

# π(1800)

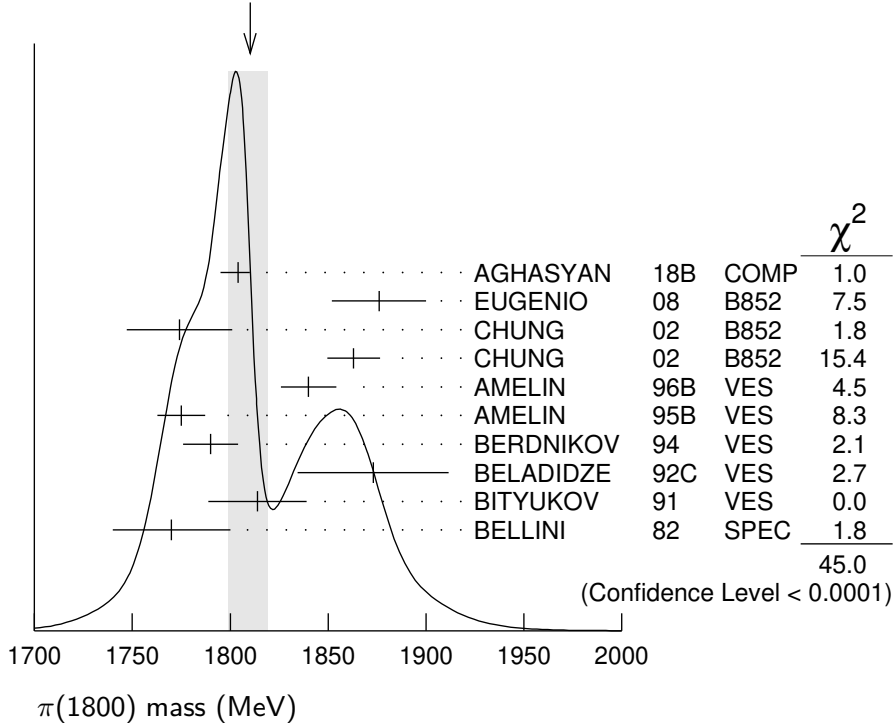
$$I^G(J^{PC}) = 1^-(0^{-+})$$

See the review on "Spectroscopy of Light Meson Resonances."

## π(1800) MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>1810<sup>+9</sup><sub>-11</sub> OUR AVERAGE</b> Error includes scale factor of 2.2. See the ideogram below.					
1804 <sup>+6</sup> <sub>-9</sub>	46M	<sup>1</sup> AGHASYAN	18B	COMP	190 π <sup>-</sup> p → π <sup>-</sup> π <sup>+</sup> π <sup>-</sup> p
1876 ± 18 ± 16	4k	<sup>2</sup> EUGENIO	08	B852	- 18 π <sup>-</sup> p → ηηπ <sup>-</sup> p
1774 ± 18 ± 20		<sup>3</sup> CHUNG	02	B852	18.3 π <sup>-</sup> p → π <sup>+</sup> π <sup>-</sup> π <sup>-</sup> p
1863 ± 9 ± 10		<sup>4</sup> CHUNG	02	B852	18.3 π <sup>-</sup> p → π <sup>+</sup> π <sup>-</sup> π <sup>-</sup> p
1840 ± 10 ± 10	1.2k	AMELIN	96B	VES	- 37 π <sup>-</sup> A → ηηπ <sup>-</sup> A
1775 ± 7 ± 10		<sup>5</sup> AMELIN	95B	VES	- 36 π <sup>-</sup> A → π <sup>+</sup> π <sup>-</sup> π <sup>-</sup> A
1790 ± 14		<sup>6</sup> BERDNIKOV	94	VES	- 37 π <sup>-</sup> A → K <sup>+</sup> K <sup>-</sup> π <sup>-</sup> A
1873 ± 33 ± 20		BELADIDZE	92C	VES	- 36 π <sup>-</sup> Be → π <sup>-</sup> η' η Be
1814 ± 10 ± 23	426	BITYUKOV	91	VES	- 36 π <sup>-</sup> C → π <sup>-</sup> ηη C
1770 ± 30	1.1k	BELLINI	82	SPEC	- 40 π <sup>-</sup> A → 3π A
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
1785 ± 9 <sup>+12</sup> <sub>-6</sub>	420k	<sup>7</sup> ALEKSEEV	10	COMP	190 π <sup>-</sup> Pb → π <sup>-</sup> π <sup>-</sup> π <sup>+</sup> Pb'
1737 ± 5 ± 15		AMELIN	99	VES	37 π <sup>-</sup> A → ω π <sup>-</sup> π <sup>0</sup> A*

WEIGHTED AVERAGE  
1810+9-11 (Error scaled by 2.2)



- <sup>1</sup> Statistical error negligible.
- <sup>2</sup> From a single-pole fit.
- <sup>3</sup> In the  $f_0(980)\pi$  wave.
- <sup>4</sup> In the  $f_0(500)\pi$  wave.
- <sup>5</sup> From a fit to  $J^{PC} = 0^{-+} f_0(980)\pi, f_0(1370)\pi$  waves.
- <sup>6</sup> From a fit to  $J^{PC} = 0^{-+} K_0^*(1430)K^-$  and  $f_0(980)\pi^-$  waves.
- <sup>7</sup> Superseded by AGHASYAN 2018B.

### $\pi(1800)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b><math>215^{+8}_{-8}</math> OUR AVERAGE</b>					
$220^{+8}_{-11}$	46M	<sup>8</sup> AGHASYAN	18B	COMP	190 $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$
$221 \pm 26 \pm 38$	4k	<sup>9</sup> EUGENIO	08	B852	– 18 $\pi^- p \rightarrow \eta \eta \pi^- p$
$223 \pm 48 \pm 50$		<sup>10</sup> CHUNG	02	B852	18.3 $\pi^- p \rightarrow$ $\pi^+ \pi^- \pi^- p$
$191 \pm 21 \pm 20$		<sup>11</sup> CHUNG	02	B852	18.3 $\pi^- p \rightarrow$ $\pi^+ \pi^- \pi^- p$
$210 \pm 30 \pm 30$	1.2k	AMELIN	96B	VES	– 37 $\pi^- A \rightarrow \eta \eta \pi^- A$
$190 \pm 15 \pm 15$		<sup>12</sup> AMELIN	95B	VES	– 36 $\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$
$210 \pm 70$		<sup>13</sup> BERDNIKOV	94	VES	– 37 $\pi^- A \rightarrow K^+ K^- \pi^- A$
$225 \pm 35 \pm 20$		BELADIDZE	92C	VES	– 36 $\pi^- Be \rightarrow \pi^- \eta' \eta Be$
$205 \pm 18 \pm 32$	426	BITYUKOV	91	VES	– 36 $\pi^- C \rightarrow \pi^- \eta \eta C$
$310 \pm 50$	1.1k	BELLINI	82	SPEC	– 40 $\pi^- A \rightarrow 3\pi A$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
$208 \pm 22^{+21}_{-37}$	420k	<sup>14</sup> ALEKSEEV	10	COMP	190 $\pi^- Pb \rightarrow$ $\pi^- \pi^- \pi^+ Pb'$
$259 \pm 19 \pm 6$		AMELIN	99	VES	37 $\pi^- A \rightarrow \omega \pi^- \pi^0 A^*$

- <sup>8</sup> Statistical error negligible.
- <sup>9</sup> From a single-pole fit.
- <sup>10</sup> In the  $f_0(980)\pi$  wave.
- <sup>11</sup> In the  $f_0(500)\pi$  wave.
- <sup>12</sup> From a fit to  $J^{PC} = 0^{-+} f_0(980)\pi, f_0(1370)\pi$  waves.
- <sup>13</sup> From a fit to  $J^{PC} = 0^{-+} K_0^*(1430)K^-$  and  $f_0(980)\pi^-$  waves.
- <sup>14</sup> Superseded by AGHASYAN 2018B.

### $\pi(1800)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $\pi^+ \pi^- \pi^-$	seen
$\Gamma_2$ $f_0(500)\pi^-$	seen
$\Gamma_3$ $f_0(980)\pi^-$	seen
$\Gamma_4$ $f_0(1370)\pi^-$	seen
$\Gamma_5$ $f_0(1500)\pi^-$	not seen
$\Gamma_6$ $\rho \pi^-$	not seen
$\Gamma_7$ $\eta \eta \pi^-$	seen

$\Gamma_8$	$a_0(980)\eta$	seen
$\Gamma_9$	$a_2(1320)\eta$	not seen
$\Gamma_{10}$	$f_2(1270)\pi$	not seen
$\Gamma_{11}$	$f_0(1370)\pi^-$	not seen
$\Gamma_{12}$	$f_0(1500)\pi^-$	seen
$\Gamma_{13}$	$\eta\eta'(958)\pi^-$	seen
$\Gamma_{14}$	$K_0^*(1430)K^-$	seen
$\Gamma_{15}$	$K^*(892)K^-$	not seen

### $\pi(1800)$ BRANCHING RATIOS

#### $\Gamma(f_0(980)\pi^-)/\Gamma(f_0(500)\pi^-)$ $\Gamma_3/\Gamma_2$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
<b>0.44±0.08±0.38</b>	<sup>15</sup> CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$

#### $\Gamma(f_0(980)\pi^-)/\Gamma(f_0(1370)\pi^-)$ $\Gamma_3/\Gamma_4$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

1.7±1.3	<sup>16</sup> AMELIN	95B	VES	–	36 $\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$
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#### $\Gamma(f_0(1370)\pi^-)/\Gamma_{\text{total}}$ $\Gamma_4/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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<b>seen</b>	BELLINI	82	SPEC	–	40 $\pi^- A \rightarrow 3\pi A$
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#### $\Gamma(f_0(1500)\pi^-)/\Gamma_{\text{total}}$ $\Gamma_5/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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<b>not seen</b>	CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$
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#### $\Gamma(\rho\pi^-)/\Gamma_{\text{total}}$ $\Gamma_6/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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<b>not seen</b>	BELLINI	82	SPEC	–	40 $\pi^- A \rightarrow 3\pi A$
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#### $\Gamma(\rho\pi^-)/\Gamma(f_0(980)\pi^-)$ $\Gamma_6/\Gamma_3$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.25		CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+ \pi^- \pi^- p$	
<0.14	90	AMELIN	95B	VES	–	36 $\pi^- A \rightarrow \pi^+ \pi^- \pi^- A$

#### $\Gamma(\eta\eta\pi^-)/\Gamma(\pi^+\pi^-\pi^-)$ $\Gamma_7/\Gamma_1$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.5±0.1	1200	<sup>16</sup> AMELIN	96B	VES	–	37 $\pi^- A \rightarrow \eta\eta\pi^- A$
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#### $\Gamma(a_2(1320)\eta)/\Gamma_{\text{total}}$ $\Gamma_9/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>not seen</b>	EUGENIO	08	B852	18 $\pi^- p \rightarrow \eta\eta\pi^- p$
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$\Gamma(f_2(1270)\pi)/\Gamma_{\text{total}}$   $\Gamma_{10}/\Gamma$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>not seen</b>	EUGENIO 08	B852	18 $\pi^- p \rightarrow \eta\eta\pi^- p$

 $\Gamma(f_0(1370)\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{11}/\Gamma$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>not seen</b>	EUGENIO 08	B852	18 $\pi^- p \rightarrow \eta\eta\pi^- p$

 $\Gamma(f_0(1500)\pi^-)/\Gamma(a_0(980)\eta)$   $\Gamma_{12}/\Gamma_8$ 

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.48 ± 0.17	4k <sup>16,17</sup>	EUGENIO 08	B852	–	18 $\pi^- p \rightarrow \eta\eta\pi^- p$
0.030 <sup>+0.014</sup> <sub>–0.011</sub>	<sup>16</sup>	ANISOVICH 01B	SPEC	0	0.6–1.94 $p\bar{p} \rightarrow \eta\eta\pi^0\pi^0$
0.08 ± 0.03	1200 <sup>16,18</sup>	AMELIN 96B	VES	–	37 $\pi^- A \rightarrow \eta\eta\pi^- A$

 $\Gamma(\eta\eta'(958)\pi^-)/\Gamma(\eta\eta\pi^-)$   $\Gamma_{13}/\Gamma_7$ 

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.29 ± 0.07		<sup>16</sup> BELADIDZE 92C	VES	–	36 $\pi^- \text{Be} \rightarrow \pi^- \eta' \eta \text{Be}$
0.3 ± 0.1	426 ± 57	<sup>16</sup> BITYUKOV 91	VES	–	36 $\pi^- \text{C} \rightarrow \pi^- \eta \eta \text{C}$

 $\Gamma(K_0^*(1430)K^-)/\Gamma_{\text{total}}$   $\Gamma_{14}/\Gamma$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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**seen** BERDNIKOV 94 VES – 37  $\pi^- A \rightarrow K^+ K^- \pi^- A$

 $\Gamma(K^*(892)K^-)/\Gamma_{\text{total}}$   $\Gamma_{15}/\Gamma$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
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**not seen** BERDNIKOV 94 VES – 37  $\pi^- A \rightarrow K^+ K^- \pi^- A$

<sup>15</sup> Assuming that  $f_0(980)$  decays only to  $\pi\pi$ .

<sup>16</sup> Systematic errors not estimated.

<sup>17</sup> From a single-pole fit.

<sup>18</sup> Assuming that  $f_0(1500)$  decays only to  $\eta\eta$  and  $a_0(980)$  decays only to  $\eta\pi$ .

 **$\pi(1800)$  REFERENCES**

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ALEKSEEV 10	PRL 104 241803	M.G. Alekseev <i>et al.</i>	(COMPASS Collab.)
EUGENIO 08	PL B660 466	P. Eugenio <i>et al.</i>	(BNL E852 Collab.)
CHUNG 02	PR D65 072001	S.U. Chung <i>et al.</i>	(BNL E852 Collab.)
ANISOVICH 01B	PL B500 222	A.V. Anisovich <i>et al.</i>	
AMELIN 99	PAN 62 445	D.V. Amelin <i>et al.</i>	(VES Collab.)
	Translated from YAF 62 487.		
AMELIN 96B	PAN 59 976	D.V. Amelin <i>et al.</i>	(SERP, TBIL) IGJPC
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AMELIN 95B	PL B356 595	D.V. Amelin <i>et al.</i>	(SERP, TBIL)
BERDNIKOV 94	PL B337 219	E.B. Berdnikov <i>et al.</i>	(SERP, TBIL)
BELADIDZE 92C	SJNP 55 1535	G.M. Beladidze, S.I. Bityukov, G.V. Borisov	(SERP+)
	Translated from YAF 55 2748.		
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BELLINI 82	PRL 48 1697	G. Bellini <i>et al.</i>	(MILA, BGNA, JINR)