$f_0(1710)$

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

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$f_0(1710)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1713± 6 OUR AVERAGE					
1740^{+30}_{-25}		[1] BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
1698±18		[2] BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
1710±12 ±11		[3] BARBERIS	99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$
1710±25		[4] FRENCH	99		300 $pp \to p_f(K^+K^-)p_s$
1707±10		[5] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+K^-$, $K^0_S K^0_S$
1698±15		[5] AUGUSTIN	87	DM2	$J/\psi \to \gamma\pi^+\pi^-$
1720±10 ±10		[6] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+K^-$
1742±15		[5] 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. • • •					
1770±12		[7] ANISOVICH	99B	SPEC	0.6–1.2 $p\overline{p} \to \eta\eta\pi^0$
1730±15		[1] BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+K^-$
1750±20		[1] BARBERIS	99B	OMEG	450 $pp \to p_s p_f \pi^+\pi^-$
1750±30		[8] ANISOVICH	98B	RVUE	Compilation
1720±39		BAI	98H	BES	$J/\psi \to \gamma\pi^0\pi^0$
1775± 1.5	57	[9] BARKOV	98		$\pi^- p \to K^0_S K^0_S n$
1690±11		[10] ABREU	96C	DLPH	$Z^0 \to K^+K^- X$
1696± 5 $^{+\ 9}_{-34}$		[6] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
1781± 8 $^{+10}_{-31}$		[1] BAI	96C	BES	$J/\psi \to \gamma K^+K^-$
1768±14		BALOSHIN	95	SPEC	40 $\pi^- C \to K^0_S K^0_S X$
1750±15		[11] BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
1620±16		[6] BUGG	95	MRK3	$J/\psi \to \gamma\pi^+\pi^-\pi^+\pi^-$
1748±10		[5] 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		[12] ALDE	92D	GAM2	38 $\pi^- p \to \eta\eta n$
1713±10		[13] ARMSTRONG	89D	OMEG	300 $pp \to ppK^+K^-$

1706±10	[13] ARMSTRONG	89D	OMEG	300 $pp \to ppK^0_S K^0_S$
1700±15	[6] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
1720±60	[1] BOLONKIN	88	SPEC	40 $\pi^- p \to K^0_S K^0_S n$
1638±10	[14] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$
1690± 4	[15] FALVARD	88	DM2	$J/\psi \to \phi K^+ K^-$, $K^0_S K^0_S$
1755± 8	[16] ALDE	86C	GAM2	38 $\pi^- p \to n 2\eta$
1730^{+2}_{-10}	[17] LONGACRE	86	RVUE	22 $\pi^- p \to n 2K^0_S$
1650±50	BURKE	82	MRK2	$J/\psi \to \gamma 2\rho$
1640±50	[18,19] EDWARDS	82D	CBAL	$J/\psi \to \gamma 2\eta$
1730±10 ±20	[20] ETKIN	82C	MPS	23 $\pi^- p \to n 2K^0_S$

[1] $J^P = 0^+$.
[2] T-matrix pole.
[3] Supersedes BARBERIS 99 and BARBERIS 99B.
[4] $J^P = 0^+$, supersedes by ARMSTRONG 89D.
[5] No J^{PC} determination.
[6] $J^P = 2^+$.
[7] Preliminary data from CBAR, $J^P = 0^+$.
[8] T-matrix pole, assuming $J^P = 0^+$
[9] No J^{PC} determination.
[10] No J^{PC} determination, width not determined.
[11] From a fit to the 0^+ partial wave.
[12] ALDE 92D combines all the GAMS-2000 data.
[13] $J^P = 2^+$, superseded by FRENCH 99.
[14] From an analysis ignoring interference with $f'_2(1525)$.
[15] From an analysis including interference with $f'_2(1525)$.
[16] Superseded by ALDE 92D.
[17] 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.
[18] $J^P = 2^+$ preferred.
[19] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83.
[20] Superseded by LONGACRE 86.

$f_0(1710)$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
125 ± 10 OUR AVERAGE						
120^{+50}_{-40}			[21] BAI	00A	BES	$J/\psi \to \gamma(\pi^+\pi^-\pi^+\pi^-)$
120 ± 26			[22] BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
126 ± 16 ±18			[23] BARBERIS	99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$
105 ± 34			[24] FRENCH	99		300 $pp \to p_f (K^+K^-) p_s$
166.4± 33.2			[25] AUGUSTIN	88	DM2	$J/\psi \to \gamma K^+ K^-$, $K^0_S K^0_S$
136 ± 28			[25] AUGUSTIN	87	DM2	$J/\psi \to \gamma \pi^+\pi^-$
130 ± 20			[26] BALTRUSAIT...	87	MRK3	$J/\psi \to \gamma K^+ K^-$
57 ± 38			[5] WILLIAMS	84	MPSF	200 $\pi^- N \to 2K^0_S X$
160 ± 80			BLOOM	83	CBAL	$J/\psi \to \gamma 2\eta$

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

220 ± 42			[27] ANISOVICH	99B	SPEC	0.6–1.2 $p\overline{p} \rightarrow \eta\eta\pi^0$
100 ± 25			[21] BARBERIS	99	OMEG	450 $pp \rightarrow p_s p_f K^+ K^-$
160 ± 30			[21] BARBERIS	99B	OMEG	450 $pp \rightarrow p_s p_f \pi^+ \pi^-$
250 ± 140			[28] ANISOVICH	98B	RVUE	Compilation
30 ± 7		57	[29] BARKOV	98		$\pi^- p \rightarrow K^0_S K^0_S n$
$103 \pm 18 ^{+30}_{-11}$			[26] BAI	96C	BES	$J/\psi \rightarrow \gamma K^+ K^-$
$85 \pm 24 ^{+22}_{-19}$			[21] BAI	96C	BES	$J/\psi \rightarrow \gamma K^+ K^-$
56 ± 19			BALOSHIN	95	SPEC	40 π^- C $\rightarrow K^0_S K^0_S$ X
160 ± 40			[30] BUGG	95	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$
$160 ^{+60}_{-20}$			[26] BUGG	95	MRK3	$J/\psi \rightarrow \gamma\pi^+\pi^-\pi^+\pi^-$
264 ± 25			[25] ARMSTRONG	93C	E760	$\overline{p}p \rightarrow \pi^0\eta\eta \rightarrow 6\gamma$
200 to 300			BREAKSTONE	93	SFM	$pp \rightarrow pp\pi^+\pi^-\pi^+\pi^-$
< 80	90		[31] ALDE	92D	GAM2	38 $\pi^- p \rightarrow \eta\eta N^*$
181 ± 30			[32] ARMSTRONG	89D	OMEG	300 $pp \rightarrow ppK^+K^-$
104 ± 30			[32] ARMSTRONG	89D	OMEG	300 $pp \rightarrow ppK^0_S K^0_S$
30 ± 20			[26] BOLONKIN	88	SPEC	40 $\pi^- p \rightarrow K^0_S K^0_S n$
350 ± 150			[21] BOLONKIN	88	SPEC	40 $\pi^- p \rightarrow K^0_S K^0_S n$
148 ± 17			[33] FALVARD	88	DM2	$J/\psi \rightarrow \phi K^+ K^-$, $K^0_S K^0_S$
184 ± 6			[34] FALVARD	88	DM2	$J/\psi \rightarrow \phi K^+ K^-$, $K^0_S K^0_S$
$122 ^{+74}_{-15}$			[35] LONGACRE	86	RVUE	22 $\pi^- p \rightarrow n 2K^0_S$
200 ± 100			BURKE	82	MRK2	$J/\psi \rightarrow \gamma 2\rho$
$220 ^{+100}_{-70}$			[36,37] EDWARDS	82D	CBAL	$J/\psi \rightarrow \gamma 2\eta$
$200.0 ^{+156.0}_{-9.0}$			[38] ETKIN	82B	MPS	23 $\pi^- p \rightarrow n 2K^0_S$

[21] $J^P = 0^+$.
[22] T-matrix pole.
[23] Supersedes BARBERIS 99 and BARBERIS 99B.
[24] $J^P = 0^+$, supersedes by ARMSTRONG 89D.
[25] No J^{PC} determination.
[26] $J^P = 2^+$.
[27] Preliminary data from CBAR, $J^P = 0^+$.
[28] T-matrix pole, assuming $J^P = 0^+$
[29] No J^{PC} determination.
[30] From a fit to the 0^+ partial wave.
[31] ALDE 92D combines all the GAMS-2000 data.
[32] $J^P = 2^+$, (0^+ excluded).

[33] From an analysis ignoring interference with $f'_2(1525)$.
[34] From an analysis including interference with $f'_2(1525)$.
[35] 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.
[36] $J^P = 2^+$ preferred.
[37] From fit neglecting nearby $f'_2(1525)$. Replaced by BLOOM 83.
[38] From an amplitude analysis of the $K^0_S K^0_S$ system, superseded by LONGACRE 86.

$f_0(1710)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K\overline{K}$	seen
Γ_2	$\eta\eta$	seen
Γ_3	$\pi\pi$	seen
Γ_4	$\gamma\gamma$	

$f_0(1710)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_4/\Gamma$

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.11	95	[39] BEHREND	89C	CELL	$\gamma\gamma \to K^0_S K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.48	95	ALBRECHT	90G	ARG	$\gamma\gamma \to K^+K^-$
<0.28	95	[39] ALTHOFF	85B	TASS	$\gamma\gamma \to K\overline{K}\pi$

[39] Assuming helicity 2.

$\Gamma(\pi\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_3\Gamma_4/\Gamma$

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
<0.82	95	[40] BARATE	00E	ALEP	$\gamma\gamma \to \pi^+\pi^-$

[40] Assuming spin 0.

$f_0(1710)$ BRANCHING RATIOS

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.38^{+0.09}_{-0.19}$	[41,42] LONGACRE	86	MPS	$22\ \pi^- p \to n 2K^0_S$

$\Gamma(\eta\eta)/\Gamma_{\text{total}}$ — Γ_2/Γ

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.18^{+0.03}_{-0.13}$	[41,42] LONGACRE	86	RVUE

$\Gamma(\pi\pi)/\Gamma_{total}$ — Γ_3/Γ

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.039^{+0.002}_{-0.024}$	[41,42] LONGACRE	86	RVUE

$\Gamma(\pi\pi)/\Gamma(K\overline{K})$ — Γ_3/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
0.39±0.14	ARMSTRONG	91	OMEG	300 $pp \to pp\pi\pi$, $ppK\overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.2 ±0.024±0.036	BARBERIS	99D	OMEG	450 $pp \to K^+K^-$, $\pi^+\pi^-$

$\Gamma(\eta\eta)/\Gamma(K\overline{K})$ — Γ_2/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.48±0.15		BARBERIS	00E		450 $pp \to p_f\eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.02	90	[43] PROKOSHKIN	91	GA24	300 $\pi^- p \to \pi^- p\eta\eta$

[41] From a partial-wave analysis of data using a K-matrix formalism with 5 poles, but assuming spin 2.

[42] Fit with constrained inelasticity.

[43] Combining results of GAM4 with those of ARMSTRONG 89D.

$f_0(1710)$ REFERENCES

BAI	00A	PL B472 207	J.Z. Bai et al.	(BES Collab.)
BARATE	00E	PL B472 189	R. Barate et al.	(ALEPH Collab.)
BARBERIS	00E	PL B479 59	D. Barberis et al.	(WA 102 Collab.)
ANISOVICH	99B	PL B449 154	A.V. Anisovich et al.	
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.)
FRENCH	99	PL B214 213	B. French et al.	(WA76 Collab.)
ANISOVICH	98B	UFN 41 419	V.V. Anisovich et al.	
BAI	98H	PRL 81 1179	J.Z. Bai et al.	(BES Collab.)
BARKOV	98	JEPTL 68 764	B.P. Barkov et al.	
ABREU	96C	PL B379 309	P. Abreu et al.	(DELPHI Collab.)
BAI	96C	PRL 77 3959	J.Z. Bai et al.	(BES Collab.)
BALOSHIN	95	PAN 58 46 Translated from YAF 58 50.	O.N. Baloshin et al.	(ITEP)
BUGG	95	PL B353 378	D.V. Bugg et al.	(LOQM, PNPI, WASH)
ARMSTRONG	93C	PL B307 394	T.A. Armstrong et al.	(FNAL, FERR, GENO+)
BREAKSTONE	93	ZPHY C58 251	A.M. Breakstone et al.	(IOWA, CERN, DORT+)
ALDE	92D	PL B284 457	D.M. Alde et al.	(GAM2 Collab.)
Also	91	SJNP 54 451 Translated from YAF 54 745.	D.M. Alde et al.	(GAM2 Collab.)
ARMSTRONG	91	ZPHY C51 351	T.A. Armstrong et al.	(ATHU, BARI, BIRM+)
PROKOSHKIN	91	SPD 36 155 Translated from DANS 316 900.	Y.D. Prokoshkin	(GAM2, GAM4 Collab.)

ALBRECHT	90G	ZPHY C48 183	H. Albrecht *et al.*	(ARGUS Collab.)
ARMSTRONG	89D	PL B227 186	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)
BEHREND	89C	ZPHY C43 91	H.J. Behrend *et al.*	(CELLO Collab.)
AUGUSTIN	88	PRL 60 2238	J.E. Augustin *et al.*	(DM2 Collab.)
BOLONKIN	88	NP B309 426	B.V. Bolonkin *et al.*	(ITEP, SERP)
FALVARD	88	PR D38 2706	A. Falvard *et al.*	(CLER, FRAS, LALO+)
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.)
ALDE	86C	PL B182 105	D.M. Alde *et al.*	(SERP, BELG, LANL, LAPP)
LONGACRE	86	PL B177 223	R.S. Longacre *et al.*	(BNL, BRAN, CUNY+)
ALTHOFF	85B	ZPHY C29 189	M. Althoff *et al.*	(TASSO Collab.)
WILLIAMS	84	PR D30 877	E.G.H. Williams *et al.*	(VAND, NDAM, TUFTS+)
BLOOM	83	ARNS 33 143	E.D. Bloom, C. Peck	(SLAC, CIT)
BURKE	82	PRL 49 632	D.L. Burke *et al.*	(LBL, SLAC)
EDWARDS	82D	PRL 48 458	C. Edwards *et al.*	(CIT, HARV, PRIN+)
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GODFREY	99	RMP 71 1411	S. Godfrey, J. Napolitano	
GRYGOREV	99	PAN 62 470	V.K. Grygorev *et al.*	
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LINDENBAUM	92	PL B274 492	S.J. Lindenbaum, R.S. Longacre	(BNL)
BISELLO	89B	PR D39 701	G. Busetto *et al.*	(DM2 Collab.)
ASTON	88D	NP B301 525	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)
AKESSON	86	NP B264 154	T. Akesson *et al.*	(Axial Field Spec. Collab.)
ARMSTRONG	86B	PL 167B 133	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)
BALTRUSAIT...	86B	PR D33 1222	R.M. Baltrusaitis *et al.*	(Mark III Collab.)
ALTHOFF	83	PL 121B 216	M. Althoff *et al.*	(TASSO Collab.)
BARNETT	83B	PL 120B 455	B. Barnett *et al.*	(JHU)
ALTHOFF	82	ZPHY C16 13	M. Althoff *et al.*	(TASSO Collab.)
BARNES	82	PL B116 365	T. Barnes, F.E. Close	(RHEL)
BARNES	82B	NP B198 360	T. Barnes, F.E. Close, S. Monaghan	(RHEL, OXFTP)
TANIMOTO	82	PL 116B 198	M. Tanimoto	(BIEL)