$\psi(4040)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\psi(4040)$ MASS

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
4039± 1 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4037± 2	[1] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4040± 1	[2] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4040±10	BRANDELIK	78C	DASP	e^+e^-

[1] From a fit to Crystal Ball (OSTERHELD 86) data.
[2] From a fit to BES (BAI 02C) data.

$\psi(4040)$ WIDTH

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
80±10 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
85±10	[3] SETH	05A	RVUE	$e^+e^- \to$ hadrons
89± 6	[4] SETH	05A	RVUE	$e^+e^- \to$ hadrons
52±10	BRANDELIK	78C	DASP	e^+e^-

[3] From a fit to Crystal Ball (OSTERHELD 86) data.
[4] From a fit to BES (BAI 02C) data.

$\psi(4040)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)		Confidence level
Γ_1	e^+e^-	$(1.07\pm0.16)\times10^{-5}$		
Γ_2	$D^0\overline{D}^0$	seen		
Γ_3	$D^*(2007)^0\overline{D}^0$ + c.c.	seen		
Γ_4	$D^*(2007)^0\overline{D}^*(2007)^0$	seen		
Γ_5	$J/\psi(1S)$hadrons			
Γ_6	$J/\psi\pi^+\pi^-$	< 4	$\times10^{-3}$	90%
Γ_7	$J/\psi\pi^0\pi^0$	< 2	$\times10^{-3}$	90%
Γ_8	$J/\psi\eta$	< 7	$\times10^{-3}$	90%
Γ_9	$J/\psi\pi^0$	< 2	$\times10^{-3}$	90%
Γ_{10}	$J/\psi\pi^+\pi^-\pi^0$	< 2	$\times10^{-3}$	90%
Γ_{11}	$\chi_{c1}\gamma$	< 1.1	%	90%
Γ_{12}	$\chi_{c2}\gamma$	< 1.7	%	90%
Γ_{13}	$\chi_{c1}\pi^+\pi^-\pi^0$	< 1.1	%	90%
Γ_{14}	$\chi_{c2}\pi^+\pi^-\pi^0$	< 3.2	%	90%
Γ_{15}	$\phi\pi^+\pi^-$	< 3	$\times10^{-3}$	90%
Γ_{16}	$\mu^+\mu^-$			

$\psi(4040)$ PARTIAL WIDTHS

$\Gamma(e^+e^-)$ Γ_1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.86±0.07 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.88±0.11	[5] SETH	05A	RVUE	$e^+e^- \to$ hadrons
0.91±0.13	[6] SETH	05A	RVUE	$e^+e^- \to$ hadrons
0.75±0.15	BRANDELIK	78C	DASP	e^+e^-

[5] From a fit to Crystal Ball (OSTERHELD 86) data.
[6] From a fit to BES (BAI 02C) data.

$\psi(4040)$ BRANCHING RATIOS

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_1/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 1.0	FELDMAN	77	MRK1	e^+e^-

$\Gamma(D^0\overline{D}^0)/\Gamma(D^*(2007)^0\overline{D}^0 + \text{c.c.})$ Γ_2/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
0.05±0.03	[7] GOLDHABER	77	MRK1	e^+e^-

$\Gamma(D^*(2007)^0\overline{D}^*(2007)^0)/\Gamma(D^*(2007)^0\overline{D}^0 + \text{c.c.})$ Γ_4/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
32.0±12.0	[7] GOLDHABER	77	MRK1	e^+e^-

$\Gamma(J/\psi\pi^+\pi^-)/\Gamma_{total}$ Γ_6/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\pi^0\pi^0)/\Gamma_{total}$ Γ_7/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\eta)/\Gamma_{total}$ Γ_8/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\pi^0)/\Gamma_{total}$ Γ_9/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{10}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	3.97–4.06 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c1}\gamma)/\Gamma_{total}$ Γ_{11}/Γ

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<11	90	COAN	06	CLEO	3.97–4.06 e^+e^- → hadrons

$\Gamma(\chi_{c2}\gamma)/\Gamma_{total}$ Γ_{12}/Γ

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<17	90	COAN	06	CLEO	3.97–4.06 e^+e^- → hadrons

$\Gamma(\chi_{c1}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{13}/Γ

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<11	90	COAN	06	CLEO	3.97–4.06 e^+e^- → hadrons

$\Gamma(\chi_{c2}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{14}/Γ

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<32	90	COAN	06	CLEO	3.97–4.06 e^+e^- → hadrons

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{total}$ Γ_{15}/Γ

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<3	90	COAN	06	CLEO	3.97–4.06 e^+e^- → hadrons

[7] Phase-space factor (p^3) explicitly removed.

$\psi(4040)$ REFERENCES

COAN	06	PRL 96 162003	T.E. Coan *et al.*	(CLEO Collab.)
SETH	05A	PR D72 017501	K.K. Seth	
BAI	02C	PRL 88 101802	J.Z. Bai *et al.*	(BES Collab.)
OSTERHELD	86	SLAC-PUB-4160	A. Osterheld *et al.*	(SLAC Crystal Ball Collab.)
BRANDELIK	78C	PL 76B 361	R. Brandelik *et al.*	(DASP Collab.)
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FELDMAN	77	PRPL 33C 285	G.J. Feldman, M.L. Perl	(LBL, SLAC)
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