$\psi(2S)$ PARTIAL WIDTHS

Γ(hadrons) Γ_1

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
224 ± 56	LUTH	75	MRK1	e^+e^-

$\Gamma(e^+e^-)$ Γ_3

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
2.14 ± 0.21	ALEXANDER	89	RVUE	See Υ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.0 ± 0.3	BRANDELIK	79C	DASP	e^+e^-
2.1 ± 0.3	[3] LUTH	75	MRK1	e^+e^-

[3] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$, and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$.

$\Gamma(\gamma\gamma)$ Γ_{37}

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<43	90	BRANDELIK	79C	DASP	e^+e^-

$\psi(2S)$ Γ(i)$\Gamma(e^+e^-)/\Gamma$(total)

This combination of a partial width with the partial width into e^+e^- and with the total width is obtained from the integrated cross section into channel$_i$ in the e^+e^- annihilation. We list only data that have not been used to determine the partial width Γ(i) or the branching ratio Γ(i)/total.

Γ(hadrons) × $\Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_1\Gamma_3/\Gamma$

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.2 ± 0.4	ABRAMS	75	MRK1	e^+e^-

$\psi(2S)$ BRANCHING RATIOS

Γ(hadrons)/Γ_{total} Γ_1/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.981 ±0.003	[4] LUTH	75	MRK1	e^+e^-

Γ(virtual $\gamma \to$ hadrons)/Γ_{total} Γ_2/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.029 ± 0.004	[5] LUTH	75	MRK1	e^+e^-

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$ Γ_3/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
88 ± 13	[6] FELDMAN	77	RVUE	e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
77 ± 17	[7] HILGER	75	SPEC	e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ Γ_4/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.89 ± 0.16	BOYARSKI	75C	MRK1	e^+e^-

[4] Includes cascade decay into $J/\psi(1S)$.

[5] Included in Γ(hadrons)/Γ_{total}.

[6] From an overall fit assuming equal partial widths for e^+e^- and $\mu^+\mu^-$. For a measurement of the ratio see the entry $\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ below. Includes LUTH 75, HILGER 75, BURMESTER 77.

[7] Restated by us using B($\psi(2S) \to J/\psi(1S)$anything) = 0.55.

DECAYS INTO $J/\psi(1S)$ AND ANYTHING

$\Gamma(J/\psi(1S)\text{anything})/\Gamma_{\text{total}}$ $\Gamma_5/\Gamma = (\Gamma_7+\Gamma_8+\Gamma_9+0.273\Gamma_{30}+0.135\Gamma_{31})/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
0.57 ± 0.04 OUR FIT				
0.55 ± 0.07 OUR AVERAGE				
0.51 ± 0.12	BRANDELIK	79C	DASP	$e^+e^- \to \mu^+\mu^-$X
0.57 ± 0.08	ABRAMS	75B	MRK1	$e^+e^- \to \mu^+\mu^-$X

$\Gamma(J/\psi(1S)\text{neutrals})/\Gamma_{\text{total}}$ $\Gamma_6/\Gamma = (0.9761\Gamma_8+0.708\Gamma_9+0.273\Gamma_{30}+0.135\Gamma_{31})/\Gamma$

VALUE	DOCUMENT ID
0.232 ± 0.026 OUR FIT	

$\Gamma(J/\psi(1S)\text{neutrals})/\Gamma(J/\psi(1S)\text{anything})$ $\Gamma_6/\Gamma_5 = (0.9761\Gamma_8+0.708\Gamma_9+0.273\Gamma_{30}+0.135\Gamma_{31})/(\Gamma_7+\Gamma_8+\Gamma_9+0.273\Gamma_{30}+0.135\Gamma_{31})$

VALUE	DOCUMENT ID		TECN	COMMENT
0.409 ± 0.026 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.44 ± 0.03	[8] ABRAMS	75B	MRK1	$e^+e^- \to J/\psi$X

$\Gamma(J/\psi(1S)\text{neutrals})/\Gamma(J/\psi(1S)\pi^+\pi^-)$ $\Gamma_6/\Gamma_7 = (0.9761\Gamma_8+0.708\Gamma_9+0.273\Gamma_{30}+0.135\Gamma_{31})/\Gamma_7$

VALUE	DOCUMENT ID		TECN	COMMENT
0.72 ± 0.08 OUR FIT				
0.73 ± 0.09	[8] TANENBAUM	76	MRK1	e^+e^-

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.324 ± 0.026 OUR FIT				
0.332 ± 0.033 OUR AVERAGE				
0.32 ± 0.04	ABRAMS	75B	MRK1	$e^+e^- \to J/\psi\pi^+\pi^-$
0.36 ± 0.06	WIIK	75	DASP	$e^+e^- \to J/\psi\pi^+\pi^-$

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_8/Γ

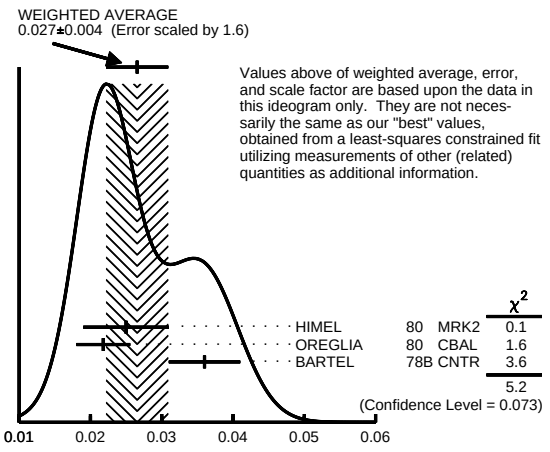
VALUE	DOCUMENT ID		TECN	COMMENT
0.184 ± 0.027 OUR FIT				
0.18 ± 0.06	WIIK	75	DASP	$e^+e^- \to J/\psi 2\pi^0$

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_8/Γ_7

VALUE	DOCUMENT ID		TECN	COMMENT
0.57 ± 0.08 OUR FIT				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.53 ± 0.06	[9] TANENBAUM	76	MRK1	e^+e^-
0.64 ± 0.15	[10] HILGER	75	SPEC	e^+e^-

$\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$ Γ_9/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.027 ± 0.004 OUR FIT Error includes scale factor of 1.7.					
0.027 ± 0.004 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.					
0.025 ± 0.006	166	HIMEL	80	MRK2	e^+e^-
0.0218 ± 0.0014 ± 0.0035	386	OREGLIA	80	CBAL	$e^+e^- \to J/\psi 2\gamma$
0.036 ± 0.005	164	BARTEL	78B	CNTR	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.035 ± 0.009	17	[11] BRANDELIK	79B	DASP	$e^+e^- \to J/\psi 2\gamma$
0.043 ± 0.008	44	[11] TANENBAUM	76	MRK1	e^+e^-



$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
9.7 ± 2.1 OUR AVERAGE					
15 ± 6	7	HIMEL	80	MRK2	e^+e^-
9 ± 2 ± 1	23	OREGLIA	80	CBAL	$\psi(2S) \to J/\psi 2\gamma$

[8] The ABRAMS 75B measurement of Γ_6/Γ_5 and the TANENBAUM 76 result for Γ_6/Γ_7 are not independent. The TANENBAUM 76 result is used in the fit because it includes more accurate corrections for angular distributions.

[9] Not independent of the TANENBAUM 76 result for Γ_6/Γ_7.

[10] Ignoring the $J/\psi(1S)\eta$ and $J/\psi(1S)\gamma\gamma$ decays.

[11] Low statistics data removed from average.

HADRONIC DECAYS

$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
35 ± 16	6	FRANKLIN	83	MRK2	e^+e^- → hadrons

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
31 ± 7 OUR AVERAGE					
30 ± 8	42	FRANKLIN	83	MRK2	e^+e^-
35 ± 15		ABRAMS	75	MRK1	e^+e^-