

$\eta_c(1S)$

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

$\eta_c(1S)$ MASS

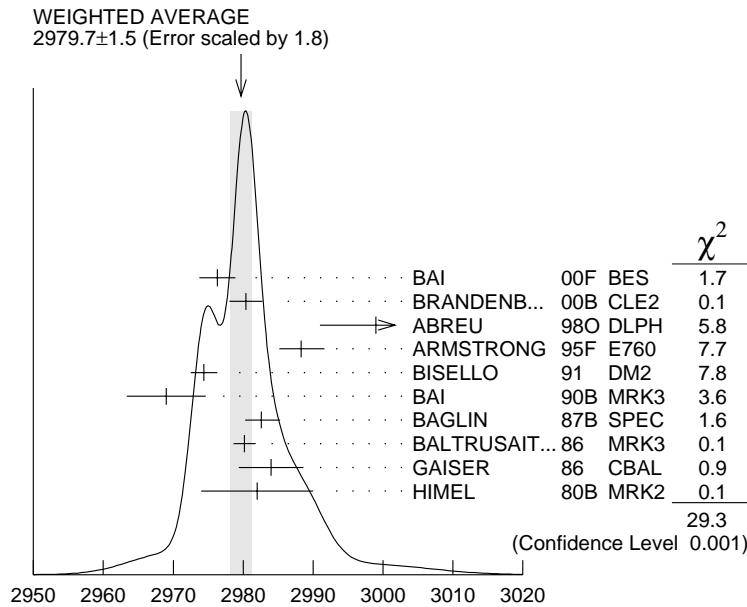
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2979.7 ± 1.5 OUR AVERAGE		Error includes scale factor of 1.8. See the ideogram below.		
2976.3 ± 2.3 ± 1.2		^{1,2,5} BAI	00F BES	$J/\psi \rightarrow \gamma \eta_c$ and $\psi(2S) \rightarrow \gamma \eta_c$
2980.4 ± 2.3 ± 0.6		BRANDENB...	00B CLE2	$\gamma\gamma \rightarrow \eta_c \rightarrow$ $K^\pm K_S^0 \pi^\mp$
2999 ± 8	25	ABREU	98O DLPH	$e^+ e^- \rightarrow e^+ e^-$ +hadrons
2988.3 ⁺ ₋ 3.3 3.1		ARMSTRONG	95F E760	$\bar{p}p \rightarrow \gamma\gamma$
2974.4 ± 1.9		¹ BISELLO	91 DM2	$J/\psi \rightarrow \eta_c \gamma$
2969 ± 4 ± 4	80	BAI	90B MRK3	$J/\psi \rightarrow$ $\gamma K^+ K^- K^+ K^-$
2982.6 ⁺ ₋ 2.7 2.3	12	BAGLIN	87B SPEC	$\bar{p}p \rightarrow \gamma\gamma$
2980.2 ± 1.6		¹ BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$
2984 ± 2.3 ± 4.0		GAISER	86 CBAL	$J/\psi \rightarrow \gamma X, \psi(2S) \rightarrow$ γX
2982 ± 8	18	³ HIMEL	80B MRK2	$e^+ e^-$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
2976.6 ± 2.9 ± 1.3	140	^{1,2} BAI	00F BES	$J/\psi \rightarrow \gamma \eta_c$
2975.8 ± 3.9 ± 1.2		^{1,2} BAI	99B BES	Sup. by BAI 00F
2956 ± 12 ± 12		BAI	90B MRK3	$J/\psi \rightarrow$ $\gamma K^+ K^- K_S^0 K_L^0$
2976 ± 8		⁴ BALTRUSAIT..84	MRK3	$J/\psi \rightarrow 2\phi\gamma$
2980 ± 9		³ PARTRIDGE	80B CBAL	$e^+ e^-$

¹ Average of several decay modes.

² Using an η_c width of 13.2 MeV.

³ Mass adjusted by us to correspond to $J/\psi(1S)$ mass = 3097 MeV.

⁴ $\eta_c \rightarrow \phi\phi$.



$\eta_c(1S)$ mass (MeV)

⁵ Weighted average of the $\psi(2S)$ and $J/\psi(1S)$ samples.

$\eta_c(1S)$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
16.0^{+3.6}_{-3.2}					OUR AVERAGE Error includes scale factor of 1.2.
11.0 ± 8.1 ± 4.1			⁷ BAI	00F BES	$J/\psi \rightarrow \gamma \eta_c$ and $\psi(2S) \rightarrow \gamma \eta_c$
27.0 ± 5.8 ± 1.4			BRANDENB...	00B CLE2	$\gamma\gamma \rightarrow \eta_c \rightarrow$ $K^\pm K_S^0 \pi^\mp$
23.9 ^{+12.6} _{-7.1}			ARMSTRONG	95F E760	$\bar{p}p \rightarrow \gamma\gamma$
7.0 ^{+7.5} _{-7.0}		12	BAGLIN	87B SPEC	$\bar{p}p \rightarrow \gamma\gamma$
10.1 ^{+33.0} _{-8.2}		23	⁶ BALTRUSAIT..	86 MRK3	$J/\psi \rightarrow \gamma p\bar{p}$
11.5 ± 4.5			GAISER	86 CBAL	$J/\psi \rightarrow \gamma X,$ $\psi(2S) \rightarrow \gamma X$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<40	90	18	HIMEL	80B MRK2	e^+e^-
<20	90		PARTRIDGE	80B CBAL	e^+e^-

⁶ Positive and negative errors correspond to 90% confidence level.

⁷ From a fit to the 4-prong invariant mass in $\psi(2S) \rightarrow \gamma \eta_c$ and $J/\psi(1S) \rightarrow \gamma \eta_c$ decays.

$\eta_c(1S)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Confidence level
Decays involving hadronic resonances		
Γ_1 $\eta'(958)\pi\pi$	(4.1 \pm 1.7) %	
Γ_2 $\rho\rho$	(2.6 \pm 0.9) %	
Γ_3 $K^*(892)^0 K^- \pi^+ + \text{c.c.}$	(2.0 \pm 0.7) %	
Γ_4 $K^*(892)\bar{K}^*(892)$	(8.5 \pm 3.1) $\times 10^{-3}$	
Γ_5 $\phi\phi$	(7.1 \pm 2.8) $\times 10^{-3}$	
Γ_6 $a_0(980)\pi$	< 2 %	90%
Γ_7 $a_2(1320)\pi$	< 2 %	90%
Γ_8 $K^*(892)\bar{K} + \text{c.c.}$	< 1.28 %	90%
Γ_9 $f_2(1270)\eta$	< 1.1 %	90%
Γ_{10} $\omega\omega$	< 3.1 $\times 10^{-3}$	90%
Decays into stable hadrons		
Γ_{11} $K\bar{K}\pi$	(5.5 \pm 1.7) %	
Γ_{12} $\eta\pi\pi$	(4.9 \pm 1.8) %	
Γ_{13} $\pi^+\pi^- K^+ K^-$	(2.0 $^{+0.7}_{-0.6}$) %	
Γ_{14} $2(K^+ K^-)$	(2.1 \pm 1.2) %	
Γ_{15} $2(\pi^+ \pi^-)$	(1.2 \pm 0.4) %	
Γ_{16} $\rho\bar{\rho}$	(1.2 \pm 0.4) $\times 10^{-3}$	
Γ_{17} $K\bar{K}\eta$	< 3.1 %	90%
Γ_{18} $\pi^+\pi^- \rho\bar{\rho}$	< 1.2 %	90%
Γ_{19} $\Lambda\bar{\Lambda}$	< 2 $\times 10^{-3}$	90%
Radiative decays		
Γ_{20} $\gamma\gamma$	(3.0 \pm 1.2) $\times 10^{-4}$	

$\eta_c(1S)$ PARTIAL WIDTHS

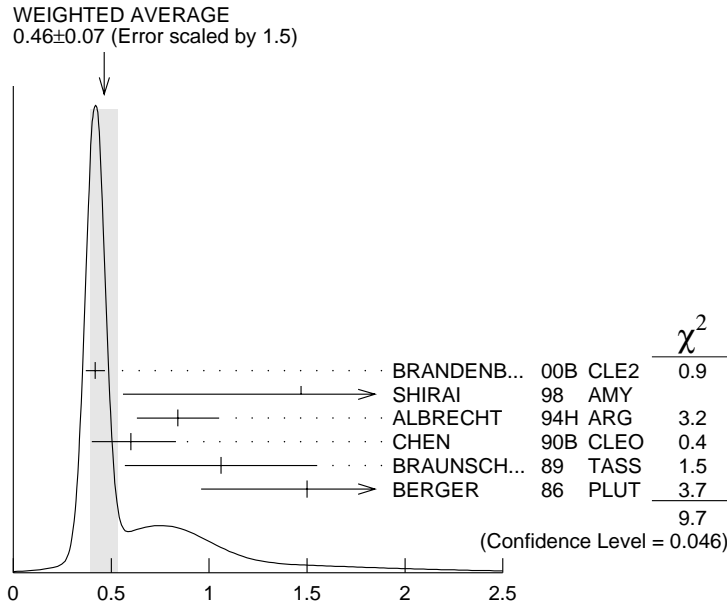
$\Gamma(\gamma\gamma)$	Γ_{20}	
<u>VALUE (keV)</u>	<u>EVTS</u>	
<u>DOCUMENT ID</u>	<u>TECN</u>	
<u>COMMENT</u>		
7.5 \pm 0.8 OUR AVERAGE		
7.6 \pm 0.8 \pm 0.4		
6.9 \pm 1.7 \pm 2.1	76	
27 \pm 16 \pm 10	5	
6.7 $^{+2.4}_{-1.7} \pm 2.3$		
11.3 \pm 4.2		
5.9 $^{+2.1}_{-1.8} \pm 1.9$		
6.4 $^{+5.0}_{-3.4}$		
28 \pm 15		
8.0 \pm 2.3 \pm 2.4	17	
8 BRANDENB...	00B CLE2	$\gamma\gamma \rightarrow \eta_c \rightarrow K^\pm K_S^0 \pi^\mp$
9 ACCIARRI	99T L3	$e^+ e^- \rightarrow e^+ e^- \eta_c$
8 SHIRAI	98 AMY	58 $e^+ e^-$
10 ARMSTRONG	95F E760	$\bar{p}p \rightarrow \gamma\gamma$
11 ALBRECHT	94H ARG	$e^+ e^- \rightarrow e^+ e^- \eta_c$
12 CHEN	90B CLEO	$e^+ e^- \rightarrow e^+ e^- \eta_c$
13 AIHARA	88D TPC	$e^+ e^- \rightarrow e^+ e^- X$
8,14 BERGER	86 PLUT	$\gamma\gamma \rightarrow K\bar{K}\pi$
15 ADRIANI	93N L3	$e^+ e^- \rightarrow e^+ e^- \eta_c$

- ⁸ Normalized to $B(\eta_c \rightarrow K^\pm K_S^0 \pi^\mp)$.
⁹ Normalized to the sum of 9 branching ratios.
¹⁰ Normalized to $B(\eta_c \rightarrow p\bar{p}) = (1.2 \pm 0.4) \times 10^{-3}$.
¹¹ Normalized to the sum of $B(\eta_c \rightarrow K^\pm K_S^0 \pi^\mp)$, $B(\eta_c \rightarrow \phi\phi)$, $B(\eta_c \rightarrow K^+ K^- \pi^+ \pi^-)$, and $B(\eta_c \rightarrow 2\pi^+ 2\pi^-)$.
¹² Normalized to the sum of $B(\eta_c \rightarrow K^\pm K_S^0 \pi^\mp)$, $B(\eta_c \rightarrow K^+ K^- \pi^+ \pi^-)$, and $B(\eta_c \rightarrow 2\pi^+ 2\pi^-)$.
¹³ Normalized to the sum of $B(\eta_c \rightarrow K^\pm K_S^0 \pi^\mp)$, $B(\eta_c \rightarrow 2K^+ 2K^-)$, $B(\eta_c \rightarrow K^+ K^- \pi^+ \pi^-)$, and $B(\eta_c \rightarrow 2\pi^+ 2\pi^-)$.
¹⁴ Re-evaluated by AIHARA 88D.
¹⁵ Superseded by ACCIARRI 99T.

$\eta_c(1S) \Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(K\bar{K}\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\Gamma_{11}\Gamma_{20}/\Gamma$

VALUE (keV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.46 ± 0.07	OUR AVERAGE				Error includes scale factor of 1.5. See the ideogram below.
0.418 ± 0.044 ± 0.022			¹⁶ BRANDENB...	00B CLE2	$\gamma\gamma \rightarrow \eta_c \rightarrow K^\pm K_S^0 \pi^\mp$
1.47 ± 0.87 ± 0.27			¹⁶ SHIRAI	98 AMY	$\gamma\gamma \rightarrow \eta_c \rightarrow K^\pm K_S^0 \pi^\mp$
0.84 ± 0.21			¹⁶ ALBRECHT	94H ARG	$\gamma\gamma \rightarrow K^\pm K_S^0 \pi^\mp$
0.60 ^{+0.23} _{-0.20}			¹⁶ CHEN	90B CLEO	$\gamma\gamma \rightarrow \eta_c K^\pm K_S^0 \pi^\mp$
1.06 ± 0.41 ± 0.27		11	¹⁶ BRAUNSCH...	89 TASS	$\gamma\gamma \rightarrow K\bar{K}\pi$
1.5 ^{+0.60} _{-0.45} ± 0.3		7	¹⁶ BERGER	86 PLUT	$\gamma\gamma \rightarrow K\bar{K}\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
<0.63	95		¹⁶ BEHREND	89 CELL	$\gamma\gamma \rightarrow K_S^0 K^\pm \pi^\mp$
<4.4	95		ALTHOFF	85B TASS	$\gamma\gamma \rightarrow K\bar{K}\pi$
¹⁶ $K^\pm K_S^0 \pi^\mp$ corrected to $K\bar{K}\pi$ by factor 3.					



$$\Gamma(K\bar{K}\pi) \times \Gamma(\gamma\gamma) / \Gamma_{\text{total}} \qquad \Gamma_{11}\Gamma_{20}/\Gamma$$

$\eta_c(1S)$ BRANCHING RATIOS

HADRONIC DECAYS

$$\Gamma(\eta'(958)\pi\pi) / \Gamma_{\text{total}} \qquad \Gamma_1/\Gamma$$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.041 ± 0.017	14	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$

$$\Gamma(\rho\rho) / \Gamma_{\text{total}} \qquad \Gamma_2/\Gamma$$

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
26 ± 9 OUR EVALUATION			(Treating systematic errors as correlated.)		
25 ± 8 OUR AVERAGE					
26.0 ± 2.4 ± 8.8		113	17 BISELLO	91 DM2	$J/\psi \rightarrow \gamma \rho^0 \rho^0$
23.6 ± 10.6 ± 8.2		32	17 BISELLO	91 DM2	$J/\psi \rightarrow \gamma \rho^+ \rho^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<140	90	17	BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$

$$\Gamma(K^*(892)^0 K^- \pi^+ + \text{c.c.}) / \Gamma_{\text{total}} \qquad \Gamma_3/\Gamma$$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.02 ± 0.007	63	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$

$$\Gamma(K^*(892)\bar{K}^*(892)) / \Gamma_{\text{total}} \qquad \Gamma_4/\Gamma$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
85 ± 31 OUR AVERAGE				
82 ± 28 ± 27	14	17 BISELLO	91 DM2	$e^+ e^- \rightarrow \gamma K^+ K^- \pi^+ \pi^-$
90 ± 50	9	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$

$\Gamma(K^*(892)\bar{K} + c.c.)/\Gamma_{total}$ Γ_8/Γ

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.0128	90	BISELLO	91 DM2	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
<0.0132	90	17 BISELLO	91 DM2	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$

$\Gamma(\phi\phi)/\Gamma_{total}$ Γ_5/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
71 ± 28 OUR EVALUATION		(Treating systematic errors as correlated.)		
71 ± 22 OUR AVERAGE				
$74 \pm 18 \pm 24$	80	17 BAI	90B MRK3	$J/\psi \rightarrow \gamma K^+ K^- K^+ K^-$
$67 \pm 21 \pm 24$		17 BAI	90B MRK3	$J/\psi \rightarrow \gamma K^+ K^- K_S^0 K_L^0$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$31 \pm 7 \pm 10$	19	17 BISELLO	91 DM2	$J/\psi \rightarrow \gamma K^+ K^- K^+ K^-$
$30^{+18}_{-12} \pm 10$	5	17 BISELLO	91 DM2	$J/\psi \rightarrow \gamma K^+ K^- K_S^0 K_L^0$

$\Gamma(a_0(980)\pi)/\Gamma_{total}$ Γ_6/Γ

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.02	90	17,18 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$

$\Gamma(a_2(1320)\pi)/\Gamma_{total}$ Γ_7/Γ

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.02	90	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$

$\Gamma(f_2(1270)\eta)/\Gamma_{total}$ Γ_9/Γ

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.011	90	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$

$\Gamma(\omega\omega)/\Gamma_{total}$ Γ_{10}/Γ

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.0031	90	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.0063		17 BISELLO	91 DM2	$J/\psi \rightarrow \gamma \omega \omega$
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$\Gamma(K\bar{K}\pi)/\Gamma_{total}$ Γ_{11}/Γ

<u>VALUE</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.055 ± 0.017 OUR EVALUATION			(Treating systematic errors as correlated.)		
0.055 ± 0.008 OUR AVERAGE					
$0.0690 \pm 0.0142 \pm 0.0132$		33	17 BISELLO	91 DM2	$J/\psi \rightarrow \gamma K^+ K^- \pi^0$
$0.0543 \pm 0.0094 \pm 0.0094$		68	17 BISELLO	91 DM2	$J/\psi \rightarrow \gamma K^\pm \pi^\mp K_S^0$
0.048 ± 0.011		95	17,19 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$
$0.161^{+0.092}_{-0.073}$		20	HIMEL	80B MRK2	$\psi(2S) \rightarrow \eta_c \gamma$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.107	90	17 PARTRIDGE	80B CBAL	$J/\psi \rightarrow \eta_c \gamma$
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$\Gamma(\eta\pi\pi)/\Gamma_{\text{total}}$					Γ_{12}/Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.049±0.018 OUR EVALUATION					
0.047±0.015 OUR AVERAGE					
0.054±0.020	75	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$	
0.037±0.013±0.020	18	17 PARTRIDGE 80B	CBAL	$J/\psi \rightarrow \eta\pi^+\pi^-\gamma$	
$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{\text{total}}$					Γ_{13}/Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.020^{+0.007}_{-0.006} OUR AVERAGE					
0.021±0.007	110	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$	
0.014 ^{+0.022} _{-0.009}		20 HIMEL 80B	MRK2	$\psi(2S) \rightarrow \eta_c \gamma$	
$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$					Γ_{15}/Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.012 ±0.004 OUR EVALUATION					
0.0120±0.0031 OUR AVERAGE					
0.0105±0.0017±0.0034	137	17 BISELLO 91	DM2	$J/\psi \rightarrow \gamma 2\pi^+ 2\pi^-$	
0.013 ±0.006	25	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$	
0.020 ^{+0.015} _{-0.010}		20 HIMEL 80B	MRK2	$\psi(2S) \rightarrow \eta_c \gamma$	
$\Gamma(2(K^+K^-))/\Gamma_{\text{total}}$					Γ_{14}/Γ
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.021±0.010±0.006					
		21 ALBRECHT 94H	ARG	$\gamma\gamma \rightarrow K^+K^-K^+K^-$	
$\Gamma(p\bar{p})/\Gamma_{\text{total}}$					Γ_{16}/Γ
<u>VALUE (units 10⁻⁴)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
12± 4 OUR AVERAGE					
10± 3±4	18	17 BISELLO 91	DM2	$J/\psi \rightarrow \gamma p\bar{p}$	
11± 6	23	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$	
29 ⁺²⁹ ₋₁₅		20 HIMEL 80B	MRK2	$\psi(2S) \rightarrow \eta_c \gamma$	
$\Gamma(K\bar{K}\eta)/\Gamma_{\text{total}}$					Γ_{17}/Γ
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<0.031					
	90	17 BALTRUSAIT..86	MRK3	$J/\psi \rightarrow \eta_c \gamma$	
$\Gamma(\pi^+\pi^-p\bar{p})/\Gamma_{\text{total}}$					Γ_{18}/Γ
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<0.012					
	90	HIMEL 80B	MRK2	$\psi(2S) \rightarrow \eta_c \gamma$	
$\Gamma(\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$					Γ_{19}/Γ
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<0.002					
	90	17 BISELLO 91	DM2	$e^+e^- \rightarrow \gamma\Lambda\bar{\Lambda}$	

$\Gamma_i \Gamma_f / \Gamma_{\text{total}}^2$ in $p\bar{p} \rightarrow \eta_c(1S) \rightarrow \phi\phi$ $\Gamma_{16} \Gamma_5 / \Gamma^2$

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
$4.0^{+3.5}_{-3.2}$	BAGLIN	89	SPEC $\bar{p}p \rightarrow K^+ K^- K^+ K^-$

¹⁷ The quoted branching ratios use $B(J/\psi(1S) \rightarrow \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$. Where relevant, the error in this branching ratio is treated as a common systematic in computing averages.

¹⁸ We are assuming $B(a_0(980) \rightarrow \eta\pi) > 0.5$.

¹⁹ Average from $K^+ K^- \pi^0$ and $K^\pm K^0 \pi^\mp$ decay channels.

²⁰ Estimated using $B(\psi(2S) \rightarrow \gamma\eta_c(1S)) = 0.0028 \pm 0.0006$.

²¹ Normalized to the sum of $B(\eta_c \rightarrow K^\pm K_S^0 \pi^\mp)$, $B(\eta_c \rightarrow \phi\phi)$, $B(\eta_c \rightarrow K^+ K^- \pi^+ \pi^-)$, and $B(\eta_c \rightarrow 2\pi^+ 2\pi^-)$.

————— **RADIATIVE DECAYS** —————

$\Gamma(\gamma\gamma) / \Gamma_{\text{total}}$ Γ_{20} / Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
3.0 ± 1.2	OUR AVERAGE			
$2.80^{+0.67}_{-0.58} \pm 1.0$		ARMSTRONG	95F E760	$\bar{p}p \rightarrow \gamma\gamma$
$6^{+4}_{-3} \pm 4$		BAGLIN	87B SPEC	$\bar{p}p \rightarrow \gamma\gamma$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 9 90 ¹⁷ BISELLO 91 DM2 $J/\psi \rightarrow \gamma\gamma\gamma$

< 18 90 ²² BLOOM 83 CBAL $J/\psi \rightarrow \eta_c \gamma$

²² Using $B(J/\psi(1S) \rightarrow \gamma\eta_c(1S)) = 0.0127 \pm 0.0036$.

$\Gamma_i \Gamma_f / \Gamma_{\text{total}}^2$ in $p\bar{p} \rightarrow \eta_c(1S) \rightarrow \gamma\gamma$ $\Gamma_{16} \Gamma_{20} / \Gamma^2$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
$0.36^{+0.08}_{-0.07}$	OUR AVERAGE			Error includes scale factor of 1.1.
$0.336^{+0.080}_{-0.070}$		ARMSTRONG	95F E760	$\bar{p}p \rightarrow \gamma\gamma$
$0.68^{+0.42}_{-0.31}$	12	BAGLIN	87B SPEC	$\bar{p}p \rightarrow \gamma\gamma$

$\eta_c(1S)$ REFERENCES

BAI	00F	PR D62 072001	J.Z. Bai <i>et al.</i>	(BES Collab.)
BRANDENB...	00B	PRL 85 3095	G. Brandenburg <i>et al.</i>	(CLEO Collab.)
ACCIARRI	99T	PL B461 155	M. Acciarri <i>et al.</i>	(L3 Collab.)
BAI	99B	PR D60 072001	J.Z. Bai <i>et al.</i>	(BES Collab.)
ABREU	98O	PL B441 479	P. Abreu <i>et al.</i>	(DELPHI Collab.)
SHIRAI	98	PL B424 405	M. Shirai <i>et al.</i>	(AMY Collab.)
ARMSTRONG	95F	PR D52 4839	T.A. Armstrong <i>et al.</i>	(FNAL, FERR, GENO+)
ALBRECHT	94H	PL B338 390	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ADRIANI	93N	PL B318 575	O. Adriani <i>et al.</i>	(L3 Collab.)
BISELLO	91	NP B350 1	D. Bisello <i>et al.</i>	(DM2 Collab.)
BAI	90B	PRL 65 1309	Z. Bai <i>et al.</i>	(Mark III Collab.)
CHEN	90B	PL B243 169	W.Y. Chen <i>et al.</i>	(CLEO Collab.)
BAGLIN	89	PL B231 557	C. Baglin, S. Baird, G. Bassompierre	(R704 Collab.)

BEHREND	89	ZPHY C42 367	H.J. Behrend <i>et al.</i>	(CELLO Collab.)
BRAUNSCH...	89	ZPHY C41 533	W. Braunschweig <i>et al.</i>	(TASSO Collab.)
AIHARA	88D	PRL 60 2355	H. Aihara <i>et al.</i>	(TPC Collab.)
BAGLIN	87B	PL B187 191	C. Baglin <i>et al.</i>	(R704 Collab.)
BALTRUSAIT...	86	PR D33 629	R.M. Baltrusaitis <i>et al.</i>	(Mark III Collab.)
BERGER	86	PL 167B 120	C. Berger <i>et al.</i>	(PLUTO Collab.)
GAISER	86	PR D34 711	J. Gaiser <i>et al.</i>	(Crystal Ball Collab.)
ALTHOFF	85B	ZPHY C29 189	M. Althoff <i>et al.</i>	(TASSO Collab.)
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BLOOM	83	ARNS 33 143	E.D. Bloom, C. Peck	(SLAC, CIT)
HIMEL	80B	PRL 45 1146	T.M. Himel <i>et al.</i>	(SLAC, LBL, UCB)
PARTRIDGE	80B	PRL 45 1150	R. Partridge <i>et al.</i>	(CIT, HARV, PRIN+)

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