$\Upsilon(4S)$ or $\Upsilon(10580)$

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

$\Upsilon(4S)$ MASS

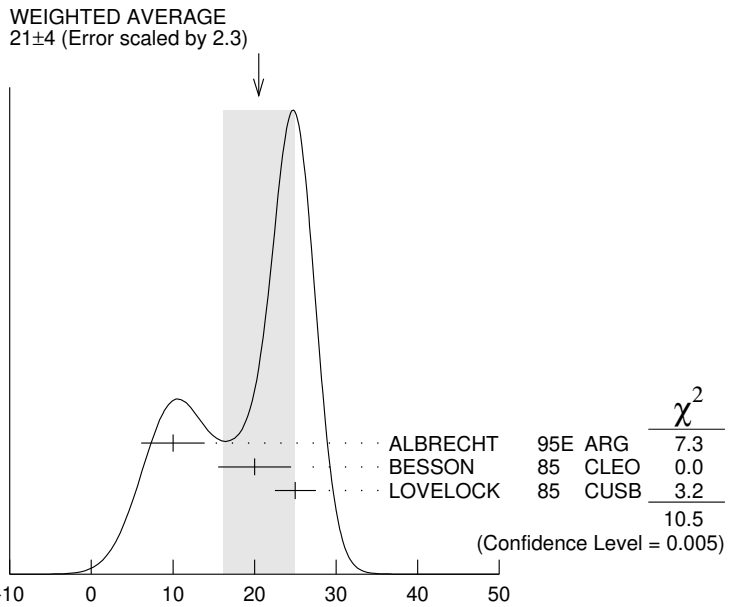
VALUE (GeV)	DOCUMENT ID		TECN	COMMENT
10.5800±0.0035	[1] BEBEK	87	CLEO	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.5774±0.0010	[2] LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

[1] Reanalysis of BESSON 85.
[2] No systematic error given.

$\Upsilon(4S)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
21 ±4 OUR AVERAGE Error includes scale factor of 2.3. See the ideogram below.				
10.0±2.8±2.7	[3] ALBRECHT	95E	ARG	$e^+e^- \to$ hadrons
20 ±2 ±4	BESSON	85	CLEO	$e^+e^- \to$ hadrons
25 ±2.5	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

[3] Using LEYAOUANC 77 parametrization of $\Gamma(s)$.



$\Upsilon(4S)$ DECAY MODES

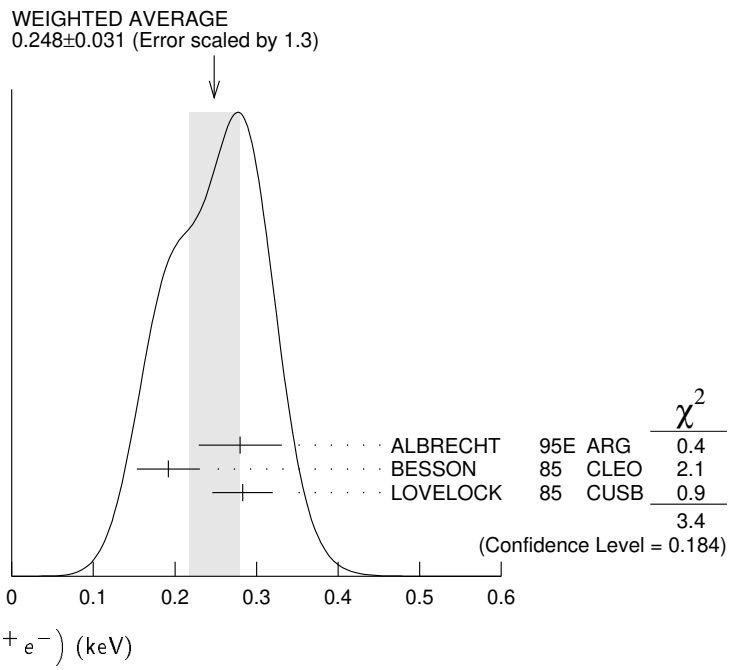
	Mode	Fraction (Γ_i/Γ)		Confidence level
Γ_1	$B\overline{B}$	dominant		
Γ_2	e^+e^-	$(2.8\pm0.7)\times10^{-5}$		
Γ_3	$J/\psi(3097)$anything	$(2.2\pm0.7)\times10^{-3}$		
Γ_4	D^{*+}anything + c.c.	< 7.4	%	90%
Γ_5	ϕanything	< 2.3	$\times10^{-3}$	90%
Γ_6	$\Upsilon(1S)$anything	< 4	$\times10^{-3}$	90%
Γ_7	non-$B\overline{B}$	< 4	%	95%

$\Upsilon(4S)$ PARTIAL WIDTHS

$\Gamma(e^+e^-)$ Γ_2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.248±0.031 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
0.28 ±0.05 ±0.01	[4] ALBRECHT	95E	ARG	$e^+e^- \to$ hadrons
0.192±0.007±0.038	BESSON	85	CLEO	$e^+e^- \to$ hadrons
0.283±0.037	LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons

[4] Using LEYAOUANC 77 parametrization of $\Gamma(s)$.



$\Upsilon(4S)$ BRANCHING RATIOS

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_2/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
2.77±0.50±0.49	[5] ALBRECHT	95E	ARG	$e^+e^- \to$ hadrons

[5] Using LEYAOUANC 77 parametrization of $\Gamma(s)$.

$\Gamma(J/\psi(3097)\text{anything})/\Gamma_{total}$ Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.0022±0.0006±0.0004	ALEXANDER	90C	CLEO	e^+e^-

$[\Gamma(D^{*+}\text{anything}) + \Gamma(\text{c.c.})]/\Gamma_{total}$ Γ_4/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.074	90	[6] ALEXANDER	90C	CLEO	e^+e^-

[6] For $x > 0.473$.

$\Gamma(\phi\text{anything})/\Gamma_{total}$ Γ_5/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0023	90	[7] ALEXANDER	90C	CLEO	e^+e^-

[7] For $x > 0.52$.

$\Gamma(\Upsilon(1S)\text{anything})/\Gamma_{total}$ Γ_6/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.004	90	ALEXANDER	90C	CLEO	e^+e^-

$\Gamma(\text{non-}B\overline{B})/\Gamma_{total}$ Γ_7/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	95	BARISH	96B	CLEO	e^+e^-

$\Upsilon(4S)$ REFERENCES

BARISH	96B	PRL 76 1570	+Chadha, Chan, et al	(CLEO Collab.)
ALBRECHT	95E	ZPHY C65 619	+Hamacher+	(ARGUS Collab.)
ALEXANDER	90C	PRL 64 2226	+Artuso+	(CLEO Collab.)
BEBEK	87	PR D36 1289	+Berkelman, Blucher, Cassel+	(CLEO Collab.)
BESSON	85	PRL 54 381	+Green, Namjoshi, Sannes+	(CLEO Collab.)
LOVELOCK	85	PRL 54 377	+Horstkotte, Klopfenstein+	(CUSB Collab.)
LEYAOUANC	77	PL B71 397	+Oliver, Pene, Raynal	(ORSAY)

OTHER RELATED PAPERS

HENDERSON	92	PR D45 2212	+Kinoshita, Pipkin, Procario+	(CLEO Collab.)
ANDREWS	80B	PRL 45 219	+Berkelman, Cabenda, Cassel+	(CLEO Collab.)
FINOCCHI...	80	PRL 45 222	Finocchiaro, Giannini, Lee-Franzini+	(CUSB Collab.)