

$\chi_{b2}(1P)$

$$I^G(J^{PC}) = 0^+(2^{++})$$

J needs confirmation.

Observed in radiative decay of the $\Upsilon(2S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$. $J = 2$ from SKWARNICKI 87.

$\chi_{b2}(1P)$ MASS

| VALUE (MeV) | DOCUMENT ID |
|---|---|
| 9912.21 ± 0.26 ± 0.31 OUR EVALUATION | From average γ energy below, using $\Upsilon(2S)$ mass = 10023.26 ± 0.31 MeV |

γ ENERGY IN $\Upsilon(2S)$ DECAY

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|----------------------------------|-------------------------------------|------|---|
| 110.44 ± 0.29 OUR AVERAGE | Error includes scale factor of 1.1. | | |
| 110.58 ± 0.08 ± 0.30 | ARTUSO | 05 | CLEO $\Upsilon(2S) \rightarrow \gamma X$ |
| 110.8 ± 0.3 ± 0.6 | EDWARDS | 99 | CLE2 $\Upsilon(2S) \rightarrow \gamma X(1P)$ |
| 107.0 ± 1.1 ± 1.3 | WALK | 86 | CBAL $\Upsilon(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$ |
| 110.6 ± 0.3 ± 0.9 | ALBRECHT | 85E | ARG $\Upsilon(2S) \rightarrow \text{conv.} \gamma X$ |
| 110.4 ± 0.8 ± 2.2 | NERNST | 85 | CBAL $\Upsilon(2S) \rightarrow \gamma X$ |
| 109.5 ± 0.7 ± 1.0 | HAAS | 84 | CLEO $\Upsilon(2S) \rightarrow \text{conv.} \gamma X$ |
| 108.2 ± 0.3 ± 2.0 | KLOPFEN... | 83 | CUSB $\Upsilon(2S) \rightarrow \gamma X$ |
| 108.8 ± 4.0 | PAUSS | 83 | CUSB $\Upsilon(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$ |

$\chi_{b2}(1P)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) |
|--------------------------------------|--------------------------------|
| $\Gamma_1 \quad \gamma \Upsilon(1S)$ | (22 ± 4) % |

$\chi_{b2}(1P)$ BRANCHING RATIOS

| $\Gamma(\gamma \Upsilon(1S))/\Gamma_{\text{total}}$ | DOCUMENT ID | TECN | COMMENT | Γ_1/Γ |
|---|-------------|------|---|-------------------|
| 0.22 ± 0.04 OUR AVERAGE | | | | |
| 0.27 ± 0.06 ± 0.06 | WALK | 86 | CBAL $\Upsilon(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$ | |
| 0.20 ± 0.05 | KLOPFEN... | 83 | CUSB $\Upsilon(2S) \rightarrow \gamma \gamma \ell^+ \ell^-$ | |

$\chi_{b2}(1P)$ REFERENCES

| | | | | |
|------------|-----|---------------|-------------------------------|--------------------------|
| ARTUSO | 05 | PRL 94 032001 | M. Artuso <i>et al.</i> | (CLEO Collab.) |
| EDWARDS | 99 | PR D59 032003 | K.W. Edwards <i>et al.</i> | (CLEO Collab.) |
| SKWARNICKI | 87 | PRL 58 972 | T. Skwarnicki <i>et al.</i> | (Crystal Ball Collab.) J |
| WALK | 86 | PR D34 2611 | W.S. Walk <i>et al.</i> | (Crystal Ball Collab.) |
| ALBRECHT | 85E | PL 160B 331 | H. Albrecht <i>et al.</i> | (ARGUS Collab.) |
| NERNST | 85 | PRL 54 2195 | R. Nernst <i>et al.</i> | (Crystal Ball Collab.) |
| HAAS | 84 | PRL 52 799 | J. Haas <i>et al.</i> | (CLEO Collab.) |
| KLOPFEN... | 83 | PRL 51 160 | C. Klopfenstein <i>et al.</i> | (CUSB Collab.) |
| PAUSS | 83 | PL 130B 439 | F. Pauss <i>et al.</i> | (MPIM, COLU, CORN, LSU+) |