$a_1(1260)$

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

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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 $\pi^- p \to n3\pi$
1280±30		[13] DAUM	81B	CNTR		63,94 $\pi^- p \to p3\pi$
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 $pp \to p_f \pi^+\pi^-\pi^0 p_s$
$621 \pm 32 \pm 58$		[19,23] ACKERSTAFF	97R	OPAL		$E_{\rm cm}^{ee}$= 88–94, $\tau \to 3\pi\nu$
$457 \pm 15 \pm 17$		[20,23] ACKERSTAFF	97R	OPAL		$E_{\rm cm}^{ee}$= 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$pp \to pp\pi^+\pi^-\pi^0$
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 $\pi^- p \rightarrow n3\pi$
300± 50	[30] DAUM	81B	CNTR		63,94 $\pi^- p \rightarrow p3\pi$
230± 50	[31] GAVILLET	77	HBC	+	4.2 $K^- p \rightarrow \Sigma 3\pi$

[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 π^+ Z $\rightarrow$ Z3π

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

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

[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 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$

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

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

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

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

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

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

$\Gamma(\sigma\pi)/\Gamma_{\text{total}}$ 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 $\pi^- p \to \pi^+\pi^-\pi^- p$
$18.76 \pm 4.29 \pm 1.48$	37k	[35,37] ASNER	00	CLE2	10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(f_0(980)\pi)/\Gamma_{total}$ 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 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$

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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$7.40 \pm 2.71 \pm 1.26$	37k	[35,38] ASNER	00	CLE2	10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$

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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.19 \pm 0.49 \pm 0.17$	37k	[35,39] ASNER	00	CLE2	10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma_{total}$ 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	$B \to D^{(*)} K^- K^{*0}$
$3.3 \pm 0.5 \pm 0.1$	37k	[41] ASNER	00	CLE2	10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(\sigma\pi)/\Gamma((\rho\pi)_{S-wave})$ 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 $e^+e^- \to \pi^+\pi^-\pi^+\pi^-$
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 $pp \to p_f 3\pi^0 p_s$

[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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BARBERIS	01	PL B507 14	D. Barberis *et al.*	
ASNER	00	PR D61 012002	D.M. Asner *et al.*	(CLEO Collab.)
AKHMETSHIN	99E	PL B466 392	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)
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.)
AKERS	95P	ZPHY C67 45	R. Akers *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+)
IVANOV	91	ZPHY C49 563	Y.P. Ivanov, A.A. Osipov, M.K. Volkov	(JINR)
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)
ALBRECHT	86B	ZPHY C33 7	H. Albrecht *et al.*	(ARGUS Collab.)
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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LONGACRE	82	PR D26 83	R.S. Longacre	(BNL)
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DAUM	80	PL 89B 281	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+) JP
GAVILLET	77	PL 69B 119	P. Gavillet *et al.*	(AMST, CERN, NIJM+) JP
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