Citation: K. Hagiwara *et al.* (Particle Data Group), Phys. Rev. D **66**, 010001 (2002) and 2003 partial update for edition 2004 (URL: http://pdg.lbl.gov)

$\eta_c(2S)$

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

OMITTED FROM SUMMARY TABLE

Needs confirmation. Quantum numbers are quark model predictions.

$\eta_c(2S)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3654±10 OUR NEW AVERAGE		[3594 ± 5 MeV OUR 2002 AVERAGE]			
3654± 6±8	39 ± 11	CHOI	02	BELL	$B \to K K_S K^- \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3622±12	42	[1] ABE,K	02	BELL	10.6 $e^+ e^- \to J/\psi + X$
3594± 5		[2] EDWARDS	82C	CBAL	$e^+ e^- \to \gamma X$

[1] From a fit of the J/ψ recoil mass spectrum. Systematic errors not estimated.
[2] Assuming mass of $\psi(2S) = 3686$ MeV.

$\eta_c(2S)$ WIDTH

VALUE (MeV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<55	90	39 ± 11	[3] CHOI	02	BELL	$B \to K K_S K^- \pi^+$
< 8.0	95		[4] EDWARDS	82C	CBAL	$e^+ e^- \to \gamma X$

[3] For a mass value of 3654 ± 6 MeV
[4] For a mass value of 3594 ± 5 MeV

$\eta_c(2S)$ DECAY MODES

	Mode
Γ_1	hadrons
Γ_2	$K\overline{K}\pi$
Γ_3	$p\overline{p}$
Γ_4	$\gamma\gamma$

$\eta_c(2S)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma^2(total)$

$\Gamma(p\overline{p}) \times \Gamma(\gamma\gamma)/\Gamma^2_{total}$ **$\Gamma_3\Gamma_4/\Gamma^2$**

VALUE (units 10^{-8})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
< 5.6	90	[5,6,7] AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 8.0	90	[5,6,8] AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$
<12.0	90	[6,8] AMBROGIANI	01	E835	$\overline{p}p \to \gamma\gamma$

[5] Including the measurements of of ARMSTRONG 95F in the AMBROGIANI 01 analysis.
[6] For a total width Γ=5 MeV.
[7] For the resonance mass region 3589–3599 MeV/c^2.
[8] For the resonance mass region 3575–3660 MeV/c^2.

$\eta_c(2S)$ BRANCHING RATIOS

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	ABREU	980	DLPH	$e^+e^- \to e^+e^-$ +hadrons
seen	[9] EDWARDS	82C	CBAL	$e^+e^- \to \gamma X$

$\Gamma(K\overline{K}\pi)/\Gamma_{\text{total}}$ Γ_2/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	39 ± 11	[10] CHOI	02	BELL	$B \to K K_S K^- \pi^+$

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.01	90	LEE	85	CBAL	$\psi' \to$ photons

[9] For a mass value of 3594 ± 5 MeV
[10] For a mass value of 3654 ± 6 MeV

$\eta_c(2S)$ REFERENCES

ABE,K	02	PRL 89 142001	K. Abe *et al.*	(Belle Collab.)
CHOI	02	PRL 89 102001	S.-K. Choi *et al.*	(BELLE Collab.)
AMBROGIANI	01	PR D64 052003	M. Ambrogiani *et al.*	(FNAL E835 Collab.)
ABREU	98O	PL B441 479	P. Abreu *et al.*	(DELPHI Collab.)
ARMSTRONG	95F	PR D52 4839	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)
LEE	85	SLAC 282	R.A. Lee	(SLAC)
EDWARDS	82C	PRL 48 70	C. Edwards *et al.*	(CIT, HARV, PRIN+)

OTHER RELATED PAPERS

EICHTEN	02	PRL 89 162002	E.J. Eichten, K. Lane, C. Quigg	
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OREGLIA	82	PR D25 2259	M.J. Oreglia *et al.*	(SLAC, CIT, HARV+)
PORTER	81	SLAC Summer Inst. 355	F.C. Porter *et al.*	(CIT, HARV, PRIN+)
BARTEL	78B	PL 79B 492	W. Bartel *et al.*	(DESY, HEIDP)