

$K_0^*(1430)$ 

$$I(J^P) = \frac{1}{2}(0^+)$$

### $K_0^*(1430)$ T-MATRIX POLE $\sqrt{s}$

Note that  $\Gamma = -2 \operatorname{Im}(\sqrt{s})$ .

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>(1431 ± 6) – i (110 ± 19) OUR ESTIMATE</b>			
(1431 ± 6) – i (110 ± 19)	<sup>1</sup> PELAEZ	17	RVUE $\pi K \rightarrow \pi K$
<sup>1</sup> Reanalysis of ESTABROOKS 78 and ASTON 88 satisfying Forward Dispersion Relations and using sequences of Pade approximants.			

### $K_0^*(1430)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1425 ± 50 OUR ESTIMATE</b>				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1493 ± 4 ± 7		<sup>1</sup> AAJ	23AH LHCb	$B^+ \rightarrow K^+ (K_S^0 K \pi)$
1449 ± 17 ± 2		<sup>2</sup> LEES	21A BABR	$\eta_c(1S) \rightarrow \eta' K^+ K^-$
1438 ± 8 ± 4	5.4k	<sup>3</sup> LEES	14E BABR	$\eta_c(1S) \rightarrow K^+ K^- \eta/\pi^0$
1427 ± 4 ± 13		<sup>4</sup> BUGG	10 RVUE	S-matrix pole
1466.6 ± 0.7 ± 3.4	141k	<sup>5</sup> BONVICINI	08A CLEO	$D^+ \rightarrow K^- \pi^+ \pi^+$
~ 1412		<sup>6</sup> LINK	07 FOCS	$D^+ \rightarrow K^- K^+ \pi^+$
1461.0 ± 4.0 ± 2.1	54k	<sup>7</sup> LINK	07B FOCS	$D^+ \rightarrow K^- \pi^+ \pi^+$
1406 ± 29		<sup>8</sup> BUGG	06 RVUE	
1435 ± 6		<sup>9</sup> ZHOU	06 RVUE	$K p \rightarrow K^- \pi^+ n$
1455 ± 20 ± 15		ABLIKIM	05Q BES2	$\psi(2S) \rightarrow$ $\gamma \pi^+ \pi^- K^+ K^-$
1456 ± 8		<sup>10</sup> ZHENG	04 RVUE	$K^- p \rightarrow K^- \pi^+ n$
~ 1419		<sup>11</sup> BUGG	03 RVUE	$11 K^- p \rightarrow K^- \pi^+ n$
~ 1440		<sup>12</sup> LI	03 RVUE	$11 K^- p \rightarrow K^- \pi^+ n$
1459 ± 9	15k	<sup>13</sup> AITALA	02 E791	$D^+ \rightarrow K^- \pi^+ \pi^+$
~ 1440		<sup>14</sup> JAMIN	00 RVUE	$K p \rightarrow K p$
1436 ± 8		<sup>15</sup> BARBERIS	98E OMEG	$450 p p \rightarrow$ $p_f p_s K^+ K^- \pi^+ \pi^-$
1415 ± 25		<sup>11</sup> ANISOVICH	97C RVUE	$11 K^- p \rightarrow K^- \pi^+ n$
~ 1450		<sup>16</sup> TORNQVIST	96 RVUE	$\pi \pi \rightarrow \pi \pi, K \bar{K}, K \pi$
1412 ± 6		<sup>17</sup> ASTON	88 LASS	$11 K^- p \rightarrow K^- \pi^+ n$
~ 1430		BAUBILLIER	84B HBC	$8.25 K^- p \rightarrow \bar{K}^0 \pi^- p$
~ 1425		<sup>18</sup> ESTABROOKS	78 ASPK	$13 K^\pm p \rightarrow K^\pm \pi^\pm (n, \Delta)$
~ 1450.0		MARTIN	78 SPEC	$10 K^\pm p \rightarrow K_S^0 \pi p$

<sup>1</sup> From Dalitz plot analyses of  $\eta_c(1S, 2S) \rightarrow K_S^0 K^+ \pi^- + \text{c.c.}$ .<sup>2</sup> Using a  $K \pi - K \eta'$  coupled channel Breit-Wigner function.<sup>3</sup> Using both  $\eta \rightarrow \gamma \gamma$  and  $\eta \rightarrow \pi^+ \pi^- \pi^0$ . From a likelihood scan in the presence of several interfering scalar-meson resonances with fixed width  $\Gamma(K_0^*(1430)) = 210$  MeV.

- <sup>4</sup> S-matrix pole. Supersedes BUGG 06. Combined analysis of ASTON 88, ABLIKIM 06C, AITALA 06, and LINK 09 using an  $s$ -dependent width with couplings to  $K\pi$  and  $K\eta'$ , and the Adler zero near thresholds.
- <sup>5</sup> From the isobar model with a complex pole for the  $\kappa$ .
- <sup>6</sup> From a non-parametric analysis.
- <sup>7</sup> A Breit-Wigner mass and width.
- <sup>8</sup> S-matrix pole. Reanalysis of ASTON 88, AITALA 02, and ABLIKIM 06C including the  $\kappa$  with an  $s$ -dependent width and an Adler zero near threshold.
- <sup>9</sup> S-matrix pole. Using ASTON 88 and assuming  $K_0^*(700)$ ,  $K_0^*(1950)$ .
- <sup>10</sup> Using ASTON 88 and assuming  $K_0^*(700)$ .
- <sup>11</sup> T-matrix pole. Reanalysis of ASTON 88 data.
- <sup>12</sup> Breit-Wigner fit. Using ASTON 88.
- <sup>13</sup> Assuming a low-mass scalar  $K\pi$  resonance,  $\kappa(700)$ .
- <sup>14</sup> T-matrix pole. Using data from ESTABROOKS 78 and ASTON 88.
- <sup>15</sup>  $J^P$  not determined, could be  $K_2^*(1430)$ .
- <sup>16</sup> T-matrix pole.
- <sup>17</sup> Uses a model for the background, without this background they get a mass 1340 MeV, where the phase shift passes  $90^\circ$ .
- <sup>18</sup> Mass defined by pole position. From elastic  $K\pi$  partial-wave analysis.

### $K_0^*(1430)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>270 ± 80</b>				<b>OUR ESTIMATE</b>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
215 ± 7 ± 4		<sup>1</sup> AAIJ	23AH LHCb	$B^+ \rightarrow K^+(K_S^0 K\pi)$
210 ± 20 ± 12	5.4k	<sup>2</sup> LEES	14E BABR	$\eta_c(1S) \rightarrow K^+ K^- \eta/\pi^0$
270 ± 10 ± 40		<sup>3</sup> BUGG	10 RVUE	S-matrix pole
174.2 ± 1.9 ± 3.2	141k	<sup>4</sup> BONVICINI	08A CLEO	$D^+ \rightarrow K^- \pi^+ \pi^+$
~ 500		<sup>5</sup> LINK	07 FOCS	$D^+ \rightarrow K^- K^+ \pi^+$
177.0 ± 8.0 ± 3.4	54k	<sup>6</sup> LINK	07B FOCS	$D^+ \rightarrow K^- \pi^+ \pi^+$
350 ± 40		<sup>7</sup> BUGG	06 RVUE	
288 ± 22		<sup>8</sup> ZHOU	06 RVUE	$Kp \rightarrow K^- \pi^+ n$
270 ± 45 <sup>+30</sup> / <sub>-35</sub>		ABLIKIM	05Q BES2	$\psi(2S) \rightarrow \gamma \pi^+ \pi^- K^+ K^-$
217 ± 31		<sup>9</sup> ZHENG	04 RVUE	$K^- p \rightarrow K^- \pi^+ n$
~ 316		<sup>10</sup> BUGG	03 RVUE	$11 K^- p \rightarrow K^- \pi^+ n$
~ 350		<sup>11</sup> LI	03 RVUE	$11 K^- p \rightarrow K^- \pi^+ n$
175 ± 17	15k	<sup>12</sup> AITALA	02 E791	$D^+ \rightarrow K^- \pi^+ \pi^+$
~ 300		<sup>13</sup> JAMIN	00 RVUE	$Kp \rightarrow Kp$
196 ± 45		<sup>14</sup> BARBERIS	98E OMEG	$450 pp \rightarrow p_f p_s K^+ K^- \pi^+ \pi^-$
330 ± 50		<sup>10</sup> ANISOVICH	97C RVUE	$11 K^- p \rightarrow K^- \pi^+ n$
~ 320		<sup>15</sup> TORNQVIST	96 RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, K\pi$
294 ± 23		ASTON	88 LASS	$11 K^- p \rightarrow K^- \pi^+ n$
~ 200		BAUBILLIER	84B HBC	$8.25 K^- p \rightarrow \bar{K}^0 \pi^- p$
200 to 300		<sup>16</sup> ESTABROOKS	78 ASPK	$13 K^\pm p \rightarrow K^\pm \pi^\pm (n, \Delta)$

<sup>1</sup> From Dalitz plot analyses of  $\eta_c(1S, 2S) \rightarrow K_S^0 K^+ \pi^- + \text{c.c.}$

- <sup>2</sup> Using both  $\eta \rightarrow \gamma\gamma$  and  $\eta \rightarrow \pi^+\pi^-\pi^0$ . From a likelihood scan in the presence of several interfering scalar-meson resonances with fixed mass  $M(K_0^*(1430)) = 1435$  MeV.
- <sup>3</sup> S-matrix pole. Supersedes BUGG 06. Combined analysis of ASTON 88, ABLIKIM 06c, AITALA 06, and LINK 09 using an  $s$ -dependent width with couplings to  $K\pi$  and  $K\eta'$ , and the Adler zero near thresholds.
- <sup>4</sup> From the isobar model with a complex pole for the  $\kappa$ .
- <sup>5</sup> From a non-parametric analysis.
- <sup>6</sup> A Breit-Wigner mass and width.
- <sup>7</sup> S-matrix pole. Reanalysis of ASTON 88, AITALA 02, and ABLIKIM 06c including the  $\kappa$  with an  $s$ -dependent width and an Adler zero near threshold.
- <sup>8</sup> S-matrix pole. Using ASTON 88 and assuming  $K_0^*(700)$ ,  $K_0^*(1950)$ .
- <sup>9</sup> Using ASTON 88 and assuming  $K_0^*(700)$ .
- <sup>10</sup> T-matrix pole. Reanalysis of ASTON 88 data.
- <sup>11</sup> Breit-Wigner fit. Using ASTON 88.
- <sup>12</sup> Assuming a low-mass scalar  $K\pi$  resonance,  $\kappa(700)$ .
- <sup>13</sup> T-matrix pole. Using data from ESTABROOKS 78 and ASTON 88.
- <sup>14</sup>  $J^P$  not determined, could be  $K_2^*(1430)$ .
- <sup>15</sup> T-matrix pole.
- <sup>16</sup> From elastic  $K\pi$  partial-wave analysis.

### $K_0^*(1430)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $K\pi$	(93 $\pm$ 10) %
$\Gamma_2$ $K\eta$	( 8.6 $^{+2.7}_{-3.4}$ ) %
$\Gamma_3$ $K\eta'(958)$	seen

### $K_0^*(1430)$ BRANCHING RATIOS

$\Gamma(K\pi)/\Gamma_{\text{total}}$						$\Gamma_1/\Gamma$
VALUE	DOCUMENT ID	TECN	CHG	COMMENT		
<b>0.93<math>\pm</math>0.04<math>\pm</math>0.09</b>	ASTON	88	LASS	0	11	$K^-p \rightarrow K^-\pi^+n$

$\Gamma(K\eta)/\Gamma(K\pi)$						$\Gamma_2/\Gamma_1$
VALUE (%)	EVTS	DOCUMENT ID	TECN	COMMENT		
<b>9.2<math>\pm</math>2.5<math>^{+1.0}_{-2.5}</math></b>	5.4k	<sup>1</sup> LEES	14E	BABR	$\eta_c(1S) \rightarrow K^+K^-\eta/\pi^0$	

<sup>1</sup> Using both  $\eta \rightarrow \gamma\gamma$  and  $\eta \rightarrow \pi^+\pi^-\pi^0$ . From a Dalitz analysis in the presence of several interfering scalar-meson resonances.

$\Gamma(K\eta'(958))/\Gamma_{\text{total}}$						$\Gamma_3/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT			
<b>seen</b>	ABLIKIM	14J	BES3	$\psi(2S) \rightarrow \gamma K^+K^-\eta'(958)$		

$\Gamma(K\eta'(958))/\Gamma(K\pi)$  $\Gamma_3/\Gamma_1$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.397 ± 0.064 ± 0.054</b>	<sup>1</sup> LEES	21A BABR	$\eta_c(1S) \rightarrow \eta' K^+ K^-$

<sup>1</sup> Using  $K\pi$  data from LEES 14E. **$K_0^*(1430)$  REFERENCES**

AAIJ	23AH	PR D108 032010	R. Aaij <i>et al.</i>	(LHCb Collab.)
LEES	21A	PR D104 072002	J.P. Lees <i>et al.</i>	(BABAR Collab.)
PELAEZ	17	EPJ C77 91	J.R. Pelaez, A.Rodas, J.R. de Elvira	
ABLIKIM	14J	PR D89 074030	M. Ablikim <i>et al.</i>	(BESIII Collab.)
LEES	14E	PR D89 112004	J.P. Lees <i>et al.</i>	(BABAR Collab.)
BUGG	10	PR D81 014002	D.V. Bugg	(LOQM)
LINK	09	PL B681 14	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
BONVICINI	08A	PR D78 052001	G. Bonvicini <i>et al.</i>	(CLEO Collab.)
LINK	07	PL B648 156	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
LINK	07B	PL B653 1	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
ABLIKIM	06C	PL B633 681	M. Ablikim <i>et al.</i>	(BES Collab.)
AITALA	06	PR D73 032004	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
Also		PR D74 059901 (errat.)	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
BUGG	06	PL B632 471	D.V. Bugg	(LOQM)
ZHOU	06	NP A775 212	Z.Y. Zhou, H.Q. Zheng	
ABLIKIM	05Q	PR D72 092002	M. Ablikim <i>et al.</i>	(BES Collab.)
ZHENG	04	NP A733 235	H.Q. Zheng <i>et al.</i>	
BUGG	03	PL B572 1	D.V. Bugg	
LI	03	PR D67 034025	L. Li, B. Zou, G. Li	
AITALA	02	PRL 89 121801	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
JAMIN	00	NP B587 331	M. Jamin <i>et al.</i>	
BARBERIS	98E	PL B436 204	D. Barberis <i>et al.</i>	(Omega Expt.)
ANISOVICH	97C	PL B413 137	A.V. Anisovich, A.V. Sarantsev	
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)
ASTON	88	NP B296 493	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
BAUBILLIER	84B	ZPHY C26 37	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
ESTABROOKS	78	NP B133 490	P.G. Estabrooks <i>et al.</i>	(MCGI, CARL, DURH+)
MARTIN	78	NP B134 392	A.D. Martin <i>et al.</i>	(DURH, GEVA)