

# $\pi_1(1400)$

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

See also the mini-review under non- $q\bar{q}$  candidates in PDG 06, Journal of Physics, G **33** 1 (2006).

## $\pi_1(1400)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>1354 ±25</b>	<b>OUR AVERAGE</b>	Error includes scale factor of 1.8. See the ideogram below.			
1257 ±20 ±25	23.5k	ADAMS	07B	B852	18 $\pi^- p \rightarrow \eta \pi^0 n$
1384 ±20 ±35	90k	SALVINI	04	OBLX	$\bar{p} p \rightarrow 2\pi^+ 2\pi^-$
1360 ±25		ABELE	99	CBAR	0.0 $\bar{p} p \rightarrow \pi^0 \pi^0 \eta$
1400 ±20 ±20		ABELE	98B	CBAR	0.0 $\bar{p} n \rightarrow \pi^- \pi^0 \eta$
1370 ±16 <sup>+50</sup> / <sub>-30</sub>		<sup>1</sup> THOMPSON	97	MPS	18 $\pi^- p \rightarrow \eta \pi^- p$

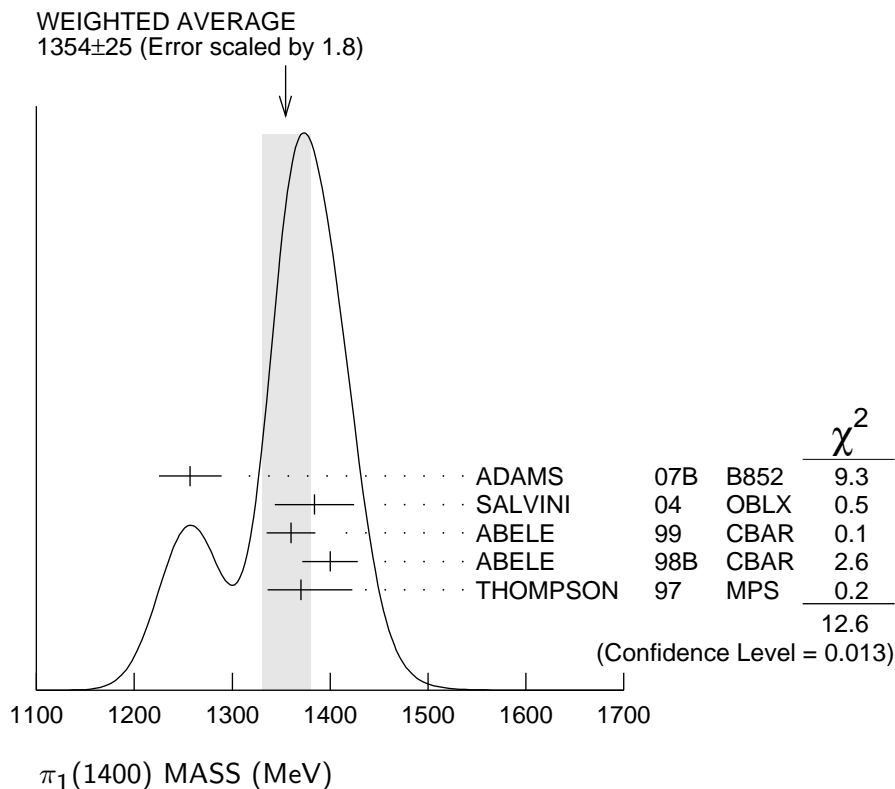
• • • We do not use the following data for averages, fits, limits, etc. • • •

1323.1 ± 4.6	<sup>2</sup> AOYAGI	93	BKEI	$\pi^- p \rightarrow \eta \pi^- p$
1406 ±20	<sup>3</sup> ALDE	88B	GAM4 0	100 $\pi^- p \rightarrow \eta \pi^0 n$

<sup>1</sup> Natural parity exchange, questioned by DZIERBA 03.

<sup>2</sup> Unnatural parity exchange.

<sup>3</sup> Seen in the  $P_0$ -wave intensity of the  $\eta \pi^0$  system, unnatural parity exchange.



## $\pi_1(1400)$ WIDTH

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
<b>330 ± 35</b>	<b>OUR AVERAGE</b>				
354 ± 64 ± 58	23.5k	ADAMS	07B	B852	18 $\pi^- p \rightarrow \eta \pi^0 n$
378 ± 50 ± 50	90k	SALVINI	04	OBLX	$\bar{p} p \rightarrow 2\pi^+ 2\pi^-$
220 ± 90		ABELE	99	CBAR	0.0 $\bar{p} p \rightarrow \pi^0 \pi^0 \eta$
310 ± 50 $\begin{smallmatrix} + 50 \\ - 30 \end{smallmatrix}$		ABELE	98B	CBAR	0.0 $\bar{p} n \rightarrow \pi^- \pi^0 \eta$
385 ± 40 $\begin{smallmatrix} + 65 \\ - 105 \end{smallmatrix}$		<sup>4</sup> THOMPSON	97	MPS	18 $\pi^- p \rightarrow \eta \pi^- p$

• • • We do not use the following data for averages, fits, limits, etc. • • •

143.2 ± 12.5		<sup>5</sup> AOYAGI	93	BKEI	$\pi^- p \rightarrow \eta \pi^- p$
180 ± 20		<sup>6</sup> ALDE	88B	GAM4 0	100 $\pi^- p \rightarrow \eta \pi^0 n$

<sup>4</sup> Resolution is not unfolded, natural parity exchange, questioned by DZIERBA 03.

<sup>5</sup> Unnatural parity exchange.

<sup>6</sup> Seen in the  $P_0$ -wave intensity of the  $\eta \pi^0$  system, unnatural parity exchange.

## $\pi_1(1400)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1 \quad \eta \pi^0$	seen
$\Gamma_2 \quad \eta \pi^-$	seen
$\Gamma_3 \quad \eta' \pi$	

## $\pi_1(1400)$ BRANCHING RATIOS

<u><math>\Gamma(\eta \pi^0)/\Gamma_{\text{total}}</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	<u><math>\Gamma_1/\Gamma</math></u>
not seen	PROKOSHKIN	95B	GAM4	100 $\pi^- p \rightarrow \eta \pi^0 n$	
not seen	<sup>7</sup> BUGG	94	RVUE	$\bar{p} p \rightarrow \eta 2\pi^0$	
not seen	<sup>8</sup> APEL	81	NICE 0	40 $\pi^- p \rightarrow \eta \pi^0 n$	

<sup>7</sup> Using Crystal Barrel data.

<sup>8</sup> A general fit allowing  $S$ ,  $D$ , and  $P$  waves (including  $m=0$ ) is not done because of limited statistics.

<u><math>\Gamma(\eta \pi^-)/\Gamma_{\text{total}}</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>\Gamma_2/\Gamma</math></u>
possibly seen	BELADIDZE	93	VES $37 \pi^- N \rightarrow \eta \pi^- N$	

<u><math>\Gamma(\eta' \pi)/\Gamma(\eta \pi^0)</math></u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>\Gamma_3/\Gamma_1</math></u>
<0.80	95	BOUTEMEUR	90	GAM4 100 $\pi^- p \rightarrow 4\gamma n$	

## $\pi_1(1400)$ REFERENCES

ADAMS	07B	PL B657 27	G.S. Adams <i>et al.</i>	(BNL E852 Collab.)
PDG	06	JPG 33 1	W.-M. Yao <i>et al.</i>	(PDG Collab.)
SALVINI	04	EPJ C35 21	P. Salvini <i>et al.</i>	(OBELIX Collab.)
DZIERBA	03	PR D67 094015	A.R. Dzierba <i>et al.</i>	
ABELE	99	PL B446 349	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
ABELE	98B	PL B423 175	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
THOMPSON	97	PRL 79 1630	D.R. Thompson <i>et al.</i>	(BNL E852 Collab.)
PROKOSHKIN	95B	PAN 58 606	Y.D. Prokoshkin, S.A. Sadovsky	(SERP)
		Translated from YAF 58 662.		
BUGG	94	PR D50 4412	D.V. Bugg <i>et al.</i>	(LOQM)
AOYAGI	93	PL B314 246	H. Aoyagi <i>et al.</i>	(BKEI Collab.)
BELADIDZE	93	PL B313 276	G.M. Beladidze <i>et al.</i>	(VES Collab.)
BOUTEMEUR	90	Hadron 89 Conf. p 119	M. Boutemeur, M. Poulet	(SERP, BELG, LANL+)
ALDE	88B	PL B205 397	D.M. Alde <i>et al.</i>	(SERP, BELG, LANL, LAPP) IGJPC
APEL	81	NP B193 269	W.D. Apel <i>et al.</i>	(SERP, CERN)

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