

$a_1(1640)$

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

Possibly seen in the study of the hadronic structure in decay $\tau \rightarrow 3\pi\nu_\tau$ (ABREU 98G and ASNER 00).

 $a_1(1640)$ MASS

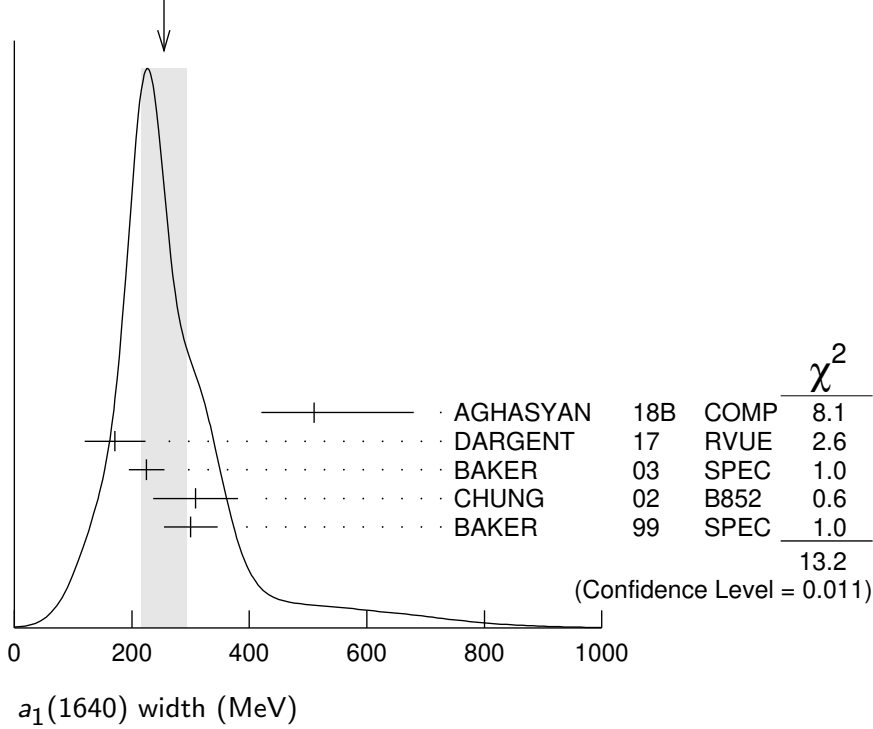
| <u>VALUE (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|-------------------------------------|-------------|---|
| 1655 ± 16 OUR AVERAGE | | Error includes scale factor of 1.2. | | |
| 1700 ⁺ ₋₁₃₀ ³⁵ | 46M | ¹ AGHASYAN | 18B | COMP 190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$ |
| 1691 ± 18 ± 30 | | DARGENT | 17 | RVUE $D^0 \rightarrow \pi^- \pi^+ \pi^- \pi^+$ |
| 1630 ± 20 | 35k | ² BAKER | 03 | SPEC $\bar{p} p \rightarrow \omega \pi^+ \pi^- \pi^0$ |
| 1714 ± 9 ± 36 | | CHUNG | 02 | B852 18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$ |
| 1640 ± 12 ± 30 | | BAKER | 99 | SPEC 1.94 $\bar{p} p \rightarrow 4\pi^0$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| 1670 ± 90 | | BELLINI | 85 | SPEC 40 $\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$ |

¹ Statistical error negligible.² Using the $a_1(1260)$ mass and width results of BOWLER 88. **$a_1(1640)$ WIDTH**

| <u>VALUE (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|-------------|---|-------------|---|
| 250 ± 40 OUR AVERAGE | | Error includes scale factor of 1.8. See the ideogram below. | | |
| 510 ⁺ ₋₉₀ ¹⁷⁰ | 46M | ¹ AGHASYAN | 18B | COMP 190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$ |
| 171 ± 33 ± 40 | | DARGENT | 17 | RVUE $D^0 \rightarrow \pi^- \pi^+ \pi^- \pi^+$ |
| 225 ± 30 | 35k | ² BAKER | 03 | SPEC $\bar{p} p \rightarrow \omega \pi^+ \pi^- \pi^0$ |
| 308 ± 37 ± 62 | | CHUNG | 02 | B852 18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$ |
| 300 ± 22 ± 40 | | BAKER | 99 | SPEC 1.94 $\bar{p} p \rightarrow 4\pi^0$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | |
| 300 ± 100 | | BELLINI | 85 | SPEC 40 $\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$ |

¹ Statistical error negligible.² Using the $a_1(1260)$ mass and width results of BOWLER 88.

WEIGHTED AVERAGE
 250 ± 40 (Error scaled by 1.8)



$a_1(1640)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) |
|------------------------------------|--------------------------------|
| Γ_1 $\pi\pi\pi$ | seen |
| Γ_2 $f_2(1270)\pi$ | seen |
| Γ_3 $\sigma\pi$ | seen |
| Γ_4 $\rho\pi$ <i>S-wave</i> | seen |
| Γ_5 $\rho\pi$ <i>D-wave</i> | seen |
| Γ_6 $\omega\pi\pi$ | seen |
| Γ_7 $f_1(1285)\pi$ | seen |
| Γ_8 $a_1(1260)\eta$ | not seen |

$a_1(1640)$ BRANCHING RATIOS

| $\Gamma(f_2(1270)\pi)/\Gamma(\sigma\pi)$ | Γ_2/Γ_3 | | |
|--|---------------------|------|---|
| VALUE | DOCUMENT ID | TECN | COMMENT |
| 0.24 ± 0.07 | BAKER | 99 | SPEC $1.94 \bar{p}p \rightarrow 4\pi^0$ |

| $\Gamma(\rho\pi$ <i>D-wave</i>)/ Γ_{total} | Γ_5/Γ | | |
|---|-------------------|------|---|
| VALUE | DOCUMENT ID | TECN | COMMENT |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| seen | CHUNG | 02 | B852 $18.3 \pi^- p \rightarrow \pi^+ \pi^- \pi^- p$ |
| seen | AMELIN | 95B | VES $36 \pi^- A \rightarrow \pi^+ \pi^- \pi^- A$ |

$\Gamma(\omega\pi\pi)/\Gamma_{\text{total}}$ Γ_6/Γ

| VALUE | EVTS | DOCUMENT ID | TECN | COMMENT |
|-------|------|-------------|------|---------|
|-------|------|-------------|------|---------|

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

| | | | | |
|------|-------|--------------------|----|---|
| seen | 35280 | ¹ BAKER | 03 | SPEC $\bar{p}p \rightarrow \omega\pi^+\pi^-\pi^0$ |
|------|-------|--------------------|----|---|

¹ Assuming the $\omega\rho$ mechanism for the $\omega\pi\pi$ state.

 $\Gamma(f_1(1285)\pi)/\Gamma_{\text{total}}$ Γ_7/Γ

| VALUE | DOCUMENT ID | TECN | COMMENT |
|-------|-------------|------|---------|
|-------|-------------|------|---------|

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

| | | | | |
|----------|------|----|------|---|
| not seen | KUHN | 04 | B852 | $18 \pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$ |
| seen | LEE | 94 | MPS2 | $18 \pi^- p \rightarrow K^+\bar{K}^0\pi^-\pi^- p$ |

 $\Gamma(a_1(1260)\eta)/\Gamma_{\text{total}}$ Γ_8/Γ

| VALUE | DOCUMENT ID | TECN | COMMENT |
|-------|-------------|------|---------|
|-------|-------------|------|---------|

| | | | | |
|-----------------|------|----|------|--|
| not seen | KUHN | 04 | B852 | $18 \pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$ |
|-----------------|------|----|------|--|

 $a_1(1640)$ REFERENCES

| | | | | |
|----------|-----|---------------|---------------------------|-------------------------|
| AGHASYAN | 18B | PR D98 092003 | M. Aghasyan <i>et al.</i> | (COMPASS Collab.) |
| DARGENT | 17 | JHEP 1705 143 | P. dArgent <i>et al.</i> | (HEID, BRIS) |
| KUHN | 04 | PL B595 109 | J. Kuhn <i>et al.</i> | (BNL E852 Collab.) |
| BAKER | 03 | PL B563 140 | C.A. Baker <i>et al.</i> | |
| CHUNG | 02 | PR D65 072001 | S.U. Chung <i>et al.</i> | (BNL E852 Collab.) |
| ASNER | 00 | PR D61 012002 | D.M. Asner <i>et al.</i> | (CLEO Collab.) |
| BAKER | 99 | PL B449 114 | C.A. Baker <i>et al.</i> | |
| ABREU | 98G | PL B426 411 | P. Abreu <i>et al.</i> | (DELPHI Collab.) |
| AMELIN | 95B | PL B356 595 | D.V. Amelin <i>et al.</i> | (SERP, TBIL) |
| LEE | 94 | PL B323 227 | J.H. Lee <i>et al.</i> | (BNL, IND, KYUN, MASD+) |
| BOWLER | 88 | PL B209 99 | M.G. Bowler | (OXF) |
| BELLINI | 85 | SJNP 41 781 | D. Bellini <i>et al.</i> | |

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