

$\pi_1(1400)$

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

See also the mini-review under non- $q\bar{q}$ candidates in PDG 06, Journal of Physics **G33** 1 (2006).

$\pi_1(1400)$ MASS

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | CHG | COMMENT |
|--|--------------------|---|------|------|--|
| 1354 ±25 | OUR AVERAGE | 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 ⁺⁵⁰ ₋₃₀ | | ¹ THOMPSON | 97 | MPS | 18 $\pi^- p \rightarrow \eta \pi^- p$ |

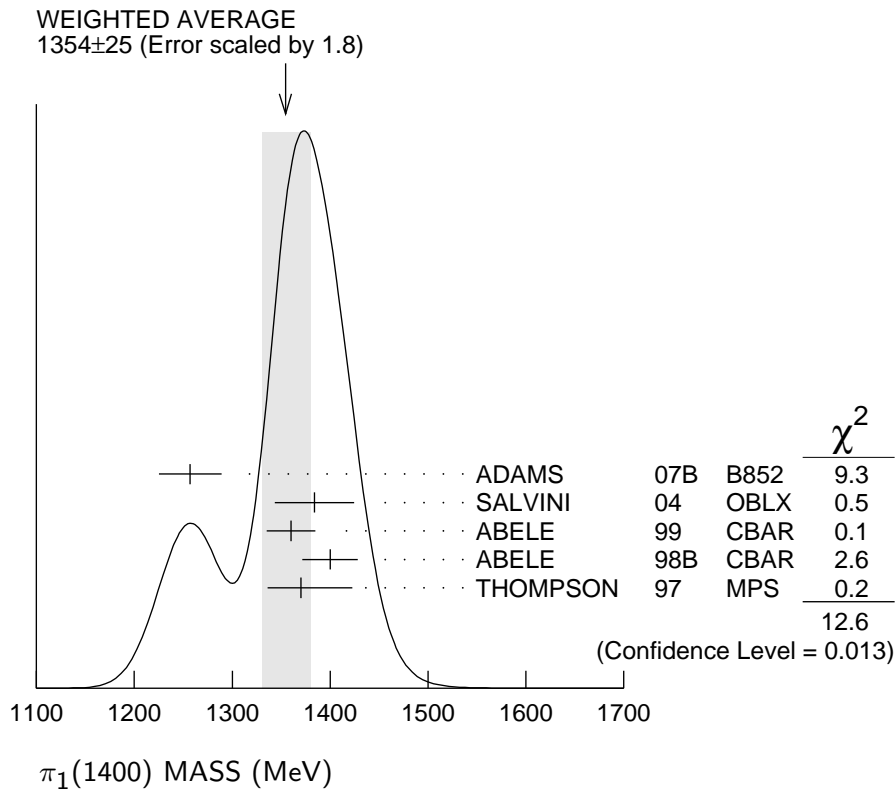
• • • We do not use the following data for averages, fits, limits, etc. • • •

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

¹ Natural parity exchange, questioned by DZIERBA 03.

² Unnatural parity exchange.

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



$\pi_1(1400)$ WIDTH

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | CHG | COMMENT |
|--|--------------------|-----------------------|------|------|--|
| 330 ± 35 | OUR AVERAGE | | | | |
| 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 $\begin{smallmatrix} + 65 \\ - 105 \end{smallmatrix}$ | | ⁴ 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 | | ⁵ AOYAGI | 93 | BKEI | $\pi^- p \rightarrow \eta \pi^- p$ |
| 180 ± 20 | | ⁶ ALDE | 88B | GAM4 0 | 100 $\pi^- p \rightarrow \eta \pi^0 n$ |

⁴ Resolution is not unfolded, natural parity exchange, questioned by DZIERBA 03.

⁵ Unnatural parity exchange.

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

 $\pi_1(1400)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) |
|-----------------------------|--------------------------------|
| $\Gamma_1 \quad \eta \pi^0$ | seen |
| $\Gamma_2 \quad \eta \pi^-$ | seen |
| $\Gamma_3 \quad \eta' \pi$ | |

 $\pi_1(1400)$ BRANCHING RATIOS

| $\Gamma(\eta \pi^0)/\Gamma_{\text{total}}$ | | | | | Γ_1/Γ |
|--|-------------------|------|--------|--|-------------------|
| VALUE | DOCUMENT ID | TECN | CHG | COMMENT | |
| not seen | PROKOSHKIN 95B | GAM4 | | 100 $\pi^- p \rightarrow \eta \pi^0 n$ | |
| not seen | ⁷ BUGG | 94 | RVUE | $\bar{p} p \rightarrow \eta 2\pi^0$ | |
| not seen | ⁸ APEL | 81 | NICE 0 | 40 $\pi^- p \rightarrow \eta \pi^0 n$ | |

⁷ Using Crystal Barrel data.

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

| $\Gamma(\eta \pi^-)/\Gamma_{\text{total}}$ | | | | | Γ_2/Γ |
|--|--------------|------|---------------------------------------|--|-------------------|
| VALUE | DOCUMENT ID | TECN | COMMENT | | |
| possibly seen | BELADIDZE 93 | VES | $37 \pi^- N \rightarrow \eta \pi^- N$ | | |

| $\Gamma(\eta' \pi)/\Gamma(\eta \pi^0)$ | | | | | Γ_3/Γ_1 |
|--|-----|--------------|------|-------------------------------------|---------------------|
| VALUE | CL% | DOCUMENT ID | TECN | COMMENT | |
| <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 | JP G33 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) |
