

# $K_3^*(1780)$

$$I(J^P) = \frac{1}{2}(3^-)$$

## $K_3^*(1780)$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
<b>1776 ± 7 OUR AVERAGE</b> Error includes scale factor of 1.1.						
1781 ± 8 ± 4		<sup>1</sup> ASTON	88	LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
1740 ± 14 ± 15		<sup>1</sup> ASTON	87	LASS	0	11 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
1779 ± 11		<sup>2</sup> BALDI	76	SPEC	+	10 $K^+ p \rightarrow K^0 \pi^+ p$
1776 ± 26		<sup>3</sup> BRANDENB...	76D	ASPK	0	13 $K^\pm p \rightarrow K^\pm \pi^\mp N$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1720 ± 10 ± 15	6111	<sup>4</sup> BIRD	89	LASS	-	11 $K^- p \rightarrow \bar{K}^0 \pi^- p$
1749 ± 10		ASTON	88B	LASS	-	11 $K^- p \rightarrow K^- \eta p$
1780 ± 9	300	BAUBILLIER	84B	HBC	-	8.25 $K^- p \rightarrow \bar{K}^0 \pi^- p$
1790 ± 15		BAUBILLIER	82B	HBC	0	8.25 $K^- p \rightarrow K_S^0 2\pi N$
1784 ± 9	2060	CLELAND	82	SPEC	±	50 $K^+ p \rightarrow K_S^0 \pi^\pm p$
1786 ± 15		<sup>5</sup> ASTON	81D	LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
1762 ± 9	190	TOAFF	81	HBC	-	6.5 $K^- p \rightarrow \bar{K}^0 \pi^- p$
1850 ± 50		ETKIN	80	MPS	0	6 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^-$
1812 ± 28		BEUSCH	78	OMEG		10 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
1786 ± 8		CHUNG	78	MPS	0	6 $K^- p \rightarrow K^- \pi^+ n$

<sup>1</sup> From energy-independent partial-wave analysis.

<sup>2</sup> From a fit to  $Y_6^2$  moment.  $J^P = 3^-$  found.

<sup>3</sup> Confirmed by phase shift analysis of ESTABROOKS 78, yields  $J^P = 3^-$ .

<sup>4</sup> From a partial wave amplitude analysis.

<sup>5</sup> From a fit to the  $Y_6^0$  moment.

## $K_3^*(1780)$ WIDTH

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
<b>159 ± 21 OUR AVERAGE</b> Error includes scale factor of 1.3. See the ideogram below.						
203 ± 30 ± 8		<sup>6</sup> ASTON	88	LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
171 ± 42 ± 20		<sup>6</sup> ASTON	87	LASS	0	11 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
135 ± 22		<sup>7</sup> BALDI	76	SPEC	+	10 $K^+ p \rightarrow K^0 \pi^+ p$

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

$187 \pm 31 \pm 20$	6111	<sup>8</sup> BIRD	89	LASS	–	11 $K^- p \rightarrow \bar{K}^0 \pi^- p$
$193^{+51}_{-37}$		ASTON	88B	LASS	–	11 $K^- p \rightarrow K^- \eta p$
$99 \pm 30$	300	BAUBILLIER	84B	HBC	–	$8.25 K^- p \rightarrow \bar{K}^0 \pi^- p$
~ 130		BAUBILLIER	82B	HBC	0	$8.25 K^- p \rightarrow K_S^0 2\pi N$
$191 \pm 24$	2060	CLELAND	82	SPEC	±	50 $K^+ p \rightarrow K_S^0 \pi^\pm p$
$225 \pm 60$		<sup>9</sup> ASTON	81D	LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
~ 80	190	TOAFF	81	HBC	–	$6.5 K^- p \rightarrow \bar{K}^0 \pi^- p$
$240 \pm 50$		ETKIN	80	MPS	0	$6 K^- p \rightarrow \bar{K}^0 \pi^+ \pi^-$
$181 \pm 44$		<sup>10</sup> BEUSCH	78	OMEG		$10 K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
$96 \pm 31$		CHUNG	78	MPS	0	$6 K^- p \rightarrow K^- \pi^+ n$
$270 \pm 70$		<sup>11</sup> BRANDENB...	76D	ASPK	0	$13 K^\pm p \rightarrow K^\pm \pi^\mp N$

<sup>6</sup> From energy-independent partial-wave analysis.

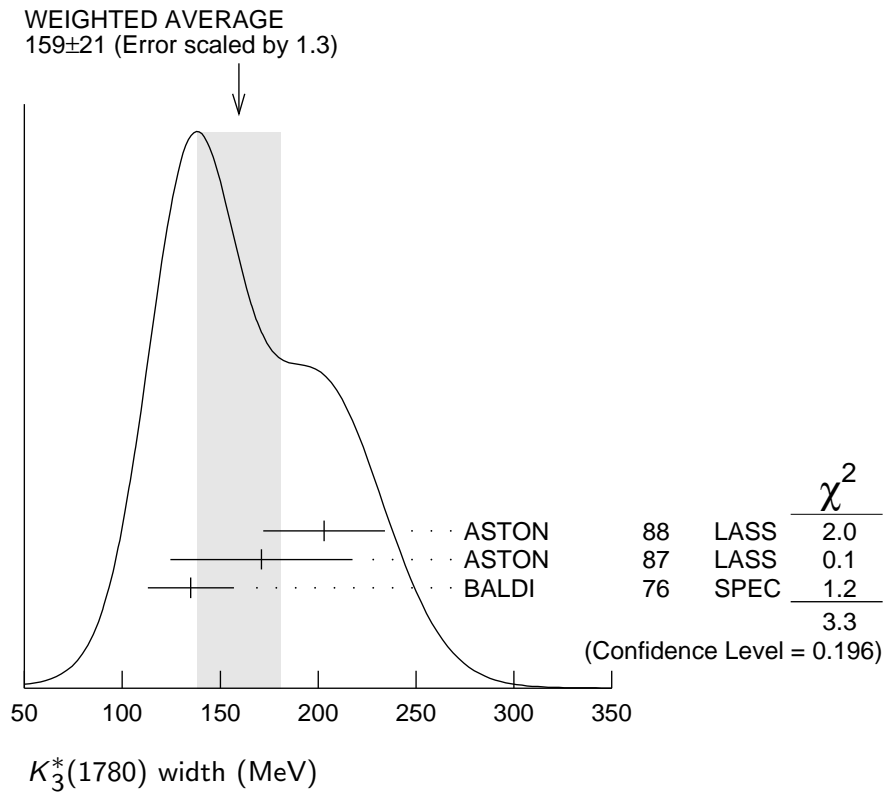
<sup>7</sup> From a fit to  $Y_6^2$  moment.  $J^P = 3^-$  found.

<sup>8</sup> From a partial wave amplitude analysis.

<sup>9</sup> From a fit to  $Y_6^0$  moment.

<sup>10</sup> Errors enlarged by us to  $4\Gamma/\sqrt{N}$ ; see the note with the  $K^*(892)$  mass.

<sup>11</sup> ESTABROOKS 78 find that BRANDENBURG 76D data are consistent with 175 MeV width. Not averaged.



### $K_3^*(1780)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Confidence level
$\Gamma_1$ $K\rho$	$(31 \pm 9) \%$	
$\Gamma_2$ $K^*(892)\pi$	$(20 \pm 5) \%$	
$\Gamma_3$ $K\pi$	$(18.8 \pm 1.0) \%$	
$\Gamma_4$ $K\eta$	$(30 \pm 13) \%$	
$\Gamma_5$ $K_2^*(1430)\pi$	$< 16 \%$	95%

## CONSTRAINED FIT INFORMATION

An overall fit to 3 branching ratios uses 4 measurements and one constraint to determine 4 parameters. The overall fit has a  $\chi^2 = 0.0$  for 1 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients  $\langle \delta x_i \delta x_j \rangle / (\delta x_i \delta x_j)$ , in percent, from the fit to the branching fractions,  $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$ . The fit constrains the  $x_i$  whose labels appear in this array to sum to one.

$x_2$	85		
$x_3$	18	21	
$x_4$	-98	-94	-27
	$x_1$	$x_2$	$x_3$

### $K_3^*(1780)$ BRANCHING RATIOS

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$   $\Gamma_1/\Gamma_2$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>1.52 ± 0.23 OUR FIT</b>				
<b>1.52 ± 0.21 ± 0.10</b>	ASTON	87	LASS	0
				11 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$

$\Gamma(K^*(892)\pi)/\Gamma(K\pi)$   $\Gamma_2/\Gamma_3$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>1.09 ± 0.26 OUR FIT</b>				
<b>1.09 ± 0.26</b>	ASTON	84B	LASS	0
				11 $K^- p \rightarrow \bar{K}^0 2\pi n$

$\Gamma(K\pi)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>0.188 ± 0.010 OUR FIT</b>				
<b>0.188 ± 0.010 OUR AVERAGE</b>				
0.187 ± 0.008 ± 0.008	ASTON	88	LASS	0
				11 $K^- p \rightarrow K^- \pi^+ n$
0.19 ± 0.02	ESTABROOKS	78	ASPK	0
				13 $K^\pm p \rightarrow K\pi N$

$\Gamma(K\eta)/\Gamma(K\pi)$   $\Gamma_4/\Gamma_3$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<b>1.6 ± 0.7 OUR FIT</b>				

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

0.41 ± 0.050	<sup>12</sup> BIRD	89	LASS	-	11 $K^- p \rightarrow \bar{K}^0 \pi^- p$
0.50 ± 0.18	ASTON	88B	LASS	-	11 $K^- p \rightarrow K^- \eta p$

<sup>12</sup> This result supersedes ASTON 88B.

$\Gamma(K_2^*(1430)\pi)/\Gamma(K^*(892)\pi)$   $\Gamma_5/\Gamma_2$

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
<b>&lt; 0.78</b>	95	ASTON	87	LASS	0
					11 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$

### $K_3^*$ (1780) REFERENCES

BIRD	89	SLAC-332	P.F. Bird	(SLAC)
ASTON	88	NP B296 493	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
ASTON	88B	PL B201 169	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS) JP
ASTON	87	NP B292 693	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
ASTON	84B	NP B247 261	D. Aston <i>et al.</i>	(SLAC, CARL, OTTA)
BAUBILLIER	84B	ZPHY C26 37	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
BAUBILLIER	82B	NP B202 21	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
CLELAND	82	NP B208 189	W.E. Cleland <i>et al.</i>	(DURH, GEVA, LAUS+)
ASTON	81D	PL 99B 502	D. Aston <i>et al.</i>	(SLAC, CARL, OTTA) JP
TOAFF	81	PR D23 1500	S. Toaff <i>et al.</i>	(ANL, KANS)
ETKIN	80	PR D22 42	A. Etkin <i>et al.</i>	(BNL, CUNY) JP
BEUSCH	78	PL 74B 282	W. Beusch <i>et al.</i>	(CERN, AACH3, ETH) JP
CHUNG	78	PRL 40 355	S.U. Chung <i>et al.</i>	(BNL, BRAN, CUNY+) JP
ESTABROOKS	78	NP B133 490	P.G. Estabrooks <i>et al.</i>	(MCGI, CARL, DURH+) JP
Also		PR D17 658	P.G. Estabrooks <i>et al.</i>	(MCGI, CARL, DURH+)
BALDI	76	PL 63B 344	R. Baldi <i>et al.</i>	(GEVA) JP
BRANDENB...	76D	PL 60B 478	G.W. Brandenburg <i>et al.</i>	(SLAC) JP

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