

$\pi_1(1600)$ 

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

See the review on "Non- $q\bar{q}$  Mesons" and a note in PDG 06, Journal of Physics **G33** 1 (2006).

### $\pi_1(1600)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>1660^{+15}_{-11}</math> OUR AVERAGE</b>		Error includes scale factor of 1.2.		
$1564 \pm 24 \pm 86$		<sup>1</sup> RODAS	19 JPAC	191 $\pi^- p \rightarrow \eta^{(\prime)} \pi^- p$
$1600^{+110}_{-60}$	46M	<sup>2</sup> AGHASYAN	18B COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
$1664 \pm 8 \pm 10$	145k	<sup>3</sup> LU	05 B852	18 $\pi^- p \rightarrow \omega \pi^- \pi^0 p$
$1709 \pm 24 \pm 41$	69k	<sup>4</sup> KUHN	04 B852	18 $\pi^- p \rightarrow \eta \pi^+ \pi^- \pi^- p$
$1597 \pm 10^{+45}_{-10}$		<sup>4</sup> IVANOV	01 B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$1660 \pm 10^{+0}_{-64}$	420k	<sup>5</sup> ALEKSEEV	10 COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
$1593 \pm 8^{+29}_{-47}$		<sup>4,6</sup> ADAMS	98B B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$

<sup>1</sup> The coupled-channel analysis of both the  $\eta\pi$  and  $\eta'\pi$  systems using ADOLPH 15data. The mass is extracted from the T-matrix pole.

<sup>2</sup> Statistical error negligible.

<sup>3</sup> May be a different state: natural and unnatural parity exchanges.

<sup>4</sup> Natural parity exchange.

<sup>5</sup> Superseded by AGHASYAN 2018B.

<sup>6</sup> Superseded by DZIERBA 06 excluding this state in a more refined PWA analysis, with 2.6 M events of  $\pi^- p \rightarrow \pi^- \pi^- \pi^+ p$  and 3 M events of  $\pi^- p \rightarrow \pi^- \pi^0 \pi^0 p$  of E852 data.

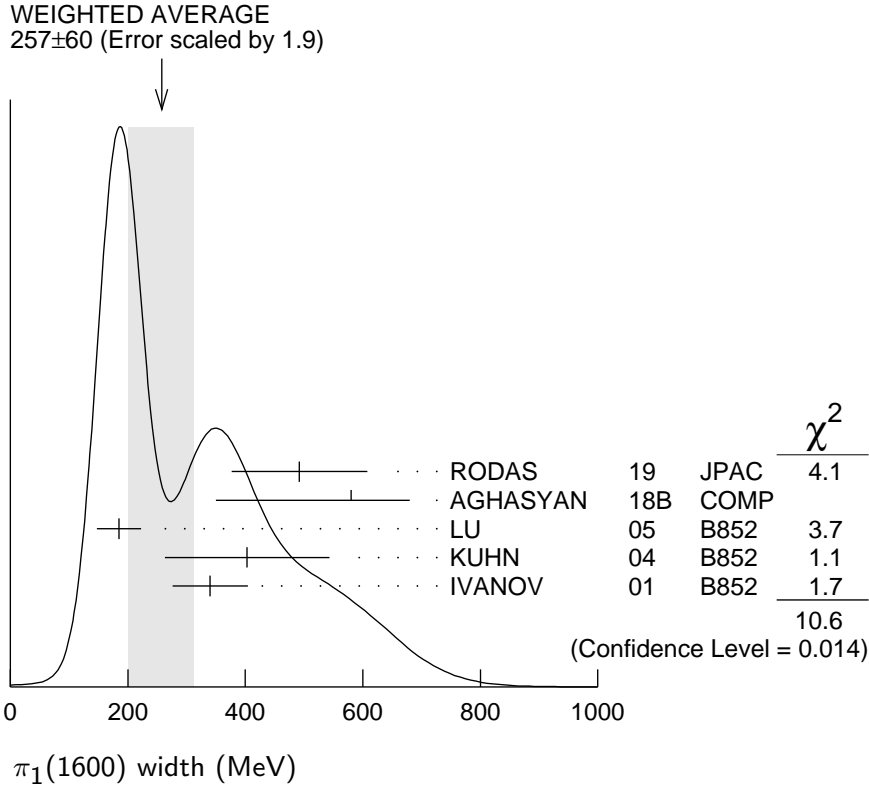
### $\pi_1(1600)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>257 \pm 60</math> OUR AVERAGE</b>		Error includes scale factor of 1.9. See the ideogram below.		
$492 \pm 54 \pm 102$		<sup>1</sup> RODAS	19 JPAC	191 $\pi^- p \rightarrow \eta^{(\prime)} \pi^- p$
$580^{+100}_{-230}$	46M	<sup>2</sup> AGHASYAN	18B COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
$185 \pm 25 \pm 28$	145k	<sup>3</sup> LU	05 B852	18 $\pi^- p \rightarrow \omega \pi^- \pi^0 p$
$403 \pm 80 \pm 115$	69k	<sup>4</sup> KUHN	04 B852	18 $\pi^- p \rightarrow \eta \pi^+ \pi^- \pi^- p$
$340 \pm 40 \pm 50$		<sup>4</sup> IVANOV	01 B852	18 $\pi^- p \rightarrow \eta' \pi^- p$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$269 \pm 21^{+42}_{-64}$	420k	<sup>5</sup> ALEKSEEV	10 COMP	190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$
$168 \pm 20^{+150}_{-12}$		<sup>4,6</sup> ADAMS	98B B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$

<sup>1</sup> The coupled-channel analysis of both the  $\eta\pi$  and  $\eta'\pi$  systems using ADOLPH 15data. The width is extracted from the T-matrix pole.

<sup>2</sup> Statistical error negligible.

- <sup>3</sup> May be a different state: natural and unnatural parity exchanges.
- <sup>4</sup> Natural parity exchange.
- <sup>5</sup> Superseded by AGHASYAN 2018B.
- <sup>6</sup> Superseded by DZIERBA 06 excluding this state in a more refined PWA analysis, with 2.6 M events of  $\pi^- p \rightarrow \pi^- \pi^- \pi^+ p$  and 3 M events of  $\pi^- p \rightarrow \pi^- \pi^0 \pi^0 p$  of E852 data.



### $\pi_1(1600)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $\pi \pi \pi$	seen
$\Gamma_2$ $\rho^0 \pi^-$	seen
$\Gamma_3$ $f_2(1270) \pi^-$	not seen
$\Gamma_4$ $b_1(1235) \pi$	seen
$\Gamma_5$ $\eta'(958) \pi^-$	seen
$\Gamma_6$ $f_1(1285) \pi$	seen

### $\pi_1(1600)$ BRANCHING RATIOS

$\Gamma(\rho^0 \pi^-)/\Gamma_{\text{total}}$	$\Gamma_2/\Gamma$		
VALUE	DOCUMENT ID	TECN	COMMENT
seen	ALEKSEEV	10	COMP 190 $\pi^- Pb \rightarrow \pi^- \pi^- \pi^+ Pb'$

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

not seen NOZAR 09 CLAS  $\gamma p \rightarrow 2\pi^+\pi^-n$   
 not seen <sup>1</sup> DZIERBA 06 B852 18  $\pi^-p$

<sup>1</sup> From the PWA analysis of 2.6 M  $\pi^-p \rightarrow \pi^-\pi^-\pi^+p$  and 3 M events of  $\pi^-p \rightarrow \pi^-\pi^0\pi^0p$  of E852 data. Supersedes ADAMS 98B.

### $\Gamma(f_2(1270)\pi^-)/\Gamma_{\text{total}}$ $\Gamma_3/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>not seen</b>	<sup>1</sup> DZIERBA 06	B852	18 $\pi^-p$

<sup>1</sup> From the PWA analysis of 2.6 M  $\pi^-p \rightarrow \pi^-\pi^-\pi^+p$  and 3 M events of  $\pi^-p \rightarrow \pi^-\pi^0\pi^0p$  of E852 data. Supersedes CHUNG 02.

### $\Gamma(b_1(1235)\pi)/\Gamma_{\text{total}}$ $\Gamma_4/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>seen</b>	35280	<sup>1</sup> BAKER 03	SPEC	$\bar{p}p \rightarrow \omega\pi^+\pi^-\pi^0$

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

seen	145k	LU 05	B852	18 $\pi^-p \rightarrow \omega\pi^-\pi^0p$
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<sup>1</sup>  $B((b_1\pi)_{D\text{-wave}})/B((b_1\pi)_{S\text{-wave}})=0.3 \pm 0.1$ .

### $\Gamma(\eta'(958)\pi^-)/\Gamma_{\text{total}}$ $\Gamma_5/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>seen</b>	IVANOV 01	B852	18 $\pi^-p \rightarrow \eta'\pi^-p$

### $\Gamma(f_1(1285)\pi)/\Gamma(\eta'(958)\pi^-)$ $\Gamma_6/\Gamma_5$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>3.80±0.78</b>	69k	<sup>1</sup> KUHN 04	B852	18 $\pi^-p \rightarrow \eta\pi^+\pi^-\pi^-p$

<sup>1</sup> Using  $\eta'(958)\pi$  data from IVANOV 01.

## $\pi_1(1600)$ REFERENCES

RODAS 19	PRL 122 042002	A. Rodas <i>et al.</i>	(JPAC Collab.)
AGHASYAN 18B	PR D98 092003	M. Aghasyan <i>et al.</i>	(COMPASS Collab.)
ADOLPH 15	PL B740 303	M. Adolph <i>et al.</i>	(COMPASS Collab.)
ALEKSEEV 10	PRL 104 241803	M.G. Alekseev <i>et al.</i>	(COMPASS Collab.)
NOZAR 09	PRL 102 102002	M. Nozar <i>et al.</i>	(JLab CLAS Collab.)
DZIERBA 06	PR D73 072001	A.R. Dzierba <i>et al.</i>	(BNL E852 Collab.)
PDG 06	JP G33 1	W.-M. Yao <i>et al.</i>	(PDG Collab.)
LU 05	PRL 94 032002	M. Lu <i>et al.</i>	(BNL E852 Collab.)
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.)
IVANOV 01	PRL 86 3977	E.I. Ivanov <i>et al.</i>	(BNL E852 Collab.)
ADAMS 98B	PRL 81 5760	G.S. Adams <i>et al.</i>	(BNL E852 Collab.)