$a_0(1450)$

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

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	$D^0 \to K^0_S K^\pm\pi^\mp$
$1316.8^{+0.7+24.7}_{-1.0-4.6}$		[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 $\overline{p}p \to \pi^0\pi^0\eta$, $\pi^0\eta\eta$, $\pi^0 K^+ K^-$

[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. • • •					
$\leq$ 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	V.V. Anisovich *et al.*	
		Translated from UFN 168 481.		

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)