

$\chi_{b0}(1P)$

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

J needs confirmation.

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

$\chi_{b0}(1P)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
9859.9 ± 1.0 OUR AVERAGE			
9860.0 ± 0.8 ± 1.2	¹ EDWARDS	99 CLE2	$\Upsilon(2S) \rightarrow \gamma\chi(1P)$
9859.9 ± 0.5 ± 1.4	¹ ALBRECHT	85E ARG	$\Upsilon(2S) \rightarrow \text{conv.}\gamma X$
9858.1 ± 1.6 ± 2.7	¹ NERNST	85 CBAL	$\Upsilon(2S) \rightarrow \gamma X$
9864.0 ± 7 ± 1	¹ HAAS	84 CLEO	$\Upsilon(2S) \rightarrow \text{conv.}\gamma X$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
9872.8 ± 0.7 ± 5.0	¹ KLOPFEN...	83 CUSB	$\Upsilon(2S) \rightarrow \gamma X$
¹ From γ energy below, assuming $\Upsilon(2S)$ mass = 10023.3 MeV.			

γ ENERGY IN $\Upsilon(2S)$ DECAY

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
162.1 ± 1.0 OUR AVERAGE			
162.0 ± 0.8 ± 1.2	EDWARDS	99 CLE2	$\Upsilon(2S) \rightarrow \gamma\chi(1P)$
162.1 ± 0.5 ± 1.4	ALBRECHT	85E ARG	$\Upsilon(2S) \rightarrow \text{conv.}\gamma X$
163.8 ± 1.6 ± 2.7	NERNST	85 CBAL	$\Upsilon(2S) \rightarrow \gamma X$
158.0 ± 7 ± 1	HAAS	84 CLEO	$\Upsilon(2S) \rightarrow \text{conv.}\gamma X$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
149.4 ± 0.7 ± 5.0	KLOPFEN...	83 CUSB	$\Upsilon(2S) \rightarrow \gamma X$

$\chi_{b0}(1P)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Confidence level
$\Gamma_1 \quad \gamma \Upsilon(1S)$	< 6 %	90%

$\chi_{b0}(1P)$ BRANCHING RATIOS

$\Gamma(\gamma \Upsilon(1S))/\Gamma_{\text{total}}$					Γ_1/Γ
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
< 0.06	90	WALK	86 CBAL	$\Upsilon(2S) \rightarrow \gamma\gamma\ell^+\ell^-$	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
< 0.11	90	PAUSS	83 CUSB	$\Upsilon(2S) \rightarrow \gamma\gamma\ell^+\ell^-$	

$\chi_{b0}(1P)$ REFERENCES

EDWARDS	99	PR D59 032003	K.W. Edwards <i>et al.</i>	(CLEO Collab.)
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+)
