

$a_4(1970)$

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

$a_4(1970)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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⁴ Superseded by AGHASYAN 2018B.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.

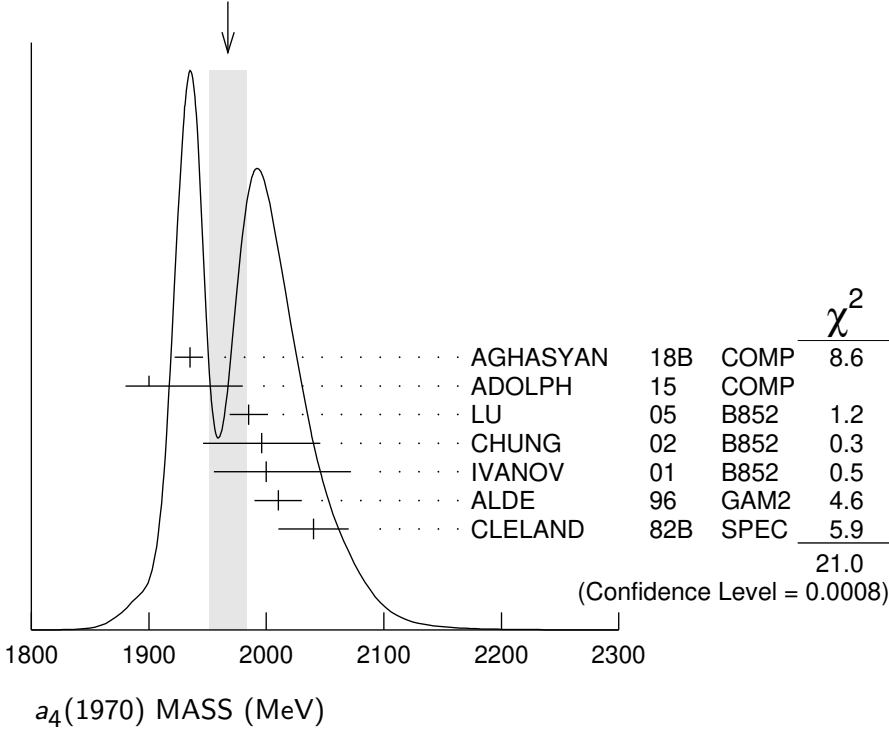
⁶ From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F.

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.

WEIGHTED AVERAGE
1967±16 (Error scaled by 2.1)



$a_4(1970)$ 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 $\pm$ 30 $\pm$ 46	145k	LU	05	B852	18 $\pi^- p \rightarrow \omega \pi^- \pi^0 p$
298 $\pm$ 81 $\pm$ 85		CHUNG	02	B852	18.3 $\pi^- p \rightarrow 3\pi p$
350 $\pm$ 100 ⁺⁷⁰ ₋₅₀		IVANOV	01	B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
370 $\pm$ 80		² ALDE	96	GAM2	0 38 $\pi^- p \rightarrow \eta \pi^0 n$
380 $\pm$ 150		³ CLELAND	82B	SPEC	$\pm$ 50 $\pi p \rightarrow K_S^0 K^\pm p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
294 $\pm$ 25 ⁺⁴⁶ ₋₁₉	420k	⁴ ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
401 $\pm$ 16	80k	⁵ UMAN	06	E835	5.2 $\bar{p} p \rightarrow \eta \eta \pi^0$
180 $\pm$ 30		⁶ ANISOVICH	01F	SPEC	2.0 $\bar{p} p \rightarrow 3\pi^0, \pi^0 \eta, \pi^0 \eta'$
324 $\pm$ 26 $\pm$ 75		⁷ AMELIN	99	VES	37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$
166 $\pm$ 43		⁸ BALDI	78	SPEC	– 10 $\pi^- p \rightarrow p K_S^0 K^-$
510 $\pm$ 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)
$\Gamma_1 \quad K \bar{K}$	seen
$\Gamma_2 \quad \pi^+ \pi^- \pi^0$	seen
$\Gamma_3 \quad \rho \pi$	seen
$\Gamma_4 \quad f_2(1270) \pi$	seen
$\Gamma_5 \quad \omega \pi^- \pi^0$	seen
$\Gamma_6 \quad \omega \rho$	seen
$\Gamma_7 \quad \eta \pi$	seen
$\Gamma_8 \quad \eta'(958) \pi$	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
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>	
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