

$h_c(1P)$

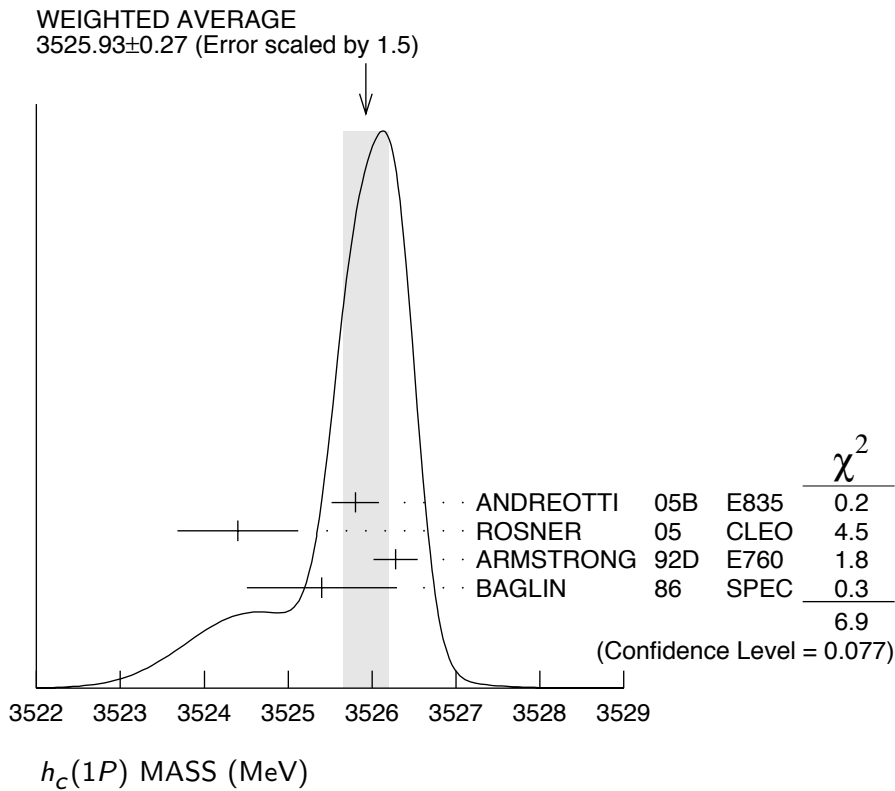
$$I^G(J^{PC}) = ?^?(1^{+-})$$

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

$h_c(1P)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
3525.93±0.27 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.		
3525.8 ±0.2 ±0.2	13	ANDREOTTI 05B	E835	$\bar{p}p \rightarrow \eta_c \gamma$
3524.4 ±0.6 ±0.4	168 ± 40	ROSNER 05	CLEO	$\psi(2S) \rightarrow \pi^0 \eta_c \gamma$
3526.28±0.18±0.19	59	¹ ARMSTRONG 92D	E760	$\bar{p}p \rightarrow J/\psi \pi^0$
3525.4 ±0.8 ±0.4	5	BAGLIN 86	SPEC	$\bar{p}p \rightarrow J/\psi X$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
3527 ±8	42	ANTONIAZZI 94	E705	$300 \pi^\pm, p\text{Li} \rightarrow J/\psi \pi^0 X$

¹ Mass central value and systematic error recalculated by us according to Eq. (16) in ARMSTRONG 93B, using the value for the $\psi(2S)$ mass from AULCHENKO 03.



$h_c(1P)$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<1		13	ANDREOTTI 05B	E835	$\bar{p}p \rightarrow \eta_c \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.1	90	59	ARMSTRONG 92D	E760	$\bar{p}p \rightarrow J/\psi \pi^0$

$h_c(1P)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $J/\psi(1S)\pi^0$	
Γ_2 $J/\psi(1S)\pi\pi$	not seen
Γ_3 $\rho\bar{p}$	
Γ_4 $\eta_c \gamma$	seen

$h_c(1P)$ PARTIAL WIDTHS

$h_c(1P) \Gamma(i)\Gamma(\bar{p}p)/\Gamma(\text{total})$

$\Gamma(\eta_c \gamma) \times \Gamma(\rho\bar{p})/\Gamma_{\text{total}}$					$\Gamma_4\Gamma_3/\Gamma$
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT	
12.0 ± 4.5	13	² ANDREOTTI 05B	E835	$\bar{p}p \rightarrow \eta_c \gamma$	
² Assuming $\Gamma = 1$ MeV.					

$h_c(1P)$ BRANCHING RATIOS

$\Gamma(J/\psi(1S)\pi\pi)/\Gamma(J/\psi(1S)\pi^0)$					Γ_2/Γ_1
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
<0.18	90	ARMSTRONG 92D	E760	$\bar{p}p \rightarrow J/\psi \pi^0$	
$\Gamma(\eta_c \gamma)/\Gamma_{\text{total}}$					Γ_4/Γ
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
seen	168 ± 40	³ ROSNER 05	CLEO	$\psi(2S) \rightarrow \pi^0 \eta_c \gamma$	
³ CLEO measures the product $B(\psi(2S) \rightarrow \pi^0 h_c) \times B(h_c \rightarrow \eta_c \gamma)$ to be $(4.0 \pm 0.8 \pm 0.7) \times 10^{-4}$.					

$h_c(1P)$ REFERENCES

ANDREOTTI 05B	PR D72 032001	M. Andreotti <i>et al.</i>	(FNAL E835 Collab.)
ROSNER 05	PRL 95 102003	J.L. Rosner <i>et al.</i>	(CLEO Collab.)
AULCHENKO 03	PL B573 63	V.M. Aulchenko <i>et al.</i>	(KEDR Collab.)
ANTONIAZZI 94	PR D50 4258	L. Antoniazzi <i>et al.</i>	(E705 Collab.)
ARMSTRONG 93B	PR D47 772	T.A. Armstrong <i>et al.</i>	(FNAL E760 Collab.)
ARMSTRONG 92D	PRL 69 2337	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
BAGLIN 86	PL B171 135	C. Baglin <i>et al.</i>	(LAPP, CERN, TORI, STRB+)

————— **OTHER RELATED PAPERS** —————

FANG	06	PR D74 012007	F. Fang <i>et al.</i>	(BELLE Collab.)
Haidenbau...	06	PR D74 017501	J. Haidenbauer <i>et al.</i>	
SWANSON	06	PRPL 429 243	E.S. Swanson	(PITT)
AUBERT	05R	PR D71 071103R	B. Aubert <i>et al.</i>	(BABAR Collab.)
RUBIN	05	PR D72 092004	P. Rubin <i>et al.</i>	(CLEO Collab.)
EICHTEN	02	PRL 89 162002	E.J. Eichten, K. Lane, C. Quigg	
