^- \rightarrow$ hadrons

[8] Applying the formula of Kuraev and Fadin.

$\Upsilon(1S)$ BRANCHING RATIOS

$\Gamma(\tau^+\tau^-)/\Gamma_{total}$ — Γ_1/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.0267^{+0.0014}_{-0.0016}$ OUR AVERAGE					
$0.0261\pm0.0012^{+0.0009}_{-0.0013}$	25k	CINABRO	94B	CLE2	$e^+e^- \rightarrow \tau^+\tau^-$
$0.027\pm0.004\pm0.002$		[9] ALBRECHT	85C	ARG	$\Upsilon(2S) \rightarrow \pi^+\pi^-\tau^+\tau^-$
$0.034\pm0.004\pm0.004$		GILES	83	CLEO	$e^+e^- \rightarrow \tau^+\tau^-$

[9] Using B($\Upsilon(1S) \rightarrow ee$) = B($\Upsilon(1S) \rightarrow \mu\mu$) = 0.0256; not used for width evaluations.

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ — Γ_3/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0248±0.0006 OUR AVERAGE					
$0.0249\pm0.0008\pm0.0013$		ALEXANDER	98	CLE2	$\Upsilon(2S) \rightarrow \pi^+\pi^-\mu^+\mu^-$
$0.0212\pm0.0020\pm0.0010$		[10] BARU	92	MD1	$e^+e^- \rightarrow \mu^+\mu^-$
$0.0231\pm0.0012\pm0.0010$		[10] KOBEL	92	CBAL	$e^+e^- \rightarrow \mu^+\mu^-$
$0.0252\pm0.0007\pm0.0007$		CHEN	89B	CLEO	$e^+e^- \rightarrow \mu^+\mu^-$
$0.0261\pm0.0009\pm0.0011$		KAARSBERG	89	CSB2	$e^+e^- \rightarrow \mu^+\mu^-$
$0.0230\pm0.0025\pm0.0013$	86	ALBRECHT	87	ARG	$\Upsilon(2S) \rightarrow \pi^+\pi^-\mu^+\mu^-$
$0.029\pm0.003\pm0.002$	864	BESSON	84	CLEO	$\Upsilon(2S) \rightarrow \pi^+\pi^-\mu^+\mu^-$
$0.027\pm0.003\pm0.003$		ANDREWS	83	CLEO	$e^+e^- \rightarrow \mu^+\mu^-$
$0.032\pm0.013\pm0.003$		ALBRECHT	82	DASP	$e^+e^- \rightarrow \mu^+\mu^-$
$0.038\pm0.015\pm0.002$		NICZYPORUK	82	LENA	$e^+e^- \rightarrow \mu^+\mu^-$
$0.014^{+0.034}_{-0.014}$		BOCK	80	CNTR	$e^+e^- \rightarrow \mu^+\mu^-$
0.022 ± 0.020		BERGER	79	PLUT	$e^+e^- \rightarrow \mu^+\mu^-$

[10] Taking into account interference between the resonance and continuum.

$\Gamma(e^+e^-)/\Gamma_{total}$ — Γ_2/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0238±0.0011 OUR AVERAGE					
0.0229±0.0008±0.0011		ALEXANDER	98	CLE2	$\Upsilon(2S) \rightarrow \pi^+\pi^- e^+e^-$
0.0242±0.0014±0.0014	307	ALBRECHT	87	ARG	$\Upsilon(2S) \rightarrow \pi^+\pi^- e^+e^-$
0.028 ±0.003 ±0.002	826	BESSON	84	CLEO	$\Upsilon(2S) \rightarrow \pi^+\pi^- e^+e^-$
0.051 ±0.030		BERGER	80C	PLUT	$e^+e^- \rightarrow e^+e^-$

$\Gamma(J/\psi(1S)\text{anything})/\Gamma_{total}$ — Γ_4/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
< 0.68	90	ALBRECHT	92J	ARG	$e^+e^- \rightarrow e^+e^- X$, $e^+e^- \rightarrow \mu^+\mu^- X$
1.1 ±0.4±0.2		[11] FULTON	89	CLEO	$e^+e^- \rightarrow \mu^+\mu^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 1.7	90	MASCHMANN	90	CBAL	$e^+e^- \rightarrow$ hadrons
<20	90	NICZYPORUK	83	LENA	

[11] Using B($(J/\psi) \rightarrow \mu^+\mu^-$) = (6.9 ± 0.9)%.

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_6/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	BARU	92	MD1	$\Upsilon(1S) \rightarrow \pi^+\pi^-$

$\Gamma(K^+K^-)/\Gamma_{total}$ — Γ_7/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	BARU	92	MD1	$\Upsilon(1S) \rightarrow K^+K^-$

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_8/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	[12] BARU	96	MD1	$\Upsilon(1S) \rightarrow p\overline{p}$

[12] Supersedes BARU 92 in this node.

$\Gamma(\pi^0\pi^+\pi^-)/\Gamma_{total}$ — Γ_9/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.84	90	ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

$\Gamma(\gamma X)/\Gamma_{total}$ — Γ_{32}/Γ

(X = pseudoscalar with $m <$ 7.2 GeV)

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	[13] BALEST	95	CLEO	$e^+e^- \rightarrow \gamma + X$

[13] For a noninteracting pseudoscalar X with mass < 7.2 GeV.

$\Gamma(\gamma X\overline{X})/\Gamma_{total}$ Γ_{33}/Γ

($X\overline{X}$ = vectors with $m<$ 3.1 GeV)

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1	90	[14] BALEST	95	CLEO	$e^+e^- \rightarrow \gamma + X\overline{X}$

[14] For a noninteracting vector X with mass < 3.1 GeV.

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

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
6.3±1.2±1.3	[15] ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

[15] For $m_{\pi\pi}$ >1 GeV.

$\Gamma(\gamma\pi^0\pi^0)/\Gamma_{total}$ Γ_{12}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
1.7±0.6±0.3	[16] ANASTASSOV	99	CLE2	$e^+e^- \rightarrow$ hadrons

[16] For $m_{\pi\pi}$ >1 GeV.

$\Gamma(\gamma 2\pi^+ 2\pi^-)/\Gamma_{total}$ Γ_{17}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.5±0.7±0.5	26 ± 7	FULTON	90B	CLEO	$e^+e^- \rightarrow$ hadrons

$\Gamma(\gamma\pi^+\pi^- K^+K^-)/\Gamma_{total}$ Γ_{16}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.9±0.7±0.6	29 ± 8	FULTON	90B	CLEO	$e^+e^- \rightarrow$ hadrons

$\Gamma(\gamma\pi^+\pi^- p\overline{p})/\Gamma_{total}$ Γ_{20}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.5±0.5±0.3	22 ± 6	FULTON	90B	CLEO	$e^+e^- \rightarrow$ hadrons

$\Gamma(\gamma 2K^+ 2K^-)/\Gamma_{total}$ Γ_{22}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.2 ±0.2	2 ± 2	FULTON	90B	CLEO	$e^+e^- \rightarrow$ hadrons

$\Gamma(\gamma 3\pi^+ 3\pi^-)/\Gamma_{total}$ Γ_{18}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.5±0.9±0.8	17 ± 5	FULTON	90B	CLEO	$e^+e^- \rightarrow$ hadrons

$\Gamma(\gamma 2\pi^+ 2\pi^- K^+K^-)/\Gamma_{total}$ Γ_{19}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
2.4±0.9±0.8	18 ± 7	FULTON	90B	CLEO	$e^+e^- \rightarrow$ hadrons

$\Gamma(\gamma 2\pi^+ 2\pi^- p\overline{p})/\Gamma_{total}$ Γ_{21}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.4±0.4±0.4	7 ± 6	FULTON	90B	CLEO	$e^+e^- \rightarrow$ hadrons

$\Gamma(\gamma 2h^+ 2h^-)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.0±1.1±1.0	80 ± 12	FULTON	90B	CLEO	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma 3h^+ 3h^-)/\Gamma_{total}$ — Γ_{14}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.4±1.5±1.3	39 ± 11	FULTON	90B	CLEO	$e^+ e^- \rightarrow$ hadrons

$\Gamma(\gamma 4h^+ 4h^-)/\Gamma_{total}$ — Γ_{15}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.4±2.5±2.5	36 ± 12	FULTON	90B	CLEO	$e^+ e^- \rightarrow$ hadrons

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

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2	90	FULTON	90B		$\Upsilon(1S) \rightarrow \rho^0 \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<10	90	BLINOV	90	MD1	$\Upsilon(1S) \rightarrow \rho^0 \pi^0$
<21	90	NICZYPORUK	83	LENA	$\Upsilon(1S) \rightarrow \rho^0 \pi^0$

$\Gamma(D^*(2010)^{\pm}$ anything$)/\Gamma_{total}$ — Γ_{10}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<19	90	[17] ALBRECHT	92J	ARG	$e^+ e^- \rightarrow D^0 \pi^{\pm} X$

[17] For $x_p > 0.2$.

$\Gamma(\gamma\eta(1440))/\Gamma_{total}$ — Γ_{27}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<8.2	90	[18] FULTON	90B	CLEO	$\Upsilon(1S) \rightarrow \gamma K^+ \pi^{\mp} K^0_S$

[18] Includes unknown branching ratio of $\eta(1440) \rightarrow K^{\pm}\pi^{\mp}K^0_S$.

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ — Γ_{23}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.3	90	SCHMITT	88	CBAL	$\Upsilon(1S) \rightarrow \gamma X$

$\Gamma(\gamma\eta)/\Gamma_{total}$ — Γ_{24}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<3.5	90	SCHMITT	88	CBAL	$\Upsilon(1S) \rightarrow \gamma X$

$\Gamma(\gamma f'_2(1525))/\Gamma_{total}$ — Γ_{25}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<14	90	[19] FULTON	90B	CLEO	$\Upsilon(1S) \rightarrow \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<19.4	90	[19] ALBRECHT	89	ARG	$\Upsilon(1S) \rightarrow \gamma K^+ K^-$

[19] Assuming $B(f'_2(1525) \rightarrow K\overline{K}) = 0.71$.

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{total}$ — Γ_{28}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.6	90	[20] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 6.3	90	[20] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^+ K^-$
<19	90	[20] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^0_S K^0_S$
< 8	90	[21] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$
<24	90	[22] SCHMITT	88	CBAL	$\Upsilon(1S) \to \gamma X$

[20] Assuming B($f_0(1710) \to K\overline{K}$) = 0.38.

[21] Assuming B($f_0(1710) \to \pi\pi$) = 0.04.

[22] Assuming B($f_0(1710) \to \eta\eta$) = 0.18.

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ — Γ_{26}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
$8.1 \pm 2.3^{+2.9}_{-2.7}$		[23] ANASTASSOV	99	CLE2	$e^+ e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<21	90	[23] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$
<13	90	[23] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma \pi^+ \pi^-$
<81	90	SCHMITT	88	CBAL	$\Upsilon(1S) \to \gamma X$

[23] Using B($f_2(1270) \to \pi\pi$) = 0.84.

$\Gamma(\gamma f_J(2220) \to \gamma K^+ K^-)/\Gamma_{total}$ — Γ_{30}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.5	90	[24] FULTON	90B	CLEO	$\Upsilon(1S) \to \gamma K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 2.9	90	[24] ALBRECHT	89	ARG	$\Upsilon(1S) \to \gamma K^+ K^-$
<20	90	[24] BARU	89	MD1	$\Upsilon(1S) \to \gamma K^+ K^-$

[24] Including unknown branching ratio of $f_J(2220) \to K^+ K^-$.

$\Gamma(\gamma \eta(2225) \to \gamma \phi\phi)/\Gamma_{total}$ — Γ_{31}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.003	90	[25] BARU	89	MD1	$\Upsilon(1S) \to \gamma K^+ K^- K^+ K^-$

[25] Assuming that the $\eta(2225)$ decays only into $\phi\phi$.

$\Gamma(\gamma f_0(2200) \to \gamma K^+ K^-)/\Gamma_{total}$ — Γ_{29}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0002	90	[26] BARU	89	MD1	$\Upsilon(1S) \to \gamma K^+ K^-$

[26] Assuming that the $f_0(2200)$ decays only into $K^+ K^-$.

$\Upsilon(1S)$ REFERENCES

ARTAMONOV	00	PL B474 427	A.S. Artamonov *et al.*		
ANASTASSOV	99	PRL 82 286	A. Anastassov *et al.*	(CLEO Collab.)	
ALEXANDER	98	PR D58 052004	J.P. Alexander *et al.*	(CLEO Collab.)	
BARU	96	PRPL 267 71	S.E. Baru *et al.*	(NOVO)	
ALBRECHT	95E	ZPHY C65 619	H. Albrecht *et al.*	(ARGUS Collab.)	
BALEST	95	PR D51 2053	R. Balest *et al.*	(CLEO Collab.)	
CINABRO	94B	PL B340 129	D. Cinabro *et al.*	(CLEO Collab.)	
ALBRECHT	92J	ZPHY C55 25	H. Albrecht *et al.*	(ARGUS Collab.)	
BARU	92	ZPHY C54 229	S.E. Baru *et al.*	(NOVO)	
BARU	92B	ZPHY C56 547	S.E. Baru *et al.*	(NOVO)	
KOBEL	92	ZPHY C53 193	M. Kobel *et al.*	(Crystal Ball Collab.)	
BLINOV	90	PL B245 311	A.E. Blinov *et al.*	(NOVO)	
FULTON	90B	PR D41 1401	R. Fulton *et al.*	(CLEO Collab.)	
MASCHMANN	90	ZPHY C46 555	W.S. Maschmann *et al.*	(Crystal Ball Collab.)	
ALBRECHT	89	ZPHY C42 349	H. Albrecht *et al.*	(ARGUS Collab.)	
ALEXANDER	89	NP B320 45	J.P. Alexander *et al.*	(LBL, MICH, SLAC)	
BARU	89	ZPHY C42 505	S.E. Baru *et al.*	(NOVO)	
CHEN	89B	PR D39 3528	W.Y. Chen *et al.*	(CLEO Collab.)	
FULTON	89	PL B224 445	R. Fulton *et al.*	(CLEO Collab.)	
KAARSBERG	89	PRL 62 2077	T.M. Kaarsberg *et al.*	(CUSB Collab.)	
BUCHMUEL...	88	HE e^+e^- Physics 412	W. Buchmueller, S. Cooper	(HANN, DESY, MIT)	
		Editors: A. Ali and P. Soeding, World Scientific, Singapore			
JAKUBOWSKI	88	ZPHY C40 49	Z. Jakubowski *et al.*	(Crystal Ball Collab.)	IGJPC
SCHMITT	88	ZPHY C40 199	P. Schmitt *et al.*	(Crystal Ball Collab.)	
ALBRECHT	87	ZPHY C35 283	H. Albrecht *et al.*	(ARGUS Collab.)	
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)	
BARU	86	ZPHY C30 551	S.E. Baru *et al.*	(NOVO)	
ALBRECHT	85C	PL 154B 452	H. Albrecht *et al.*	(ARGUS Collab.)	
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)	
		Translated from YAF 41 733.			
ARTAMONOV	84	PL 137B 272	A.S. Artamonov *et al.*	(NOVO)	
BESSON	84	PR D30 1433	D. Besson *et al.*	(CLEO Collab.)	
GILES	84B	PR D29 1285	R. Giles *et al.*	(CLEO Collab.)	
MACKAY	84	PR D29 2483	W.W. MacKay *et al.*	(CUSB Collab.)	
ANDREWS	83	PRL 50 807	D.E. Andrews *et al.*	(CLEO Collab.)	
GILES	83	PRL 50 877	R. Giles *et al.*	(HARV, OSU, ROCH, RUTG+)	
NICZYPORUK	83	ZPHY C17 197	B. Niczyporuk *et al.*	(LENA Collab.)	
ALBRECHT	82	PL 116B 383	H. Albrecht *et al.*	(DESY, DORT, HEIDH+)	
ARTAMONOV	82	PL 118B 225	A.S. Artamonov *et al.*	(NOVO)	
NICZYPORUK	82	ZPHY C15 299	B. Niczyporuk *et al.*	(LENA Collab.)	
BERGER	80C	PL 93B 497	C. Berger *et al.*	(PLUTO Collab.)	
BOCK	80	ZPHY C6 125	P. Bock *et al.*	(HEIDP, MPIM, DESY, HAMB)	
BERGER	79	ZPHY C1 343	C. Berger *et al.*	(PLUTO Collab.)	

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ARTAMONOV	82	PL 118B 225	A.S. Artamonov *et al.*	(NOVO)
BERGER	78	PL 76B 243	C. Berger *et al.*	(PLUTO Collab.)
BIENLEIN	78	PL 78B 360	J.K. Bienlein *et al.*	(DESY, HAMB, HEIDP+)
DARDEN	78	PL 76B 246	C.W. Darden *et al.*	(DESY, DORT, HEIDH+)
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