$a_0(1450)$

$I^G(J^{PC}) = 1^-(0^{++})$

See the review on "Spectroscopy of Light Meson Resonances."

$a_0(1450)$ T-MATRIX POLE $\sqrt{s}$

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
(1290–1500) − *i* (30–140) OUR ESTIMATE				
$(1302.1 \pm 1.1 \pm 3.9) - i\ (56.2 \pm 0.7 \pm 1.7)$	[1] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$
$(1515 \pm 30) - i\ (115 \pm 18)$	ANISOVICH	09	RVUE	0.0 $\overline{p}p$, πN
$(1432 \pm 13 \pm 25) - i(98 \pm 5 \pm 5)$	[2] BUGG	08A	RVUE	$\overline{p}p$
$(1441^{+40}_{-15}) - i\ (55 \pm 7)$	[3] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$
$(1303 \pm 16) - i\ (46 \pm 8)$	[4] BARGIOTTI	03	OBLX	$\overline{p}p$
$(1296 \pm 10) - i\ (41 \pm 11)$	AMSLER	02	CBAR	0.9 $\overline{p}p \to \pi^0\pi^0\eta$
$(1565 \pm 30) - i\ (146 \pm 20)$	ANISOVICH	98B	RVUE	Compilation
$(1470 \pm 25) - i(132 \pm 15)$	[5] AMSLER	95D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$

[1] T-matrix pole, 2 poles, 2 channels ($\pi\eta$, $K\overline{K}$).
[2] Using data from AMSLER 94D, ABELE 98, and BAKER 03. Supersedes BUGG 94.
[3] From the pole position of a fitted Breit-Wigner amplitude.
[4] Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K^0_S\pi^\mp$.
[5] Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D.

$a_0(1450)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1439 ±34 OUR AVERAGE		Error includes scale factor of 1.8.			
1480 ±30		ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm\pi^\mp$
1410 ±25		ETKIN	82C	MPS	23 $\pi^- p \to n 2K^0_S$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1458 ±14 ±15	190k	[1] AAIJ	16N	LHCB	$D^0 \to K^0_S K^\pm\pi^\mp$
$1316.8^{+0.7}_{-1.0}{}^{+24.7}_{-4.6}$		[2] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0\eta$
1477 ±10	80k	[3] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
1290 ±10		[4] BERTIN	98B	OBLX	0.0 $\overline{p}p \to K^\pm K_s\pi^\mp$
1450 ±40		AMSLER	94D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\eta$
~ 1300		MARTIN	78	SPEC	10 $K^\pm p \to K^0_S\pi p$
1255 ± 5		[5] CASON	76		

[1] Using a model with Gaussian constraints to the PDG averaged values.
[2] May be a different state.
[3] Statistical error only.
[4] Not confirmed by BUGG 08A.
[5] Isospin 0 not excluded.

$a_0(1450)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
258 ±14 OUR AVERAGE					
265 ±15		ABELE	98	CBAR	0.0 $\overline{p}p \to K_L^0 K^\pm \pi^\mp$
230 ±30		ETKIN	82C	MPS	23 $\pi^- p \to n 2K_S^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
282 ±12 ±13	190k	[1] AAIJ	16N	LHCB	$D^0 \to K_S^0 K^\pm \pi^\mp$
$65.0^{+\ 2.1+99.1}_{-\ 5.4-32.6}$		[2] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0 \eta$
267 ±11	80k	[3] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
80 ± 5		[4] BERTIN	98B	OBLX	0.0 $\overline{p}p \to K^\pm K_s \pi^\mp$
270 ±40		AMSLER	94D	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\eta$
~ 250		MARTIN	78	SPEC	10 $K^\pm p \to K_S^0 \pi p$
79 ±10		[5] CASON	76		

[1] Using a model with Gaussian constraints to the PDG averaged values.
[2] May be a different state.
[3] Statistical error only.
[4] Not confirmed by BUGG 08A.
[5] Isospin 0 not excluded.

$a_0(1450)$ DECAY MODES

Branching fractions are given relative to the one **DEFINED AS 1**.

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\eta$	0.093±0.020
Γ_2	$\pi\eta'(958)$	0.033±0.017
Γ_3	$K\overline{K}$	0.082±0.028
Γ_4	$\omega\pi\pi$	**DEFINED AS 1**
Γ_5	$a_0(980)\pi\pi$	seen
Γ_6	$\gamma\gamma$	seen

$a_0(1450)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(\pi\eta) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_6/\Gamma$

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$432\pm6^{+1073}_{-\ 256}$	[1] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0\eta$

[1] May be a different state.

$a_0(1450)$ BRANCHING RATIOS

$\Gamma(\pi\eta'(958))/\Gamma(\pi\eta)$ — Γ_2/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
0.35±0.16	[1] ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.43±0.19	ABELE	97C	CBAR	0.0 $\overline{p}p \to \pi^0\pi^0\eta'$

[1] Using $\pi^0\eta$ from AMSLER 94D.

$\Gamma(K\overline{K})/\Gamma(\pi\eta)$ — Γ_3/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
0.88 ±0.23	[1] ABELE	98	CBAR	0.0 $\overline{p}p \to K^0_L K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.887±0.041±0.97	[2] ALBRECHT	20	RVUE	0.9 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0K^+K^-$

[1] Using $\pi^0\eta$ from AMSLER 94D.
[2] Residues from T-matrix pole, 2 poles, 2 channels ($\pi\eta$, $K\overline{K}$).

$\Gamma(\omega\pi\pi)/\Gamma(\pi\eta)$ — Γ_4/Γ_1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
10.7±2.3	35280	[1] BAKER	03	SPEC	$\overline{p}p \to \omega\pi^+\pi^-\pi^0$

[1] Using results on $\overline{p}p \to a_0(1450)^0\pi^0$, $a_0(1450) \to \eta\pi^0$ from ABELE 96C and assuming the $\omega\rho$ mechanism for the $\omega\pi\pi$ state.

$\Gamma(a_0(980)\pi\pi)/\Gamma_{total}$ — Γ_5/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	BUGG	08A	RVUE	$\overline{p}p$

$\Gamma(a_0(980)\pi\pi)/\Gamma(\pi\eta)$ — Γ_5/Γ_1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
≤ 4.3	ANISOVICH	01	RVUE	0	$\overline{p}p \to \eta 2\pi^+ 2\pi^-$

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_6/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] UEHARA	09A	BELL	$\gamma\gamma \to \pi^0\eta$

[1] May be a different state.

$a_0(1450)$ REFERENCES

ALBRECHT	20	EPJ C80 453	M. Albrecht et al.	(Crystal Barrel Collab.)
AAIJ	16N	PR D93 052018	R. Aaij et al.	(LHCb Collab.)
ANISOVICH	09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev	(PNPI)
UEHARA	09A	PR D80 032001	S. Uehara et al.	(BELLE Collab.)
BUGG	08A	PR D78 074023	D.V. Bugg	(LOQM)
UMAN	06	PR D73 052009	I. Uman et al.	(FNAL E835)
BAKER	03	PL B563 140	C.A. Baker et al.	
BARGIOTTI	03	EPJ C26 371	M. Bargiotti et al.	(OBELIX Collab.)
AMSLER	02	EPJ C23 29	C. Amsler et al.	(Crystal Barrel Collab.)
ANISOVICH	01	NP A690 567	A.V. Anisovich et al.	
ABELE	98	PR D57 3860	A. Abele et al.	(Crystal Barrel Collab.)
ANISOVICH	98B	SPU 41 419 Translated from UFN 168 481.	V.V. Anisovich et al.	

BERTIN	98B	PL B434 180	A. Bertin *et al.*	(OBELIX Collab.)
ABELE	97C	PL B404 179	A. Abele *et al.*	(Crystal Barrel Collab.)
ABELE	96C	NP A609 562	A. Abele *et al.*	(Crystal Barrel Collab.)
AMSLER	95B	PL B342 433	C. Amsler *et al.*	(Crystal Barrel Collab.)
AMSLER	95C	PL B353 571	C. Amsler *et al.*	(Crystal Barrel Collab.)
AMSLER	95D	PL B355 425	C. Amsler *et al.*	(Crystal Barrel Collab.)
AMSLER	94D	PL B333 277	C. Amsler *et al.*	(Crystal Barrel Collab.) IGJPC
BUGG	94	PR D50 4412	D.V. Bugg *et al.*	(LOQM)
ETKIN	82C	PR D25 2446	A. Etkin *et al.*	(BNL, CUNY, TUFTS, VAND)
MARTIN	78	NP B134 392	A.D. Martin *et al.*	(DURH, GEVA)
CASON	76	PRL 36 1485	N.M. Cason *et al.*	(NDAM, ANL)