

a₁(1640)

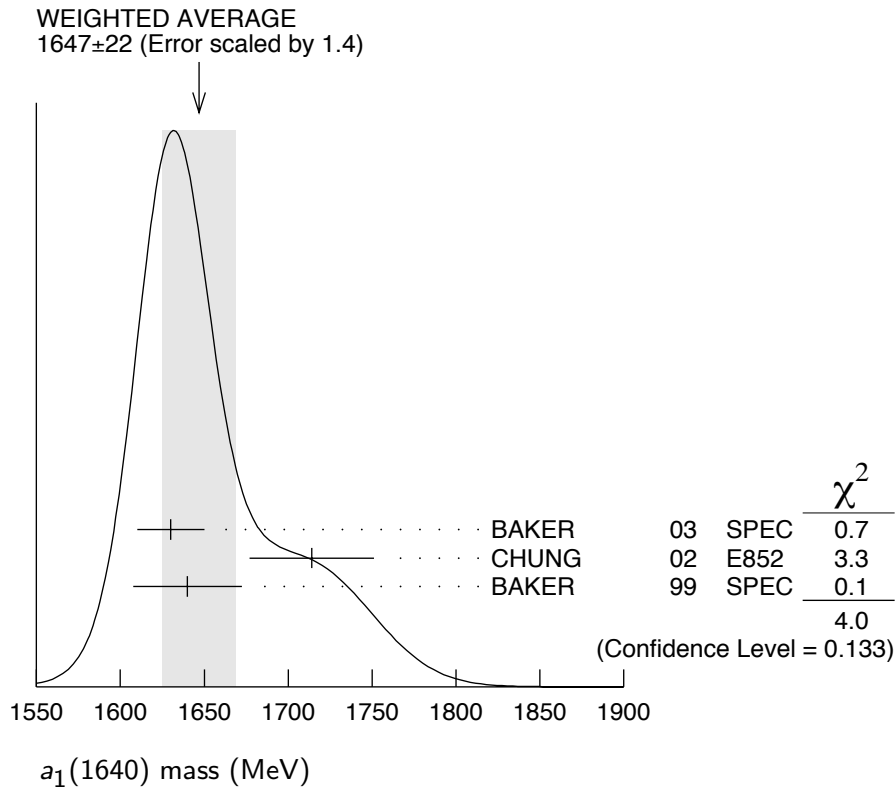
$$I^G(J^{PC}) = 1^-(1^{++})$$

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.

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_j/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				