

$\psi(3770)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
23.0 ± 2.7 OUR FIT	Error includes scale factor of 1.1.		
25.3 ± 2.9 OUR AVERAGE			
24 ± 5	SCHINDLER	80 MRK2	$e^+ e^-$
24 ± 5	BACINO	78 DLCO	$e^+ e^-$
28 ± 5	RAPIDIS	77 MRK1	$e^+ e^-$

 $\psi(3770)$ DECAY MODES

In addition to the dominant decay mode to $D\bar{D}$, $\psi(3770)$ was found to decay into the final states containing the J/ψ (BAI 05, ADAM 06). ADAMS 06 and HUANG 06A searched for various decay modes with light hadrons and found a statistically significant signal for the decay to $\phi\eta$ only (ADAMS 06).

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1 $D\bar{D}$	dominant	
Γ_2 $D^0\bar{D}^0$	seen	
Γ_3 D^+D^-	seen	
Γ_4 $J/\psi\pi^+\pi^-$	$(1.93 \pm 0.28) \times 10^{-3}$	
Γ_5 $J/\psi\pi^0\pi^0$	$(8.0 \pm 3.0) \times 10^{-4}$	
Γ_6 $J/\psi\eta$	$(9 \pm 4) \times 10^{-4}$	
Γ_7 $J/\psi\pi^0$	$< 2.8 \times 10^{-4}$	CL=90%
Γ_8 e^+e^-	$(1.05 \pm 0.14) \times 10^{-5}$	S=1.1
Γ_9 $K_S^0 K_L^0$	$< 2.1 \times 10^{-4}$	CL=90%
Γ_{10} $2(\pi^+\pi^-)$	$< 1.12 \times 10^{-3}$	CL=90%
Γ_{11} $2(\pi^+\pi^-)\pi^0$	$< 1.06 \times 10^{-3}$	CL=90%
Γ_{12} $\eta\pi^+\pi^-$	$< 1.24 \times 10^{-3}$	CL=90%
Γ_{13} $\omega\pi^+\pi^-$	$< 6.0 \times 10^{-4}$	CL=90%
Γ_{14} $\eta 3\pi$	$< 1.34 \times 10^{-3}$	CL=90%
Γ_{15} $\eta' 3\pi$	$< 2.44 \times 10^{-3}$	CL=90%
Γ_{16} $K^+K^-\pi^+\pi^-$	$< 9.0 \times 10^{-4}$	CL=90%
Γ_{17} $\phi\pi^+\pi^-$	$< 4.1 \times 10^{-4}$	CL=90%
Γ_{18} $\phi f_0(980)$	$< 4.5 \times 10^{-4}$	CL=90%
Γ_{19} $K^+K^-\pi^+\pi^-\pi^0$	$< 2.36 \times 10^{-3}$	CL=90%
Γ_{20} ηK^+K^-	$< 4.1 \times 10^{-4}$	CL=90%
Γ_{21} ωK^+K^-	$< 3.4 \times 10^{-4}$	CL=90%
Γ_{22} $2(K^+K^-)$	$< 6.0 \times 10^{-4}$	CL=90%
Γ_{23} ϕK^+K^-	$< 7.5 \times 10^{-4}$	CL=90%
Γ_{24} $2(K^+K^-)\pi^0$	$< 2.9 \times 10^{-4}$	CL=90%
Γ_{25} $p\bar{p}\pi^+\pi^-$	$< 5.8 \times 10^{-4}$	CL=90%
Γ_{26} $p\bar{p}\pi^+\pi^-\pi^0$	$< 1.85 \times 10^{-3}$	CL=90%
Γ_{27} $\eta p\bar{p}$	$< 5.4 \times 10^{-4}$	CL=90%

Γ_{28}	$\omega p \bar{p}$	< 2.9	$\times 10^{-4}$	CL=90%
Γ_{29}	$\rho \bar{p} K^+ K^-$	< 3.2	$\times 10^{-4}$	CL=90%
Γ_{30}	$\phi p \bar{p}$	< 1.3	$\times 10^{-4}$	CL=90%
Γ_{31}	$\Lambda \bar{\Lambda}$	< 1.2	$\times 10^{-4}$	CL=90%
Γ_{32}	$\Lambda \bar{\Lambda} \pi^+ \pi^-$	< 2.5	$\times 10^{-4}$	CL=90%
Γ_{33}	$\Lambda \bar{p} K^+$	< 2.8	$\times 10^{-4}$	CL=90%
Γ_{34}	$\Lambda \bar{p} K^+ \pi^+ \pi^-$	< 6.3	$\times 10^{-4}$	CL=90%
Γ_{35}	$\phi \eta$	$(3.1 \pm 0.7) \times 10^{-4}$		
Γ_{36}	$\pi^+ \pi^- \pi^0$	not seen		
Γ_{37}	$\rho \pi$	not seen		
Γ_{38}	$\omega \pi^0$	not seen		
Γ_{39}	$\phi \pi^0$	not seen		
Γ_{40}	$\rho \eta$	not seen		
Γ_{41}	$\omega \eta$	not seen		
Γ_{42}	$\rho \eta'$	not seen		
Γ_{43}	$\omega \eta'$	not seen		
Γ_{44}	$\phi \eta'$	not seen		
Γ_{45}	$K^{*0} \bar{K}^0$	not seen		
Γ_{46}	$K^{*+} K^-$	not seen		
Γ_{47}	$b_1 \pi$	not seen		

$\psi(3770)$ PARTIAL WIDTHS

$\Gamma(e^+ e^-)$ Γ_8

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
-------------	------	-------------	------	---------

0.242^{+0.027}_{-0.024} OUR FIT Error includes scale factor of 1.1.

0.219^{+0.028}_{-0.022} OUR AVERAGE

0.204 ± 0.003 ^{+0.041} _{-0.027}	1.427M	³ BESSON	06	CLEO	$e^+ e^- \rightarrow$ hadrons
---	--------	---------------------	----	------	-------------------------------

0.276 ± 0.050		SCHINDLER	80	MRK2	$e^+ e^-$
---------------	--	-----------	----	------	-----------

0.18 ± 0.06		BACINO	78	DLCO	$e^+ e^-$
-------------	--	--------	----	------	-----------

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

0.37 ± 0.09		⁴ RAPIDIS	77	MRK1	$e^+ e^-$
-------------	--	----------------------	----	------	-----------

³ BESSON 06 measure $\sigma(e^+ e^- \rightarrow \psi(3770) \rightarrow \text{hadrons}) = 6.38 \pm 0.08^{+0.41}_{-0.30}$ nb at $\sqrt{s} = 3773 \pm 1$ MeV, and obtain Γ_{ee} from the Born-level cross section calculated using $\psi(3770)$ mass and width from our 2004 edition.

⁴ See also $\Gamma(e^+ e^-)/\Gamma_{\text{total}}$ below.

$\psi(3770)$ BRANCHING RATIOS

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

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

dominant	PERUZZI	77	MRK1 $e^+ e^- \rightarrow D\bar{D}$
-----------------	---------	----	-------------------------------------

$\Gamma(D^0 \bar{D}^0)/\Gamma(D^+ D^-)$ Γ_2/Γ_3

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.43 ± 1.50 ± 0.43	34	⁵ CHISTOV	04	BELL $B^+ \rightarrow \psi(3770) K^+$

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

<u>VALUE (units 10⁻³)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.93 ± 0.28 OUR AVERAGE				
1.89 ± 0.20 ± 0.20	231 ± 33	ADAM	06	CLEO $e^+ e^- \rightarrow \psi(3770)$
3.4 ± 1.4 ± 0.9	17.8 ± 4.8	BAI	05	BES2 $e^+ e^- \rightarrow \psi(3770)$

$\Gamma(J/\psi \pi^0 \pi^0)/\Gamma_{\text{total}}$ Γ_5/Γ

<u>VALUE (units 10⁻²)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.080 ± 0.025 ± 0.016	39 ± 14	ADAM	06	CLEO $e^+ e^- \rightarrow \psi(3770)$

$\Gamma(J/\psi \eta)/\Gamma_{\text{total}}$ Γ_6/Γ

<u>VALUE (units 10⁻⁵)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
87 ± 33 ± 22	22 ± 10	ADAM	06	CLEO $e^+ e^- \rightarrow \psi(3770)$

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

<u>VALUE (units 10⁻⁵)</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<28	90	<10	ADAM	06	CLEO $e^+ e^- \rightarrow \psi(3770)$

$\Gamma(e^+ e^-)/\Gamma_{\text{total}}$ Γ_8/Γ

<u>VALUE (units 10⁻⁵)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.05 ± 0.14 OUR FIT	Error includes scale factor of 1.1.		
1.3 ± 0.2	RAPIDIS	77	MRK1 $e^+ e^-$

$\Gamma(K_S^0 K_L^0)/\Gamma_{\text{total}}$ Γ_9/Γ

<u>VALUE (units 10⁻⁴)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<2.1	90	⁶ ABLIKIM	04F	BES $e^+ e^-$

$\Gamma(2(\pi^+ \pi^-))/\Gamma_{\text{total}}$ Γ_{10}/Γ

<u>VALUE (units 10⁻⁴)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<11.2	90	⁷ HUANG	06A	CLEO $e^+ e^- \rightarrow \psi(3770)$

$\Gamma(2(\pi^+ \pi^-) \pi^0)/\Gamma_{\text{total}}$ Γ_{11}/Γ

<u>VALUE (units 10⁻⁴)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<10.6	90	⁷ HUANG	06A	CLEO $e^+ e^- \rightarrow \psi(3770)$

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

<u>VALUE (units 10⁻⁴)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<12.4	90	⁷ HUANG	06A	CLEO $e^+ e^- \rightarrow \psi(3770)$

$\Gamma(\omega \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{13}/Γ

<u>VALUE (units 10⁻⁴)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<6.0	90	⁷ HUANG	06A	CLEO $e^+ e^- \rightarrow \psi(3770)$

$\Gamma(\eta 3\pi)/\Gamma_{\text{total}}$			Γ_{14}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<13.4	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(\eta' 3\pi)/\Gamma_{\text{total}}$			Γ_{15}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<24.4	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(K^+ K^- \pi^+ \pi^-)/\Gamma_{\text{total}}$			Γ_{16}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<9.0	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(\phi \pi^+ \pi^-)/\Gamma_{\text{total}}$			Γ_{17}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<4.1	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(\phi f_0(980))/\Gamma_{\text{total}}$			Γ_{18}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<4.5	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$			Γ_{19}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<23.6	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(\eta K^+ K^-)/\Gamma_{\text{total}}$			Γ_{20}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<4.1	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(\omega K^+ K^-)/\Gamma_{\text{total}}$			Γ_{21}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<3.4	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(2(K^+ K^-))/\Gamma_{\text{total}}$			Γ_{22}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<6.0	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(\phi K^+ K^-)/\Gamma_{\text{total}}$			Γ_{23}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<7.5	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$
$\Gamma(2(K^+ K^-) \pi^0)/\Gamma_{\text{total}}$			Γ_{24}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<2.9	90	⁷ HUANG	06A	CLEO	$e^+ e^- \rightarrow \psi(3770)$

$\Gamma(\rho\bar{\rho}\pi^+\pi^-)/\Gamma_{\text{total}}$			Γ_{25}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<5.8	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\rho\bar{\rho}\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$			Γ_{26}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<18.5	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\eta\rho\bar{\rho})/\Gamma_{\text{total}}$			Γ_{27}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<5.4	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\omega\rho\bar{\rho})/\Gamma_{\text{total}}$			Γ_{28}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<2.9	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\rho\bar{\rho}K^+K^-)/\Gamma_{\text{total}}$			Γ_{29}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<3.2	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\phi\rho\bar{\rho})/\Gamma_{\text{total}}$			Γ_{30}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<1.3	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$			Γ_{31}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<1.2	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}$			Γ_{32}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<2.5	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\Lambda\bar{\rho}K^+)/\Gamma_{\text{total}}$			Γ_{33}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<2.8	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\Lambda\bar{\rho}K^+\pi^+\pi^-)/\Gamma_{\text{total}}$			Γ_{34}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<6.3	90	⁷ HUANG	06A CLEO	$e^+e^- \rightarrow \psi(3770)$	
$\Gamma(\phi\eta)/\Gamma_{\text{total}}$			Γ_{35}/Γ		
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
$3.1 \pm 0.6 \pm 0.3$		⁸ ADAMS	06 CLEC	$3.773 e^+e^- \rightarrow \phi\eta$	

⁵ See ADLER 88C for older measurements of this quantity.

⁶ Using $B(K_S^0 \rightarrow \pi^+ \pi^-) = 0.6860 \pm 0.0027$.

⁷ Using $\sigma_{tot}(e^+ e^- \rightarrow \psi(3770)) = 7.9 \pm 0.6$ nb at the resonance.

⁸ Comparing $\sigma(e^+ e^- \rightarrow \phi \eta)$ at $\sqrt{s} = 3.773$ GeV and $\sqrt{s} = 3.671$ GeV, and using $\sigma(\psi(3770) \rightarrow D\bar{D}) = 6.39 \pm 0.20$ nb.

$\psi(3770)$ REFERENCES

ADAM	06	PRL 96 082004	N.E. Adam <i>et al.</i>	(CLEO Collab.)
ADAMS	06	PR D73 012002	G.S. Adams <i>et al.</i>	(CLEO Collab.)
BESSON	06	PRL 96 092002	D. Besson <i>et al.</i>	(CLEO Collab.)
HUANG	06A	PRL 96 032003	G.S. Huang <i>et al.</i>	(CLEO Collab.)
BAI	05	PL B605 63	J.Z. Bai <i>et al.</i>	(BES Collab.)
ABLIKIM	04F	PR D70 077101	M. Ablikim <i>et al.</i>	(BES Collab.)
CHISTOV	04	PRL 93 051803	R. Chistov <i>et al.</i>	(BELLE Collab.)
ADLER	88C	PRL 60 89	J. Adler <i>et al.</i>	(Mark III Collab.)
SCHINDLER	80	PR D21 2716	R.H. Schindler <i>et al.</i>	(Mark II Collab.)
BACINO	78	PRL 40 671	W.J. Bacino <i>et al.</i>	(SLAC, UCLA, UCI)
PERUZZI	77	PRL 39 1301	I. Peruzzi <i>et al.</i>	(Mark I Collab.)
RAPIDIS	77	PRL 39 526	P.A. Rapidis <i>et al.</i>	(Mark I Collab.)

OTHER RELATED PAPERS

ABLIKIM	05K	NP B727 395	M. Ablikim <i>et al.</i>	(BEPC BES Collab.)
ABLIKIM	05M	PR D72 072007	M. Ablikim <i>et al.</i>	(BES II Collab.)
BARNES	05	PR D72 054026	T. Barnes, S. Godfrey, E.S. Swanson	
HE	05	PRL 95 121801	Q. He <i>et al.</i>	(CLEO Collab.)
VOLOSHIN	05	PR D71 114003	M.B. Voloshin	
VOLOSHIN	05A	PAN 68 771	M.B. Voloshin	
		Translated from YAF 68 804.		
ABLIKIM	04D	PL B603 130	M. Ablikim <i>et al.</i>	(BES Collab.)
LIU	04B	PR D70 094001	K.-Y. Liu, K.-T. Chao	
WANG	04C	PR D70 077505	P. Wang, X.H. Mo, C.Z. Yuan	
WANG	04D	PR D70 114014	P. Wang, C.Z. Yuan, X.H. Mo	