$h_b(1P)$

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

Quantum numbers are quark model predictions, $C = -$ established by $\eta_b\gamma$ decay.

$h_b(1P)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
9899.3±0.8 OUR AVERAGE					
9899.3±0.4±1.0	112k	TAMPONI	15	BELL	$e^+e^- \to \gamma\eta +$ hadrons
9899.1±0.4±1.0	70k	MIZUK	12	BELL	$e^+e^- \to \pi^+\pi^-$ hadrons
9902 ±4 ±2	10.8k	LEES	11K	BABR	$\Upsilon(3S) \to \eta_b\gamma\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$9898.2^{+1.1+1.0}_{-1.0-1.1}$	50.0k	[1] ADACHI	12	BELL	10.86 $e^+e^- \to \pi^+\pi^-$ MM

[1] Superseded by MIZUK 12.

$h_b(1P)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$\eta_b(1S)\gamma$	$(52\ ^{+6}_{-5})$ %	
Γ_2	$\Upsilon(1S)\pi^0$	$< 1.8 \times 10^{-3}$	90%

$h_b(1P)$ BRANCHING RATIOS

$\Gamma(\eta_b(1S)\gamma)/\Gamma_{\text{total}}$ Γ_1/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
52 $^{+6}_{-5}$ OUR AVERAGE					
56 ±8 ±4	33.1k	[1] TAMPONI	15	BELL	$e^+e^- \to \gamma\eta +$ hadrons
$49.2\pm5.7^{+5.6}_{-3.3}$	24k	MIZUK	12	BELL	$e^+e^- \to (\gamma)\pi^+\pi^-$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	10.8k	LEES	11K	BABR	$\Upsilon(3S) \to \eta_b\gamma\pi^0$

[1] Using B($\eta \to 2\gamma$) = (39.41 ± 0.20)%.

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

VALUE	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$<1.8 \times 10^{-3}$	90	0.43	KOVALENKO	24	BELL	$e^+e^- \to \Upsilon(5S)$

$h_b(1P)$ REFERENCES

KOVALENKO	24	PRL 133 261901	E. Kovalenko *et al.*	(BELLE Collab.)
TAMPONI	15	PRL 115 142001	U. Tamponi *et al.*	(BELLE Collab.)
ADACHI	12	PRL 108 032001	I. Adachi *et al.*	(BELLE Collab.)
MIZUK	12	PRL 109 232002	R. Mizuk *et al.*	(BELLE Collab.)
LEES	11K	PR D84 091101	J.P. Lees *et al.*	(BABAR Collab.)