$a_1(1260)$

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

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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 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$
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 $pp \rightarrow p_f\pi^+\pi^-\pi^0 p_s$
1262± 9± 7		[2,6] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \rightarrow 3\pi\nu$
1210± 7± 2		[3,6] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \rightarrow 3\pi\nu$
$1211\pm 7^{+50}_{-0}$		[3] ALBRECHT	93C	ARG		$\tau^+ \rightarrow \pi^+\pi^+\pi^-\nu$
1121± 8		[7] ANDO	92	SPEC		8 $\pi^- p \rightarrow \pi^+\pi^-\pi^0 n$
1242±37		[8] IVANOV	91	RVUE		$\tau \rightarrow \pi^+\pi^+\pi^-\nu$
1260±14		[9] IVANOV	91	RVUE		$\tau \rightarrow \pi^+\pi^+\pi^-\nu$
1250± 9		[10] IVANOV	91	RVUE		$\tau \rightarrow \pi^+\pi^+\pi^-\nu$
1208±15		ARMSTRONG	90	OMEG	0	300.0$pp \rightarrow pp\pi^+\pi^-\pi^0$
1220±15		[11] ISGUR	89	RVUE		$\tau^+ \rightarrow \pi^+\pi^+\pi^-\nu$
1260±25		[12] BOWLER	88	RVUE		
1166±18±11		BAND	87	MAC		$\tau^+ \rightarrow \pi^+\pi^+\pi^-\nu$
1164±41±23		BAND	87	MAC		$\tau^+ \rightarrow \pi^+\pi^0\pi^0\nu$
1250±40		[11] TORNQVIST	87	RVUE		
1046±11		ALBRECHT	86B	ARG		$\tau^+ \rightarrow \pi^+\pi^+\pi^-\nu$
1056±20±15		RUCKSTUHL	86	DLCO		$\tau^+ \rightarrow \pi^+\pi^+\pi^-\nu$
1194±14±10		SCHMIDKE	86	MRK2		$\tau^+ \rightarrow \pi^+\pi^+\pi^-\nu$
1255±23		BELLINI	85	SPEC		40 $\pi^- A \rightarrow \pi^-\pi^+\pi^- A$
1240±80		[13] DANKOWY...	81	SPEC	0	8.45 $\pi^- p \rightarrow n 3\pi$
1280±30		[13] DAUM	81B	CNTR		63,94 $\pi^- p \rightarrow p 3\pi$
1041±13		[14] GAVILLET	77	HBC	+	4.2 $K^- p \rightarrow \Sigma 3\pi$

[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.

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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. • • •						
$814\pm 36\pm 13$	37k	[15] ASNER	00	CLE2		10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$
450 ± 50	22k	[16] AKHMETSHIN	99E	CMD2		1.05–1.38 $e^+e^- \to \pi^+\pi^-\pi^0\pi^0$
570 ± 10		[17] BONDAR	99	RVUE		$e^+e^- \to 4\pi$, $\tau \to 3\pi\nu_\tau$
$587\pm 27\pm 21$	5904	[18] ABREU	98G	DLPH		e^+e^-
$478\pm 3\pm 15$	5904	[19] ABREU	98G	DLPH		e^+e^-
$425\pm 14\pm 8$	5904	[20,21] ABREU	98G	DLPH		e^+e^-
400 ± 35		BARBERIS	98B			450 $pp \to p_f\pi^+\pi^-\pi^0 p_s$
$621\pm 32\pm 58$		[18,22] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$
$457\pm 15\pm 17$		[19,22] ACKERSTAFF	97R	OPAL		E^{ee}_{cm}= 88–94, $\tau \to 3\pi\nu$
$446\pm 21^{+140}_{-0}$		[19] ALBRECHT	93C	ARG		$\tau^+ \to \pi^+\pi^+\pi^-\nu$
239 ± 11		ANDO	92	SPEC		8 $\pi^- p \to \pi^+\pi^-\pi^0 n$
$266\pm 13\pm 4$		[23] ANDO	92	SPEC		8 $\pi^- p \to \pi^+\pi^-\pi^0 n$
465^{+228}_{-143}		[24] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$
298^{+40}_{-34}		[25] IVANOV	91	RVUE		$\tau \to \pi^+\pi^+\pi^-\nu$

488 ± 32	[26] 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	[27] ISGUR	89	RVUE		$\tau^+ \to \pi^+\pi^+\pi^-\nu$
396 ± 43	[28] BOWLER	88	RVUE		
$405\pm 75\pm 25$	BAND	87	MAC		$\tau^+ \to \pi^+\pi^+\pi^-\nu$
$419\pm108\pm 57$	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	[29] DANKOWY...	81	SPEC	0	$8.45\ \pi^- p \to n 3\pi$
300 ± 50	[29] DAUM	81B	CNTR		$63,94\ \pi^- p \to p 3\pi$
230 ± 50	[30] GAVILLET	77	HBC	+	$4.2\ K^- p \to \Sigma 3\pi$

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

$a_1(1260)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$(\rho\pi)_{S-\text{wave}}$	seen
Γ_2	$(\rho\pi)_{D-\text{wave}}$	seen
Γ_3	$(\rho(1450)\pi)_{S-\text{wave}}$	seen
Γ_4	$(\rho(1450)\pi)_{D-\text{wave}}$	seen
Γ_5	$\sigma\pi$	seen

Γ_6	$f_0(980)\pi$	not seen
Γ_7	$f_0(1370)\pi$	seen
Γ_8	$f_2(1270)\pi$	seen
Γ_9	$K\overline{K}^*(892)$+c.c.	seen
Γ_{10}	$\pi(1300)\pi$	not seen
Γ_{11}	$\pi\gamma$	seen

$a_1(1260)$ PARTIAL WIDTHS

$\Gamma(\pi\gamma)$ — Γ_{11}

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
−0.107±0.016 OUR AVERAGE				
−0.10 ±0.02 ±0.02	[31,32] ACKERSTAFF	97R	OPAL	E^{ee}_{cm}= 88–94, $\tau \rightarrow 3\pi\nu$
−0.11 ±0.02	[31] ALBRECHT	93C	ARG	$\tau^+ \rightarrow \pi^+\pi^+\pi^-\nu$

[31] Uses the model of ISGUR 89.
[32] Supersedes AKERS 95P.

$a_1(1260)$ BRANCHING RATIOS

$\Gamma((\rho\pi)_{S-wave})/\Gamma_{total}$ — Γ_1/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
68.11	37k	[34] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho\pi)_{D-wave})/\Gamma_{total}$ — Γ_2/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.36±0.17±0.06	37k	[34] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho(1450)\pi)_{S-wave})/\Gamma_{total}$ — Γ_3/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.30±0.64±0.17	37k	[34,35] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma((\rho(1450)\pi)_{D-wave})/\Gamma_{total}$ — Γ_4/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.43±0.28±0.06	37k	[34,35] ASNER	00	CLE2	10.6 $e^+e^- \rightarrow \tau^+\tau^-$, $\tau^- \rightarrow \pi^-\pi^0\pi^0\nu_\tau$

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

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$16.18\pm3.85\pm1.28$	37k	[34,36] 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_6/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_7/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.29\pm2.29\pm0.73$	37k	[34,37] 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_8/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.14\pm0.06\pm0.02$	37k	[34,38] 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_9/Γ

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.3\pm0.5\pm0.1$	37k	[39] ASNER	00	CLE2	10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$

$\Gamma(\pi(1300)\pi)/\Gamma_{total}$ — Γ_{10}/Γ

VALUE (units 10^{-2})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.01	90	37k	[40,41] ASNER	00	CLE2	10.6 $e^+e^- \to \tau^+\tau^-$, $\tau^- \to \pi^-\pi^0\pi^0\nu_\tau$
<0.019	90	37k	[40,42] 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_5/Γ_1

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		[33] LONGACRE	82	RVUE	

[33] Uses multichannel Aitchison-Bowler model (BOWLER 75). Uses data from GAVILLET 77, DAUM 80, and DANKOWYCH 81.

[34] From a fit to the Dalitz plot.
[35] Assuming for $\rho(1450)$ mass and width of 1370 and 386 MeV respectively.
[36] Assuming for σ mass and width of 860 and 880 MeV respectively.
[37] Assuming for $f_0(1370)$ mass and width of 1186 and 350 MeV respectively.
[38] Assuming for $f_2(1270)$ mass and width of 1275 and 185 MeV respectively.
[39] From a fit to the 3π mass spectrum including the $K\overline{K}^*(892)$ threshold.
[40] Assuming for $\pi(1300)$ mass and width of 1300 and 400 MeV respectively. From a fit to the Dalitz plot.
[41] Assuming $\pi(1300) \rightarrow \rho\pi$ decay.
[42] Assuming $\pi(1300) \rightarrow \sigma\pi$ decay.

$a_1(1260)$ REFERENCES

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