

**$h_b(1P)$** 

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

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

 **$h_b(1P)$  MASS**

| VALUE (MeV)   | EVTS  | DOCUMENT ID         | TECN     | COMMENT  |
|---|-------|---------------------|----------|--|
| <b>9899.3 ± 0.8 OUR AVERAGE</b>   |       |                     |          |  |
| 9899.3 ± 0.4 ± 1.0  | 112k  | TAMPONI             | 15 BELL  | $e^+e^- \rightarrow \gamma\eta + \text{hadrons}$ |
| 9899.1 ± 0.4 ± 1.0  | 70k   | MIZUK               | 12 BELL  | $e^+e^- \rightarrow \pi^+\pi^- \text{ hadrons}$  |
| 9902 ± 4 ± 2  | 10.8k | LEES                | 11K BABR | $\Upsilon(3S) \rightarrow \eta_b \gamma \pi^0$   |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● |       |                     |          |  |
| 9898.2 <sup>+1.1+1.0</sup> <sub>-1.0-1.1</sub>                                | 50.0k | <sup>1</sup> ADACHI | 12 BELL  | 10.86 $e^+e^- \rightarrow \pi^+\pi^- \text{ MM}$ |
| <sup>1</sup> Superseded by MIZUK 12.  |       |                     |          |  |

 **$h_b(1P)$  DECAY MODES**

| Mode                              | Fraction ( $\Gamma_i/\Gamma$ )      |
|-----------------------------------|-------------------------------------|
| $\Gamma_1 \quad \eta_b(1S)\gamma$ | (52 <sup>+6</sup> <sub>-5</sub> ) % |

 **$h_b(1P)$  BRANCHING RATIOS**

| $\Gamma(\eta_b(1S)\gamma)/\Gamma_{\text{total}}$                              | $\Gamma_1/\Gamma$ |                      |          |   |
|---|-------------------|----------------------|----------|---|
| VALUE (units $10^{-2}$ )  | EVTS              | DOCUMENT ID          | TECN     | COMMENT   |
| <b>52<sup>+6</sup><sub>-5</sub> OUR AVERAGE</b>                               |                   |                      |          |   |
| 56 ± 8 ± 4  | 33.1k             | <sup>1</sup> TAMPONI | 15 BELL  | $e^+e^- \rightarrow \gamma\eta + \text{hadrons}$        |
| 49.2 ± 5.7 <sup>+5.6</sup> <sub>-3.3</sub>                                    | 24k               | MIZUK                | 12 BELL  | $e^+e^- \rightarrow (\gamma)\pi^+\pi^- \text{ hadrons}$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● |                   |                      |          |   |
| seen  | 10.8k             | LEES                 | 11K BABR | $\Upsilon(3S) \rightarrow \eta_b \gamma \pi^0$          |
| <sup>1</sup> Using $B(\eta \rightarrow 2\gamma) = (39.41 \pm 0.20)\%$ .       |                   |                      |          |   |

 **$h_b(1P)$  REFERENCES**

|         |     |                |                          |                 |
|---------|-----|----------------|--------------------------|-----------------|
| TAMPONI | 15  | PRL 115 142001 | U. Tamponi <i>et al.</i> | (BELLE Collab.) |
| ADACHI  | 12  | PRL 108 032001 | I. Adachi <i>et al.</i>  | (BELLE Collab.) |
| MIZUK   | 12  | PRL 109 232002 | R. Mizuk <i>et al.</i>   | (BELLE Collab.) |
| LEES    | 11K | PR D84 091101  | J.P. Lees <i>et al.</i>  | (BABAR Collab.) |