$\Upsilon(2S)$

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

$\Upsilon(2S)$ MASS

VALUE (GeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
10.02326±0.00031 OUR AVERAGE				
10.0235 ±0.0005	[1] ARTAMONOV	00	MD1	$e^+ e^- \to$ hadrons
10.0231 ±0.0004	BARBER	84	REDE	$e^+ e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.0236 ±0.0005	[2,3] BARU	86B	REDE	$e^+ e^- \to$ hadrons

[1] Reanalysis of BARU 86B using new electron mass (COHEN 87).
[2] Reanalysis of ARTAMONOV 84.
[3] Superseded by ARTAMONOV 00.

$\Upsilon(2S)$ WIDTH

VALUE (keV)	*DOCUMENT ID*
31.98±2.63 OUR EVALUATION	See the Note on "Width Determinations of the Υ States"

$\Upsilon(2S)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	$\Upsilon(1S)\pi^+\pi^-$	(18.1 ± 0.4) %	
Γ_2	$\Upsilon(1S)\pi^0\pi^0$	(8.6 ± 0.4) %	
Γ_3	$\tau^+\tau^-$	(2.00± 0.21) %	
Γ_4	$\mu^+\mu^-$	(1.93± 0.17) %	S=2.2
Γ_5	e^+e^-	(1.91± 0.16) %	
Γ_6	$\Upsilon(1S)\pi^0$	< 1.8 $\times 10^{-4}$	CL=90%
Γ_7	$\Upsilon(1S)\eta$	($2.1^{+0.8}_{-0.7}$) $\times 10^{-4}$	
Γ_8	$J/\psi(1S)$ anything	< 6 $\times 10^{-3}$	CL=90%
Γ_9	$\overline{d}$ anything	(3.4 ± 0.6) $\times 10^{-5}$	
Γ_{10}	hadrons	(94 ±11) %	
Γ_{11}	ggg	(58.8 ± 1.2) %	
Γ_{12}	γgg	(1.87± 0.28) %	
	Radiative decays		
Γ_{13}	$\gamma\chi_{b1}(1P)$	(6.9 ± 0.4) %	
Γ_{14}	$\gamma\chi_{b2}(1P)$	(7.15± 0.35) %	
Γ_{15}	$\gamma\chi_{b0}(1P)$	(3.8 ± 0.4) %	
Γ_{16}	$\gamma f_0(1710)$	< 5.9 $\times 10^{-4}$	CL=90%

Γ_{17}	$\gamma f'_2(1525)$		$<$ 5.3	$\times 10^{-4}$	CL=90%
Γ_{18}	$\gamma f_2(1270)$		$<$ 2.41	$\times 10^{-4}$	CL=90%
Γ_{19}	$\gamma f_J(2220)$				
Γ_{20}	$\gamma \eta_b(1S)$		(3.9 $\pm$ 1.5)	$\times 10^{-4}$	
Γ_{21}	$\gamma X \rightarrow \gamma + \geq 4$ prongs	[a]	$<$ 1.95	$\times 10^{-4}$	CL=95%

Lepton Flavor (*LF*) violating decays

Γ_{22}	$\mu^{\pm}\tau^{\mp}$	*LF*	$<$ 1.44	$\times 10^{-5}$	CL=95%

[a] 1.5 GeV $< m_X <$ 5.0 GeV

$\Upsilon(2S)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

$\Gamma(\mu^+\mu^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_4\Gamma_5/\Gamma$

VALUE (eV)	*DOCUMENT ID*		*TECN*	*COMMENT*
6.5±1.5±1.0	KOBEL	92	CBAL	$e^+e^- \rightarrow \mu^+\mu^-$

$\Gamma(\Upsilon(1S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_5/\Gamma$

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
105.4±1.0±4.2	11.8K	[4] AUBERT	08BP	BABR	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\ell^+\ell^-$

[4] Using B($\Upsilon(1S) \rightarrow e^+e^-$) = (2.38 ± 0.11)% and B($\Upsilon(1S) \rightarrow \mu^+\mu^-$) = (2.48 ± 0.05)%.

$\Gamma(\text{hadrons}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_{10}\Gamma_5/\Gamma$

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.577±0.009 OUR AVERAGE				
0.581±0.004±0.009	[5] ROSNER	06	CLEO	10.0 $e^+e^- \rightarrow$ hadrons
0.552±0.031±0.017	[5] BARU	96	MD1	$e^+e^- \rightarrow$ hadrons
0.54 ±0.04 ±0.02	[5] JAKUBOWSKI	88	CBAL	$e^+e^- \rightarrow$ hadrons
0.58 ±0.03 ±0.04	[6] GILES	84B	CLEO	$e^+e^- \rightarrow$ hadrons
0.60 ±0.12 ±0.07	[6] ALBRECHT	82	DASP	$e^+e^- \rightarrow$ hadrons
0.54 ±0.07 $^{+0.09}_{-0.05}$	[6] NICZYPORUK	81C	LENA	$e^+e^- \rightarrow$ hadrons
0.41 ±0.18	[6] BOCK	80	CNTR	$e^+e^- \rightarrow$ hadrons

[5] Radiative corrections evaluated following KURAEV 85.
[6] Radiative corrections reevaluated by BUCHMUELLER 88 following KURAEV 85.

$\Upsilon(2S)$ PARTIAL WIDTHS

$\Gamma(e^+e^-)$ — Γ_5

VALUE (keV)	*DOCUMENT ID*
0.612±0.011 OUR EVALUATION	

$\Upsilon(2S)$ BRANCHING RATIOS

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_1/Γ

Abbreviation MM in the *COMMENT* field below stands for missing mass.

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
18.1 ±0.4 OUR AVERAGE					
18.02±0.02±0.61	851k	[7] BHARI	09	CLEO	$e^+e^- \to \pi^+\pi^-$ MM
17.22±0.17±0.75	11.8K	[8,9] AUBERT	08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-\ell^+\ell^-$
19.2 ±0.2 ±1.0	52.6k	[10] ALEXANDER	98	CLE2	$\pi^+\pi^-\ell^+\ell^-$, $\pi^+\pi^-$ MM
18.1 ±0.5 ±1.0	11.6k	ALBRECHT	87	ARG	$e^+e^- \to \pi^+\pi^-$ MM
16.9 ±4.0		GELPHMAN	85	CBAL	$e^+e^- \to e^+e^-\pi^+\pi^-$
19.1 ±1.2 ±0.6		BESSON	84	CLEO	$\pi^+\pi^-$ MM
18.9 ±2.6		FONSECA	84	CUSB	$e^+e^- \to \ell^+\ell^-\pi^+\pi^-$
21 ±7	7	NICZYPORUK	81B	LENA	$e^+e^- \to \ell^+\ell^-\pi^+\pi^-$

[7] A weighted average of the inclusive and exclusive results.

[8] Using B($\Upsilon(2S) \to e^+e^-$) = (1.91 ± 0.16)% and B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.93 ± 0.17)%.

[9] Using $\Gamma_{ee}(\Upsilon(2S))$ = 0.612 ± 0.011 keV.

[10] Using B($\Upsilon(1S) \to e^+e^-$) = (2.52 ± 0.17)% and B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.07)%.

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma_{total}$ — Γ_2/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
8.6 ±0.4 OUR AVERAGE					
8.43±0.16±0.42	38k	[11] BHARI	09	CLEO	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
9.2 ±0.6 ±0.8	275	[12] ALEXANDER	98	CLE2	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
9.5 ±1.9 ±1.9	25	ALBRECHT	87	ARG	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
8.0 ±1.5		GELPHMAN	85	CBAL	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$
10.3 ±2.3		FONSECA	84	CUSB	$e^+e^- \to \pi^0\pi^0\ell^+\ell^-$

[11] Authors assume B($\Upsilon(1S) \to e^+e^-$) + B($\Upsilon(1S) \to \mu^+\mu^-$) = 4.96%.

[12] Using B($\Upsilon(1S) \to e^+e^-$) = (2.52 ± 0.17)% and B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.07)%.

$\Gamma(\Upsilon(1S)\pi^0\pi^0)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ — Γ_2/Γ_1

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.462±0.037	[13] BHARI	09	CLEO	$e^+e^- \to \Upsilon(2S)$

[13] Not independent of other values reported by BHARI 09.

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

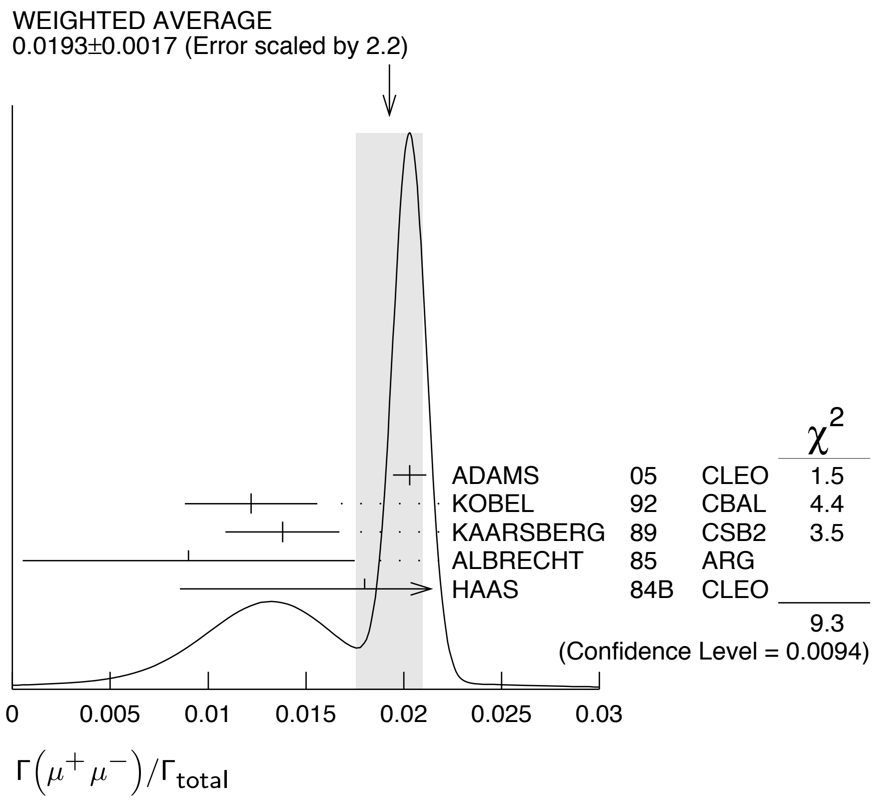
VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2.00±0.21 OUR AVERAGE					
2.00±0.12±0.18	22k	[14] BESSON	07	CLEO	$e^+e^- \to \Upsilon(2S) \to \tau^+\tau^-$
1.7 ±1.5 ±0.6		HAAS	84B	CLEO	$e^+e^- \to \tau^+\tau^-$

[14] BESSON 07 reports [$\Gamma(\Upsilon(2S) \to \tau^+\tau^-)/\Gamma_{total}$] / [B($\Upsilon(2S) \to \mu^+\mu^-$)] = 1.04 ± 0.04 ± 0.05 which we multiply by our best value B($\Upsilon(2S) \to \mu^+\mu^-$) = (1.93 ± 0.17) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

VALUE	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.0193±0.0017 OUR AVERAGE Error includes scale factor of 2.2. See the ideogram below.						
0.0203±0.0003±0.0008		120k	ADAMS	05	CLEO	$e^+e^- \to \mu^+\mu^-$
0.0122±0.0028±0.0019			[15] KOBEL	92	CBAL	$e^+e^- \to \mu^+\mu^-$
0.0138±0.0025±0.0015			KAARSBERG	89	CSB2	$e^+e^- \to \mu^+\mu^-$
0.009 ±0.006 ±0.006			[16] ALBRECHT	85	ARG	$e^+e^- \to \mu^+\mu^-$
0.018 ±0.008 ±0.005			HAAS	84B	CLEO	$e^+e^- \to \mu^+\mu^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.038	90		NICZYPORUK	81C	LENA	$e^+e^- \to \mu^+\mu^-$

[15] Taking into account interference between the resonance and continuum.
[16] Re-evaluated using B($\Upsilon(1S) \to \mu^+\mu^-$) = 0.026.



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

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.04±0.04±0.05	22k	BESSON	07	CLEO	$e^+e^- \to \Upsilon(2S)$

$\Gamma(\Upsilon(1S)\pi^0)/\Gamma_{total}$ — Γ_6/Γ

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.18	90	[17] HE	08A	CLEO	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.1	90	ALEXANDER	98	CLE2	$e^+e^- \to \ell^+\ell^-\gamma\gamma$
<8	90	LURZ	87	CBAL	$e^+e^- \to \ell^+\ell^-\gamma\gamma$

[17] Authors assume B($\Upsilon(1S) \to e^+e^-$) + B($\Upsilon(1S) \to \mu^+\mu^-$) = 4.96%.

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{total}$ Γ_7/Γ

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$0.21^{+0.07}_{-0.06}\pm0.03$		14	[18] HE	08A	CLEO	$e^+e^- \to \ell^+\ell^-\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.9	90		[19,20] AUBERT	08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-\pi^0\ell^+\ell^-$
<2.8	90		ALEXANDER	98	CLE2	$e^+e^- \to \ell^+\ell^-\eta$
<5	90		ALBRECHT	87	ARG	$e^+e^- \to \pi^+\pi^-\ell^+\ell^-$ MM
<7	90		LURZ	87	CBAL	$e^+e^- \to \ell^+\ell^-(\gamma\gamma,\ 3\pi^0)$
<10	90		BESSON	84	CLEO	$e^+e^- \to \pi^+\pi^-\ell^+\ell^-$ MM
<2	90		FONSECA	84	CUSB	$e^+e^- \to \ell^+\ell^-(\gamma\gamma,\pi^+\pi^-\pi^0)$

[18] Authors assume B($\Upsilon(1S) \to e^+e^-$) + B($\Upsilon(1S) \to \mu^+\mu^-$) = 4.96%.

[19] Using B($\Upsilon(1S) \to e^+e^-$) = (2.38 ± 0.11)% and B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.05)%.

[20] Using $\Gamma_{ee}(\Upsilon(2S))$ = 0.612 ± 0.011 keV.

$\Gamma(\Upsilon(1S)\eta)/\Gamma(\Upsilon(1S)\pi^+\pi^-)$ Γ_7/Γ_1

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.52	90	[21] AUBERT	08BP	BABR	$e^+e^- \to \gamma\pi^+\pi^-(\pi^0)\ell^+\ell^-$

[21] Not independent of other values reported by AUBERT 08BP.

$\Gamma(J/\psi(1S)$ anything$)/\Gamma_{total}$ Γ_8/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.006	90	MASCHMANN	90	CBAL	$e^+e^- \to$ hadrons

$\Gamma(\overline{d}$ anything$)/\Gamma_{total}$ Γ_9/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.37±0.50±0.25	58	ASNER	07	CLEO	$e^+e^- \to \overline{d}X$

$\Gamma(ggg)/\Gamma_{total}$ Γ_{11}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
58.8±1.2	6M	[22] BESSON	06A	CLEO	$\Upsilon(2S) \to$ hadrons

[22] Calculated using the value $\Gamma(\gamma gg)/\Gamma(ggg)$ = (3.18 ± 0.04 ± 0.22 ± 0.41)% from BESSON 06A and PDG 08 values of B($\pi^+\pi^-\Upsilon(1S)$) = (18.1 ± 0.4)%, B($\pi^0\pi^0\Upsilon(1S)$) = (8.6 ± 0.4)%, B($\mu^+\mu^-$) = (1.93 ± 0.17)%, and $R_{hadrons}$ = 3.51. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(\gamma gg)/\Gamma_{total}$ measurement of BESSON 06A.

$\Gamma(\gamma gg)/\Gamma_{total}$ Γ_{12}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
8.79±1.05	100k	[23] BESSON	06A	CLEO	$\Upsilon(2S) \to \gamma$ + hadrons

[23] Calculated using BESSON 06A values of $\Gamma(\gamma gg)/\Gamma(ggg)$ = (3.18 ± 0.04 ± 0.22 ± 0.41)% and $\Gamma(ggg)/\Gamma_{total}$. The statistical error is negligible and the systematic error is partially correlated with that of $\Gamma(ggg)/\Gamma_{total}$ measurement of BESSON 06A.

$\Gamma(\gamma g g)/\Gamma(g g g)$ — Γ_{12}/Γ_{11}

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
3.18±0.04±0.47	6M	BESSON	06A	CLEO	$\Upsilon(2S) \to (\gamma +)$ hadrons

$\Gamma(\gamma \chi_{b1}(1P))/\Gamma_{total}$ — Γ_{13}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.069 ±0.004 OUR AVERAGE					
0.0693±0.0012±0.0041	407k	ARTUSO	05	CLEO	$e^+e^- \to \gamma X$
0.069 ±0.005 ±0.009		EDWARDS	99	CLE2	$\Upsilon(2S) \to \gamma\chi(1P)$
0.091 ±0.018 ±0.022		ALBRECHT	85E	ARG	$e^+e^- \to \gamma$ conv. X
0.065 ±0.007 ±0.012		NERNST	85	CBAL	$e^+e^- \to \gamma X$
0.080 ±0.017 ±0.016		HAAS	84	CLEO	$e^+e^- \to \gamma$ conv. X
0.059 ±0.014		KLOPFEN...	83	CUSB	$e^+e^- \to \gamma X$

$\Gamma(\gamma \chi_{b2}(1P))/\Gamma_{total}$ — Γ_{14}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0715±0.0035 OUR AVERAGE					
0.0724±0.0011±0.0040	410k	ARTUSO	05	CLEO	$e^+e^- \to \gamma X$
0.074 ±0.005 ±0.008		EDWARDS	99	CLE2	$\Upsilon(2S) \to \gamma\chi(1P)$
0.098 ±0.021 ±0.024		ALBRECHT	85E	ARG	$e^+e^- \to \gamma$ conv. X
0.058 ±0.007 ±0.010		NERNST	85	CBAL	$e^+e^- \to \gamma X$
0.102 ±0.018 ±0.021		HAAS	84	CLEO	$e^+e^- \to \gamma$ conv. X
0.061 ±0.014		KLOPFEN...	83	CUSB	$e^+e^- \to \gamma X$

$\Gamma(\gamma \chi_{b0}(1P))/\Gamma_{total}$ — Γ_{15}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.038 ±0.004 OUR AVERAGE					
0.0375±0.0012±0.0047	198k	ARTUSO	05	CLEO	$e^+e^- \to \gamma X$
0.034 ±0.005 ±0.006		EDWARDS	99	CLE2	$\Upsilon(2S) \to \gamma\chi(1P)$
0.064 ±0.014 ±0.016		ALBRECHT	85E	ARG	$e^+e^- \to \gamma$ conv. X
0.036 ±0.008 ±0.009		NERNST	85	CBAL	$e^+e^- \to \gamma X$
0.044 ±0.023 ±0.009		HAAS	84	CLEO	$e^+e^- \to \gamma$ conv. X
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.035 ±0.014		KLOPFEN...	83	CUSB	$e^+e^- \to \gamma X$

$\Gamma(\gamma f_0(1710))/\Gamma_{total}$ — Γ_{16}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<59	90	[24] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 5.9	90	[25] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma\pi^+\pi^-$

[24] Re-evaluated assuming B($f_0(1710) \to K^+K^-$) = 0.19.

[25] Includes unknown branching ratio of $f_0(1710) \to \pi^+\pi^-$.

$\Gamma(\gamma f'_2(1525))/\Gamma_{total}$ — Γ_{17}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<53	90	[26] ALBRECHT	89	ARG	$\Upsilon(2S) \to \gamma K^+K^-$

[26] Re-evaluated assuming B($f'_2(1525) \to K\overline{K}$) = 0.71.

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ — Γ_{18}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<24.1	90	[27] ALBRECHT	89	ARG	$\Upsilon(2S) \rightarrow \gamma\pi^+\pi^-$

[27] Using B($f_2(1270) \rightarrow \pi\pi$) = 0.84.

$\Gamma(\gamma f_J(2220))/\Gamma_{total}$ — Γ_{19}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6.8	90	[28] ALBRECHT	89	ARG	$\Upsilon(2S) \rightarrow \gamma K^+K^-$

[28] Includes unknown branching ratio of $f_J(2220) \rightarrow K^+K^-$.

$\Gamma(\gamma\eta_b(1S))/\Gamma_{total}$ — Γ_{20}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$3.9\pm1.1^{+1.1}_{-0.9}$		13 ± 5k	[29] AUBERT	09AQ	BABR	$\Upsilon(2S) \rightarrow \gamma X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<8.4	90		[29] BONVICINI	10	CLEO	$\Upsilon(2S) \rightarrow \gamma X$
<5.1	90		[30] ARTUSO	05	CLEO	$e^+e^- \rightarrow \gamma X$

[29] Assuming $\Gamma_{\eta_b(1S)}$ = 10 MeV.

[30] Superseded by BONVICINI 10.

$\Gamma(\gamma X \rightarrow \gamma + \geq 4\text{ prongs})/\Gamma_{total}$ — Γ_{21}/Γ

(1.5 GeV < m_X < 5.0 GeV)

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.95	95	ROSNER	07A	CLEO	$e^+e^- \rightarrow \gamma X$

$\Gamma(\mu^\pm\tau^\mp)/\Gamma_{total}$ — Γ_{22}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
<14.4	95	LOVE	08A	CLEO	$e^+e^- \rightarrow \mu^\pm\tau^\mp$

$\Upsilon(2S)$ REFERENCES

BONVICINI	10	PR D81 031104R	G. Bonvicini et al.	(CLEO Collab.)
AUBERT	09AQ	PRL 103 161801	B. Aubert et al.	(BABAR Collab.)
BHARI	09	PR D79 011103	S.R. Bhari et al.	(CLEO Collab.)
AUBERT	08BP	PR D78 112002	B. Aubert et al.	(BABAR Collab.)
HE	08A	PRL 101 192001	Q. He et al.	(CLEO Collab.)
LOVE	08A	PRL 101 201601	W. Love et al.	(CLEO Collab.)
PDG	08	PL B667 1	C. Amsler et al.	(PDG Collab.)
ASNER	07	PR D75 012009	D.M. Asner et al.	(CLEO Collab.)
BESSON	07	PRL 98 052002	D. Besson et al.	(CLEO Collab.)
ROSNER	07A	PR D76 117102	J.L. Rosner et al.	(CLEO Collab.)
BESSON	06A	PR D74 012003	D. Besson et al.	(CLEO Collab.)
ROSNER	06	PRL 96 092003	J.L. Rosner et al.	(CLEO Collab.)
ADAMS	05	PRL 94 012001	G.S. Adams et al.	(CLEO Collab.)
ARTUSO	05	PRL 94 032001	M. Artuso et al.	(CLEO Collab.)
ARTAMONOV	00	PL B474 427	A.S. Artamonov et al.	
EDWARDS	99	PR D59 032003	K.W. Edwards 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)
KOBEL	92	ZPHY C53 193	M. Kobel et al.	(Crystal Ball 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.)

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
ALBRECHT	87	ZPHY C35 283	H. Albrecht *et al.*	(ARGUS Collab.)
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)
LURZ	87	ZPHY C36 383	B. Lurz *et al.*	(Crystal Ball Collab.)
BARU	86B	ZPHY C32 622 (erratum)	S.E. Baru *et al.*	(NOVO)
ALBRECHT	85	ZPHY C28 45	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	85E	PL 160B 331	H. Albrecht *et al.*	(ARGUS Collab.)
GELPHMAN	85	PR D32 2893	D. Gelphman *et al.*	(Crystal Ball Collab.)
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)
		Translated from YAF 41 733.		
NERNST	85	PRL 54 2195	R. Nernst *et al.*	(Crystal Ball Collab.)
ARTAMONOV	84	PL 137B 272	A.S. Artamonov *et al.*	(NOVO)
BARBER	84	PL 135B 498	D.P. Barber *et al.*	(DESY, ARGUS Collab.+)
BESSON	84	PR D30 1433	D. Besson *et al.*	(CLEO Collab.)
FONSECA	84	NP B242 31	V. Fonseca *et al.*	(CUSB Collab.)
GILES	84B	PR D29 1285	R. Giles *et al.*	(CLEO Collab.)
HAAS	84	PRL 52 799	J. Haas *et al.*	(CLEO Collab.)
HAAS	84B	PR D30 1996	J. Haas *et al.*	(CLEO Collab.)
KLOPFEN...	83	PRL 51 160	C. Klopfenstein *et al.*	(CUSB Collab.)
ALBRECHT	82	PL 116B 383	H. Albrecht *et al.*	(DESY, DORT, HEIDH+)
NICZYPORUK	81B	PL 100B 95	B. Niczyporuk *et al.*	(LENA Collab.)
NICZYPORUK	81C	PL 99B 169	B. Niczyporuk *et al.*	(LENA Collab.)
BOCK	80	ZPHY C6 125	P. Bock *et al.*	(HEIDP, MPIM, DESY, HAMB)