

K₂(1770)

$$I(J^P) = \frac{1}{2}(2^-)$$

THE K₂(1770) AND THE K₂(1820)

A partial-wave analysis of the $K^- \omega$ system based on about 100,000 $K^- p \rightarrow K^- \omega p$ events (ASTON 93) gives evidence for two $q\bar{q}$ D -wave states near 1.8 GeV. A previous analysis based on about 200,000 diffractively produced $K^- p \rightarrow K^- \pi^+ \pi^- p$ events (DAUM 81) gave evidence for two $J^P = 2^-$ states in this region, with masses ~ 1780 MeV and ~ 1840 MeV and widths ~ 200 MeV, in good agreement with the results of ASTON 93. In contrast, the masses obtained using a single resonance do not agree well: ASTON 93 obtains 1728 ± 7 MeV, while DAUM 81 estimates ~ 1820 MeV. We conclude that there are indeed two K_2 resonances here.

We list under the $K_2(1770)$ other measurements that do not resolve the two-resonance structure of the enhancement.

References

References may be found at the end of the $K_2(1770)$ Listing.

K₂(1770) MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
1773 ± 8		¹ ASTON	93	LASS	11 $K^- p \rightarrow K^- \omega p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
1743 ± 15		TIKHOMIROV	03	SPEC	40.0 $\pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
1810 ± 20		FRAME	86	OMEG +	13 $K^+ p \rightarrow \phi K^+ p$
~ 1730		ARMSTRONG	83	OMEG -	18.5 $K^- p \rightarrow 3K p$
~ 1780		² DAUM	81C	CNTR -	63 $K^- p \rightarrow K^- 2\pi p$
1710 ± 15	60	CHUNG	74	HBC -	7.3 $K^- p \rightarrow K^- \omega p$
1767 ± 6		BLIEDEN	72	MMS -	11-16 $K^- p$
1730 ± 20	306	³ FIRESTONE	72B	DBC +	12 $K^+ d$
1765 ± 40		⁴ COLLEY	71	HBC +	10 $K^+ p \rightarrow K 2\pi N$
1740		DENEGRI	71	DBC -	12.6 $K^- d \rightarrow \bar{K} 2\pi d$
1745 ± 20		AGUILAR-...	70C	HBC -	4.6 $K^- p$
1780 ± 15		BARTSCH	70C	HBC -	10.1 $K^- p$
1760 ± 15		LUDLAM	70	HBC -	12.6 $K^- p$

- ¹ From a partial wave analysis of the $K^- \omega$ system.
² From a partial wave analysis of the $K^- 2\pi$ system.
³ Produced in conjunction with excited deuteron.
⁴ Systematic errors added correspond to spread of different fits.

$K_2(1770)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
186 ± 14		⁵ ASTON	93 LASS		11 $K^- p \rightarrow K^- \omega p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
147 ± 70		TIKHOMIROV 03	SPEC		40.0 $\pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
140 ± 40		FRAME	86 OMEG +		13 $K^+ p \rightarrow \phi K^+ p$
~ 220		ARMSTRONG	83 OMEG -		18.5 $K^- p \rightarrow 3K p$
~ 210		⁶ DAUM	81C CNTR -		63 $K^- p \rightarrow K^- 2\pi p$
110 ± 50	60	CHUNG	74 HBC -		7.3 $K^- p \rightarrow K^- \omega p$
100 ± 26		BLIEDEN	72 MMS -		11-16 $K^- p$
210 ± 30	306	⁷ FIRESTONE	72B DBC +		12 $K^+ d$
90 ± 70		⁸ COLLEY	71 HBC +		10 $K^+ p \rightarrow K 2\pi N$
130		DENEGRI	71 DBC -		12.6 $K^- d \rightarrow \bar{K} 2\pi d$
100 ± 50		AGUILAR-...	70C HBC -		4.6 $K^- p$
138 ± 40		BARTSCH	70C HBC -		10.1 $K^- p$
50 ⁺⁴⁰ ₋₂₀		LUDLAM	70 HBC -		12.6 $K^- p$

- ⁵ From a partial wave analysis of the $K^- \omega$ system.
⁶ From a partial wave analysis of the $K^- 2\pi$ system.
⁷ Produced in conjunction with excited deuteron.
⁸ Systematic errors added correspond to spread of different fits.

$K_2(1770)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $K \pi \pi$	
Γ_2 $K_2^*(1430) \pi$	dominant
Γ_3 $K^*(892) \pi$	seen
Γ_4 $K f_2(1270)$	seen
Γ_5 $K f_0(980)$	
Γ_6 $K \phi$	seen
Γ_7 $K \omega$	seen

$K_2(1770)$ BRANCHING RATIOS

$$\frac{\Gamma(K_2^*(1430)\pi)/\Gamma(K\pi\pi)}{\Gamma_2/\Gamma_1} \quad (K_2^*(1430) \rightarrow K\pi)$$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				

~ 0.03	DAUM	81C CNTR		63 $K^- p \rightarrow K^- 2\pi p$
~ 1.0	⁹ FIRESTONE	72B DBC	+	12 $K^+ d$
<1.0	COLLEY	71 HBC		10 $K^+ p$
0.2 ± 0.2	AGUILAR-...	70C HBC	-	4.6 $K^- p$
<1.0	BARTSCH	70C HBC	-	10.1 $K^- p$
1.0	BARBARO-...	69 HBC	+	12.0 $K^+ p$

⁹Produced in conjunction with excited deuteron.

$\Gamma(K^*(892)\pi)/\Gamma(K\pi\pi)$ Γ_3/Γ_1

VALUE DOCUMENT ID TECN COMMENT

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

~ 0.23	DAUM	81C CNTR		63 $K^- p \rightarrow K^- 2\pi p$
--------	------	----------	--	-----------------------------------

$\Gamma(K f_2(1270))/\Gamma(K\pi\pi)$ Γ_4/Γ_1

($f_2(1270) \rightarrow \pi\pi$)

VALUE DOCUMENT ID TECN COMMENT

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

~ 0.74	DAUM	81C CNTR		63 $K^- p \rightarrow K^- 2\pi p$
--------	------	----------	--	-----------------------------------

$\Gamma(K f_0(980))/\Gamma_{total}$ Γ_5/Γ

VALUE DOCUMENT ID TECN COMMENT

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

possibly seen	TIKHOMIROV 03	SPEC		40.0 $\pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
---------------	---------------	------	--	--

$\Gamma(K\phi)/\Gamma_{total}$ Γ_6/Γ

VALUE DOCUMENT ID TECN CHG COMMENT

seen	ARMSTRONG 83	OMEG	-	18.5 $K^- p \rightarrow K^- \phi N$
-------------	--------------	------	---	-------------------------------------

$\Gamma(K\omega)/\Gamma_{total}$ Γ_7/Γ

VALUE DOCUMENT ID TECN CHG COMMENT

seen	OTTER	81	HBC	±	8.25,10,16 $K^\pm p$
seen	CHUNG	74	HBC	-	7.3 $K^- p \rightarrow K^- \omega p$

$K_2(1770)$ REFERENCES

TIKHOMIROV 03	PAN 66 828	G.D. Tikhomirov <i>et al.</i>
	Translated from YAF 66 860.	
ASTON 93	PL B308 186	D. Aston <i>et al.</i> (SLAC, NAGO, CINC, INUS)
FRAME 86	NP B276 667	D. Frame <i>et al.</i> (GLAS)
ARMSTRONG 83	NP B221 1	T.A. Armstrong <i>et al.</i> (BARI, BIRM, CERN+)
DAUM 81C	NP B187 1	C. Daum <i>et al.</i> (AMST, CERN, CRAC, MPIM+)
OTTER 81	NP B181 1	G. Otter (AACH3, BERL, LOIC, VIEN, BIRM+)
CHUNG 74	PL 51B 413	S.U. Chung <i>et al.</i> (BNL)
BLIEDEN 72	PL 39B 668	H.R. Blieden <i>et al.</i> (STON, NEAS)
FIRESTONE 72B	PR D5 505	A. Firestone <i>et al.</i> (LBL)
COLLEY 71	NP B26 71	D.C. Colley <i>et al.</i> (BIRM, GLAS)
DENEGRI 71	NP B28 13	D. Denegri <i>et al.</i> (JHU) JP
AGUILAR-... 70C	PRL 25 54	M. Aguilar-Benitez <i>et al.</i> (BNL)
BARTSCH 70C	PL 33B 186	J. Bartsch <i>et al.</i> (AACH, BERL, CERN+)
LUDLAM 70	PR D2 1234	T. Ludlam, J. Sandweiss, A.J. Slaughter (YALE)
BARBARO-... 69	PRL 22 1207	A. Barbaro-Galtieri <i>et al.</i> (LRL)

————— **OTHER RELATED PAPERS** —————

BERLINGHIERI	67	PRL 18 1087	J.C. Berlinghieri <i>et al.</i>	(ROCH) I
CARMONY	67	PRL 18 615	D.D. Carmony, T. Hendricks, R.L. Lander	(UCSD)
JOBES	67	PL 26B 49	M. Jobes <i>et al.</i>	(BIRM, CERN, BRUX)
BARTSCH	66	PL 22 357	J. Bartsch <i>et al.</i>	(AACH, BERL, CERN+)
