$f_1(1420)$

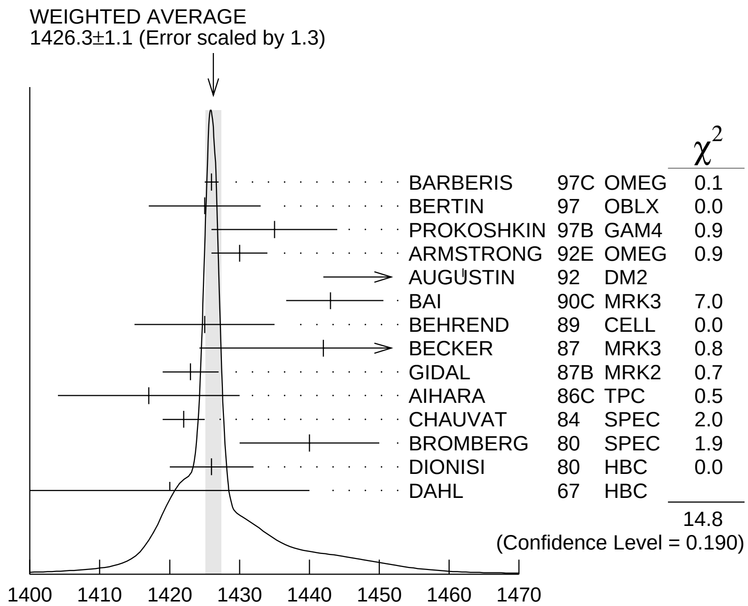
$I^G(J^{PC}) = 0^+(1^{++})$

See the minireview under $\eta(1440)$.

$f_1(1420)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1426.3± 1.1 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
1426 ± 1		BARBERIS	97C	OMEG	450 $pp \to ppK^0_S K^\pm \pi^\mp$
1425 ± 8		BERTIN	97	OBLX	0.0 $\overline{p}p \to K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
1435 ± 9		PROKOSHKIN	97B	GAM4	100 $\pi^- p \to \eta \pi^0 \pi^0 n$
1430 ± 4		[1] ARMSTRONG	92E	OMEG	85,300 $\pi^+ p$, $pp \to \pi^+ p$, $pp(K\overline{K}\pi)$
1462 ±20		[2] AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$
1443 $^{+7}_{-6}$ $^{+3}_{-2}$	1100	BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$
1425 ±10	17	BEHREND	89	CELL	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
1442 ± 5 $^{+10}_{-17}$	111	BECKER	87	MRK3	$e^+ e^-$, $\omega K\overline{K}\pi$
1423 ± 4		GIDAL	87B	MRK2	$e^+ e^- \to e^+ e^- K\overline{K}\pi$
1417 ±13	13	AIHARA	86C	TPC	$e^+ e^- \to e^+ e^- K\overline{K}\pi$
1422 ± 3		CHAUVAT	84	SPEC	ISR 31.5 pp
1440 ±10		[3] BROMBERG	80	SPEC	100 $\pi^- p \to K\overline{K}\pi X$
1426 ± 6	221	DIONISI	80	HBC	4 $\pi^- p \to K\overline{K}\pi n$
1420 ±20		DAHL	67	HBC	1.6–4.2 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1430.8± 0.9		[4] SOSA	99	SPEC	$pp \to p_{slow} (K^0_S K^+ \pi^-) p_{fast}$
1433.4± 0.8		[4] SOSA	99	SPEC	$pp \to p_{slow} (K^0_S K^- \pi^+) p_{fast}$
1429 ± 3	389	ARMSTRONG	89	OMEG	300 $pp \to K\overline{K}\pi pp$
1425 ± 2	1520	ARMSTRONG	84	OMEG	85 $\pi^+ p$, $pp \to (\pi^+, p)(K\overline{K}\pi)p$
~ 1420		BITYUKOV	84	SPEC	32 $K^- p \to K^+ K^- \pi^0 Y$

[1] This result supersedes ARMSTRONG 84, ARMSTRONG 89.
[2] From fit to the $K^*(892)K$ 1^{++} partial wave.
[3] Mass error increased to account for $a_0(980)$ mass cut uncertainties.
[4] No systematic error given.



$f_1(1420)$ mass (MeV)

$f_1(1420)$ WIDTH

VALUE (MeV)			*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
55.5± 2.9 OUR AVERAGE							
58	$\pm$ 4			BARBERIS	97C	OMEG	450 $pp \to pp K^0_S K^\pm \pi^\mp$
45	$\pm$10			BERTIN	97	OBLX	0.0 $\overline{p}p \to K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
90	$\pm$25			PROKOSHKIN	97B	GAM4	100 $\pi^- p \to \eta \pi^0 \pi^0 n$
58	$\pm$10			[5] ARMSTRONG	92E	OMEG	85,300 $\pi^+ p$, $pp \to \pi^+ p$, $pp(K\overline{K}\pi)$
129	$\pm$41			[6] AUGUSTIN	92	DM2	$J/\psi \to \gamma K \overline{K} \pi$
68	$^{+29}_{-18}$	$^{+8}_{-9}$	1100	BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm \pi^\mp$
42	$\pm$22		17	BEHREND	89	CELL	$\gamma\gamma \to K^0_S K^\pm \pi^\mp$
40	$^{+17}_{-13}$	$\pm$5	111	BECKER	87	MRK3	$e^+ e^- \to \omega K \overline{K} \pi$
35	$^{+47}_{-20}$		13	AIHARA	86C	TPC	$e^+ e^- \to e^+ e^- K \overline{K} \pi$
47	$\pm$10			CHAUVAT	84	SPEC	ISR 31.5 pp
62	$\pm$14			BROMBERG	80	SPEC	100 $\pi^- p \to K \overline{K} \pi X$
40	$\pm$15		221	DIONISI	80	HBC	4 $\pi^- p \to K \overline{K} \pi n$
60	$\pm$20			DAHL	67	HBC	1.6–4.2 $\pi^- p$

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

68.7± 2.9		[7] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^+ \pi^-) p_{fast}$
58.8± 3.3		[7] SOSA	99	SPEC	$p p \to p_{slow} (K^0_S K^- \pi^+) p_{fast}$
58 ± 8	389	ARMSTRONG	89	OMEG	300 $p p \to K \overline{K} \pi p p$
62 ± 5	1520	ARMSTRONG	84	OMEG	85 $\pi^+ p$, $p p \to (\pi^+, p)(K \overline{K} \pi) p$
∼ 50		BITYUKOV	84	SPEC	32 $K^- p \to K^+ K^- \pi^0 Y$

[5] This result supersedes ARMSTRONG 84, ARMSTRONG 89.
[6] From fit to the $K^*(892) K$ 1^{++} partial wave.
[7] No systematic error given.

f_1(1420) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K \overline{K} \pi$	dominant
Γ_2	$K \overline{K}^*(892)+$ c.c.	dominant
Γ_3	$\eta \pi \pi$	possibly seen
Γ_4	$a_0(980) \pi$	
Γ_5	$\pi \pi \rho$	
Γ_6	4π	
Γ_7	$\rho^0 \gamma$	
Γ_8	$\phi \gamma$	seen

f_1(1420) Γ(i)Γ($\gamma\gamma$)/Γ(total)

$\Gamma(K \overline{K} \pi) \times / \Gamma_{total}$ — $\Gamma_1 \Gamma_0/\Gamma$

VALUE (keV)	CL%	DOCUMENT ID		TECN	COMMENT
1.7±0.4 OUR AVERAGE					
3.0±0.9±0.7		[8,9] BEHREND	89	CELL	$e^+ e^- \to e^+ e^- K^0_S K \pi$
$2.3^{+1.0}_{-0.9}$±0.8		HILL	89	JADE	$e^+ e^- \to e^+ e^- K^{\pm} K^0_S \pi^{\mp}$
1.3±0.5±0.3		AIHARA	88B	TPC	$e^+ e^- \to e^+ e^- K^{\pm} K^0_S \pi^{\mp}$
1.6±0.7±0.3		[8,10] GIDAL	87B	MRK2	$e^+ e^- \to e^+ e^- K \overline{K} \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<8.0	95	JENNI	83	MRK2	$e^+ e^- \to e^+ e^- K \overline{K} \pi$

[8] Assume a ρ-pole form factor.
[9] A ϕ - pole form factor gives considerably smaller widths.
[10] Published value divided by 2.

$f_1(1420)$ BRANCHING RATIOS

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma(K\overline{K}\pi)$ — Γ_2/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.76±0.06	BROMBERG	80	SPEC	100 $\pi^- p \to K\overline{K}\pi X$
0.86±0.12	DIONISI	80	HBC	4 $\pi^- p \to K\overline{K}\pi n$

$\Gamma(\pi\pi\rho)/\Gamma(K\overline{K}\pi)$ — Γ_5/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.3	95	CORDEN	78	OMEG	12–15 $\pi^- p$
<2.0		DAHL	67	HBC	1.6–4.2 $\pi^- p$

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.1	95	ARMSTRONG	91B	OMEG	300 $pp \to pp\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.35±0.75		KOPKE	89	MRK3	$J/\psi \to \omega\eta\pi\pi(K\overline{K}\pi)$
<0.6	90	GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
<0.5	95	CORDEN	78	OMEG	12–15 $\pi^- p$
1.5 ±0.8		DEFOIX	72	HBC	0.7 $\overline{p}p$

$\Gamma(a_0(980)\pi)/\Gamma(\eta\pi\pi)$ — Γ_4/Γ_3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
>0.1	90	PROKOSHKIN	97B	GAM4	100 $\pi^- p \to \eta\pi^0\pi^0 n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen in either mode		ANDO	86	SPEC	8 $\pi^- p$
not seen in either mode		CORDEN	78	OMEG	12–15 $\pi^- p$
0.4±0.2		DEFOIX	72	HBC	0.7 $\overline{p}p \to 7\pi$

$\Gamma(4\pi)/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_6/Γ_2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.90	95	DIONISI	80	HBC	4 $\pi^- p$

$\Gamma(K\overline{K}\pi)/[\Gamma(K\overline{K}^*(892)+\text{c.c.})+\Gamma(a_0(980)\pi)]$ — $\Gamma_1/(\Gamma_2+\Gamma_4)$

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.65±0.27	[11] DIONISI	80	HBC	4 $\pi^- p$

[11] Calculated using $\Gamma(K\overline{K})/\Gamma(\eta\pi) = 0.24 \pm 0.07$ for $a_0(980)$ fractions.

$\Gamma(a_0(980)\pi)/\Gamma(K\overline{K}^*(892)+\text{c.c.})$ — Γ_4/Γ_2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.04 ±0.01 ±0.01		BARBERIS	98C	OMEG	450 $pp \to p_f f_1(1420) p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.04	68	ARMSTRONG	84	OMEG	85 $\pi^+ p$

$\Gamma(4\pi)/\Gamma(K\overline{K}\pi)$ — Γ_6/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.62	95	ARMSTRONG 89G	OMEG	85 $\pi p \to 4\pi X$

$\Gamma(\rho^0\gamma)/\Gamma_{\text{total}}$ — Γ_7/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.08	95	[12] ARMSTRONG 92C	SPEC	300 $pp \to pp\pi^+\pi^-\gamma$

[12] Using the data on the $\overline{K}K\pi$ mode from ARMSTRONG 89.

$\Gamma(\rho^0\gamma)/\Gamma(K\overline{K}\pi)$ — Γ_7/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.02	95	BARBERIS 98C	OMEG	450 $pp \to p_f f_1(1420) p_s$

$\Gamma(\phi\gamma)/\Gamma(K\overline{K}\pi)$ — Γ_8/Γ_1

VALUE	DOCUMENT ID	TECN	COMMENT
0.003 ±0.001 ±0.001	BARBERIS 98C	OMEG	450 $pp \to p_f f_1(1420) p_s$

$f_1(1420)$ REFERENCES

SOSA	99	PRL 83 913	M. Sosa *et al.*	
BARBERIS	98C	PL B440 225	D. Barberis *et al.*	(WA102 Collab.)
BARBERIS	97C	PL B413 225	D. Barberis *et al.*	(WA102 Collab.)
BERTIN	97	PL B400 226	A. Bertin *et al.*	(OBELIX Collab.)
PROKOSHKIN	97B	SPD 42 298	Yu.D. Prokoshkin, S.A. Sadovsky	
		Translated from DANS 354 751.		
ARMSTRONG	92C	ZPHY C54 371	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)
ARMSTRONG	92E	ZPHY 56 29	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+) JPC
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)
BAI	90C	PRL 65 2507	Z. Bai *et al.*	(Mark III Collab.)
ARMSTRONG	89	PL B221 216	T.A. Armstrong *et al.*	(CERN, CDEF, BIRM+) JPC
ARMSTRONG	89G	ZPHY C43 55	T.A. Armstrong *et al.*	(CERN, BIRM, BARI+)
BEHREND	89	ZPHY C42 367	H.J. Behrend *et al.*	(CELLO Collab.)
HILL	89	ZPHY C42 355	P. Hill *et al.*	(JADE Collab.) JP
KOPKE	89	PRPL 174 67	L. Kopke *et al.*	(CERN)
AIHARA	88B	PL B209 107	H. Aihara *et al.*	(TPC-2γ Collab.)
BECKER	87	PRL 59 186	J.J. Becker *et al.*	(Mark III Collab.) JP
GIDAL	87	PRL 59 2012	G. Gidal *et al.*	(LBL, SLAC, HARV)
GIDAL	87B	PRL 59 2016	G. Gidal *et al.*	(LBL, SLAC, HARV)
AIHARA	86C	PRL 57 2500	H. Aihara *et al.*	(TPC-2γ Collab.) JP
ANDO	86	PRL 57 1296	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+)
ARMSTRONG	84	PL 146B 273	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+) JP
BITYUKOV	84	SJNP 39 735	S. Bityukov *et al.*	(SERP)
		Translated from YAF 39 1165.		
CHAUVAT	84	PL 148B 382	P. Chauvat *et al.*	(CERN, CLER, UCLA+)
JENNI	83	PR D27 1031	P. Jenni *et al.*	(SLAC, LBL)
BROMBERG	80	PR D22 1513	C.M. Bromberg *et al.*	(CIT, FNAL, ILLC+)
DIONISI	80	NP B169 1	C. Dionisi *et al.*	(CERN, MADR, CDEF+) IJP
CORDEN	78	NP B144 253	M.J. Corden *et al.*	(BIRM, RHEL, TELA+)
DEFOIX	72	NP B44 125	C. Defoix *et al.*	(CDEF, CERN)
DAHL	67	PR 163 1377	O.I. Dahl *et al.*	(LRL) IJP
Also	65	PRL 14 1074	D.H. Miller *et al.*	(LRL, UCB)

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GODFREY	99	RMP 71 1411	S. Godfrey, J. Napolitano	
PROKOSHKIN	99	PAN 62 356 Translated from YAF 62 396.	Yu.D. Prokoshkin *et al.*	
IIZUKA	91	PTP 86 885	J. Iizuka, H. Koibuchi	(NAGO)
ISHIDA	89	PTP 82 119	S. Ishida *et al.*	(NIHO)
AIHARA	88C	PR D38 1	H. Aihara *et al.*	(TPC-2γ Collab.) JPC
BITYUKOV	88	PL B203 327	S.I. Bityukov *et al.*	(SERP)
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