$f_1(1420)$

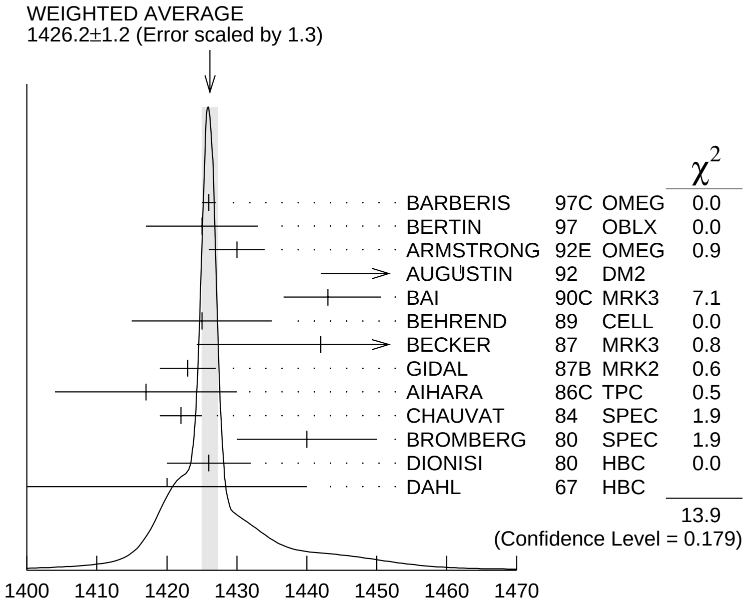
$I^G(J^{PC}) = 0^+(1^{++})$

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

$f_1(1420)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1426.2± 1.2 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 $\overline{p}p \to K^\pm(K^0)\pi^\mp\pi^+\pi^-$
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. • • •					
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.



$f_1(1420)$ mass (MeV)

$f_1(1420)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
55.0± 3.0 OUR AVERAGE					
58 ± 4		BARBERIS	97C	OMEG	450 $pp \rightarrow ppK^0_S K^\pm \pi^\mp$
45 ±10		BERTIN	97	OBLX	0.0 $\overline{p}p \rightarrow K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
58 ±10		[4] ARMSTRONG	92E	OMEG	85,300 $\pi^+ p$, $pp \rightarrow \pi^+ p$, $pp(K\overline{K}\pi)$
129 ±41		[5] AUGUSTIN	92	DM2	$J/\psi \rightarrow \gamma K\overline{K}\pi$
68 $^{+29}_{-18}$ $^{+8}_{-9}$	1100	BAI	90C	MRK3	$J/\psi \rightarrow \gamma K^0_S K^\pm \pi^\mp$
42 ±22	17	BEHREND	89	CELL	$\gamma\gamma \rightarrow K^0_S K^\pm \pi^\mp$
40 $^{+17}_{-13}$ ±5	111	BECKER	87	MRK3	$e^+ e^- \rightarrow \omega K\overline{K}\pi$
35 $^{+47}_{-20}$	13	AIHARA	86C	TPC	$e^+ e^- \rightarrow e^+ e^- K\overline{K}\pi$
47 ±10		CHAUVAT	84	SPEC	ISR 31.5 pp
62 ±14		BROMBERG	80	SPEC	100 $\pi^- p \rightarrow K\overline{K}\pi X$
40 ±15	221	DIONISI	80	HBC	4 $\pi^- p \rightarrow K\overline{K}\pi n$
60 ±20		DAHL	67	HBC	1.6–4.2 $\pi^- p$

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

58 ± 8	389	ARMSTRONG	89	OMEG	300 $pp \to K\overline{K}\pi pp$
62 ± 5	1520	ARMSTRONG	84	OMEG	85 $\pi^+ p$, $pp \to (\pi^+, p)(K\overline{K}\pi)p$
∼ 50		BITYUKOV	84	SPEC	32 $K^- p \to K^+ K^- \pi^0 Y$

[4] This result supersedes ARMSTRONG 84, ARMSTRONG 89.
[5] From fit to the $K^*(892) K$ 1^{++} partial wave.

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	$\gamma\gamma^*$	
Γ_8	$\rho^0\gamma$	

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

$\Gamma(K\overline{K}\pi) \times \Gamma(\gamma\gamma^*)/\Gamma_{total}$ — $\Gamma_1\Gamma_7/\Gamma$

VALUE (keV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.7±0.4 OUR AVERAGE					
3.0±0.9±0.7		[6,7] 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		[6,8] 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	$e^+ e^- \to e^+ e^- K\overline{K}\pi$

[6] Assume a ρ-pole form factor.
[7] A ϕ - pole form factor gives considerably smaller widths.
[8] 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	DOCUMENT ID		TECN	COMMENT
• • • 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	[9] DIONISI	80	HBC	4 $\pi^- p$

[9] 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
• • • 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_8/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.08	95	[10] ARMSTRONG	92C	SPEC	300 $pp \to pp\pi^+\pi^-\gamma$

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

$f_1(1420)$ REFERENCES

BARBERIS	97C	PL B413 225	D. Barberis+	(WA102 Collab.)	
BERTIN	97	PL B400 226	+Bruschi, Capponi+	(OBELIX Collab.)	
ARMSTRONG	92C	ZPHY C54 371	+Barnes, Benayoun+	(ATHU, BARI, BIRM, CERN, CDEF)	
ARMSTRONG	92E	ZPHY 56 29	+Benayoun+	(ATHU, BARI, BIRM, CERN, CDEF)	JPC
AUGUSTIN	92	PR D46 1951	+Cosme	(DM2 Collab.)	
ARMSTRONG	91B	ZPHY C52 389	+Barnes+	(ATHU, BARI, BIRM, CERN, CDEF)	
BAI	90C	PRL 65 2507	+Blaylock+	(Mark III Collab.)	
ARMSTRONG	89	PL B221 216	+Benayoun+	(CERN, CDEF, BIRM, BARI, ATHU, CURIN+)	JPC
ARMSTRONG	89G	ZPHY C43 55	+Bloodworth+	(CERN, BIRM, BARI, ATHU, CURIN+)	
BEHREND	89	ZPHY C42 367	+Criegee+	(CELLO Collab.)	
HILL	89	ZPHY C42 355	+Olsson+	(JADE Collab.)	JP
KOPKE	89	PRPL 174 67	+Wermes+	(CERN)	
AIHARA	88B	PL B209 107	+Alston-Garnjost+	(TPC-2γ Collab.)	
BECKER	87	PRL 59 186	+Blaylock, Bolton, Brown+	(Mark III Collab.)	JP
GIDAL	87	PRL 59 2012	+Boyer, Butler, Cords, Abrams+	(LBL, SLAC, HARV)	
GIDAL	87B	PRL 59 2016	+Boyer, Butler, Cords, Abrams+	(LBL, SLAC, HARV)	
AIHARA	86C	PRL 57 2500	+Alston-Garnjost+	(TPC-2γ Collab.)	JP
ANDO	86	PRL 57 1296	+Imai+	(KEK, KYOT, NIRS, SAGA, INUS, TSUK+)	
ARMSTRONG	84	PL 146B 273	+Bloodworth, Burns+	(ATHU, BARI, BIRM, CERN)	JP
BITYUKOV	84	SJNP 39 735	S. Bityukov+	(SERP)	
		Translated from YAF 39 1165.			
CHAUVAT	84	PL 148B 382	+Meritet, Bonino+	(CERN, CLER, UCLA, SACL)	
JENNI	83	PR D27 1031	+Burke, Telnov, Abrams, Blocker+	(SLAC, LBL)	
BROMBERG	80	PR D22 1513	+Haggerty, Abrams, Dzierba	(CIT, FNAL, ILLC, IND)	
DIONISI	80	NP B169 1	+Gavillet+	(CERN, MADR, CDEF, STOH)	IJP
CORDEN	78	NP B144 253	+Corbett, Alexander+	(BIRM, RHEL, TELA, LOWC)	
DEFOIX	72	NP B44 125	+Nascimento, Bizzarri+	(CDEF, CERN)	
DAHL	67	PR 163 1377	+Hardy, Hess, Kirz, Miller	(LRL)	IJP
Also	65	PRL 14 1074	Miller, Chung, Dahl, Hess, Hardy, Kirz+	(LRL, UCB)	

OTHER RELATED PAPERS

IIZUKA	91	PTP 86 885	+Koibuchi	(NAGO)	
ISHIDA	89	PTP 82 119	+Oda, Sawazaki, Yamada	(NIHO)	
AIHARA	88C	PR D38 1	+Alston-Garnjost+	(TPC-2γ Collab.)	JPC
BITYUKOV	88	PL B203 327	+Borisov, Dorofeev+	(SERP)	
PROTOPOP...	87B	Hadron 87 Conf.	Protopopescu, Chung	(BNL)	