$\psi(4160)$

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

$\psi(4160)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4153± 3 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4151± 4	[1] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4155± 5	[2] SETH	05A	RVUE	$e^+e^- \to$ hadrons
4159±20	BRANDELIK	78C	DASP	e^+e^-

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

$\psi(4160)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
103± 8 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
107±10	[3] SETH	05A	RVUE	$e^+e^- \to$ hadrons
107±16	[4] SETH	05A	RVUE	$e^+e^- \to$ hadrons
78±20	BRANDELIK	78C	DASP	e^+e^-

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

$\psi(4160)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	e^+e^-	$(8.1\pm0.9)\times10^{-6}$	
Γ_2	$J/\psi\pi^+\pi^-$	$< 3 \times 10^{-3}$	90%
Γ_3	$J/\psi\pi^0\pi^0$	$< 3 \times 10^{-3}$	90%
Γ_4	$J/\psi K^+K^-$	$< 2 \times 10^{-3}$	90%
Γ_5	$J/\psi\eta$	$< 8 \times 10^{-3}$	90%
Γ_6	$J/\psi\pi^0$	$< 1 \times 10^{-3}$	90%
Γ_7	$J/\psi\eta'$	$< 5 \times 10^{-3}$	90%
Γ_8	$J/\psi\pi^+\pi^-\pi^0$	$< 1 \times 10^{-3}$	90%
Γ_9	$\psi(2S)\pi^+\pi^-$	$< 4 \times 10^{-3}$	90%
Γ_{10}	$\chi_{c1}\gamma$	$< 7 \times 10^{-3}$	90%
Γ_{11}	$\chi_{c2}\gamma$	< 1.3 %	90%
Γ_{12}	$\chi_{c1}\pi^+\pi^-\pi^0$	$< 2 \times 10^{-3}$	90%
Γ_{13}	$\chi_{c2}\pi^+\pi^-\pi^0$	$< 8 \times 10^{-3}$	90%
Γ_{14}	$\phi\pi^+\pi^-$	$< 2 \times 10^{-3}$	90%

$\psi(4160)$ PARTIAL WIDTHS

$\Gamma(e^+e^-)$ — Γ_1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.83±0.07 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.83±0.08	[5] SETH	05A	RVUE	$e^+e^- \to$ hadrons
0.84±0.13	[6] SETH	05A	RVUE	$e^+e^- \to$ hadrons
0.77±0.23	BRANDELIK	78C	DASP	e^+e^-

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

$\psi(4160)$ BRANCHING RATIOS

$\Gamma(J/\psi\pi^+\pi^-)/\Gamma_{total}$ — Γ_2/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\pi^0\pi^0)/\Gamma_{total}$ — Γ_3/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<3	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi K^+K^-)/\Gamma_{total}$ — Γ_4/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\eta)/\Gamma_{total}$ — Γ_5/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\pi^0)/\Gamma_{total}$ — Γ_6/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\eta')/\Gamma_{total}$ — Γ_7/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<5	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(J/\psi\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_8/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma_{total}$ — Γ_9/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \to$ hadrons

$\Gamma(\chi_{c1}\gamma)/\Gamma_{total}$ Γ_{10}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<7	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c2}\gamma)/\Gamma_{total}$ Γ_{11}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<13	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c1}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{12}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c2}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{13}/Γ

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<8	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

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

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	COAN	06	CLEO	4.12–4.2 $e^+e^- \rightarrow$ hadrons

ψ(4160) 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.)
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