

$a_1(1640)$

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

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**

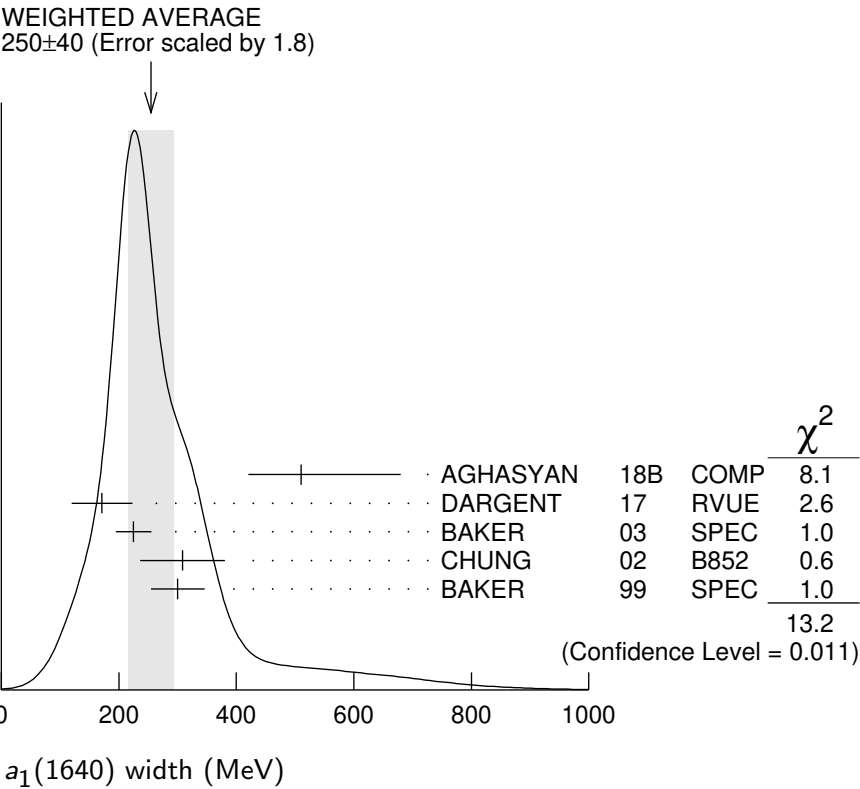
| VALUE (MeV)                                                                   | EVTS | DOCUMENT ID                         | TECN | COMMENT                                               |
|-------------------------------------------------------------------------------|------|-------------------------------------|------|-------------------------------------------------------|
| <b>1655± 16 OUR AVERAGE</b>                                                   |      | Error includes scale factor of 1.2. |      |                                                       |
| 1700 <sup>+35</sup> <sub>-130</sub>                                           | 46M  | <sup>1</sup> 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  | <sup>2</sup> 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 $\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$     |

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

**$a_1(1640)$  WIDTH**

| VALUE (MeV)                                                                   | EVTS | DOCUMENT ID                                                 | TECN | COMMENT                                               |
|-------------------------------------------------------------------------------|------|-------------------------------------------------------------|------|-------------------------------------------------------|
| <b>250± 40 OUR AVERAGE</b>                                                    |      | Error includes scale factor of 1.8. See the ideogram below. |      |                                                       |
| 510 <sup>+170</sup> <sub>-90</sub>                                            | 46M  | <sup>1</sup> 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  | <sup>2</sup> 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 $\pi^- A \rightarrow \pi^- \pi^+ \pi^- A$     |

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



**$a_1(1640)$  DECAY MODES**

| Mode                               | Fraction ( $\Gamma_i/\Gamma$ ) |
|------------------------------------|--------------------------------|
| $\Gamma_1$ $\pi\pi\pi$             | seen                           |
| $\Gamma_2$ $f_2(1270)\pi$          | seen                           |
| $\Gamma_3$ $\sigma\pi$             | seen                           |
| $\Gamma_4$ $\rho\pi$ <i>S-wave</i> | seen                           |
| $\Gamma_5$ $\rho\pi$ <i>D-wave</i> | seen                           |
| $\Gamma_6$ $\omega\pi\pi$          | seen                           |
| $\Gamma_7$ $f_1(1285)\pi$          | seen                           |
| $\Gamma_8$ $a_1(1260)\eta$         | not seen                       |

**$a_1(1640)$  BRANCHING RATIOS**

| $\Gamma(f_2(1270)\pi)/\Gamma(\sigma\pi)$                                      |                    |             |                | $\Gamma_2/\Gamma_3$                            |
|-------------------------------------------------------------------------------|--------------------|-------------|----------------|------------------------------------------------|
| <u>VALUE</u>                                                                  | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                                                |
| <b>0.24±0.07</b>                                                              | BAKER              | 99          | SPEC           | 1.94 $\bar{p}p \rightarrow 4\pi^0$             |
| $\Gamma(\rho\pi_{D\text{--}wave})/\Gamma_{\text{total}}$                      |                    |             |                | $\Gamma_5/\Gamma$                              |
| <u>VALUE</u>                                                                  | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                                                |
| ● ● ● 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 $\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$   |

| $\Gamma(\omega\pi\pi)/\Gamma_{\text{total}}$                                   |       |                    |      |         | $\Gamma_6/\Gamma$                            |
|--------------------------------------------------------------------------------|-------|--------------------|------|---------|----------------------------------------------|
| VALUE                                                                          | EPTS  | DOCUMENT ID        | TECN | COMMENT |                                              |
| • • • We do not use the following data for averages, fits, limits, etc. • • •  |       |                    |      |         |                                              |
| seen                                                                           | 35280 | <sup>1</sup> BAKER | 03   | SPEC    | $\bar{p}p \rightarrow \omega\pi^+\pi^-\pi^0$ |
| <sup>1</sup> Assuming the $\omega\rho$ mechanism for the $\omega\pi\pi$ state. |       |                    |      |         |                                              |

| $\Gamma(f_1(1285)\pi)/\Gamma_{\text{total}}$                                  |  |             |      |         | $\Gamma_7/\Gamma$                              |
|-------------------------------------------------------------------------------|--|-------------|------|---------|------------------------------------------------|
| 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    | $18\pi^-p \rightarrow K^+\bar{K}^0\pi^-\pi^-p$ |

| $\Gamma(a_1(1260)\eta)/\Gamma_{\text{total}}$ |  |             |      |         | $\Gamma_8/\Gamma$                           |
|-----------------------------------------------|--|-------------|------|---------|---------------------------------------------|
| 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>  |                         |
| Translated from YAF 41 1223. |     |               |                           |                         |