Reference = DOBBS 15; PR D91 052006
Verifier code = DOBBS

Normally we send all verifications for one experiment to one person, usually the spokesperson or data-analysis co-ordinator, who then distributes them to the appropriate people. Please tell us if we should send the verifications for your experiment to someone else.

PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Sean A Dobbs

EMAIL: s-dobbs@northwestern.edu

July 21, 2016

Dear Colleague,

(1) Please check the results of your experiment carefully. They are marked.

(2) Please reply within one week.

(3) Please reply even if everything is correct.

(4) IMPORTANT!! Please tell WHICH papers you are verifying. We have lots of requests out.

(5) Feel free to make comments on our treatment of any of the results (not just yours) you see.

Thank you for helping us make the Review accurate and useful.

Sincerely,

Simon Eidelman
BINP, Budker Inst. of Nuclear Physics
Prospekt Lavrent'eva 11
RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

LIGHT UNFLAVORED MESONS ($S = C = B = 0$)

NODE=MXXX005

For $I = 1$ (π, b, ρ, a): $u\overline{d}$, $(u\overline{u}-d\overline{d})/\sqrt{2}$, $d\overline{u}$;
for $I = 0$ (η, η', h, h', ω, ϕ, f, f'): $c_1(u\overline{u} + d\overline{d}) + c_2(s\overline{s})$

NODE=MXXX005

NODE=M005

$f_2(1270)$

$I^G(J^{PC}) = 0^+(2^{++})$

$f_2(1270)$ MASS

NODE=M005M

NODE=M005M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1275.5± 0.8 OUR AVERAGE					
1275.8± 1.0±0.4		[1] BOGOLYUB...	13	SPEC	$7\pi^+(K^+,p)A \rightarrow n\gamma + X$
1262 $^{+\ 1}_{-\ 2}$ ±8		ABLIKIM	06V	BES2	$e^+e^- \rightarrow J/\psi \rightarrow \gamma\pi^+\pi^-$
1275 ±15		ABLIKIM	05	BES2	$J/\psi \rightarrow \phi\pi^+\pi^-$
1283 ± 5		ALDE	98	GAM4	100 $\pi^- p \rightarrow \pi^0\pi^0 n$
1278 ± 5		[2] BERTIN	97C	OBLX	0.0 $\overline{p}p \rightarrow \pi^+\pi^-\pi^0$
1272 ± 8	200k	PROKOSHKIN	94	GAM2	38 $\pi^- p \rightarrow \pi^0\pi^0 n$
1269.7± 5.2	5730	AUGUSTIN	89	DM2	$e^+e^- \rightarrow 5\pi$
1283 ± 8	400	[3] ALDE	87	GAM4	100 $\pi^- p \rightarrow 4\pi^0 n$
1274 ± 5		[3] AUGUSTIN	87	DM2	$J/\psi \rightarrow \gamma\pi^+\pi^-$
1283 ± 6		[4] LONGACRE	86	MPS	22 $\pi^- p \rightarrow n2K^0_S$
1276 ± 7		COURAU	84	DLCO	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-$
1273.3± 2.3		[5] CHABAUD	83	ASPK	17 $\pi^- p$ polarized
1280 ± 4		[6] CASON	82	STRC	8 $\pi^+ p \rightarrow \Delta^{++}\pi^0\pi^0$
1281 ± 7	11600	GIDAL	81	MRK2	J/ψ decay
1282 ± 5		[7] CORDEN	79	OMEG	12–15 $\pi^- p \rightarrow n2\pi$
1269 ± 4	10k	APEL	75	NICE	40 $\pi^- p \rightarrow n2\pi^0$
1272 ± 4	4600	ENGLER	74	DBC	6 $\pi^+ n \rightarrow \pi^+\pi^- p$
1277 ± 4	5300	FLATTE	71	HBC	7.0 $\pi^+ p$
1273 ± 8		[3] STUNTEBECK	70	HBC	8 $\pi^- p$, 5.4 $\pi^+ d$
1265 ± 8		BOESEBECK	68	HBC	8 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 1259 ± 4 ±4	1.7k	[8,9] DOBBS	15		$J/\psi \rightarrow \gamma\pi^+\pi^-$
YOUR DATA 1267 ± 4 ±3	1.5k	[8,9] DOBBS	15		$\psi(2S) \rightarrow \gamma\pi^+\pi^-$ OCCUR=2
1270 ± 8		[10] ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
1277 ± 6	870	[11] SCHEGELSKY	06A	RVUE	$\gamma\gamma \rightarrow K^0_S K^0_S$
1251 ±10		TIKHOMIROV	03	SPEC	40.0 π^- C $\rightarrow K^0_S K^0_S K^0_L$ X
1260 ±10		[12] ALDE	97	GAM2	450 $pp \rightarrow pp\pi^0\pi^0$
1278 ± 6		[12] GRYGOREV	96	SPEC	40 $\pi^- N \rightarrow K^0_S K^0_S$ X
1262 ±11		AGUILAR-...	91	EHS	400 pp
1275 ±10		AKER	91	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0$
1220 ±10		BREAKSTONE	90	SFM	$pp \rightarrow pp\pi^+\pi^-$
1288 ±12		ABACHI	86B	HRS	$e^+e^- \rightarrow \pi^+\pi^-$ X
1284 ±30	3k	BINON	83	GAM2	38 $\pi^- p \rightarrow n2\eta$
1280 ±20	3k	APEL	82	CNTR	25 $\pi^- p \rightarrow n2\pi^0$
1284 ±10	16000	DEUTSCH...	76	HBC	16 $\pi^+ p$
1258 ±10	600	TAKAHASHI	72	HBC	8 $\pi^- p \rightarrow n2\pi$
1275 ±13		ARMENISE	70	HBC	9 $\pi^+ n \rightarrow p\pi^+\pi^-$ OCCUR=2
1261 ± 5	1960	[3] ARMENISE	68	DBC	5.1 $\pi^+ n \rightarrow p\pi^+$ MM$^-$
1270 ±10	360	[3] ARMENISE	68	DBC	5.1 $\pi^+ n \rightarrow p\pi^0$ MM OCCUR=2
1268 ± 6		[13] JOHNSON	68	HBC	3.7–4.2 $\pi^- p$

[1] Averaged over six nuclear targets, no statistically significant dependence from target nucleus observed. NODE=M005M;LINKAGE=B

[2] T-matrix pole. NODE=M005M;LINKAGE=A

[3] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M005M;LINKAGE=T

[4] From a partial-wave analysis of data using a K-matrix formalism with 5 poles. NODE=M005M;LINKAGE=L

[5] From an energy-independent partial-wave analysis. NODE=M005M;LINKAGE=O

[6] From an amplitude analysis of the reaction $\pi^+\pi^- \rightarrow 2\pi^0$. NODE=M005M;LINKAGE=P

[7] From an amplitude analysis of $\pi^+\pi^- \to \pi^+\pi^-$ scattering data.
YOUR NOTE [8] Using CLEO-c data but not authored by the CLEO Collaboration.
YOUR NOTE [9] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 185$ MeV.
[10] 4-poles, 5-channel K matrix fit.
[11] From analysis of L3 data at 91 and 183–209 GeV.
[12] Systematic uncertainties not estimated.
[13] JOHNSON 68 includes BONDAR 63, LEE 64, DERADO 65, EISNER 67.

NODE=M005M;LINKAGE=S
NODE=M005M;LINKAGE=C
NODE=M005M;LINKAGE=D
NODE=M005M;LINKAGE=AN
NODE=M005M;LINKAGE=SC
NODE=M005M;LINKAGE=QQ
NODE=M005M;LINKAGE=J

$f_2(1270)$ REFERENCES

NODE=M005

YOUR PAPER DOBBS 15 PR D91 052006 S. Dobbs *et al.* (NWES) REFID=56805
BOGOLYUB... 13 PAN 76 1324 M.Yu. Bogolyubsky *et al.* (HYPERON-M Collab.) REFID=55585
Translated from YAF 76 1389.
ANISOVICH 09 IJMP A24 2481 V.V. Anisovich, A.V. Sarantsev REFID=52719
ABLIKIM 06V PL B642 441 M. Ablikim *et al.* (BES Collab.) REFID=51507
SCHEGELSKY 06A EPJ A27 207 V.A. Schegelsky *et al.* REFID=51185
ABLIKIM 05 PL B607 243 M. Ablikim *et al.* (BES Collab.) REFID=50450
TIKHOMIROV 03 PAN 66 828 G.D. Tikhomirov *et al.* REFID=49423
Translated from YAF 66 860.
ALDE 98 EPJ A3 361 D. Alde *et al.* (GAM4 Collab.) REFID=46605
Also PAN 62 405 D. Alde *et al.* (GAMS Collab.) REFID=46914
Translated from YAF 62 446.
ALDE 97 PL B397 350 D.M. Alde *et al.* (GAMS Collab.) REFID=45392
BERTIN 97C PL B408 476 A. Bertin *et al.* (OBELIX Collab.) REFID=45701
GRYGOREV 96 PAN 59 2105 V.K. Grigoriev, O.N. Baloshin, B.P. Barkov (ITEP) REFID=45566
Translated from YAF 59 2187.
PROKOSHKIN 94 SPD 39 420 Y.D. Prokoshkin, A.A. Kondashov (SERP) REFID=44094
Translated from DANS 336 613.
AGUILAR-... 91 ZPHY C50 405 M. Aguilar-Benitez *et al.* (LEBC-EHS Collab.) REFID=41637
AKER 91 PL B260 249 E. Aker *et al.* (Crystal Barrel Collab.) REFID=41587
BREAKSTONE 90 ZPHY C48 569 A.M. Breakstone *et al.* (ISU, BGNA, CERN+) REFID=41376
AUGUSTIN 89 NP B320 1 J.E. Augustin, G. Cosme (DM2 Collab.) REFID=41004
ALDE 87 PL B198 286 D.M. Alde *et al.* (LANL, BRUX, SERP, LAPP) REFID=40221
AUGUSTIN 87 ZPHY C36 369 J.E. Augustin *et al.* (LALO, CLER, FRAS+) REFID=40268
ABACHI 86B PRL 57 1990 S. Abachi *et al.* (PURD, ANL, IND, MICH+) REFID=20394
LONGACRE 86 PL B177 223 R.S. Longacre *et al.* (BNL, BRAN, CUNY+) REFID=20768
COURAU 84 PL 147B 227 A. Courau *et al.* (CIT, SLAC) REFID=20758
BINON 83 NC 78A 313 F.G. Binon *et al.* (BELG, LAPP, SERP+) REFID=20750
Also SJNP 38 561 F.G. Binon *et al.* (BELG, LAPP, SERP+) REFID=20751
Translated from YAF 38 934.
CHABAUD 83 NP B223 1 V. Chabaud *et al.* (CERN, CRAC, MPIM) REFID=20131
APEL 82 NP B201 197 W.D. Apel *et al.* (KARLK, KARLE, PISA, SERP+) REFID=20745
CASON 82 PRL 48 1316 N.M. Cason *et al.* (NDAM, ANL) REFID=20746
GIDAL 81 PL 107B 153 G. Gidal *et al.* (SLAC, LBL) REFID=20386
CORDEN 79 NP B157 250 M.J. Corden *et al.* (BIRM, RHEL, TELA+) REFID=20374
DEUTSCH... 76 NP B103 426 M. Deutschmann *et al.* (AACH3, BERL, BONN+) REFID=20119
APEL 75 PL 57B 398 W.D. Apel *et al.* (KARLK, KARLE, PISA, SERP+) REFID=20720
ENGLER 74 PR D10 2070 A. Engler *et al.* (CMU, CASE) REFID=20110
TAKAHASHI 72 PR D6 1266 K. Takahashi *et al.* (TOHOK, PENN, NDAM+) REFID=20103
FLATTE 71 PL 34B 551 S.M. Flatte *et al.* (LBL) REFID=20700
ARMENISE 70 LNC 4 199 N. Armenise *et al.* (BARI, BGNA, FIRZ) REFID=20693
STUNTEBECK 70 PL 32B 391 P.H. Stuntebeck *et al.* (NDAM) REFID=20696
ARMENISE 68 NC 54A 999 N. Armenise *et al.* (BARI, BGNA, FIRZ+) REFID=20054
BOESEBECK 68 NP B4 501 K. Boesebeck *et al.* (AACH, BERL, CERN) REFID=20585
JOHNSON 68 PR 176 1651 P.B. Johnson *et al.* (NDAM, PURD, SLAC) REFID=20065
EISNER 67 PR 164 1699 R.L. Eisner *et al.* (PURD) REFID=20046
DERADO 65 PRL 14 872 I. Derado *et al.* (NDAM) REFID=20668
LEE 64 PRL 12 342 Y.Y. Lee *et al.* (MICH) REFID=20663
BONDAR 63 PL 5 153 L. Bondar *et al.* (AACH, BIRM, BONN, DESY+) REFID=20657

NODE=M147

$f_0(1370)$

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

See also the mini-reviews on scalar mesons under $f_0(500)$ (see the index for the page number) and on non-$q\bar{q}$ candidates in PDG 06, Journal of Physics **G33** 1 (2006).

NODE=M147

$f_0(1370)$ BREIT-WIGNER MASS OR K-MATRIX POLE PARAMETER

NODE=M147205

$K\overline{K}$ MODE

NODE=M147M2

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA $1360\pm31\pm28$	430	[1,2] DOBBS	15		$J/\psi \to \gamma K^+K^-$
YOUR DATA $1350\pm48\pm15$	168	[1,2] DOBBS	15		$\psi(2S) \to \gamma K^+K^-$
1440 ± 6		VLADIMIRSK...06		SPEC	40 $\pi^- p \to K^0_S K^0_S n$
1391 ± 10		TIKHOMIROV	03	SPEC	40.0 π^- C $\to K^0_S K^0_S K^0_L$ X
1440 ± 50		BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
1463 ± 9		ETKIN	82B	MPS	23 $\pi^- p \to n2K^0_S$
1425 ± 15		WICKLUND	80	SPEC	6 $\pi N \to K^+K^-N$
~ 1300		POLYCHRO...	79	STRC	7 $\pi^- p \to n2K^0_S$

NODE=M147M2
OCCUR=2

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M147M2;LINKAGE=A
YOUR NOTE [2] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 346$ MeV. NODE=M147M2;LINKAGE=B

$f_0(1370)$ REFERENCES

NODE=M147

YOUR PAPER

DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
VLADIMIRSK...	06	PAN 69 493 Translated from YAF 69 515.	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
TIKHOMIROV	03	PAN 66 828 Translated from YAF 66 860.	G.D. Tikhomirov *et al.*		REFID=49423
BOLONKIN	88	NP B309 426	B.V. Bolonkin *et al.*	(ITEP, SERP)	REFID=40580
ETKIN	82B	PR D25 1786	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)	REFID=20390
WICKLUND	80	PRL 45 1469	A.B. Wicklund *et al.*	(ANL)	REFID=20383
POLYCHRO...	79	PR D19 1317	V.A. Polychronakos *et al.*	(NDAM, ANL)	REFID=20378

NODE=M152

$f_0(1500)$

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

See also the mini-reviews on scalar mesons under $f_0(500)$ (see the index for the page number) and on non-$q\bar{q}$ candidates in PDG 06, Journal of Physics **G33** 1 (2006). NODE=M152

$f_0(1500)$ MASS

NODE=M152M

NODE=M152M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
1504± 6 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.				
1468^{+14+23}_{-15-74}	5.5k	[1] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$	
1466± 6± 20		ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
1515±12		[2] BARBERIS	00A		450 $pp \to p_f\eta\eta p_s$	
1511± 9		[2,3] BARBERIS	00C		450 $pp \to p_f 4\pi p_s$	
1510± 8		[2] BARBERIS	00E		450 $pp \to p_f\eta\eta p_s$	
1522±25		BERTIN	98	OBLX	0.05–0.405 $\bar{n}p \to \pi^+\pi^+\pi^-$	
1449±20		[2] BERTIN	97C	OBLX	0.0 $\bar{p}p \to \pi^+\pi^-\pi^0$	
1515±20		ABELE	96B	CBAR	0.0 $\bar{p}p \to \pi^0 K^0_L K^0_L$	
1500±15		[4] AMSLER	95B	CBAR	0.0 $\bar{p}p \to 3\pi^0$	
1505±15		[5] AMSLER	95C	CBAR	0.0 $\bar{p}p \to \eta\eta\pi^0$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •						
YOUR DATA 1447±16± 13	163	[6,7] DOBBS	15		$J/\psi \to \gamma\pi^+\pi^-$	
YOUR DATA 1442± 9± 4	261	[6,7] DOBBS	15		$\psi(2S) \to \gamma\pi^+\pi^-$	OCCUR=2
1486±10		[2] ANISOVICH	09	RVUE	0.0 $\bar{p}p$, πN	
1470±60	568	[8] KLEMPT	08	E791	$D^+_s \to \pi^-\pi^+\pi^+$	
1470^{+6+72}_{-7-255}		[9] UEHARA	08A	BELL	10.6 $e^+e^- \to e^+e^-\pi^0\pi^0$	
1495± 4		AMSLER	06	CBAR	0.9 $\bar{p}p \to K^+K^-\pi^0$	
1539±20	9.9k	AUBERT	06O	BABR	$B^+ \to K^+K^+K^-$	
1473± 5	80k	[10,11] UMAN	06	E835	5.2 $\bar{p}p \to \eta\eta\pi^0$	
1478± 6		VLADIMIRSK...	06	SPEC	40 $\pi^- p \to K^0_S K^0_S n$	
1493± 7		[10] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$	
1524±14	1400	[12] GARMASH	05	BELL	$B^+ \to K^+K^+K^-$	
1489^{+8}_{-4}		[13] ANISOVICH	03	RVUE		
1490±30		[10] ABELE	01	CBAR	0.0 $\bar{p}d \to \pi^- 4\pi^0 p$	
1497±10		[10] BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+K^-$	
1502±10		[10] BARBERIS	99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$	
1502±12± 10		[14] BARBERIS	99D	OMEG	450 $pp \to K^+K^-, \pi^+\pi^-$	
1530±45		[10] BELLAZZINI	99	GAM4	450 $pp \to pp\pi^0\pi^0$	
1505±18		[10] FRENCH	99		300 $pp \to p_f(K^+K^-)p_s$	
1447±27		[15] KAMINSKI	99	RVUE	$\pi\pi \to \pi\pi, K\overline{K}, \sigma\sigma$	
1580±80		[10] ALDE	98	GAM4	100 $\pi^- p \to \pi^0\pi^0 n$	
1499± 8		[2] ANISOVICH	98B	RVUE	Compilation	
~ 1520		REYES	98	SPEC	800 $pp \to p_s p_f K^0_S K^0_S$	
1510±20		[2] BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$	
~ 1475		FRABETTI	97D	E687	$D^\pm_s \to \pi^\mp\pi^\pm\pi^\pm$	
~ 1505		ABELE	96	CBAR	0.0 $\bar{p}p \to 5\pi^0$	
1500± 8		[2] ABELE	96C	RVUE	Compilation	
1460±20	120	[10] AMELIN	96B	VES	37 $\pi^- A \to \eta\eta\pi^- A$	
1500± 8		BUGG	96	RVUE		

1500±10		[16] AMSLER	95D	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$		
1445± 5		[17] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$		
1497±30		[10] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp\pi^+\pi^-$		OCCUR=2
∼ 1505		BUGG	95	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$		
1446± 5		[10] ABATZIS	94	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$		
1545±25		[10] AMSLER	94E	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta'$		
1520±25		[2,18] ANISOVICH	94	CBAR	0.0 $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$		
1505±20		[2,19] BUGG	94	RVUE	$\overline{p}p \rightarrow 3\pi^0$, $\eta\eta\pi^0$, $\eta\pi^0\pi^0$		
1560±25		[10] AMSLER	92	CBAR	0.0 $\overline{p}p \rightarrow \pi^0\eta\eta$		
1550±45± 30		[10] BELADIDZE	92C	VES	36 π^- Be $\rightarrow \pi^-\eta'\eta$Be		
1449± 4		[10] ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$		
1610±20		[10] ALDE	88	GAM4	300 $\pi^- N \rightarrow \pi^- N 2\eta$		
∼ 1525		ASTON	88D	LASS	11 $K^- p \rightarrow K^0_S K^0_S \Lambda$		
1570±20	600	[10] ALDE	87	GAM4	100 $\pi^- p \rightarrow 4\pi^0 n$		
1575±45		[20] ALDE	86D	GAM4	100 $\pi^- p \rightarrow 2\eta n$		
1568±33		[10] BINON	84C	GAM2	38 $\pi^- p \rightarrow \eta\eta' n$		
1592±25		[10] BINON	83	GAM2	38 $\pi^- p \rightarrow 2\eta n$		
1525± 5		[10] GRAY	83	DBC	0.0 $\overline{p}N \rightarrow 3\pi$		

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M152M;LINKAGE=C

[2] T-matrix pole. NODE=M152M;LINKAGE=PP

[3] Average between $\pi^+\pi^- 2\pi^0$ and $2(\pi^+\pi^-)$. NODE=M152M;LINKAGE=PC

[4] T-matrix pole, supersedes ANISOVICH 94. NODE=M152M;LINKAGE=D

[5] T-matrix pole, supersedes ANISOVICH 94 and AMSLER 92. NODE=M152M;LINKAGE=D1

YOUR NOTE [6] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M152M;LINKAGE=F

YOUR NOTE [7] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 109$ MeV. NODE=M152M;LINKAGE=G

[8] Reanalysis of AITALA 01A data. This state could also be $f_0(1370)$. NODE=M152M;LINKAGE=KL

[9] Breit-Wigner mass. May also be the $f_0(1370)$. NODE=M152M;LINKAGE=UE

[10] Breit-Wigner mass. NODE=M152M;LINKAGE=E

[11] Statistical error only. NODE=M152M;LINKAGE=ST

[12] Breit-Wigner, solution 1, PWA ambiguous. NODE=M152M;LINKAGE=GA

[13] K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0\pi^0 n$, $\pi^- p \rightarrow K\overline{K} n$, $\pi^+\pi^- \rightarrow \pi^+\pi^-$, $\overline{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K^0_S K^0_S \pi^0$, $K^+K^0_S\pi^-$ at rest, $\overline{p}n \rightarrow \pi^-\pi^-\pi^+$, $K^0_S K^-\pi^0$, $K^0_S K^0_S \pi^-$ at rest. NODE=M152M;LINKAGE=KM

[14] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M152M;LINKAGE=BD

[15] T-matrix pole on sheet $--+$. NODE=M152M;LINKAGE=TK

[16] T-matrix pole. Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. NODE=M152M;LINKAGE=AB

[17] Supersedes ABATZIS 94, ARMSTRONG 89E. Breit-Wigner mass. NODE=M152M;LINKAGE=B

[18] From a simultaneous analysis of the annihilations $\overline{p}p \rightarrow 3\pi^0, \pi^0\eta\eta$. NODE=M152M;LINKAGE=A

[19] Reanalysis of ANISOVICH 94 data. NODE=M152M;LINKAGE=C1

[20] From central value and spread of two solutions. Breit-Wigner mass. NODE=M152M;LINKAGE=AZ

$f_0(1500)$ REFERENCES

NODE=M152

YOUR PAPER

DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)
ABLIKIM	13N	PR D87 092009	Ablikim M. *et al.*	(BES III Collab.)
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev	
KLEMPT	08	EPJ C55 39	E. Klempt, M. Matveev, A.V. Sarantsev	(BONN+)
UEHARA	08A	PR D78 052004	S. Uehara *et al.*	(BELLE Collab.)
ABLIKIM	06V	PL B642 441	M. Ablikim *et al.*	(BES Collab.)
AMSLER	06	PL B639 165	C. Amsler *et al.*	(CBAR Collab.)
AUBERT	06O	PR D74 032003	B. Aubert *et al.*	(BABAR Collab.)
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)
		Translated from YAF 69 515.		
BINON	05	PAN 68 960	F. Binon *et al.*	
		Translated from YAF 68 998.		
GARMASH	05	PR D71 092003	A. Garmash *et al.*	(BELLE Collab.)
ANISOVICH	03	EPJ A16 229	V.V. Anisovich *et al.*	
ABELE	01	EPJ C19 667	A. Abele *et al.*	(Crystal Barrel Collab.)
AITALA	01A	PRL 86 765	E.M. Aitala *et al.*	(FNAL E791 Collab.)
BARBERIS	00A	PL B471 429	D. Barberis *et al.*	(WA 102 Collab.)
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)
BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)
BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)
BARBERIS	99B	PL B453 316	D. Barberis *et al.*	(Omega Expt.)
BARBERIS	99D	PL B462 462	D. Barberis *et al.*	(Omega Expt.)
BELLAZZINI	99	PL B467 296	R. Bellazzini *et al.*	
FRENCH	99	PL B460 213	B. French *et al.*	(WA76 Collab.)
KAMINSKI	99	EPJ C9 141	R. Kaminski, L. Lesniak, B. Loiseau	(CRAC, PARIN)
ALDE	98	EPJ A3 361	D. Alde *et al.*	(GAM4 Collab.)
Also		PAN 62 405	D. Alde *et al.*	(GAMS Collab.)
		Translated from YAF 62 446.		

REFID=56805 REFID=55387 REFID=52719 REFID=52286 REFID=52309 REFID=51507 REFID=51136 REFID=51141 REFID=51004 REFID=51063 REFID=51191 REFID=50780 REFID=50641 REFID=49401 REFID=48334 REFID=48004 REFID=47957 REFID=47959 REFID=47961 REFID=46921 REFID=46922 REFID=47395 REFID=47400 REFID=47491 REFID=46927 REFID=46605 REFID=46914

ANISOVICH	98B	SPU 41 419	V.V. Anisovich *et al.*		REFID=46331
		Translated from UFN 168 481.			
BERTIN	98	PR D57 55	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45782
REYES	98	PRL 81 4079	M.A. Reyes *et al.*		REFID=46378
BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45701
FRABETTI	97D	PL B407 79	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=45554
ABELE	96	PL B380 453	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45011
ABELE	96B	PL B385 425	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45038
ABELE	96C	NP A609 562	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45076
AMELIN	96B	PAN 59 976	D.V. Amelin *et al.*	(SERP, TBIL)	REFID=44725
		Translated from YAF 59 1021.			
BUGG	96	NP B471 59	D.V. Bugg, A.V. Sarantsev, B.S. Zou	(LOQM, PNPI)	REFID=45094
AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44377
AMSLER	95C	PL B353 571	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44440
AMSLER	95D	PL B355 425	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44441
ANTINORI	95	PL B353 589	F. Antinori *et al.*	(ATHU, BARI, BIRM+)	REFID=44437
BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH)	REFID=44438
ABATZIS	94	PL B324 509	S. Abatzis *et al.*	(ATHU, BARI, BIRM+)	REFID=44090
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44093
AMSLER	94E	PL B340 259	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=44080
ANISOVICH	94	PL B323 233	V.V. Anisovich *et al.*	(Crystal Barrel Collab.)	REFID=43659
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)	REFID=44078
AMSLER	92	PL B291 347	C. Amsler *et al.*	(Crystal Barrel Collab.)	REFID=43169
BELADIDZE	92C	SJNP 55 1535	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)	REFID=43175
		Translated from YAF 55 2748.			
ARMSTRONG	89E	PL B228 536	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)	REFID=41011
ALDE	88	PL B201 160	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP+)	REFID=40283
ASTON	88D	NP B301 525	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)	REFID=40330
ALDE	87	PL B198 286	D.M. Alde *et al.*	(LANL, BRUX, SERP, LAPP)	REFID=40221
ALDE	86D	NP B269 485	D.M. Alde *et al.*	(BELG, LAPP, SERP, CERN+)	REFID=20765
BINON	84C	NC 80A 363	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=21418
BINON	83	NC 78A 313	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=20750
Also		SJNP 38 561	F.G. Binon *et al.*	(BELG, LAPP, SERP+)	REFID=20751
		Translated from YAF 38 934.			
GRAY	83	PR D27 307	L. Gray *et al.*	(SYRA)	REFID=21370

NODE=M013

$f_2'(1525)$

$I^G(J^{PC}) = 0^+(2^{++})$

$f_2'(1525)$ MASS

NODE=M013205

PRODUCED IN e^+e^- ANNIHILATION AND PARTICLE DECAYS

NODE=M013M3

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*	NODE=M013M3

The data in this block is included in the average printed for a previous datablock.

$1521.9^{+\ 1.8}_{-\ 1.5}$ OUR AVERAGE Error includes scale factor of 1.1.

$1522.2 \pm 2.8^{+\ 5.3}_{-\ 2.0}$		AAIJ	13AN	LHCB	$\overline{B}{}^0_s \to J/\psi K^+K^-$	
$1513 \pm 5\ ^{+\ 4}_{-10}$	5.5k	[5] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$	
$1525.3^{+\ 1.2}_{-\ 1.4} \pm 3.7 \pm 2.1$		UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$	
1521 ± 5		ABLIKIM	05	BES2	$J/\psi \to \phi K^+K^-$	
$1518 \pm 1 \pm 3$		ABE	04	BELL	10.6 $e^+e^- \to e^+e^-K^+K^-$	
$1519 \pm 2\ ^{+15}_{-\ 5}$		BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$	
1523 ± 6	331	[6] ACCIARRI	01H	L3	91, 183–209 $e^+e^- \to e^+e^-K^0_S K^0_S$	
$1535 \pm 5 \pm 4$		ABREU	96C	DLPH	$Z^0 \to K^+K^- + X$	
$1516 \pm 5\ ^{+\ 9}_{-15}$		BAI	96C	BES	$J/\psi \to \gamma K^+K^-$	
1531.6 ± 10.0		AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$	
1515 ± 5		[7] FALVARD	88	DM2	$J/\psi \to \phi K^+K^-$	
$1525 \pm 10 \pm 10$		BALTRUSAIT..87		MRK3	$J/\psi \to \gamma K^+K^-$	

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

YOUR DATA	$1532 \pm 3 \pm 6$	644	[8,9] DOBBS	15		$J/\psi \to \gamma K^+K^-$		
YOUR DATA	$1557 \pm 9 \pm 3$	113	[8,9] DOBBS	15		$\psi(2S) \to \gamma K^+K^-$		OCCUR=2
	1523 ± 5	870	[10] SCHEGELSKY	06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$		
	1496 ± 2		[11] FALVARD	88	DM2	$J/\psi \to \phi K^+K^-$		OCCUR=2

[5] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M013M3;LINKAGE=A

[6] Supersedes ACCIARRI 95J. NODE=M013M;LINKAGE=HA

[7] From an analysis ignoring interference with $f_0(1710)$. NODE=M013M;LINKAGE=F1

YOUR NOTE [8] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M013M3;LINKAGE=B

YOUR NOTE [9] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 73$ MeV. NODE=M013M3;LINKAGE=C

[10] From analysis of L3 data at 91 and 183–209 GeV.
[11] From an analysis including interference with $f_0(1710)$.

NODE=M013M3;LINKAGE=SC
NODE=M013M;LINKAGE=F2

$f_2'(1525)$ REFERENCES

NODE=M013

YOUR PAPER	DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
	AAIJ	13AN	PR D87 072004	R. Aaij *et al.*	(LHCb Collab.)	REFID=55137
	ABLIKIM	13N	PR D87 092009	Ablikim M. *et al.*	(BES III Collab.)	REFID=55387
	UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
	SCHEGELSKY	06A	EPJ A27 207	V.A. Schegelsky *et al.*		REFID=51185
	ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
	ABE	04	EPJ C32 323	K. Abe *et al.*	(BELLE Collab.)	REFID=49650
	BAI	03G	PR D68 052003	J.Z. Bai *et al.*	(BES Collab.)	REFID=49580
	ACCIARRI	01H	PL B501 173	M. Acciarri *et al.*	(L3 Collab.)	REFID=48321
	ABREU	96C	PL B379 309	P. Abreu *et al.*	(DELPHI Collab.)	REFID=44671
	BAI	96C	PRL 77 3959	J.Z. Bai *et al.*	(BES Collab.)	REFID=45169
	ACCIARRI	95J	PL B363 118	M. Acciarri *et al.*	(L3 Collab.)	REFID=44615
	AUGUSTIN	88	PRL 60 2238	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=40574
	FALVARD	88	PR D38 2706	A. Falvard *et al.*	(CLER, FRAS, LALO+)	REFID=40576
	BALTRUSAIT...	87	PR D35 2077	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=40010

NODE=M068

$f_0(1710)$

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

See our mini-review in the 2004 edition of this *Review*, Physics Letters **B592** 1 (2004). See also the mini-review on scalar mesons under $f_0(500)$ (see the index for the page number).

NODE=M068

$f_0(1710)$ MASS

NODE=M068M

NODE=M068M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1723^{+6}_{-5} OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.			
$1759 \pm 6\ ^{+14}_{-25}$	5.5k	[1] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$
$1750^{+6}_{-7}\ ^{+29}_{-18}$		UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$
$1701 \pm 5\ ^{+9}_{-2}$	4k	[2] CHEKANOV	08	ZEUS	$ep \to K^0_S K^0_S X$
$1765^{+4}_{-3} \pm 13$		ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
$1760 \pm 15\ ^{+15}_{-10}$		[3] ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^- K^+K^-$
1738 ± 30		ABLIKIM	04E	BES2	$J/\psi \to \omega K^+K^-$
$1740 \pm 4\ ^{+10}_{-25}$		[4] BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$
1740^{+30}_{-25}		[4] BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
1698 ± 18		[5] BARBERIS	00E		450 $pp \to p_f\eta\eta p_s$
$1710 \pm 12 \pm 11$		[6] BARBERIS	99D	OMEG	450 $pp \to K^+K^-, \pi^+\pi^-$
1710 ± 25		[7] FRENCH	99		300 $pp \to p_f(K^+K^-)p_s$
1707 ± 10		[8] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-, K^0_S K^0_S$
1698 ± 15		[8] AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$
$1720 \pm 10 \pm 10$		[9] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+K^-$
1742 ± 15		[8] WILLIAMS	84	MPSF	200 $\pi^- N \to 2K^0_S X$
1670 ± 50		BLOOM	83	CBAL	$J/\psi \to \gamma 2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA $1744 \pm 7 \pm 5$	381	[10,11] DOBBS	15		$J/\psi \to \gamma\pi^+\pi^-$
YOUR DATA $1705 \pm 11 \pm 5$	237	[10,11] DOBBS	15		$\psi(2S) \to \gamma\pi^+\pi^-$ OCCUR=2
YOUR DATA $1706 \pm 4 \pm 5$	1.0k	[10,11] DOBBS	15		$J/\psi \to \gamma K^+K^-$ OCCUR=3
YOUR DATA $1690 \pm 8 \pm 3$	349	[10,11] DOBBS	15		$\psi(2S) \to \gamma K^+K^-$ OCCUR=4
1750 ± 13		AMSLER	06	CBAR	1.64 $\overline{p}p \to K^+K^-\pi^0$
1747 ± 5	80k	[12,13] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
1776 ± 15		VLADIMIRSK...	06	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
1790^{+40}_{-30}		[3] ABLIKIM	05	BES2	$J/\psi \to \phi\pi^+\pi^-$
1670 ± 20		[12] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$
1726 ± 7	74	[13] CHEKANOV	04	ZEUS	$ep \to K^0_S K^0_S X$
$1732 + 15$		[14] ANISOVICH	03	RVUE	
1682 ± 16		TIKHOMIROV	03	SPEC	40.0 π^- C $\to K^0_S K^0_S K^0_L X$
1670 ± 26	3.6k	[4,15] NICHITIU	02	OBLX	
1770 ± 12		[16,17] ANISOVICH	99B	SPEC	0.6–1.2 $p\overline{p} \to \eta\eta\pi^0$

1730±15			[4] BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+ K^-$	
1750±20			[4] BARBERIS	99B	OMEG	450 $pp \to p_s p_f \pi^+ \pi^-$	
1750±30			[18] ANISOVICH	98B	RVUE	Compilation	
1720±39			BAI	98H	BES	$J/\psi \to \gamma \pi^0 \pi^0$	
1775± 1.5		57	[19] BARKOV	98		$\pi^- p \to K^0_S K^0_S n$	
1690±11			[20] ABREU	96C	DLPH	$Z^0 \to K^+ K^- +$ X	
1696± 5	$^{+9}_{-34}$		[9] BAI	96C	BES	$J/\psi \to \gamma K^+ K^-$	
1781± 8	$^{+10}_{-31}$		[4] BAI	96C	BES	$J/\psi \to \gamma K^+ K^-$	OCCUR=2
1768±14			BALOSHIN	95	SPEC	40 π^- C $\to K^0_S K^0_S$ X	
1750±15			[21] BUGG	95	MRK3	$J/\psi \to \gamma \pi^+ \pi^- \pi^+ \pi^-$	
1620±16			[9] BUGG	95	MRK3	$J/\psi \to \gamma \pi^+ \pi^- \pi^+ \pi^-$	OCCUR=2
1748±10			[8] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0 \eta \eta \to 6\gamma$	
∼ 1750			BREAKSTONE	93	SFM	$pp \to pp\pi^+ \pi^- \pi^+ \pi^-$	
1744±15			[22] ALDE	92D	GAM2	38 $\pi^- p \to \eta \eta n$	
1713±10			[23] ARMSTRONG	89D	OMEG	300 $pp \to pp K^+ K^-$	
1706±10			[23] ARMSTRONG	89D	OMEG	300 $pp \to pp K^0_S K^0_S$	OCCUR=2
1700±15			[9] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$	
1720±60			[4] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$	OCCUR=2
1638±10			[24] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$	
1690± 4			[25] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$	OCCUR=2
1755± 8			[26] ALDE	86C	GAM2	38 $\pi^- p \to n 2\eta$	
1730^{+2}_{-10}			[27] LONGACRE	86	RVUE	22 $\pi^- p \to n 2K^0_S$	
1650±50			BURKE	82	MRK2	$J/\psi \to \gamma 2\rho$	
1640±50			[28,29] EDWARDS	82D	CBAL	$J/\psi \to \gamma 2\eta$	
1730±10	±20		[30] ETKIN	82C	MPS	23 $\pi^- p \to n 2K^0_S$	

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M068M;LINKAGE=D

[2] In the SU(3) based model with a specific interference pattern of the $f_2(1270)$, $a_2^0(1320)$, and $f_2'(1525)$ mesons incoherently added to the $f_0(1710)$ and non-resonant background. NODE=M068M;LINKAGE=HE

[3] This state may be different from $f_0(1710)$, see CLOSE 05. NODE=M068M;LINKAGE=AB

[4] $J^P = 0^+$. NODE=M068M;LINKAGE=A8

[5] T-matrix pole. NODE=M068M;LINKAGE=TP

[6] Supersedes BARBERIS 99 and BARBERIS 99B. NODE=M068M;LINKAGE=BD

[7] $J^P = 0^+$, supersedes by ARMSTRONG 89D. NODE=M068M;LINKAGE=C3

[8] No J^{PC} determination. NODE=M068M;LINKAGE=A1

[9] $J^P = 2^+$. NODE=M068M;LINKAGE=A3

YOUR NOTE [10] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M068M;LINKAGE=F

YOUR NOTE [11] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 135$ MeV. NODE=M068M;LINKAGE=G

[12] Breit-Wigner mass. NODE=M068M;LINKAGE=BW

[13] Systematic errors not estimated. NODE=M068M;LINKAGE=CH

[14] K-matrix pole, assuming $J^P = 0^+$, from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K \overline{K} n$, $\pi^+ \pi^- \to \pi^+ \pi^-$, $\overline{p}p \to \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$, $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p}n \to \pi^- \pi^- \pi^+$, $K^0_S K^- \pi^0$, $K^0_S K^0_S \pi^-$ at rest. NODE=M068M;LINKAGE=KM

[15] Decaying to $f_0(1370)\pi\pi$. NODE=M068M;LINKAGE=NC

[16] $J^P = 0^+$. NODE=M068M;LINKAGE=AV

[17] Not seen by AMSLER 02. NODE=M068M;LINKAGE=NS

[18] T-matrix pole, assuming $J^P = 0^+$ NODE=M068M;LINKAGE=AN

[19] No J^{PC} determination. NODE=M068M;LINKAGE=4A

[20] No J^{PC} determination, width not determined. NODE=M068M;LINKAGE=A4

[21] From a fit to the 0^+ partial wave. NODE=M068M;LINKAGE=Q0

[22] ALDE 92D combines all the GAMS-2000 data. NODE=M068M;LINKAGE=AA

[23] $J^P = 2^+$, superseded by FRENCH 99. NODE=M068M;LINKAGE=C

[24] From an analysis ignoring interference with $f_2'(1525)$. NODE=M068M;LINKAGE=A

[25] From an analysis including interference with $f_2'(1525)$. NODE=M068M;LINKAGE=B

[26] Superseded by ALDE 92D. NODE=M068M;LINKAGE=BB

[27] Uses MRK3 data. From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity. NODE=M068M;LINKAGE=A9

[28] $J^P = 2^+$ preferred. NODE=M068M;LINKAGE=B2

[29] From fit neglecting nearby $f_2'(1525)$. Replaced by BLOOM 83. NODE=M068M;LINKAGE=E

[30] Superseded by LONGACRE 86. NODE=M068M;LINKAGE=B1

$f_0(1710)$ BRANCHING RATIOS

NODE=M068225

$\Gamma(K\overline{K})/\Gamma_{total}$ Γ_1/Γ

NODE=M068R2
NODE=M068R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA seen	1004	[1] DOBBS	15		$J/\psi \to \gamma K^+ K^-$
YOUR DATA seen	349	[1] DOBBS	15		$\psi(2S) \to \gamma K^+ K^-$ OCCUR=2
0.36 ± 0.12		ALBALADEJO	08	RVUE	
$0.38^{+0.09}_{-0.19}$		[2] LONGACRE	86	MPS	22 $\pi^- p \to n 2K^0_S$

YOUR NOTE
[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M068R2;LINKAGE=A
[2] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity. NODE=M068R;LINKAGE=L

$\Gamma(\pi\pi)/\Gamma_{total}$ Γ_3/Γ

NODE=M068R5
NODE=M068R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA seen	381	[1] DOBBS	15		$J/\psi \to \gamma \pi^+ \pi^-$
YOUR DATA seen	237	[1] DOBBS	15		$\psi(2S) \to \gamma \pi^+ \pi^-$ OCCUR=2
not seen		AMSLER	02	CBAR	0.9 $\bar{p}p \to \pi^0 \eta\eta$, $\pi^0 \pi^0 \pi^0$
$0.039^{+0.002}_{-0.024}$		[2] LONGACRE	86	RVUE	

YOUR NOTE
[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M068R5;LINKAGE=A
[2] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2. Fit with constrained inelasticity. NODE=M068R5;LINKAGE=L

$f_0(1710)$ REFERENCES

NODE=M068

YOUR PAPER	DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
	ABLIKIM	13N	PR D87 092009	Ablikim M. *et al.*	(BES III Collab.)	REFID=55387
	UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)	REFID=55592
	ALBALADEJO	08	PRL 101 252002	M. Albaladejo, J.A. Oller		REFID=52656
	CHEKANOV	08	PRL 101 112003	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=52275
	ABLIKIM	06V	PL B642 441	M. Ablikim *et al.*	(BES Collab.)	REFID=51507
	AMSLER	06	PL B639 165	C. Amsler *et al.*	(CBAR Collab.)	REFID=51136
	UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
	VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
			Translated from YAF 69 515.			
	ABLIKIM	05	PL B607 243	M. Ablikim *et al.*	(BES Collab.)	REFID=50450
	ABLIKIM	05Q	PR D72 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50958
	BINON	05	PAN 68 960	F. Binon *et al.*		REFID=50780
			Translated from YAF 68 998.			
	CLOSE	05	PR D71 094022	F.E. Close, Q. Zhao		REFID=50788
	ABLIKIM	04E	PL B603 138	M. Ablikim *et al.*	(BES Collab.)	REFID=50174
	CHEKANOV	04	PL B578 33	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=49672
	PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653
	ANISOVICH	03	EPJ A16 229	V.V. Anisovich *et al.*		REFID=49401
	BAI	03G	PR D68 052003	J.Z. Bai *et al.*	(BES Collab.)	REFID=49580
	TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov *et al.*		REFID=49423
			Translated from YAF 66 860.			
	AMSLER	02	EPJ C23 29	C. Amsler *et al.*		REFID=48580
	NICHITIU	02	PL B545 261	F. Nichitiu *et al.*	(OBELIX Collab.)	REFID=48848
	BAI	00A	PL B472 207	J.Z. Bai *et al.*	(BES Collab.)	REFID=47426
	BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47961
	ANISOVICH	99B	PL B449 154	A.V. Anisovich *et al.*		REFID=46886
	BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)	REFID=46921
	BARBERIS	99B	PL B453 316	D. Barberis *et al.*	(Omega Expt.)	REFID=46922
	BARBERIS	99D	PL B462 462	D. Barberis *et al.*	(Omega Expt.)	REFID=47395
	FRENCH	99	PL B460 213	B. French *et al.*	(WA76 Collab.)	REFID=47491
	ANISOVICH	98B	SPU 41 419	V.V. Anisovich *et al.*		REFID=46331
			Translated from UFN 168 481.			
	BAI	98H	PRL 81 1179	J.Z. Bai *et al.*	(BES Collab.)	REFID=46342
	BARKOV	98	JETPL 68 764	B.P. Barkov *et al.*		REFID=46616
	ABREU	96C	PL B379 309	P. Abreu *et al.*	(DELPHI Collab.)	REFID=44671
	BAI	96C	PRL 77 3959	J.Z. Bai *et al.*	(BES Collab.)	REFID=45169
	BALOSHIN	95	PAN 58 46	O.N. Baloshin *et al.*	(ITEP)	REFID=44621
			Translated from YAF 58 50.			
	BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH)	REFID=44438
	ARMSTRONG	93C	PL B307 394	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43587
	BREAKSTONE	93	ZPHY C58 251	A.M. Breakstone *et al.*	(IOWA, CERN, DORT+)	REFID=43312
	ALDE	92D	PL B284 457	D.M. Alde *et al.*	(GAM2 Collab.)	REFID=41591
	Also		SJNP 54 451	D.M. Alde *et al.*	(GAM2 Collab.)	REFID=44696
			Translated from YAF 54 745.			
	ARMSTRONG	89D	PL B227 186	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)	REFID=41010
	AUGUSTIN	88	PRL 60 2238	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=40574
	BOLONKIN	88	NP B309 426	B.V. Bolonkin *et al.*	(ITEP, SERP)	REFID=40580
	FALVARD	88	PR D38 2706	A. Falvard *et al.*	(CLER, FRAS, LALO+)	REFID=40576
	AUGUSTIN	87	ZPHY C36 369	J.E. Augustin *et al.*	(LALO, CLER, FRAS+)	REFID=40268
	BALTRUSAIT...	87	PR D35 2077	R.M. Baltrusaitis *et al.*	(Mark III Collab.)	REFID=40010
	ALDE	86C	PL B182 105	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP)	REFID=21694
	LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)	REFID=20768
	WILLIAMS	84	PR D30 877	E.G.H. Williams *et al.*	(VAND, NDAM, TUFTS+)	REFID=21693
	BLOOM	83	ARNS 33 143	E.D. Bloom, C. Peck	(SLAC, CIT)	REFID=21682
	BURKE	82	PRL 49 632	D.L. Burke *et al.*	(LBL, SLAC)	REFID=21676

EDWARDS 82D PRL 48 458 C. Edwards *et al.* (CIT, HARV, PRIN+) REFID=21677
ETKIN 82C PR D25 2446 A. Etkin *et al.* (BNL, CUNY, TUFTS, VAND) REFID=20391

NODE=M168

$f_0(2100)$

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

OMITTED FROM SUMMARY TABLE

Needs confirmation. NODE=M168

$f_0(2100)$ MASS

NODE=M168M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	NODE=M168M
2101± 7 OUR AVERAGE						
$2081 \pm 13^{+24}_{-36}$	5.5k	[1] ABLIKIM	13N	BES3	$e^+e^- \to J/\psi \to \gamma\eta\eta$	
2102 ± 13		[2] ANISOVICH	00J	SPEC	2.0 $\bar{p}p \to \eta\pi^0\pi^0$, $\pi^0\pi^0$, $\eta\eta$, $\eta\eta'$, $\pi^+\pi^-$	
2090 ± 30		BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$	
2105 ± 10		ANISOVICH	99K	SPEC	0.6–1.94 $\bar{p}p \to \eta\eta$, $\eta\eta'$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
YOUR DATA $2090 \pm 10 \pm 6$	529	[3,4] DOBBS	15		$J/\psi \to \gamma\pi^+\pi^-$	
YOUR DATA $2099 \pm 17 \pm 8$	283	[3,4] DOBBS	15		$\psi(2S) \to \gamma\pi^+\pi^-$	OCCUR=2
2105 ± 8	80k	[5] UMAN	06	E835	5.2 $\bar{p}p \to \eta\eta\pi^0$	
~ 2104		BUGG	95		$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$	
~ 2122		HASAN	94	RVUE	$\bar{p}p \to \pi\pi$	

[1] From partial wave analysis including all possible combinations of 0^{++}, 2^{++}, and 4^{++} resonances. NODE=M168M;LINKAGE=A

[2] Includes the data of ANISOVICH 00B indicating to exotic decay pattern. NODE=M168M;LINKAGE=AN

YOUR NOTE [3] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M168M;LINKAGE=B

YOUR NOTE [4] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 209$ MeV. NODE=M168M;LINKAGE=C

[5] Statistical error only. NODE=M168M;LINKAGE=ST

$f_0(2100)$ REFERENCES

NODE=M168

YOUR PAPER DOBBS 15 PR D91 052006 S. Dobbs *et al.* (NWES) REFID=56805
ABLIKIM 13N PR D87 092009 Ablikim M. *et al.* (BES III Collab.) REFID=55387
UMAN 06 PR D73 052009 I. Uman *et al.* (FNAL E835) REFID=51063
ANISOVICH 00B NP A662 319 A.V. Anisovich *et al.* REFID=47942
ANISOVICH 00J PL B491 47 A.V. Anisovich *et al.* REFID=47950
BAI 00A PL B472 207 J.Z. Bai *et al.* (BES Collab.) REFID=47426
ANISOVICH 99K PL B468 309 A.V. Anisovich *et al.* REFID=47472
BUGG 95 PL B353 378 D.V. Bugg *et al.* (LOQM, PNPI, WASH) REFID=44438
HASAN 94 PL B334 215 A. Hasan, D.V. Bugg (LOQM) REFID=44103

NODE=M112

$f_0(2200)$

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

OMITTED FROM SUMMARY TABLE

Seen in $K^0_S K^0_S$ (AUGUSTIN 88), K^+K^- (ABLIKIM 05Q) and $\eta\eta$ (BINON 05) system. Not seen in $\Upsilon(1S)$ radiative decays (BARU 89). NODE=M112

$f_0(2200)$ MASS

NODE=M112M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	NODE=M112M
2189±13 OUR AVERAGE						
$2170 \pm 20^{+10}_{-15}$		ABLIKIM	05Q	BES2	$\psi(2S) \to \gamma\pi^+\pi^-K^+K^-$	
2210 ± 50		[1] BINON	05	GAMS	33 $\pi^- p \to \eta\eta n$	
2197 ± 17		[2] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
YOUR DATA $2206 \pm 12 \pm 8$	381	[3,4] DOBBS	15		$J/\psi \to \gamma K^+K^-$	
YOUR DATA $2188 \pm 17 \pm 16$	203	[3,4] DOBBS	15		$\psi(2S) \to \gamma K^+K^-$	OCCUR=2
~ 2122		HASAN	94	RVUE	$\bar{p}p \to \pi\pi$	
~ 2321		HASAN	94	RVUE	$\bar{p}p \to \pi\pi$	OCCUR=2

[1] First solution, PWA is ambiguous. NODE=M112M;LINKAGE=BI
[2] Cannot determine spin to be 0. NODE=M112M;LINKAGE=A
YOUR NOTE [3] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M112M;LINKAGE=B
YOUR NOTE [4] From a fit to a Breit-Wigner line shape with fixed $\Gamma = 238$ MeV. NODE=M112M;LINKAGE=C

$f_0(2200)$ REFERENCES

NODE=M112

YOUR PAPER	DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
	ABLIKIM	05Q	PR D72 092002	M. Ablikim *et al.*	(BES Collab.)	REFID=50958
	BINON	05	PAN 68 960	F. Binon *et al.*		REFID=50780
			Translated from YAF 68 998.			
	HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
	BARU	89	ZPHY C42 505	S.E. Baru *et al.*	(NOVO)	REFID=40917
	AUGUSTIN	88	PRL 60 2238	J.E. Augustin *et al.*	(DM2 Collab.)	REFID=40574

NODE=M082

$f_J(2220)$

$I^G(J^{PC}) = 0^+(2^{++}$ or $4^{++})$

OMITTED FROM SUMMARY TABLE

Needs confirmation. See our mini-review in the 2004 edition of this *Review*, PDG 04. NODE=M082

$f_J(2220)$ BRANCHING RATIOS

NODE=M082225

$\Gamma(\pi\pi)/\Gamma_{total}$ **Γ_1/Γ**

NODE=M082R00
NODE=M082R00

VALUE	DOCUMENT ID		COMMENT	
YOUR DATA **not seen**	[1] DOBBS	15	$J/\psi \to \gamma\pi\pi$	
YOUR DATA not seen	[1] DOBBS	15	$\psi(2S) \to \gamma\pi\pi$	OCCUR=2

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M082R00;LINKAGE=A

$\Gamma(K\overline{K})/\Gamma_{total}$ **Γ_3/Γ**

NODE=M082R01
NODE=M082R01

VALUE	DOCUMENT ID		COMMENT	
YOUR DATA **not seen**	[1] DOBBS	15	$J/\psi \to \gamma K\overline{K}$	
YOUR DATA not seen	[1] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$	OCCUR=2

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M082R01;LINKAGE=A

$f_J(2220)$ REFERENCES

NODE=M082

YOUR PAPER	DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)	REFID=56805
	PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)	REFID=49653

$c\overline{c}$ MESONS

NODE=MXXX025

NODE=M070

$J/\psi(1S)$

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

$J/\psi(1S)$ BRANCHING RATIOS

NODE=M070230

RADIATIVE DECAYS

NODE=M070310

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ **Γ_{166}/Γ**

NODE=M070R86
NODE=M070R86

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.64 ± 0.12 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.				
YOUR DATA $2.07\pm0.16^{+0.02}_{-0.07}$	2.4k	[1,2] DOBBS	15		$J/\psi \to \gamma\pi\pi$	
$1.63\pm0.26^{+0.02}_{-0.06}$		[3] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$	
$1.42\pm0.21^{+0.01}_{-0.05}$		[4] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^0\pi^0$	OCCUR=2
$1.33\pm0.05\pm0.20$		[5] AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$	
$1.36\pm0.09\pm0.23$		[5] BALTRUSAIT..	87	MRK3	$J/\psi \to \gamma\pi^+\pi^-$	
$1.48\pm0.25\pm0.30$	178	EDWARDS	82B	CBAL	$e^+e^- \to 2\pi^0\gamma$	
$2.0\ \pm0.7$	35	ALEXANDER	78	PLUT	e^+e^-	
$1.2\ \pm0.6$	30	[6] BRANDELIK	78B	DASP	$e^+e^- \to \pi^+\pi^-\gamma$	

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070R86;LINKAGE=A

YOUR NOTE [2] DOBBS 15 reports $[\Gamma(J/\psi(1S) \to \gamma f_2(1270))/\Gamma_{\text{total}}] \times [B(f_2(1270) \to \pi\pi)] = (1.744 \pm 0.052 \pm 0.122) \times 10^{-3}$ which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R86;LINKAGE=DO

[3] ABLIKIM 06V reports $[\Gamma(J/\psi(1S) \to \gamma f_2(1270))/\Gamma_{\text{total}}] \times [B(f_2(1270) \to \pi\pi)] = (1.371 \pm 0.010 \pm 0.222) \times 10^{-3}$ which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R86;LINKAGE=AI

[4] ABLIKIM 06V reports $[\Gamma(J/\psi(1S) \to \gamma f_2(1270))/\Gamma_{\text{total}}] \times [B(f_2(1270) \to \pi\pi)] = (1.200 \pm 0.027 \pm 0.174) \times 10^{-3}$ which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R86;LINKAGE=AL

[5] Estimated using $B(f_2(1270) \to \pi\pi)$=0.843 ± 0.012. The errors do not contain the uncertainty in the $f_2(1270)$ decay. NODE=M070R86;LINKAGE=X

[6] Restated by us to take account of spread of E1, M2, E3 transitions. NODE=M070R86;LINKAGE=T

$\Gamma(\gamma f_0(1370) \to \gamma K\overline{K})/\Gamma_{\text{total}}$ Γ_{167}/Γ

NODE=M070R00
NODE=M070R00

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		COMMENT
YOUR DATA **4.19±0.73±1.34**	478	[1] DOBBS	15	$J/\psi \to \gamma K\overline{K}$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070R00;LINKAGE=A

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{\text{total}}$ Γ_{168}/Γ

NODE=M070R91
NODE=M070R91

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
10.0 $\pm$ 1.1 / 0.9 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.						
YOUR DATA 11.76± 0.54±0.94		1.2k	[1] DOBBS	15		$J/\psi \to \gamma K\overline{K}$
9.62±029 $^{+3.51}_{-1.86}$			[2] BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$
5.0 ± 0.8 $^{+1.8}_{-0.4}$			[3,4] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
9.2 ± 1.4 ±1.4			[4] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$
10.4 ± 1.2 ±1.6			[4] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$ OCCUR=2
9.6 ± 1.2 ±1.8			[4] BALTRUSAIT..87		MRK3	$J/\psi \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.6 ± 0.2 $^{+0.6}_{-0.2}$			[4,5] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$ OCCUR=2
< 0.8		90	[6] BISELLO	89B		$J/\psi \to 4\pi\gamma$
1.6 ± 0.4 ±0.3			[7] BALTRUSAIT..87		MRK3	$J/\psi \to \gamma\pi^+\pi^-$ OCCUR=2
3.8 ± 1.6			[8] EDWARDS	82D	CBAL	$e^+e^- \to \eta\eta\gamma$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070R91;LINKAGE=D

[2] Includes unknown branching ratio to K^+K^- or $K^0_S K^0_S$. NODE=M070R91;LINKAGE=K9

[3] Assuming $J^P = 2^+$ for $f_0(1710)$. NODE=M070R91;LINKAGE=A1

[4] Includes unknown branching fraction to K^+K^- or $K^0_S K^0_S$. We have multiplied K^+K^- measurement by 2, and $K^0_S K^0_S$ by 4 to obtain $K\overline{K}$ result. NODE=M070R91;LINKAGE=B

[5] Assuming $J^P = 0^+$ for $f_0(1710)$. NODE=M070R91;LINKAGE=A2

[6] Includes unknown branching fraction to $\rho^0\rho^0$. NODE=M070R91;LINKAGE=C

[7] Includes unknown branching fraction to $\pi^+\pi^-$. NODE=M070R91;LINKAGE=Z

[8] Includes unknown branching fraction to $\eta\eta$. NODE=M070R91;LINKAGE=A

$\Gamma(\gamma f_0(1710) \to \gamma\pi\pi)/\Gamma_{\text{total}}$ Γ_{169}/Γ

NODE=M070B01
NODE=M070B01

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8 ±0.5 OUR AVERAGE					
YOUR DATA 3.72±0.30±0.43	483	[1] DOBBS	15		$J/\psi \to \gamma\pi\pi$
3.96±0.06±1.12		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$
3.99±0.15±2.64		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^0\pi^0$ OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.5 ±1.6 ±0.8		BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070B01;LINKAGE=A

[2] Including unknown branching fraction to $\pi\pi$. NODE=M070B01;LINKAGE=AB

$\Gamma(\gamma f_2'(1525))/\Gamma_{total}$ Γ_{176}/Γ

NODE=M070R87
NODE=M070R87

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$5.7\ ^{+0.8}_{-0.5}$ OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.						
YOUR DATA $8.0\ \pm0.9\ \pm0.2$		750	[1,2] DOBBS	15		$J/\psi \to \gamma K\overline{K}$
$3.85\pm0.17^{+1.91}_{-0.73}$			[3] BAI	03G	BES	$J/\psi \to \gamma K\overline{K}$
$3.6\ \pm0.4\ ^{+1.4}_{-0.4}$			[3] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
$5.6\ \pm1.4\ \pm0.9$			[3] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$ OCCUR=3
$4.5\ \pm0.4\ \pm0.9$			[3] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^0_S K^0_S$ OCCUR=4
$6.8\ \pm1.6\ \pm1.4$			[3] BALTRUSAIT..87		MRK3	$J/\psi \to \gamma K^+K^-$ OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<3.4	90	4	[4] BRANDELIK	79C	DASP	$e^+e^- \to \pi^+\pi^-\gamma$
<2.3	90	3	ALEXANDER	78	PLUT	$e^+e^- \to K^+K^-\gamma$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070R87;LINKAGE=B

YOUR NOTE [2] DOBBS 15 reports $[\Gamma(J/\psi(1S) \to \gamma f_2'(1525))/\Gamma_{total}] \times [B(f_2'(1525) \to K\overline{K})] = (7.09 \pm 0.46 \pm 0.67) \times 10^{-4}$ which we divide by our best value $B(f_2'(1525) \to K\overline{K}) = (88.7 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M070R87;LINKAGE=DO

[3] Using $B(f_2'(1525) \to K\overline{K}) = 0.888$. NODE=M070R87;LINKAGE=A1

[4] Assuming isotropic production and decay of the $f_2'(1525)$ and isospin. NODE=M070R87;LINKAGE=I

$\Gamma(\gamma f_0(2100) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{198}/Γ

NODE=M070B08
NODE=M070B08

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA **$6.24\pm0.48\pm0.87$**	744	[1] DOBBS	15		$J/\psi \to \gamma\pi\pi$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070B08;LINKAGE=A

$\Gamma(\gamma f_0(2200) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{200}/Γ

NODE=M070B09
NODE=M070B09

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA **$5.86\pm0.49\pm1.20$**	490	[1] DOBBS	15		$J/\psi \to \gamma K\overline{K}$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070B09;LINKAGE=A

$\Gamma(\gamma f_J(2220) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{202}/Γ

NODE=M070B02
NODE=M070B02

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
YOUR DATA **< 3.9**	90	[1,2] DOBBS	15		$J/\psi \to \gamma\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$14\ \pm8\ \pm4$		BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$
$8.4\pm2.6\pm3.0$		BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070B02;LINKAGE=A

YOUR NOTE [2] For $\Gamma = 20/50$ MeV, the 90% CL upper limits for $\pi^+\pi^-$ and $\pi^0\pi^0$ are $2.6/5.2 \times 10^{-5}$ and $1.3/1.9 \times 10^{-5}$, respectively. NODE=M070B02;LINKAGE=DO

$\Gamma(\gamma f_J(2220) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{203}/Γ

NODE=M070B03
NODE=M070B03

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
YOUR DATA **< 4.1**	90	[1,2] DOBBS	15		$J/\psi \to \gamma K\overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 3.6		[3] DEL-AMO-SA..10O		BABR	$e^+e^- \to J/\psi \to \gamma K^+K^-$
< 2.9		[3] DEL-AMO-SA..10O		BABR	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$ OCCUR=2
$6.6\pm2.9\pm2.4$		BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^+K^-$
$10.8\pm4.0\pm3.2$		BAI	96B	BES	$e^+e^- \to J/\psi \to \gamma K^0_S K^0_S$ OCCUR=2

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070B03;LINKAGE=A

YOUR NOTE [2] For $\Gamma = 20/50$ MeV, the 90% CL upper limits for K^+K^- and $K^0_S K^0_S$ are $1.7/3.1 \times 10^{-5}$ and $1.2/2.0 \times 10^{-5}$, respectively. NODE=M070B03;LINKAGE=DO

[3] For spin 2 and helicity 0; other combinations lead to more stringent upper limits. NODE=M070B03;LINKAGE=DE

$\Gamma(\gamma f_0(1500) \to \gamma\pi\pi)/\Gamma_{total}$ Γ_{206}/Γ

NODE=M070S32
NODE=M070S32

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
1.09 ± 0.24 OUR AVERAGE					
YOUR DATA $1.21\pm0.29\pm0.24$	174	[1] DOBBS	15		$J/\psi \to \gamma\pi\pi$
$1.00\pm0.03\pm0.45$		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^+\pi^-$

$1.02 \pm 0.09 \pm 0.45$		[2] ABLIKIM	06V	BES2	$e^+e^- \to J/\psi \to \gamma\pi^0\pi^0$		OCCUR=2

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

5.7 ± 0.8	[3,4] BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$		

YOUR NOTE

[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M070S32;LINKAGE=C

[2] Including unknown branching fraction to $\pi\pi$. NODE=M070S32;LINKAGE=AB

[3] Including unknown branching ratio for $f_0(1500) \to \pi^+\pi^-\pi^+\pi^-$. NODE=M070S32;LINKAGE=A

[4] Assuming that $f_0(1500)$ decays only to two S-wave dipions. NODE=M070S32;LINKAGE=B

$J/\psi(1S)$ REFERENCES

NODE=M070

YOUR PAPER

DOBBS	15	PR D91 052006	S. Dobbs *et al.*	(NWES)
DEL-AMO-SA...	10O	PRL 105 172001	P. del Amo Sanchez *et al.*	(BABAR Collab.)
ABLIKIM	06V	PL B642 441	M. Ablikim *et al.*	(BES Collab.)
BAI	03G	PR D68 052003	J.Z. Bai *et al.*	(BES Collab.)
BAI	98H	PRL 81 1179	J.Z. Bai *et al.*	(BES Collab.)
BAI	96B	PRL 76 3502	J.Z. Bai *et al.*	(BES Collab.)
BAI	96C	PRL 77 3959	J.Z. Bai *et al.*	(BES Collab.)
BUGG	95	PL B353 378	D.V. Bugg *et al.*	(LOQM, PNPI, WASH)
BISELLO	89B	PR D39 701	G. Busetto *et al.*	(DM2 Collab.)
AUGUSTIN	88	PRL 60 2238	J.E. Augustin *et al.*	(DM2 Collab.)
AUGUSTIN	87	ZPHY C36 369	J.E. Augustin *et al.*	(LALO, CLER, FRAS+)
BALTRUSAIT...	87	PR D35 2077	R.M. Baltrusaitis *et al.*	(Mark III Collab.)
EDWARDS	82B	PR D25 3065	C. Edwards *et al.*	(CIT, HARV, PRIN+)
EDWARDS	82D	PRL 48 458	C. Edwards *et al.*	(CIT, HARV, PRIN+)
Also		ARNS 33 143	E.D. Bloom, C. Peck	(SLAC, CIT)
BRANDELIK	79C	ZPHY C1 233	R. Brandelik *et al.*	(DASP Collab.)
ALEXANDER	78	PL 72B 493	G. Alexander *et al.*	(DESY, HAMB, SIEG+)
BRANDELIK	78B	PL 74B 292	R. Brandelik *et al.*	(DASP Collab.)

REFID=56805 REFID=53533 REFID=51507 REFID=49580 REFID=46342 REFID=44736 REFID=45169 REFID=44438 REFID=40575 REFID=40574 REFID=40268 REFID=40010 REFID=22080 REFID=21677 REFID=21682 REFID=22114 REFID=22065 REFID=22067

NODE=M071

$\psi(2S)$

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

See the Review on "$\psi(2S)$ and χ_c branching ratios" before the $\chi_{c0}(1P)$ Listings. NODE=M071

$\psi(2S)$ BRANCHING RATIOS

NODE=M071235

RADIATIVE DECAYS

NODE=M071315

$\Gamma(\gamma f_2(1270))/\Gamma_{total}$ Γ_{139}/Γ

NODE=M071R84

VALUE (units 10^{-4})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$2.73^{+0.29}_{-0.25}$ OUR AVERAGE Error includes scale factor of 1.8.					
$2.84 \pm 0.15^{+0.03}_{-0.10}$	1.9k	[1,2] DOBBS	15		$\psi(2S) \to \gamma\pi\pi$
$2.12 \pm 0.19 \pm 0.32$		[3,4] BAI	03C	BES	$\psi(2S) \to \gamma\pi\pi$

NODE=M071R84

YOUR DATA

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

$2.08 \pm 0.19 \pm 0.33$	200.6 ± 18.8	[3] BAI	03C	BES	$\psi(2S) \to \gamma\pi^+\pi^-$	OCCUR=2
$2.90 \pm 1.08 \pm 1.07$	29.9 ± 11.1	[3] BAI	03C	BES	$\psi(2S) \to \gamma\pi^0\pi^0$	OCCUR=3

YOUR NOTE

[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071R84;LINKAGE=A

YOUR NOTE

[2] DOBBS 15 reports $[\Gamma(\psi(2S) \to \gamma f_2(1270))/\Gamma_{total}] \times [B(f_2(1270) \to \pi\pi)] = (2.39 \pm 0.09 \pm 0.09) \times 10^{-4}$ which we divide by our best value $B(f_2(1270) \to \pi\pi) = (84.2^{+2.9}_{-0.9}) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071R84;LINKAGE=B

[3] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R;LINKAGE=3B

[4] Combining the results from $\pi^+\pi^-$ and $\pi^0\pi^0$ decay modes. NODE=M071R;LINKAGE=B9

$\Gamma(\gamma f_0(1370) \to \gamma K\overline{K})/\Gamma_{total}$ Γ_{140}/Γ

NODE=M071S75

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*COMMENT*
YOUR DATA **$3.1 \pm 1.0 \pm 1.4$**	175	[1] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$

YOUR NOTE

[1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071S75;LINKAGE=A

$\Gamma(\gamma f_0(1500))/\Gamma_{total}$ Γ_{141}/Γ

NODE=M071S76

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*		*COMMENT*
YOUR DATA **$9.2 \pm 1.8 \pm 0.6$**	274	[1,2] DOBBS	15	$\psi(2S) \to \gamma\pi\pi$

YOUR NOTE [1] DOBBS 15 reports $[\Gamma(\psi(2S) \to \gamma f_0(1500))/\Gamma_{\text{total}}] \times [B(f_0(1500) \to \pi\pi)] = (3.2 \pm 0.6 \pm 0.2) \times 10^{-5}$ which we divide by our best value $B(f_0(1500) \to \pi\pi) = (34.9 \pm 2.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071S76;LINKAGE=A

YOUR NOTE [2] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071S76;LINKAGE=B

$\Gamma(\gamma f_2'(1525))/\Gamma_{\text{total}}$ Γ_{142}/Γ

NODE=M071S77
NODE=M071S77

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		COMMENT
YOUR DATA **$3.3 \pm 0.8 \pm 0.1$**	136	[1,2] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$

YOUR NOTE [1] DOBBS 15 reports $[\Gamma(\psi(2S) \to \gamma f_2'(1525))/\Gamma_{\text{total}}] \times [B(f_2'(1525) \to K\overline{K})] = (2.9 \pm 0.6 \pm 0.3) \times 10^{-5}$ which we divide by our best value $B(f_2'(1525) \to K\overline{K}) = (88.7 \pm 2.2) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M071S77;LINKAGE=A

YOUR NOTE [2] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071S77;LINKAGE=B

$\Gamma(\gamma f_0(1710) \to \gamma\pi\pi)/\Gamma_{\text{total}}$ Γ_{144}/Γ

NODE=M071R85
NODE=M071R85

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
3.5 ± 0.6 OUR AVERAGE					
YOUR DATA $3.6 \pm 0.4 \pm 0.5$	290	[1] DOBBS	15		$\psi(2S) \to \gamma\pi\pi$
$3.01 \pm 0.41 \pm 1.24$	35.6 ± 4.8	[2] BAI	03C	BES	$\psi(2S) \to \gamma\pi^+\pi^-$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071R85;LINKAGE=A
[2] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R85;LINKAGE=3B

$\Gamma(\gamma f_0(1710) \to \gamma K\overline{K})/\Gamma_{\text{total}}$ Γ_{145}/Γ

NODE=M071R86
NODE=M071R86

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
6.6 ± 0.7 OUR AVERAGE						
YOUR DATA $6.7 \pm 0.6 \pm 0.6$		375	[1] DOBBS	15		$\psi(2S) \to \gamma K\overline{K}$
$6.04 \pm 0.90 \pm 1.32$		39.6 ± 5.9	[2,3] BAI	03C	BES	$\psi(2S) \to \gamma K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 15.6	90	6.8 ± 3.1	[2,3] BAI	03C	BES	$\psi(2S) \to \gamma K_S^0 K_S^0$ OCCUR=2

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071R86;LINKAGE=A
[2] Includes unknown branching fractions to K^+K^- or $K_S^0K_S^0$. We have multiplied the K^+K^- result by a factor of 2 and the $K_S^0K_S^0$ result by a factor of 4 to obtain the $K\overline{K}$ result. NODE=M071R;LINKAGE=CK
[3] Normalized to $B(\psi(2S) \to J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$. NODE=M071R86;LINKAGE=3B

$\Gamma(\gamma f_0(2100) \to \gamma\pi\pi)/\Gamma_{\text{total}}$ Γ_{146}/Γ

NODE=M071S78
NODE=M071S78

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		COMMENT
YOUR DATA **$4.8 \pm 0.5 \pm 0.9$**	373	[1] DOBBS	15	$\psi(2S) \to \gamma\pi\pi$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071S78;LINKAGE=A

$\Gamma(\gamma f_0(2200) \to \gamma K\overline{K})/\Gamma_{\text{total}}$ Γ_{147}/Γ

NODE=M071S79
NODE=M071S79

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		COMMENT
YOUR DATA **$3.2 \pm 0.6 \pm 0.8$**	207	[1] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071S79;LINKAGE=A

$\Gamma(\gamma f_J(2220) \to \gamma\pi\pi)/\Gamma_{\text{total}}$ Γ_{148}/Γ

NODE=M071S80
NODE=M071S80

VALUE	CL%	DOCUMENT ID		COMMENT
YOUR DATA **$< 5.8 \times 10^{-6}$**	90	[1,2] DOBBS	15	$\psi(2S) \to \gamma\pi\pi$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071S80;LINKAGE=A
YOUR NOTE [2] For $\Gamma = 20/50$ MeV, the 90% CL upper limits for $\pi^+\pi^-$ and $\pi^0\pi^0$ are $3.2/4.3 \times 10^{-6}$ and $2.6/4.0 \times 10^{-6}$, respectively. NODE=M071S80;LINKAGE=DO

$\Gamma(\gamma f_J(2220) \to \gamma K\overline{K})/\Gamma_{\text{total}}$ Γ_{149}/Γ

NODE=M071S81
NODE=M071S81

VALUE	CL%	DOCUMENT ID		COMMENT
YOUR DATA **$< 9.5 \times 10^{-6}$**	90	[1,2] DOBBS	15	$\psi(2S) \to \gamma K\overline{K}$

YOUR NOTE [1] Using CLEO-c data but not authored by the CLEO Collaboration. NODE=M071S81;LINKAGE=A
YOUR NOTE [2] For $\Gamma = 20/50$ MeV, the 90% CL upper limits for K^+K^- and $K_S^0K_S^0$ are $2.1/4.3 \times 10^{-6}$ and $3.7/5.5 \times 10^{-6}$, respectively. NODE=M071S81;LINKAGE=DO

$\psi(2S)$ REFERENCES

NODE=M071

YOUR PAPER DOBBS 15 PR D91 052006 S. Dobbs *et al.* (NWES) REFID=56805
BAI 03C PR D67 032004 J.Z. Bai *et al.* (BES Collab.) REFID=49190