$a_1(1260)$

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

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$a_1(1260)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1230±40 OUR ESTIMATE						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1331±10± 3	37k	[1] ASNER	00	CLE2		10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$
1255± 7± 6	5904	[2] ABREU	98G	DLPH		e^+e^-
1207± 5± 8	5904	[3] ABREU	98G	DLPH		e^+e^-
1196± 4± 5	5904	[4,5] ABREU	98G	DLPH		e^+e^-
1240±10		BARBERIS	98B			450 $pp \to p_f\pi^+\pi^-\pi^0 p_s$
1262± 9± 7		[2,6] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$
1210± 7± 2		[3,6] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$
1211± 7^{+50}_{-0}		[3] ALBRECHT	93C	ARG		$\tau^+ \to \pi^+\pi^+\pi^-\nu$
1121± 8		[7] ANDO	92	SPEC		8 $\pi^- p \to \pi^+\pi^-\pi^0 n$
1242±37		[8] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$
1260±14		[9] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$
1250± 9		[10] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$
1208±15		ARMSTRONG	90	OMEG	0	300.0$pp \to pp\pi^+\pi^-\pi^0$
1220±15		[11] ISGUR	89	RVUE		$\tau^+ \to \pi^+\pi^+\pi^-\nu$
1260±25		[12] BOWLER	88	RVUE		
1166±18±11		BAND	87	MAC		$\tau^+ \to \pi^+\pi^+\pi^-\nu$
1164±41±23		BAND	87	MAC		$\tau^+ \to \pi^+\pi^0\pi^0\nu$
1250±40		[11] TORNQVIST	87	RVUE		
1046±11		ALBRECHT	86B	ARG		$\tau^+ \to \pi^+\pi^+\pi^-\nu$
1056±20±15		RUCKSTUHL	86	DLCO		$\tau^+ \to \pi^+\pi^+\pi^-\nu$
1194±14±10		SCHMIDKE	86	MRK2		$\tau^+ \to \pi^+\pi^+\pi^-\nu$
1255±23		BELLINI	85	SPEC		40 $\pi^- A \to \pi^-\pi^+\pi^- A$
1240±80		[13] DANKOWY...	81	SPEC	0	8.45 $\pi^- p \to n 3\pi$
1280±30		[13] DAUM	81B	CNTR		63,94 $\pi^- p \to p 3\pi$
1041±13		[14] GAVILLET	77	HBC	+	4.2 $K^- p \to \Sigma 3\pi$

[1] From a fit to the 3π mass spectrum including the $K\overline{K}^*(892)$ threshold.
[2] Uses the model of KUHN 90.
[3] Uses the model of ISGUR 89.
[4] Includes the effect of a possible a'_1 state.
[5] Uses the model of FEINDT 90.
[6] Supersedes AKERS 95P.
[7] Average and spread of values using 2 variants of the model of BOWLER 75.

[8] Reanalysis of RUCKSTUHL 86.
[9] Reanalysis of SCHMIDKE 86.
[10] Reanalysis of ALBRECHT 86B.
[11] From a combined reanalysis of ALBRECHT 86B, SCHMIDKE 86, and RUCKSTUHL 86.
[12] From a combined reanalysis of ALBRECHT 86B and DAUM 81B.
[13] Uses the model of BOWLER 75.
[14] Produced in K^- backward scattering.

a_1(1260) WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
250 to 600 OUR ESTIMATE						
• • • We do not use the following data for averages, fits, limits, etc. • • •						
460 ± 85	205	[15] DRUTSKOY	02	BELL		$B \to D^{(*)} K^- K^{*0}$
$814\pm 36\pm 13$	37k	[16] ASNER	00	CLE2		$10.6\ e^+ e^- \to \tau^+ \tau^-, \tau^- \to \pi^- \pi^0 \pi^0 \nu_\tau$
450 ± 50	22k	[17] AKHMETSHIN	99E	CMD2		1.05–$1.38\ e^+ e^- \to \pi^+ \pi^- \pi^0 \pi^0$
570 ± 10		[18] BONDAR	99	RVUE		$e^+ e^- \to 4\pi, \tau \to 3\pi \nu_\tau$
$587\pm 27\pm 21$	5904	[19] ABREU	98G	DLPH		$e^+ e^-$
$478\pm 3\pm 15$	5904	[20] ABREU	98G	DLPH		$e^+ e^-$
$425\pm 14\pm 8$	5904	[21,22] ABREU	98G	DLPH		$e^+ e^-$
400 ± 35		BARBERIS	98B			$450\ p p \to p_f \pi^+ \pi^- \pi^0 p_s$
$621\pm 32\pm 58$		[19,23] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi \nu$
$457\pm 15\pm 17$		[20,23] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi \nu$
$446\pm 21{}^{+140}_{-\ \ 0}$		[20] ALBRECHT	93C	ARG		$\tau^+ \to \pi^+ \pi^+ \pi^- \nu$
239 ± 11		ANDO	92	SPEC		$8\ \pi^- p \to \pi^+ \pi^- \pi^0 n$
$266\pm 13\pm 4$		[24] ANDO	92	SPEC		$8\ \pi^- p \to \pi^+ \pi^- \pi^0 n$
$465{}^{+228}_{-143}$		[25] IVANOV	91	RVUE		$\tau \to \pi^+ \pi^+ \pi^- \nu$
$298{}^{+\ 40}_{-\ 34}$		[26] IVANOV	91	RVUE		$\tau \to \pi^+ \pi^+ \pi^- \nu$
488 ± 32		[27] IVANOV	91	RVUE		$\tau \to \pi^+ \pi^+ \pi^- \nu$
430 ± 50		ARMSTRONG	90	OMEG	0	$300.0 p p \to p p \pi^+ \pi^- \pi^0$
420 ± 40		[28] ISGUR	89	RVUE		$\tau^+ \to \pi^+ \pi^+ \pi^- \nu$
396 ± 43		[29] BOWLER	88	RVUE		
$405\pm 75\pm 25$		BAND	87	MAC		$\tau^+ \to \pi^+ \pi^+ \pi^- \nu$
$419\pm 108\pm 57$		BAND	87	MAC		$\tau^+ \to \pi^+ \pi^0 \pi^0 \nu$
521 ± 27		ALBRECHT	86B	ARG		$\tau^+ \to \pi^+ \pi^+ \pi^- \nu$
$476{}^{+132}_{-120}\pm 54$		RUCKSTUHL	86	DLCO		$\tau^+ \to \pi^+ \pi^+ \pi^- \nu$
$462\pm 56\pm 30$		SCHMIDKE	86	MRK2		$\tau^+ \to \pi^+ \pi^+ \pi^- \nu$
292 ± 40		BELLINI	85	SPEC		$40\ \pi^- A \to \pi^- \pi^+ \pi^- A$

380±100	[30] DANKOWY...	81	SPEC	0	8.45 $\pi^- p \to n 3\pi$
300± 50	[30] DAUM	81B	CNTR		63,94 $\pi^- p \to p 3\pi$
230± 50	[31] GAVILLET	77	HBC	+	4.2 $K^- p \to \Sigma 3\pi$

[15] From a fit of the $K^- K^{*0}$ distribution assuming m_{a_1}= 1230 MeV and purely resonant production of the $K^- K^{*0}$ system.
[16] From a fit to the 3π mass spectrum including the $K \overline{K}^*(892)$ threshold.
[17] Using the $a_1(1260)$ mass of 1230 MeV.
[18] From AKHMETSHIN 99E and ASNER 00 data using the $a_1(1260)$ mass of 1230 MeV.
[19] Uses the model of KUHN 90.
[20] Uses the model of ISGUR 89.
[21] Includes the effect of a possible a_1' state.
[22] Uses the model of FEINDT 90.
[23] Supersedes AKERS 95P.
[24] Average and spread of values using 2 variants of the model of BOWLER 75.
[25] Reanalysis of RUCKSTUHL 86.
[26] Reanalysis of SCHMIDKE 86.
[27] Reanalysis of ALBRECHT 86B.
[28] From a combined reanalysis of ALBRECHT 86B, SCHMIDKE 86, and RUCKSTUHL 86.
[29] From a combined reanalysis of ALBRECHT 86B and DAUM 81B.
[30] Uses the model of BOWLER 75.
[31] Produced in K^- backward scattering.

$a_1(1260)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi^+ \pi^- \pi^0$	
Γ_2	$\pi^0 \pi^0 \pi^0$	
Γ_3	$(\rho\pi)_{S-\text{wave}}$	seen
Γ_4	$(\rho\pi)_{D-\text{wave}}$	seen
Γ_5	$(\rho(1450)\pi)_{S-\text{wave}}$	seen
Γ_6	$(\rho(1450)\pi)_{D-\text{wave}}$	seen
Γ_7	$\sigma\pi$	seen
Γ_8	$f_0(980)\pi$	not seen
Γ_9	$f_0(1370)\pi$	seen
Γ_{10}	$f_2(1270)\pi$	seen
Γ_{11}	$K \overline{K}^*(892)$+c.c.	seen
Γ_{12}	$\pi\gamma$	seen

$a_1(1260)$ PARTIAL WIDTHS

$\Gamma(\pi\gamma)$ **Γ_{12}**

VALUE (keV)	*DOCUMENT ID*		*TECN*	*COMMENT*
640±246	ZIELINSKI	84C	SPEC	200 $\pi^+ Z \to Z 3\pi$

D-wave/*S*-wave AMPLITUDE RATIO IN DECAY OF $a_1(1260) \rightarrow \rho\pi$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
−0.108±0.016 OUR NEW AVERAGE [−0.107 ± 0.016 OUR 2002 AVERAGE]				
−0.14 ±0.04 ±0.07	[34] CHUNG	02	MPS	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
−0.10 ±0.02 ±0.02	[32,33] ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \rightarrow 3\pi\nu$
−0.11 ±0.02	[32] ALBRECHT	93C	ARG	$\tau^+ \rightarrow \pi^+ \pi^+ \pi^- \nu$

[32] Uses the model of ISGUR 89.
[33] Supersedes AKERS 95P.
[34] Deck-type background not subtracted.

$a_1(1260)$ BRANCHING RATIOS

$\Gamma((\rho\pi)_{S-\text{wave}})/\Gamma_{\text{total}}$ — Γ_3/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
60.19	37k	[35] ASNER	00	CLE2	10.6 $e^+ e^- \rightarrow \tau^+ \tau^-$, $\tau^- \rightarrow \pi^- \pi^0 \pi^0 \nu_\tau$

$\Gamma((\rho\pi)_{D-\text{wave}})/\Gamma_{\text{total}}$ — Γ_4/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.30±0.60±0.22	37k	[35] ASNER	00	CLE2	10.6 $e^+ e^- \rightarrow \tau^+ \tau^-$, $\tau^- \rightarrow \pi^- \pi^0 \pi^0 \nu_\tau$

$\Gamma((\rho(1450)\pi)_{S-\text{wave}})/\Gamma_{\text{total}}$ — Γ_5/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.56±0.84±0.32	37k	[35,36] ASNER	00	CLE2	10.6 $e^+ e^- \rightarrow \tau^+ \tau^-$, $\tau^- \rightarrow \pi^- \pi^0 \pi^0 \nu_\tau$

$\Gamma((\rho(1450)\pi)_{D-\text{wave}})/\Gamma_{\text{total}}$ — Γ_6/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.04±1.20±0.28	37k	[35,36] ASNER	00	CLE2	10.6 $e^+ e^- \rightarrow \tau^+ \tau^-$, $\tau^- \rightarrow \pi^- \pi^0 \pi^0 \nu_\tau$

$\Gamma(\sigma\pi)/\Gamma_{\text{total}}$ — Γ_7/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		CHUNG	02	MPS	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
18.76±4.29±1.48	37k	[35,37] ASNER	00	CLE2	10.6 $e^+ e^- \rightarrow \tau^+ \tau^-$, $\tau^- \rightarrow \pi^- \pi^0 \pi^0 \nu_\tau$

$\Gamma(f_0(980)\pi)/\Gamma_{total}$ — Γ_8/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen	37k	ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(f_0(1370)\pi)/\Gamma_{total}$ — Γ_9/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$7.40\pm2.71\pm1.26$	37k	[35,38] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(f_2(1270)\pi)/\Gamma_{total}$ — Γ_{10}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.19\pm0.49\pm0.17$	37k	[35,39] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma_{total}$ — Γ_{11}/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
8 to 15	205	[40] DRUTSKOY	02	BELL	$B \rightarrow D^{(*)}K^-K^{*0}$
$3.3\pm0.5\pm0.1$	37k	[41] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(\sigma\pi)/\Gamma((\rho\pi)_{S-\text{wave}})$ — Γ_7/Γ_3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
~ 0.3	28k	AKHMETSHIN	99E	CMD2	1.05–1.38 $e^+e^- \rightarrow \pi^+\pi^-\pi^+\pi^-$
0.003 ± 0.003		[42] LONGACRE	82	RVUE	

$\Gamma(\pi^0\pi^0\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_2/Γ_1

VALUE	CL%	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.008	90	[43] BARBERIS	01	450 $pp \rightarrow p_f 3\pi^0 p_s$

[35] From a fit to the Dalitz plot.
[36] Assuming for $\rho(1450)$ mass and width of 1370 and 386 MeV respectively.
[37] Assuming for σ mass and width of 860 and 880 MeV respectively.
[38] Assuming for $f_0(1370)$ mass and width of 1186 and 350 MeV respectively.
[39] Assuming for $f_2(1270)$ mass and width of 1275 and 185 MeV respectively.
[40] From a comparison to ALAM 94 assuming purely resonant production of the K^-K^{*0} system.
[41] From a fit to the 3π mass spectrum including the $K\overline{K}^*(892)$ threshold.
[42] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from GAVILLET 77, DAUM 80, and DANKOWYCH 81.
[43] Inconsistent with observatons of $\sigma\pi$, $f_0(1370)\pi$, and $f_2(1270)\pi$ decay modes.

$a_1(1260)$ REFERENCES

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BONDAR	99	PL B466 403	A.E. Bondar *et al.*	(Novosibirsk CMD-2 Collab.)
ABREU	98G	PL B426 411	P. Abreu *et al.*	(DELPHI Collab.)
BARBERIS	98B	PL B422 399	D. Barberis *et al.*	(WA 102 Collab.)
ACKERSTAFF	97R	ZPHY C75 593	K. Ackerstaff *et al.*	(OPAL Collab.)
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ALBRECHT	93C	ZPHY C58 61	H. Albrecht *et al.*	(ARGUS Collab.)
ANDO	92	PL B291 496	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+)
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ARMSTRONG	90	ZPHY C48 213	T.A. Armstrong, M. Benayoun, W. Beusch	
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BAND	87	PL B198 297	H.R. Band *et al.*	(MAC Collab.)
TORNQVIST	87	ZPHY C36 695	N.A. Tornqvist	(HELS)
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RUCKSTUHL	86	PRL 56 2132	W. Ruckstuhl *et al.*	(DELCO Collab.)
SCHMIDKE	86	PRL 57 527	W.B. Schmidke *et al.*	(Mark II Collab.)
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