

$a_0(1450)$

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

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

 $a_0(1450)$ T-MATRIX POLE $\sqrt{s}$ Note that $\Gamma = -2 \operatorname{Im}(\sqrt{s})$.

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 $0.9 \bar{p}p \rightarrow \pi^0 \pi^0 \eta,$ $\pi^0 \eta \eta, \pi^0 K^+ K^-$
$(1515 \pm 30) - i$ (115 $\pm$ 18)	ANISOVICH	09	RVUE $0.0 \bar{p}p, \pi N$
$(1432 \pm 13 \pm 25) - i$ (98 $\pm$ 5 $\pm$ 5)	² BUGG	08A	RVUE $\bar{p}p$
$(1441^{+40}_{-15}) - i$ (55 $\pm$ 7)	³ BAKER	03	SPEC $\bar{p}p \rightarrow \omega \pi^+ \pi^- \pi^0$
$(1303 \pm 16) - i$ (46 $\pm$ 8)	⁴ BARGIOTTI	03	OBLX $\bar{p}p$
$(1296 \pm 10) - i$ (41 $\pm$ 11)	AMSLER	02	CBAR $0.9 \bar{p}p \rightarrow \pi^0 \pi^0 \eta$
$(1565 \pm 30) - i$ (146 $\pm$ 20)	ANISOVICH	98B	RVUE Compilation
$(1470 \pm 25) - i$ (132 $\pm$ 15)	⁵ AMSLER	95D	CBAR $0.0 \bar{p}p \rightarrow \pi^0 \pi^0 \pi^0,$ $\pi^0 \eta \eta, \pi^0 \pi^0 \eta$

¹ T-matrix pole, 2 poles, 2 channels ($\pi \eta, K \bar{K}$).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 $K^\pm K_S^0 \pi^\mp$.⁵ Coupled-channel analysis of AMSLER 95B, AMSLER 95C, and AMSLER 94D. **$a_0(1450)$ MASS**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1439 $\pm$ 34 OUR AVERAGE		Error includes scale factor of 1.8.		
1480 $\pm$ 30		ABELE	98	CBAR $0.0 \bar{p}p \rightarrow K_L^0 K^\pm \pi^\mp$
1410 $\pm$ 25		ETKIN	82C	MPS $23 \pi^- p \rightarrow n 2 K_S^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1458 $\pm$ 14 $\pm$ 15	190k	¹ AAIJ	16N	LHCB $D^0 \rightarrow K_S^0 K^\pm \pi^\mp$
$1316.8^{+0.7+24.7}_{-1.0-4.6}$		² UEHARA	09A	BELL $\gamma\gamma \rightarrow \pi^0 \eta$
1477 $\pm$ 10	80k	³ UMAN	06	E835 $5.2 \bar{p}p \rightarrow \eta \eta \pi^0$
1290 $\pm$ 10		⁴ BERTIN	98B	OBLX $0.0 \bar{p}p \rightarrow K^\pm K_S^0 \pi^\mp$
1450 $\pm$ 40		AMSLER	94D	CBAR $0.0 \bar{p}p \rightarrow \pi^0 \pi^0 \eta$
~ 1300		MARTIN	78	SPEC $10 K^\pm p \rightarrow K_S^0 \pi p$
1255 $\pm$ 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 $\bar{p}p \rightarrow K_L^0 K^\pm \pi^\mp$
230 ± 30		ETKIN	82C	MPS 23 $\pi^- p \rightarrow n 2 K_S^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
282 ± 12 ± 13	190k	¹ AAIJ	16N	LHCB $D^0 \rightarrow K_S^0 K^\pm \pi^\mp$
$65.0^{+2.1+99.1}_{-5.4-32.6}$		² UEHARA	09A	BELL $\gamma\gamma \rightarrow \pi^0 \eta$
267 ± 11	80k	³ UMAN	06	E835 5.2 $\bar{p}p \rightarrow \eta \eta \pi^0$
80 ± 5		⁴ BERTIN	98B	OBLX 0.0 $\bar{p}p \rightarrow K^\pm K_S \pi^\mp$
270 ± 40		AMSLER	94D	CBAR 0.0 $\bar{p}p \rightarrow \pi^0 \pi^0 \eta$
~ 250		MARTIN	78	SPEC 10 $K^\pm p \rightarrow K_S^0 \pi p$
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)
$\Gamma_1 \quad \pi \eta$	0.093 ± 0.020
$\Gamma_2 \quad \pi \eta'(958)$	0.033 ± 0.017
$\Gamma_3 \quad K \bar{K}$	0.082 ± 0.028
$\Gamma_4 \quad \omega \pi \pi$	DEFINED AS 1
$\Gamma_5 \quad a_0(980) \pi \pi$	seen
$\Gamma_6 \quad \gamma \gamma$	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. • • •	
$432 \pm 6^{+1073}_{-256}$	¹ UEHARA 09A BELL $\gamma\gamma \rightarrow \pi^0 \eta$
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 $\bar{p}p \rightarrow K_L^0 K^\pm \pi^\mp$
• • • We do not use the following data for averages, fits, limits, etc. • • •	
0.43 ± 0.19	ABELE 97C CBAR 0.0 $\bar{p}p \rightarrow \pi^0 \pi^0 \eta'$

¹ Using $\pi^0 \eta$ from AMSLER 94D. $\Gamma(K\bar{K})/\Gamma(\pi\eta)$ Γ_3/Γ_1

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

¹ Using $\pi^0 \eta$ from AMSLER 94D.² Residues from T-matrix pole, 2 poles, 2 channels ($\pi\eta$, $K\bar{K}$). $\Gamma(\omega\pi\pi)/\Gamma(\pi\eta)$ Γ_4/Γ_1

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
10.7 ± 2.3	35280	¹ BAKER 03	SPEC	$\bar{p}p \rightarrow \omega\pi^+\pi^-\pi^0$
¹ Using results on $\bar{p}p \rightarrow a_0(1450)^0\pi^0$, $a_0(1450) \rightarrow \eta\pi^0$ from ABELE 96C and assuming the $\omega\rho$ mechanism for the $\omega\pi\pi$ state.				

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

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

 $\Gamma(a_0(980)\pi\pi)/\Gamma(\pi\eta)$ 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	$\bar{p}p \rightarrow \eta 2\pi^+ 2\pi^-$

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

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

¹ May be a different state. **$a_0(1450)$ REFERENCES**

ALBRECHT 20	EPJ C80 453	M. Albrecht <i>et al.</i>	(Crystal Barrel Collab.)
AAIJ 16N	PR D93 052018	R. Aaij <i>et al.</i>	(LHCb Collab.)
ANISOVICH 09	IJMP A24 2481	V.V. Anisovich, A.V. Sarantsev	(PNPI)
UEHARA 09A	PR D80 032001	S. Uehara <i>et al.</i>	(BELLE Collab.)
BUGG 08A	PR D78 074023	D.V. Bugg	(LOQM)
UMAN 06	PR D73 052009	I. Uman <i>et al.</i>	(FNAL E835)
BAKER 03	PL B563 140	C.A. Baker <i>et al.</i>	
BARGIOTTI 03	EPJ C26 371	M. Bargiotti <i>et al.</i>	(OBELIX Collab.)
AMSLER 02	EPJ C23 29	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
ANISOVICH 01	NP A690 567	A.V. Anisovich <i>et al.</i>	
ABELE 98	PR D57 3860	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
ANISOVICH 98B	SPU 41 419	V.V. Anisovich <i>et al.</i>	
	Translated from UFN 168 481.		
BERTIN 98B	PL B434 180	A. Bertin <i>et al.</i>	(OBELIX Collab.)
ABELE 97C	PL B404 179	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
ABELE 96C	NP A609 562	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
AMSLER 95B	PL B342 433	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
AMSLER 95C	PL B353 571	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
AMSLER 95D	PL B355 425	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
AMSLER 94D	PL B333 277	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.) IGJPC
BUGG 94	PR D50 4412	D.V. Bugg <i>et al.</i>	(LOQM)
ETKIN 82C	PR D25 2446	A. Etkin <i>et al.</i>	(BNL, CUNY, TUFTS, VAND)
MARTIN 78	NP B134 392	A.D. Martin <i>et al.</i>	(DURH, GEVA)
CASON 76	PRL 36 1485	N.M. Cason <i>et al.</i>	(NDAM, ANL)