

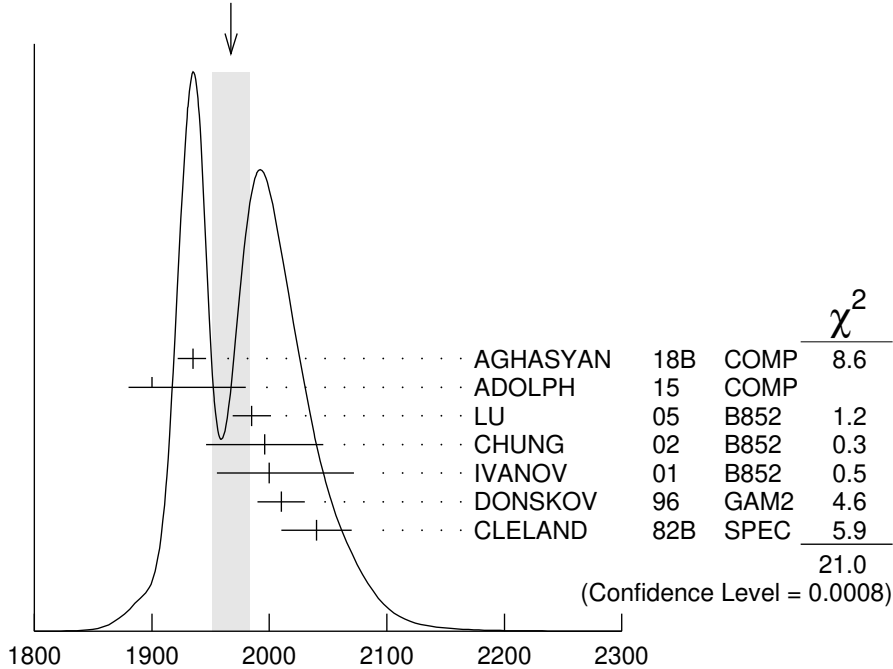
**$a_4(1970)$**   
 was  $a_4(2040)$

$$I^G(J^{PC}) = 1^-(4^{++})$$

**$a_4(1970)$  MASS**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>1967±16 OUR AVERAGE</b>		Error includes scale factor of 2.1. See the ideogram below.			
1935 <sup>+11</sup> <sub>-13</sub>	46M	1 AGHASYAN	18B	COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
1900 <sup>+80</sup> <sub>-20</sub>		ADOLPH	15	COMP	191 $\pi^- p \rightarrow \eta^{(1)} \pi^- p$
1985±10±13	145k	LU	05	B852	18 $\pi^- p \rightarrow \omega \pi^- \pi^0 p$
1996±25±43		CHUNG	02	B852	18.3 $\pi^- p \rightarrow 3\pi p$
2000±40 <sup>+60</sup> <sub>-20</sub>		IVANOV	01	B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
2010±20		2 DONSKOV	96	GAM2 0	38 $\pi^- p \rightarrow \eta \pi^0 n$
2040±30		3 CLELAND	82B	SPEC ±	50 $\pi p \rightarrow K_S^0 K^\pm p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
1885±13 <sup>+50</sup> <sub>-2</sub>	420k	4 ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
2004± 6	80k	5 UMAN	06	E835	5.2 $\bar{p} p \rightarrow \eta \eta \pi^0$
2005 <sup>+25</sup> <sub>-45</sub>		6 ANISOVICH	01F	SPEC	2.0 $\bar{p} p \rightarrow 3\pi^0, \pi^0 \eta, \pi^0 \eta'$
1944± 8±50		7 AMELIN	99	VES	37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$
1903±10		8 BALDI	78	SPEC -	10 $\pi^- p \rightarrow p K_S^0 K^-$
2030±50		9 CORDEN	78c	OMEG 0	15 $\pi^- p \rightarrow 3\pi n$

WEIGHTED AVERAGE  
 1967±16 (Error scaled by 2.1)



- <sup>1</sup> Statistical error negligible.
  - <sup>2</sup> From a simultaneous fit to the  $G_+$  and  $G_0$  wave intensities.
  - <sup>3</sup> From an amplitude analysis.
  - <sup>4</sup> Superseded by AGHASYAN 2018B.
  - <sup>5</sup> Statistical error only.
  - <sup>6</sup> From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F.
  - <sup>7</sup> May be a different state.
  - <sup>8</sup> From a fit to the  $Y_8^0$  moment. Limited by phase space.
  - <sup>9</sup>  $J^P = 4^+$  is favored, though  $J^P = 2^+$  cannot be excluded.
- $a_4(1970)$  MASS (MeV)

### $a_4(1970)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>324<sup>+</sup><sub>-</sub> 15<sup>+</sup><sub>18</sub> OUR AVERAGE</b>					
333 <sup>+</sup> <sub>-</sub> 16 <sub>21</sub>	46M	<sup>1</sup> AGHASYAN	18B	COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
300 <sup>+</sup> <sub>-</sub> 80 <sub>100</sub>		ADOLPH	15	COMP	191 $\pi^- p \rightarrow \eta^{(\prime)} \pi^- p$
231 ± 30 ± 46	145k	LU	05	B852	18 $\pi^- p \rightarrow \omega \pi^- \pi^0 p$
298 ± 81 ± 85		CHUNG	02	B852	18.3 $\pi^- p \rightarrow 3\pi p$
350 ± 100 <sup>+</sup> <sub>-</sub> 70 <sub>50</sub>		IVANOV	01	B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
370 ± 80		<sup>2</sup> DONSKOV	96	GAM2 0	38 $\pi^- p \rightarrow \eta \pi^0 n$
380 ± 150		<sup>3</sup> CLELAND	82B	SPEC ±	50 $\pi p \rightarrow K_S^0 K^\pm p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
294 ± 25 <sup>+</sup> <sub>-</sub> 46 <sub>19</sub>	420k	<sup>4</sup> ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
401 ± 16	80k	<sup>5</sup> UMAN	06	E835	5.2 $\bar{p} p \rightarrow \eta \eta \pi^0$
180 ± 30		<sup>6</sup> ANISOVICH	01F	SPEC	2.0 $\bar{p} p \rightarrow 3\pi^0, \pi^0 \eta, \pi^0 \eta'$
324 ± 26 ± 75		<sup>7</sup> AMELIN	99	VES	37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$
166 ± 43		<sup>8</sup> BALDI	78	SPEC -	10 $\pi^- p \rightarrow p K_S^0 K^-$
510 ± 200		<sup>9</sup> CORDEN	78C	OMEG 0	15 $\pi^- p \rightarrow 3\pi n$

- <sup>1</sup> Statistical error negligible.
- <sup>2</sup> From a simultaneous fit to the  $G_+$  and  $G_0$  wave intensities.
- <sup>3</sup> From an amplitude analysis.
- <sup>4</sup> Superseded by AGHASYAN 2018B.
- <sup>5</sup> Statistical error only.
- <sup>6</sup> From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F.
- <sup>7</sup> May be a different state.
- <sup>8</sup> From a fit to the  $Y_8^0$  moment. Limited by phase space.
- <sup>9</sup>  $J^P = 4^+$  is favored, though  $J^P = 2^+$  cannot be excluded.

**$a_4(1970)$  DECAY MODES**

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $K\bar{K}$	seen
$\Gamma_2$ $\pi^+\pi^-\pi^0$	seen
$\Gamma_3$ $\rho\pi$	seen
$\Gamma_4$ $f_2(1270)\pi$	seen
$\Gamma_5$ $\omega\pi^-\pi^0$	seen
$\Gamma_6$ $\omega\rho$	seen
$\Gamma_7$ $\eta\pi$	seen
$\Gamma_8$ $\eta'(958)\pi$	seen

 **$a_4(1970)$  BRANCHING RATIOS**

$\Gamma(K\bar{K})/\Gamma_{\text{total}}$	$\Gamma_1/\Gamma$			
VALUE	DOCUMENT ID	TECN	CHG	COMMENT
seen	BALDI	78	SPEC	$\pm$ 10 $\pi^- p \rightarrow K_S^0 K^- p$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$	$\Gamma_2/\Gamma$			
VALUE	DOCUMENT ID	TECN	CHG	COMMENT
seen	CORDEN	78C	OMEG	0 15 $\pi^- p \rightarrow 3\pi n$

$\Gamma(\rho\pi)/\Gamma(f_2(1270)\pi)$	$\Gamma_3/\Gamma_4$			
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$1.7^{+0.9}_{-0.8}$ OUR AVERAGE				Error includes scale factor of 3.7.

$2.9^{+0.6}_{-0.4}$	46M	<sup>1</sup> AGHASYAN	18B	COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
$1.1 \pm 0.2 \pm 0.2$		CHUNG	02	B852	18.3 $\pi^- p \rightarrow 3\pi p$

<sup>1</sup>Statistical error negligible.

$\Gamma(\eta\pi)/\Gamma_{\text{total}}$	$\Gamma_7/\Gamma$			
VALUE	DOCUMENT ID	TECN	CHG	COMMENT
seen	DONSKOV	96	GAM2	0 38 $\pi^- p \rightarrow \eta\pi^0 n$

$\Gamma(\eta'(958)\pi)/\Gamma(\eta\pi)$	$\Gamma_8/\Gamma_7$		
VALUE	DOCUMENT ID	TECN	COMMENT
$0.23 \pm 0.07$	ADOLPH	15	COMP 191 $\pi^- p \rightarrow \eta^{(\prime)}\pi^- p$

$\Gamma(\omega\rho)/\Gamma_{\text{total}}$	$\Gamma_6/\Gamma$			
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
seen	145k	LU	05	B852 18 $\pi^- p \rightarrow \omega\pi^-\pi^0 p$

 **$a_4(1970)$  REFERENCES**

AGHASYAN	18B	PR D98 092003	M. Aghasyan <i>et al.</i>	(COMPASS Collab.)
ADOLPH	15	PL B740 303	M. Adolph <i>et al.</i>	(COMPASS Collab.)
ALEKSEEV	10	PRL 104 241803	M.G. Alekseev <i>et al.</i>	(COMPASS Collab.)
UMAN	06	PR D73 052009	I. Uman <i>et al.</i>	(FNAL E835)

LU	05	PRL 94 032002	M. Lu <i>et al.</i>	(BNL E852 Collab.)
CHUNG	02	PR D65 072001	S.U. Chung <i>et al.</i>	(BNL E852 Collab.)
ANISOVICH	01F	PL B517 261	A.V. Anisovich <i>et al.</i>	
IVANOV	01	PRL 86 3977	E.I. Ivanov <i>et al.</i>	(BNL E852 Collab.)
AMELIN	99	PAN 62 445	D.V. Amelin <i>et al.</i>	(VES Collab.)
		Translated from YAF 62	487.	
ANISOVICH	99C	PL B452 173	A.V. Anisovich <i>et al.</i>	
ANISOVICH	99E	PL B452 187	A.V. Anisovich <i>et al.</i>	
DONSKOV	96	PAN 59 982	S.V. Donskov <i>et al.</i>	(GAMS Collab.) IGJPC
		Translated from YAF 59	1027.	
CLELAND	82B	NP B208 228	W.E. Cleland <i>et al.</i>	(DURH, GEVA, LAUS+)
BALDI	78	PL 74B 413	R. Baldi <i>et al.</i>	(GEVA) JP
CORDEN	78C	NP B136 77	M.J. Corden <i>et al.</i>	(BIRM, RHEL, TELA+) JP

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