$\eta_b(2S)$

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

OMITTED FROM SUMMARY TABLE

Quantum numbers shown are quark-model predictions.

$\eta_b(2S)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$9999.0 \pm 3.5^{+2.8}_{-1.9}$	26k	[1] MIZUK	12	BELL	$e^+e^- \to \gamma\pi^+\pi^- +$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$9974.6 \pm 2.3 \pm 2.1$	11 ± 4	[2,3,4] DOBBS	12		$\Upsilon(2S) \to \gamma$ hadrons

[1] Assuming $\Gamma_{\eta_b(2S)} = 4.9$ MeV. Not independent of the corresponding mass difference measurement.

[2] SANDILYA 13 (Belle Collab.) search for such a state reconstructed in the same 26 exclusive hadronic final states as DOBBS 12 using a sample of $(157.8 \pm 3.6) \times 10^6$ $\Upsilon(2S)$ decays or about 17 times larger and find no evidence for a signal. Their 90% C.L. upper limit on the branching fraction $B(\Upsilon(2S) \to \eta_b(2S)\gamma) \times \sum_i B(\eta_b(2S) \to X_i) < 4.9 \times 10^{-6}$, summed over the exclusive hadronic final states X_i, is an order of magnitude smaller than that reported by DOBBS 12.

[3] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration.

[4] Assuming $\Gamma_{\eta_b(2S)} = 5$ MeV. Not independent of the corresponding mass difference measurement.

$m_{\Upsilon(2S)} - m_{\eta_b(2S)}$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$24.3 \pm 3.5^{+2.8}_{-1.9}$	26k	[5] MIZUK	12	BELL	$e^+e^- \to \gamma\pi^+\pi^- +$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$48.7 \pm 2.3 \pm 2.1$	11 ± 4	[6,7,8] DOBBS	12		$\Upsilon(2S) \to \gamma$ hadrons

[5] Assuming $\Gamma_{\eta_b(2S)} = 4.9$ MeV. Not independent of the corresponding mass measurement.

[6] SANDILYA 13 (Belle Collab.) search for such a state reconstructed in the same 26 exclusive hadronic final states as DOBBS 12 using a sample of $(157.8 \pm 3.6) \times 10^6$ $\Upsilon(2S)$ decays or about 17 times larger and find no evidence for a signal. Their 90% C.L. upper limit on the branching fraction $B(\Upsilon(2S) \to \eta_b(2S)\gamma) \times \sum_i B(\eta_b(2S) \to X_i) < 4.9 \times 10^{-6}$, summed over the exclusive hadronic final states X_i, is an order of magnitude smaller than that reported by DOBBS 12.

[7] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration.

[8] Assuming $\Gamma_{\eta_b(2S)} = 5$ MeV. Not independent of the corresponding mass measurement.

$\eta_b(2S)$ WIDTH

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
<24	90	MIZUK	12	BELL	$e^+e^- \to \gamma\pi^+\pi^-$ hadrons

$\eta_b(2S)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	hadrons	seen

$\eta_b(2S)$ BRANCHING RATIOS

$\Gamma(\text{hadrons})/\Gamma_{\text{total}}$ **Γ_1/Γ**

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	26k	MIZUK	12	BELL	$e^+e^- \to \gamma\pi^+\pi^-$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		[9,10] DOBBS	12		$\Upsilon(2S) \to \gamma$ hadrons

[9] SANDILYA 13 (Belle Collab.) search for such a state reconstructed in the same 26 exclusive hadronic final states as DOBBS 12 using a sample of $(157.8 \pm 3.6) \times 10^6$ $\Upsilon(2S)$ decays or about 17 times larger and find no evidence for a signal. Their 90% C.L. upper limit on the branching fraction $B(\Upsilon(2S) \to \eta_b(2S)\gamma) \times \sum_i B(\eta_b(2S) \to X_i) < 4.9 \times 10^{-6}$, summed over the exclusive hadronic final states X_i, is an order of magnitude smaller than that reported by DOBBS 12.

[10] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration.

$\eta_b(2S)$ REFERENCES

SANDILYA	13	PRL 111 112001	S. Sandilya et al.	(BELLE Collab.)
DOBBS	12	PRL 109 082001	S. Dobbs et al.	
MIZUK	12	PRL 109 232002	R. Mizuk et al.	(BELLE Collab.)