

$a_4(1970)$

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

$a_4(1970)$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
1967±16 OUR AVERAGE		Error includes scale factor of 2.1. See the ideogram below.			
1935 ⁺¹¹ ₋₁₃	46M	¹ AGHASYAN	18B	COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
1900 ⁺⁸⁰ ₋₂₀		ADOLPH	15	COMP	191 $\pi^- p \rightarrow \eta^{(\prime)} \pi^- p$
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 ⁺⁶⁰ ₋₂₀		IVANOV	01	B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
2010±20		² ALDE	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 ⁺⁵⁰ ₋₂	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 ⁺²⁵ ₋₄₅		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 $\pi^- p \rightarrow 3\pi n$

¹ Statistical error negligible.

² From a simultaneous fit to the G_+ and G_0 wave intensities.

³ From an amplitude analysis.

⁴ Superseded by AGHASYAN 2018B.

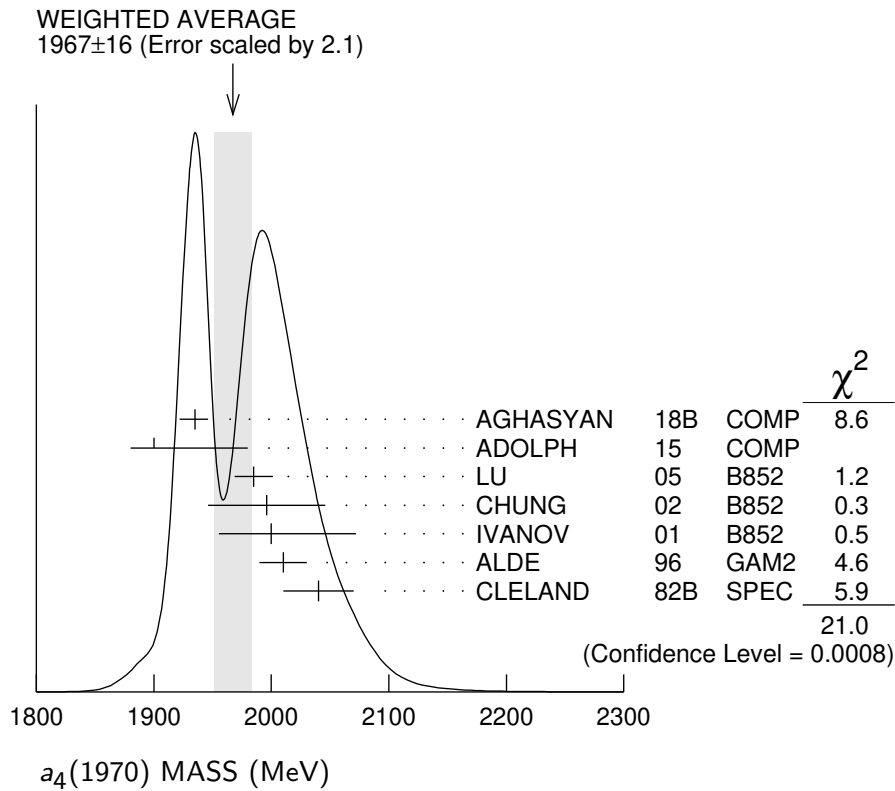
⁵ Statistical error only.

⁶ From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F.

⁷ May be a different state.

⁸ From a fit to the Y_8^0 moment. Limited by phase space.

⁹ $J^P = 4^+$ is favored, though $J^P = 2^+$ cannot be excluded.



$a_4(1970)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
324⁺¹⁵₋₁₈		OUR AVERAGE			
333 ⁺¹⁶ ₋₂₁	46M	¹ AGHASYAN	18B	COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
300 ⁺⁸⁰ ₋₁₀₀		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 ⁺⁷⁰ ₋₅₀		IVANOV	01	B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
370 ± 80		² ALDE	96	GAM2	0 38 $\pi^- p \rightarrow \eta \pi^0 n$
380 ± 150		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. ● ● ●					
294 ± 25 ⁺⁴⁶ ₋₁₉	420k	⁴ ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
401 ± 16	80k	⁵ UMAN	06	E835	5.2 $\bar{p} p \rightarrow \eta \eta \pi^0$
180 ± 30		⁶ ANISOVICH	01F	SPEC	2.0 $\bar{p} p \rightarrow 3\pi^0, \pi^0 \eta, \pi^0 \eta'$
324 ± 26 ± 75		⁷ AMELIN	99	VES	37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$
166 ± 43		⁸ BALDI	78	SPEC	- 10 $\pi^- p \rightarrow p K_S^0 K^-$
510 ± 200		⁹ CORDEN	78C	OMEG	0 15 $\pi^- p \rightarrow 3\pi n$

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- ⁴ Superseded by AGHASYAN 2018B.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

$a_4(1970)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $K\bar{K}$	seen
Γ_2 $\pi^+\pi^-\pi^0$	seen
Γ_3 $\rho\pi$	seen
Γ_4 $f_2(1270)\pi$	seen
Γ_5 $\omega\pi^-\pi^0$	seen
Γ_6 $\omega\rho$	seen
Γ_7 $\eta\pi$	seen
Γ_8 $\eta'(958)\pi$	seen

$a_4(1970)$ BRANCHING RATIOS

$\Gamma(K\bar{K})/\Gamma_{\text{total}}$	Γ_1/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u> <u>TECN</u> <u>CHG</u> <u>COMMENT</u>
seen	BALDI 78 SPEC \pm $10 \pi^- p \rightarrow K_S^0 K^- p$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$	Γ_2/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u> <u>TECN</u> <u>CHG</u> <u>COMMENT</u>
seen	CORDEN 78C OMEG 0 $15 \pi^- p \rightarrow 3\pi n$

$\Gamma(\rho\pi)/\Gamma(f_2(1270)\pi)$	Γ_3/Γ_4
<u>VALUE</u> <u>EVTS</u>	<u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u>

$1.7^{+0.9}_{-0.8}$ OUR AVERAGE	Error includes scale factor of 3.7.			
$2.9^{+0.6}_{-0.4}$ 46M	¹ AGHASYAN	18B	COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
$1.1 \pm 0.2 \pm 0.2$	CHUNG	02	B852	18.3 $\pi^- p \rightarrow 3\pi p$

¹ Statistical error negligible.

$\Gamma(\eta\pi)/\Gamma_{\text{total}}$	Γ_7/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u> <u>TECN</u> <u>CHG</u> <u>COMMENT</u>
seen	ALDE 96 GAM2 0 $38 \pi^- p \rightarrow \eta\pi^0 n$

$\Gamma(\eta'(958)\pi)/\Gamma(\eta\pi)$	Γ_8/Γ_7
<u>VALUE</u>	<u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u>
0.23 ± 0.07	ADOLPH 15 COMP 191 $\pi^- p \rightarrow \eta^{(\prime)} \pi^- p$

$\Gamma(\omega\rho)/\Gamma_{\text{total}}$					Γ_6/Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
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>	
ALDE	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