

a₁(1640)

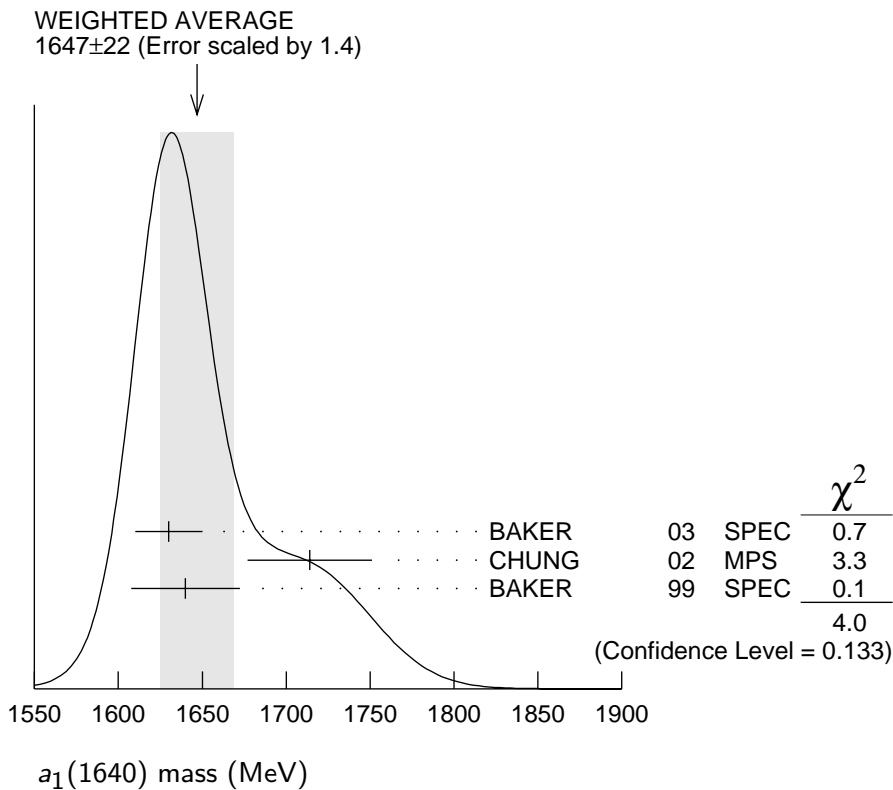
$$I^{G(J^{PC})} = 1^-(1^{++})$$

OMITTED FROM SUMMARY TABLE

Seen in the amplitude analysis of the $3\pi^0$ system produced in $\bar{p}p \rightarrow 4\pi^0$. Possibly seen in the study of the hadronic structure in decay $\tau \rightarrow 3\pi\nu_\tau$ (ABREU 98G and ASNER 00). Needs confirmation. See the Note under a₁(1260).

a₁(1640) MASS

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|-------|---|---------|--|
| 1647±22 OUR AVERAGE | | Error includes scale factor of 1.4. See the ideogram below. | | |
| 1630±20 | 35280 | ¹ BAKER | 03 SPEC | $\bar{p}p \rightarrow \omega\pi^+\pi^-\pi^0$ |
| 1714± 9±36 | | CHUNG | 02 E852 | 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 Using the a₁(1260) mass and width results of BOWLER 88.

$a_1(1640)$ WIDTH

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|-------|-------------------------------------|---------|--|
| 254 ± 27 OUR AVERAGE | | Error includes scale factor of 1.1. | | |
| 225 ± 30 | 35280 | ² BAKER | 03 SPEC | $\bar{p}p \rightarrow \omega\pi^+\pi^-\pi^0$ |
| 308 ± 37 ± 62 | | CHUNG | 02 E852 | 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 $\pi^-A \rightarrow \pi^-\pi^+\pi^-A$ |

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

$a_1(1640)$ 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 $\rho\pi S\text{-wave}$ | seen |
| Γ_5 $\rho\pi D\text{-wave}$ | 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 |
|---|-------------|---------|------------------------------------|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 0.24 ± 0.07 | BAKER | 99 SPEC | 1.94 $\bar{p}p \rightarrow 4\pi^0$ |

$\Gamma(\rho\pi D\text{-wave})/\Gamma_{\text{total}}$ Γ_5/Γ

| VALUE | DOCUMENT ID | TECN | COMMENT |
|---|-------------|---------|--|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| seen | CHUNG | 02 E852 | 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 | ³ BAKER | 03 SPEC | $\bar{p}p \rightarrow \omega\pi^+\pi^-\pi^0$ |

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

| VALUE | DOCUMENT ID | TECN | COMMENT |
|---|-------------|---------|---|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| not seen | KUHN | 04 E852 | 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

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|-----------------|--------------------|-------------|---|
| not seen | KUHN | 04 E852 | 18 $\pi^- p \rightarrow \eta \pi^+ \pi^- \pi^- p$ |

³ Assuming the $\omega\rho$ mechanism for the $\omega\pi\pi$ state.

$a_1(1640)$ REFERENCES

| | | | | |
|---------|-----|------------------------------|---------------------------|-------------------------|
| 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. | | |

OTHER RELATED PAPERS

| | | | | |
|--------|----|--|--------------------------|-------------------|
| BARNES | 97 | PR D55 4157 | T. Barnes <i>et al.</i> | (ORNL, RAL, MCHS) |
| GOUZ | 92 | Dallas HEP 92, p. 572 | Yu.P. Gouz <i>et al.</i> | (VES Collab.) |
| | | Proceedings XXVI Int. Conf. on High Energy Physics | | |