

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

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

$\Upsilon(4S)$ MASS

<u>VALUE (GeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
10.5800 ± 0.0035	¹ BEBEK	87 CLEO	$e^+e^- \rightarrow$ hadrons
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
10.5774 ± 0.0010	² LOVELOCK	85 CUSB	$e^+e^- \rightarrow$ hadrons
¹ Reanalysis of BESSON 85.			
² No systematic error given.			

$\Upsilon(4S)$ WIDTH

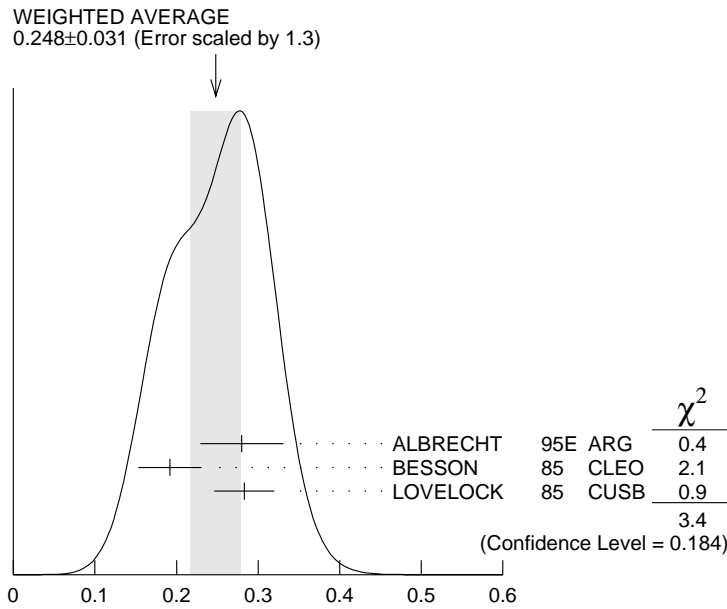
<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
14 ± 5 OUR AVERAGE	Error includes scale factor of 1.7.		
10.0 ± 2.8 ± 2.7	³ ALBRECHT	95E ARG	$e^+e^- \rightarrow$ hadrons
20 ± 2 ± 4	BESSON	85 CLEO	$e^+e^- \rightarrow$ hadrons
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
25 ± 2.5	LOVELOCK	85 CUSB	$e^+e^- \rightarrow$ hadrons
³ Using LEYAOUANC 77 parametrization of $\Gamma(s)$.			

$\Upsilon(4S)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1 $B\bar{B}$	> 96 %	95%
Γ_2 non- $B\bar{B}$	< 4 %	95%
Γ_3 e^+e^-	$(2.8 \pm 0.7) \times 10^{-5}$	
Γ_4 D^{*+} anything + c.c.	< 7.4 %	90%
Γ_5 ϕ anything	< 2.3 $\times 10^{-3}$	90%
Γ_6 $\Upsilon(1S)$ anything	< 4 $\times 10^{-3}$	90%
Γ_7 $\Upsilon(1S)\pi^+\pi^-$	< 1.2 $\times 10^{-4}$	90%
Γ_8 $\Upsilon(2S)\pi^+\pi^-$	< 3.9 $\times 10^{-4}$	90%

$\Upsilon(4S)$ PARTIAL WIDTHS

<u>VALUE (keV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_3
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	$e^+e^- \rightarrow$ hadrons	
0.192 ± 0.007 ± 0.038	BESSON	85 CLEO	$e^+e^- \rightarrow$ hadrons	
0.283 ± 0.037	LOVELOCK	85 CUSB	$e^+e^- \rightarrow$ hadrons	
⁴ Using LEYAOUANC 77 parametrization of $\Gamma(s)$.				



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

$\Upsilon(4S)$ BRANCHING RATIOS

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

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

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

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

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

⁶ For $x > 0.473$.

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

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

⁷ For $x > 0.52$.

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

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

$\Gamma(\Upsilon(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<1.2	90	GLENN	99 CLE2	e^+e^-

$\Gamma(\Upsilon(2S)\pi^+\pi^-)/\Gamma_{\text{total}}$					Γ_8/Γ
VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT	
<3.9	90	GLENN	99 CLE2	e^+e^-	

$\Gamma(\text{non-}B\bar{B})/\Gamma_{\text{total}}$					Γ_2/Γ
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
<0.04	95	BARISH	96B CLEO	e^+e^-	

$\Upsilon(4S)$ REFERENCES

GLENN	99	PR D59 052003	S. Glenn <i>et al.</i>	
BARISH	96B	PRL 76 1570	B.C. Barish <i>et al.</i>	(CLEO Collab.)
ALBRECHT	95E	ZPHY C65 619	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALEXANDER	90C	PRL 64 2226	J. Alexander <i>et al.</i>	(CLEO Collab.)
BEBEK	87	PR D36 1289	C. Bebek <i>et al.</i>	(CLEO Collab.)
BESSON	85	PRL 54 381	D. Besson <i>et al.</i>	(CLEO Collab.)
LOVELOCK	85	PRL 54 377	D.M.J. Lovelock <i>et al.</i>	(CUSB Collab.)
LEYAOUANC	77	PL B71 397	A. Le Yaouanc <i>et al.</i>	(ORSAY)

OTHER RELATED PAPERS

HENDERSON	92	PR D45 2212	S. Henderson <i>et al.</i>	(CLEO Collab.)
ANDREWS	80B	PRL 45 219	D. Andrews <i>et al.</i>	(CLEO Collab.)
FINOCCHI...	80	PRL 45 222	G. Finocchiaro <i>et al.</i>	(CUSB Collab.)