# $\rho_3(1690)$

$I^G(J^{PC}) = 1^+(3^{--})$

## $\rho_3(1690)$ MASS

| VALUE (MeV) | DOCUMENT ID |
|---|---|
| **1688.8±2.1 OUR AVERAGE** | Includes data from the 5 datablocks that follow this one. |

### $2\pi$ MODE

| VALUE (MeV) | EVTS | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | | |
| **1686± 4 OUR AVERAGE** | | | | | | |
| 1677±14 | | EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \rightarrow 2\pi p$ |
| 1679±11 | 476 | BALTAY | 78B | HBC | 0 | 15 $\pi^+ p \rightarrow \pi^+\pi^- n$ |
| 1678±12 | 175 | [1] ANTIPOV | 77 | CIBS | 0 | 25 $\pi^- p \rightarrow p3\pi$ |
| 1690± 7 | 600 | [1] ENGLER | 74 | DBC | 0 | 6 $\pi^+ n \rightarrow \pi^+\pi^- p$ |
| 1693± 8 | | [2] GRAYER | 74 | ASPK | 0 | 17 $\pi^- p \rightarrow \pi^+\pi^- n$ |
| 1678±12 | | MATTHEWS | 71C | DBC | 0 | 7 $\pi^+ N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | | |
| 1734±10 | | [3] CORDEN | 79 | OMEG | | 12–15 $\pi^- p \rightarrow n2\pi$ |
| 1692±12 | | [2,4] ESTABROOKS | 75 | RVUE | | 17 $\pi^- p \rightarrow \pi^+\pi^- n$ |
| 1737±23 | | ARMENISE | 70 | DBC | 0 | 9 $\pi^+ N$ |
| 1650±35 | 122 | BARTSCH | 70B | HBC | + | 8 $\pi^+ p \rightarrow N2\pi$ |
| 1687±21 | | STUNTEBECK | 70 | HDBC | 0 | 8 $\pi^- p$, 5.4 $\pi^+ d$ |
| 1683±13 | | ARMENISE | 68 | DBC | 0 | 5.1 $\pi^+ d$ |
| 1670±30 | | GOLDBERG | 65 | HBC | 0 | 6 $\pi^+ d$, 8 $\pi^- p$ |

[1] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.
[2] Uses same data as HYAMS 75.
[3] From a phase shift solution containing a $f_2'(1525)$ width two times larger than the $K\overline{K}$ result.
[4] From phase-shift analysis. Error takes account of spread of different phase-shift solutions.

### $K\overline{K}$ AND $K\overline{K}\pi$ MODES

| VALUE (MeV) | EVTS | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | | |
| **1696± 4 OUR AVERAGE** | | | | | | |
| 1699± 5 | | ALPER | 80 | CNTR | 0 | 62 $\pi^- p \rightarrow K^+ K^- n$ |
| 1698±12 | 6k | [5,6] MARTIN | 78D | SPEC | | 10 $\pi p \rightarrow K^0_S K^- p$ |
| 1692± 6 | | BLUM | 75 | ASPK | 0 | 18.4 $\pi^- p \rightarrow n K^+ K^-$ |
| 1690±16 | | ADERHOLZ | 69 | HBC | + | 8 $\pi^+ p \rightarrow K\overline{K}\pi$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | | |
| 1694± 8 | | [7] COSTA... | 80 | OMEG | | 10 $\pi^- p \rightarrow K^+ K^- n$ |

[5] From a fit to $J^P = 3^-$ partial wave.
[6] Systematic error on mass scale subtracted.
[7] They cannot distinguish between $\rho_3(1690)$ and $\omega_3(1670)$.

## $(4\pi)^{\pm}$ MODE

| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | | *TECN* | *CHG* | *COMMENT* |
|---|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | | |
| **1686± 5 OUR AVERAGE** Error includes scale factor of 1.1. | | | | | | |
| 1694± 6 | | [8] EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \rightarrow p 4\pi$ |
| 1665±15 | 177 | BALTAY | 78B | HBC | + | 15 $\pi^+ p \rightarrow p 4\pi$ |
| 1670±10 | | THOMPSON | 74 | HBC | + | 13 $\pi^+ p$ |
| 1687±20 | | CASON | 73 | HBC | − | 8,18.5 $\pi^- p$ |
| 1685±14 | | [9] CASON | 73 | HBC | − | 8,18.5 $\pi^- p$ |
| 1680±40 | 144 | BARTSCH | 70B | HBC | + | 8 $\pi^+ p \rightarrow N 4\pi$ |
| 1689±20 | 102 | [9] BARTSCH | 70B | HBC | + | 8 $\pi^+ p \rightarrow N 2\rho$ |
| 1705±21 | | CASO | 70 | HBC | − | 11.2 $\pi^- p \rightarrow n\rho 2\pi$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | | |
| 1718±10 | | [10] EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \rightarrow p 4\pi$ |
| 1673± 9 | | [11] EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \rightarrow p 4\pi$ |
| 1733± 9 | 66 | [9] KLIGER | 74 | HBC | − | 4.5 $\pi^- p \rightarrow p 4\pi$ |
| 1630±15 | | HOLMES | 72 | HBC | + | 10–12 $K^+ p$ |
| 1720±15 | | BALTAY | 68 | HBC | + | 7, 8.5 $\pi^+ p$ |

[8] From $\rho^- \rho^0$ mode, not independent of the other two EVANGELISTA 81 entries.
[9] From $\rho^{\pm} \rho^0$ mode.
[10] From $a_2(1320)^- \pi^0$ mode, not independent of the other two EVANGELISTA 81 entries.
[11] From $a_2(1320)^0 \pi^-$ mode, not independent of the other two EVANGELISTA 81 entries.

## $\omega\pi$ MODE

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *CHG* | *COMMENT* |
|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | |
| **1681± 7 OUR AVERAGE** | | | | | |
| 1670±25 | [12] ALDE | 95 | GAM2 | | 38 $\pi^- p \rightarrow \omega\pi^0 n$ |
| 1690±15 | EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \rightarrow \omega\pi p$ |
| 1666±14 | GESSAROLI | 77 | HBC | | 11 $\pi^- p \rightarrow \omega\pi p$ |
| 1686± 9 | THOMPSON | 74 | HBC | + | 13 $\pi^+ p$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 1654±24 | BARNHAM | 70 | HBC | + | 10 $K^+ p \rightarrow \omega\pi X$ |

[12] Supersedes ALDE 92C.

### $\eta\pi^+\pi^-$ MODE

(For difficulties with MMS experiments, see the $a_2(1320)$ mini-review in the 1973 edition.)

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *CHG* | *COMMENT* |
|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | |
| **1682±12 OUR AVERAGE** | | | | | |
| 1685±10±20 | AMELIN | 00 | VES | | 37 $\pi^- p \rightarrow \eta\pi^+\pi^- n$ |
| 1680±15 | FUKUI | 88 | SPEC | 0 | 8.95 $\pi^- p \rightarrow \eta\pi^+\pi^- n$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 1700±47 | [13] ANDERSON | 69 | MMS | – | 16 $\pi^- p$ backward |
| 1632±15 | [13,14] FOCACCI | 66 | MMS | – | 7–12 $\pi^- p \rightarrow p$MM |
| 1700±15 | [13,14] FOCACCI | 66 | MMS | – | 7–12 $\pi^- p \rightarrow p$MM |
| 1748±15 | [13,14] FOCACCI | 66 | MMS | – | 7–12 $\pi^- p \rightarrow p$MM |

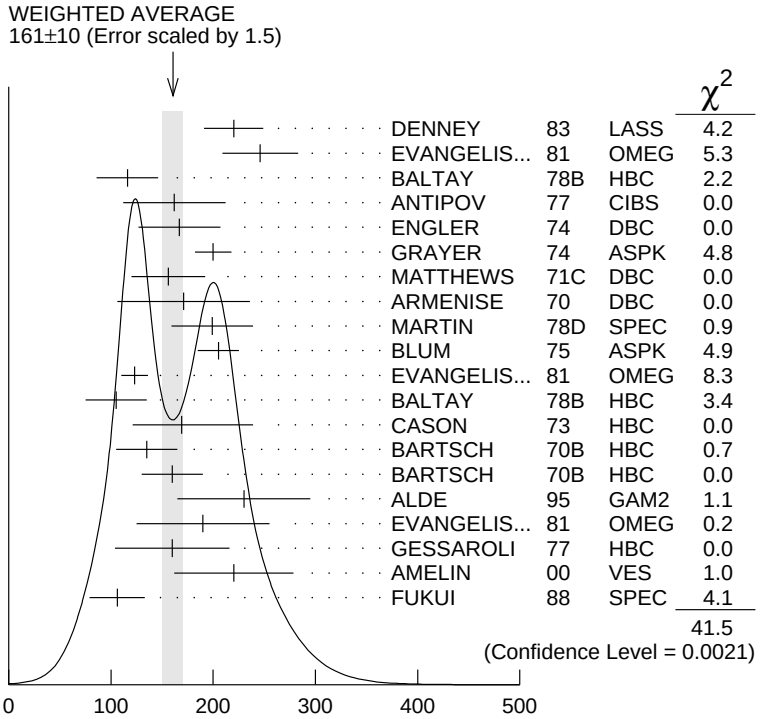
[13] Seen in 2.5–3 GeV/$c$ $\overline{p}p$. $2\pi^+2\pi^-$, with 0, 1, 2 $\pi^+\pi^-$ pairs in $\rho$ band not seen by OREN 74 (2.3 GeV/$c$ $\overline{p}p$) with more statistics. (Jan. 1976)

[14] Not seen by BOWEN 72.

## $\rho_3(1690)$ WIDTH

### $2\pi$, $K\overline{K}$, AND $K\overline{K}\pi$ MODES

| *VALUE* (MeV) | *DOCUMENT ID* |
|---|---|
| **161±10 OUR AVERAGE** Includes data from the 5 datablocks that follow this one. Error includes scale factor of 1.5. See the ideogram below. | |

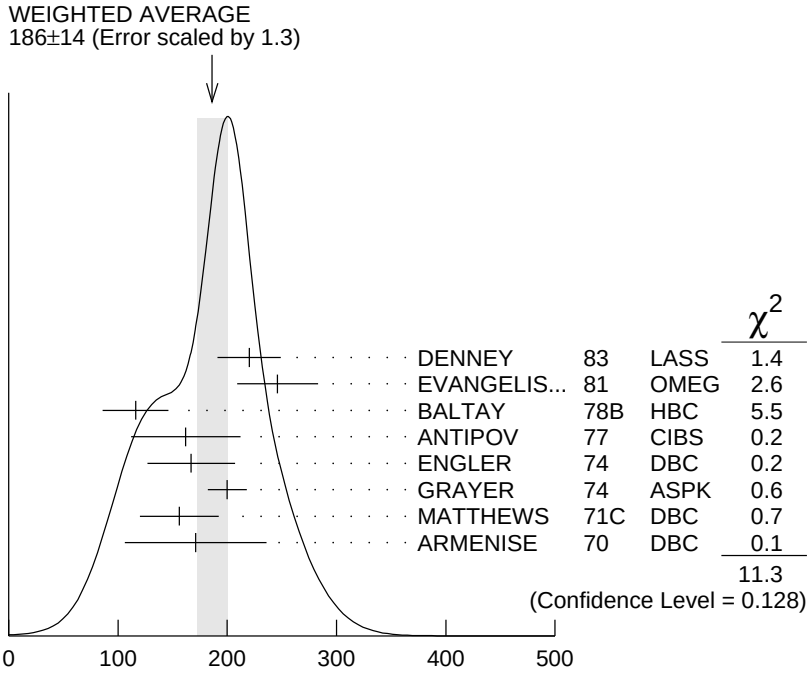



$\rho_3(1690)$ width, $2\pi$, $K\overline{K}$, and $K\overline{K}\pi$ modes (MeV)

## $2\pi$ MODE

| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | | *TECN* | *CHG* | *COMMENT* |
|---|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | | |
| **186±14 OUR AVERAGE** Error includes scale factor of 1.3. See the ideogram below. | | | | | | |
| 220±29 | | DENNEY | 83 | LASS | | 10 $\pi^+ N$ |
| 246±37 | | EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \rightarrow 2\pi p$ |
| 116±30 | 476 | BALTAY | 78B | HBC | 0 | 15 $\pi^+ p \rightarrow \pi^+\pi^- n$ |
| 162±50 | 175 | [15] ANTIPOV | 77 | CIBS | 0 | 25 $\pi^- p \rightarrow p3\pi$ |
| 167±40 | 600 | ENGLER | 74 | DBC | 0 | 6 $\pi^+ n \rightarrow \pi^+\pi^- p$ |
| 200±18 | | [16] GRAYER | 74 | ASPK | 0 | 17 $\pi^- p \rightarrow \pi^+\pi^- n$ |
| 156±36 | | MATTHEWS | 71C | DBC | 0 | 7 $\pi^+ N$ |
| 171±65 | | ARMENISE | 70 | DBC | 0 | 9 $\pi^+ d$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | | |
| 322±35 | | [17] CORDEN | 79 | OMEG | | 12–15 $\pi^- p \rightarrow n2\pi$ |
| 240±30 | | [16,18] ESTABROOKS | 75 | RVUE | | 17 $\pi^- p \rightarrow \pi^+\pi^- n$ |
| 180±30 | 122 | BARTSCH | 70B | HBC | + | 8 $\pi^+ p \rightarrow N2\pi$ |
| $267^{+72}_{-46}$ | | STUNTEBECK | 70 | HDBC | 0 | 8 $\pi^- p$, 5.4 $\pi^+ d$ |
| 188±49 | | ARMENISE | 68 | DBC | 0 | 5.1 $\pi^+ d$ |
| 180±40 | | GOLDBERG | 65 | HBC | 0 | 6 $\pi^+ d$, 8 $\pi^- p$ |

[15] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.
[16] Uses same data as HYAMS 75 and BECKER 79.
[17] From a phase shift solution containing a $f_2'(1525)$ width two times larger than the $K\overline{K}$ result.
[18] From phase-shift analysis. Error takes account of spread of different phase-shift solutions.




$\rho_3(1690)$ width, $2\pi$ mode (MeV)

## $K\overline{K}$ AND $K\overline{K}\pi$ MODES

| VALUE (MeV) | EVTS | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | | |
| **204±18 OUR AVERAGE** | | | | | | |
| 199±40 | 6000 | [19] MARTIN | 78D | SPEC | | 10 $\pi p \to K^0_S K^- p$ |
| 205±20 | | BLUM | 75 | ASPK | 0 | 18.4 $\pi^- p \to n K^+ K^-$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | | |
| 219± 4 | | ALPER | 80 | CNTR | 0 | 62 $\pi^- p \to K^+ K^- n$ |
| 186±11 | | [20] COSTA... | 80 | OMEG | | 10 $\pi^- p \to K^+ K^- n$ |
| 112±60 | | ADERHOLZ | 69 | HBC | + | 8 $\pi^+ p \to K\overline{K}\pi$ |

[19] From a fit to $J^P = 3^-$ partial wave.
[20] They cannot distinguish between $\rho_3(1690)$ and $\omega_3(1670)$.

## $(4\pi)^{\pm}$ MODE

| VALUE (MeV) | EVTS | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | | |
| **129±10 OUR AVERAGE** | | | | | | |
| 123±13 | | [21] EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \to p4\pi$ |
| 105±30 | 177 | BALTAY | 78B | HBC | + | 15 $\pi^+ p \to p4\pi$ |
| $169^{+70}_{-48}$ | | CASON | 73 | HBC | − | 8,18.5 $\pi^- p$ |
| 135±30 | 144 | BARTSCH | 70B | HBC | + | 8 $\pi^+ p \to N4\pi$ |
| 160±30 | 102 | BARTSCH | 70B | HBC | + | 8 $\pi^+ p \to N2\rho$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | | |
| 230±28 | | [22] EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \to p4\pi$ |
| 184±33 | | [23] EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \to p4\pi$ |
| 150 | 66 | [24] KLIGER | 74 | HBC | − | 4.5 $\pi^- p \to p4\pi$ |
| 106±25 | | THOMPSON | 74 | HBC | + | 13 $\pi^+ p$ |
| $125^{+83}_{-35}$ | | [24] CASON | 73 | HBC | − | 8,18.5 $\pi^- p$ |
| 130±30 | | HOLMES | 72 | HBC | + | 10–12 $K^+ p$ |
| 180±30 | 90 | [24] BARTSCH | 70B | HBC | + | 8 $\pi^+ p \to N a_2 \pi$ |
| 100±35 | | BALTAY | 68 | HBC | + | 7, 8.5 $\pi^+ p$ |

[21] From $\rho^- \rho^0$ mode, not independent of the other two EVANGELISTA 81 entries.
[22] From $a_2(1320)^- \pi^0$ mode, not independent of the other two EVANGELISTA 81 entries.
[23] From $a_2(1320)^0 \pi^-$ mode, not independent of the other two EVANGELISTA 81 entries.
[24] From $\rho^{\pm} \rho^0$ mode.

### $\omega\pi$ MODE

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *CHG* | *COMMENT* |
|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | |
| **190±40 OUR AVERAGE** | | | | | |
| 230±65 | [25] ALDE | 95 | GAM2 | | 38 $\pi^- p \to \omega\pi^0 n$ |
| 190±65 | EVANGELIS... | 81 | OMEG | − | 12 $\pi^- p \to \omega\pi p$ |
| 160±56 | GESSAROLI | 77 | HBC | | 11 $\pi^- p \to \omega\pi p$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 89±25 | THOMPSON | 74 | HBC | + | 13 $\pi^+ p$ |
| $130^{+73}_{-43}$ | BARNHAM | 70 | HBC | + | 10 $K^+ p \to \omega\pi X$ |

[25] Supersedes ALDE 92C.

### $\eta\pi^+\pi^-$ MODE

(For difficulties with MMS experiments, see the $a_2(1320)$ mini-review in the 1973 edition.)

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *CHG* | *COMMENT* |
|---|---|---|---|---|---|
| The data in this block is included in the average printed for a previous datablock. | | | | | |
| **126±40 OUR AVERAGE** Error includes scale factor of 1.8. | | | | | |
| 220±30±50 | AMELIN | 00 | VES | | 37 $\pi^- p \to \eta\pi^+\pi^- n$ |
| 106±27 | FUKUI | 88 | SPEC | 0 | 8.95 $\pi^- p \to \eta\pi^+\pi^- n$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 195 | [26] ANDERSON | 69 | MMS | − | 16 $\pi^- p$ backward |
| < 21 | [26,27] FOCACCI | 66 | MMS | − | 7–12 $\pi^- p \to p$MM |
| < 30 | [26,27] FOCACCI | 66 | MMS | − | 7–12 $\pi^- p \to p$MM |
| < 38 | [26,27] FOCACCI | 66 | MMS | − | 7–12 $\pi^- p \to p$MM |

[26] Seen in 2.5–3 GeV/$c$ $\overline{p}p$. $2\pi^+2\pi^-$, with 0, 1, 2 $\pi^+\pi^-$ pairs in $\rho^0$ band not seen by OREN 74 (2.3 GeV/$c$ $\overline{p}p$) with more statistics. (Jan. 1979)

[27] Not seen by BOWEN 72.

## $\rho_3(1690)$ DECAY MODES

| | Mode | Fraction ($\Gamma_i/\Gamma$) | Scale factor |
|---|---|---|---|
| $\Gamma_1$ | $4\pi$ | (71.1 ± 1.9 ) % | |
| $\Gamma_2$ | $\pi^\pm\pi^+\pi^-\pi^0$ | (67 ±22 ) % | |
| $\Gamma_3$ | $\omega\pi$ | (16 ± 6 ) % | |
| $\Gamma_4$ | $\pi\pi$ | (23.6 ± 1.3 ) % | |
| $\Gamma_5$ | $K\overline{K}\pi$ | ( 3.8 ± 1.2 ) % | |
| $\Gamma_6$ | $K\overline{K}$ | ( 1.58± 0.26) % | 1.2 |
| $\Gamma_7$ | $\eta\pi^+\pi^-$ | seen | |

| | | |
|---|---|---|
| $\Gamma_8$ | $\rho(770)\eta$ | seen |
| $\Gamma_9$ | $\pi\pi\rho$ | seen |
| | Excluding $2\rho$ and $a_2(1320)\pi$. | |
| $\Gamma_{10}$ | $a_2(1320)\pi$ | seen |
| $\Gamma_{11}$ | $\rho\rho$ | seen |
| $\Gamma_{12}$ | $\phi\pi$ | |
| $\Gamma_{13}$ | $\eta\pi$ | |
| $\Gamma_{14}$ | $\pi^{\pm}2\pi^{+}2\pi^{-}\pi^{0}$ | |

## CONSTRAINED FIT INFORMATION

An overall fit to 5 branching ratios uses 10 measurements and one constraint to determine 4 parameters. The overall fit has a $\chi^2 = 14.7$ for 7 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the $x_i$ whose labels appear in this array to sum to one.

| | | | |
|---|---|---|---|
| $x_4$ | −77 | | |
| $x_5$ | −74 | 17 | |
| $x_6$ | −15 | 2 | 0 |
| | $x_1$ | $x_4$ | $x_5$ |

## $\rho_3(1690)$ BRANCHING RATIOS

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

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| **0.236±0.013 OUR FIT** | | | | | |
| **0.243±0.013 OUR AVERAGE** | | | | | |
| $0.259^{+0.018}_{-0.019}$ | BECKER | 79 | ASPK | 0 | 17 $\pi^- p$ polarized |
| 0.23 ±0.02 | CORDEN | 79 | OMEG | | 12–15 $\pi^- p \to n2\pi$ |
| 0.22 ±0.04 | [28] MATTHEWS | 71C | HDBC | 0 | 7 $\pi^+ n \to \pi^- p$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.245±0.006 | [29] ESTABROOKS | 75 | RVUE | | 17 $\pi^- p \to \pi^+\pi^- n$ |

[28] One-pion-exchange model used in this estimation.
[29] From phase-shift analysis of HYAMS 75 data.

### $\Gamma(\pi\pi)/\Gamma(\pi^{\pm}\pi^{+}\pi^{-}\pi^{0})$ $\Gamma_4/\Gamma_2$

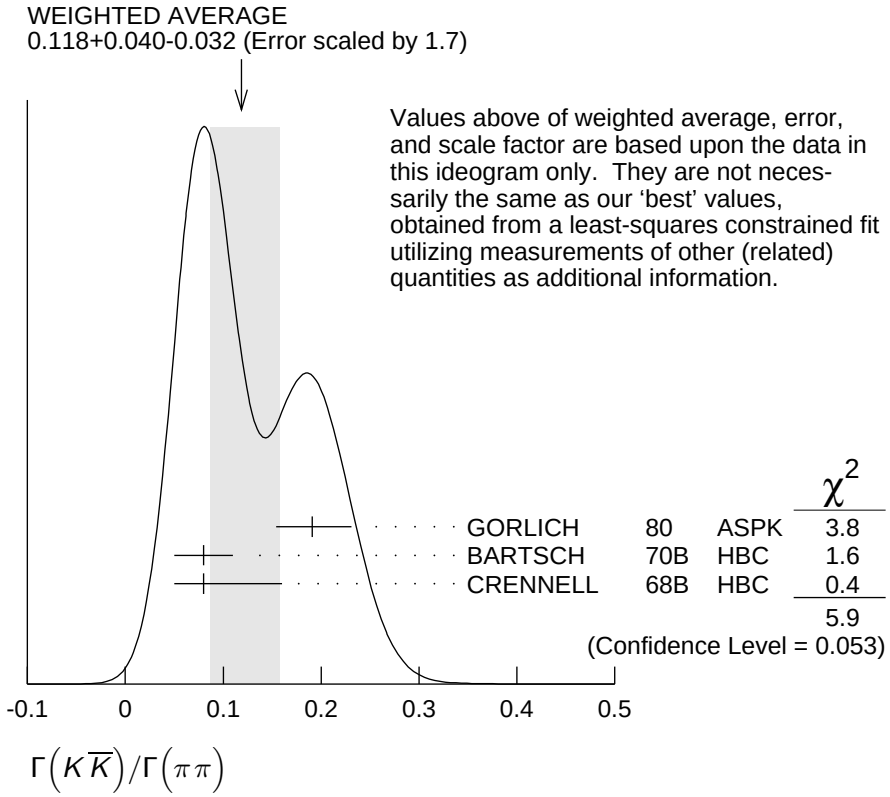
| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| **0.35±0.11** | CASON | 73 | HBC | − | 8,18.5 $\pi^- p$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| <0.2 | HOLMES | 72 | HBC | + | 10–12 $K^+ p$ |
| <0.12 | BALLAM | 71B | HBC | − | 16 $\pi^- p$ |

## $\Gamma(\pi\pi)/\Gamma(4\pi)$ $\Gamma_4/\Gamma_1$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| **0.332±0.026 OUR FIT** Error includes scale factor of 1.1. | | | | | |
| **0.30 ±0.10** | BALTAY | 78B | HBC | 0 | 15 $\pi^+ p \rightarrow p4\pi$ |

## $\Gamma(K\overline{K})/\Gamma(\pi\pi)$ $\Gamma_6/\Gamma_4$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| **0.067±0.011 OUR FIT** Error includes scale factor of 1.2. | | | | | |
| **$0.118^{+0.040}_{-0.032}$ OUR AVERAGE** Error includes scale factor of 1.7. See the ideogram below. | | | | | |
| $0.191^{+0.040}_{-0.037}$ | GORLICH | 80 | ASPK | 0 | 17,18 $\pi^- p$ polarized |
| 0.08 ±0.03 | BARTSCH | 70B | HBC | + | 8 $\pi^+ p$ |
| $0.08\ ^{+0.08}_{-0.03}$ | CRENNELL | 68B | HBC | | 6.0 $\pi^- p$ |




## $\Gamma(K\overline{K}\pi)/\Gamma(\pi\pi)$ $\Gamma_5/\Gamma_4$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| **0.16±0.05 OUR FIT** | | | | | |
| **0.16±0.05** | [30] BARTSCH | 70B | HBC | + | 8 $\pi^+ p$ |

[30] Increased by us to correspond to B($\rho_3(1690) \rightarrow \pi\pi$)=0.24.

## $[\Gamma(\pi\pi\rho)+\Gamma(a_2(1320)\pi)+\Gamma(\rho\rho)]/\Gamma(\pi^{\pm}\pi^+\pi^-\pi^0)$ $(\Gamma_9+\Gamma_{10}+\Gamma_{11})/\Gamma_2$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| **0.94±0.09 OUR AVERAGE** | | | | | |
| 0.96±0.21 | BALTAY | 78B | HBC | + | 15 $\pi^+ p \rightarrow p4\pi$ |
| 0.88±0.15 | BALLAM | 71B | HBC | − | 16 $\pi^- p$ |
| 1 ±0.15 | BARTSCH | 70B | HBC | + | 8 $\pi^+ p$ |
| consistent with 1 | CASO | 68 | HBC | − | 11 $\pi^- p$ |

## $\Gamma(\rho\rho)/\Gamma(\pi^{\pm}\pi^+\pi^-\pi^0)$ $\Gamma_{11}/\Gamma_2$

| VALUE | EVTS | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | | |
| 0.12±0.11 | | BALTAY | 78B | HBC | + | 15 $\pi^+ p \rightarrow p4\pi$ |
| 0.56 | 66 | KLIGER | 74 | HBC | − | 4.5 $\pi^- p \rightarrow p4\pi$ |
| 0.13±0.09 | | [31] THOMPSON | 74 | HBC | + | 13 $\pi^+ p$ |
| 0.7 ±0.15 | | BARTSCH | 70B | HBC | + | 8 $\pi^+ p$ |

[31] $\rho\rho$ and $a_2(1320)\pi$ modes are indistinguishable.

## $\Gamma(\rho\rho)/[\Gamma(\pi\pi\rho)+\Gamma(a_2(1320)\pi)+\Gamma(\rho\rho)]$ $\Gamma_{11}/(\Gamma_9+\Gamma_{10}+\Gamma_{11})$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.48±0.16 | CASO | 68 | HBC | − | 11 $\pi^- p$ |

## $\Gamma(a_2(1320)\pi)/\Gamma(\pi^{\pm}\pi^+\pi^-\pi^0)$ $\Gamma_{10}/\Gamma_2$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.66±0.08 | BALTAY | 78B | HBC | + | 15 $\pi^+ p \rightarrow p4\pi$ |
| 0.36±0.14 | [32] THOMPSON | 74 | HBC | + | 13 $\pi^+ p$ |
| not seen | CASON | 73 | HBC | − | 8,18.5 $\pi^- p$ |
| 0.6 ±0.15 | BARTSCH | 70B | HBC | + | 8 $\pi^+ p$ |
| 0.6 | BALTAY | 68 | HBC | + | 7,8.5 $\pi^+ p$ |

[32] $\rho\rho$ and $a_2(1320)\pi$ modes are indistinguishable.

## $\Gamma(\omega\pi)/\Gamma(\pi^{\pm}\pi^+\pi^-\pi^0)$ $\Gamma_3/\Gamma_2$

| VALUE | CL% | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|---|
| **0.23±0.05 OUR AVERAGE** | | Error includes scale factor of 1.2. | | | | |
| 0.33±0.07 | | THOMPSON | 74 | HBC | + | 13 $\pi^+ p$ |
| 0.12±0.07 | | BALLAM | 71B | HBC | − | 16 $\pi^- p$ |
| 0.25±0.10 | | BALTAY | 68 | HBC | + | 7,8.5 $\pi^+ p$ |
| 0.25±0.10 | | JOHNSTON | 68 | HBC | − | 7.0 $\pi^- p$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | | |
| <0.11 | 95 | BALTAY | 78B | HBC | + | 15 $\pi^+ p \rightarrow p4\pi$ |
| <0.09 | | KLIGER | 74 | HBC | − | 4.5 $\pi^- p \rightarrow p4\pi$ |

## $\Gamma(\phi\pi)/\Gamma(\pi^{\pm}\pi^+\pi^-\pi^0)$ $\Gamma_{12}/\Gamma_2$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| <0.11 | BALTAY | 68 | HBC | + | 7,8.5 $\pi^+ p$ |

### $\Gamma(\pi^{\pm}2\pi^{+}2\pi^{-}\pi^{0})/\Gamma(\pi^{\pm}\pi^{+}\pi^{-}\pi^{0})$ $\Gamma_{14}/\Gamma_{2}$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| <0.15 | BALTAY | 68 | HBC | + | 7,8.5 $\pi^{+}p$ |

### $\Gamma(\eta\pi)/\Gamma(\pi^{\pm}\pi^{+}\pi^{-}\pi^{0})$ $\Gamma_{13}/\Gamma_{2}$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| <0.02 | THOMPSON | 74 | HBC | + | 13 $\pi^{+}p$ |

### $\Gamma(K\overline{K})/\Gamma_{\text{total}}$ $\Gamma_{6}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| **0.0158±0.0026 OUR FIT** Error includes scale factor of 1.2. | | | | | |
| **0.0130±0.0024 OUR AVERAGE** | | | | | |
| 0.013 ±0.003 | COSTA... | 80 | OMEG | 0 | 10 $\pi^{-}p \rightarrow K^{+}K^{-}n$ |
| 0.013 ±0.004 | [33] MARTIN | 78B | SPEC | − | 10 $\pi p \rightarrow K^{0}_{S}K^{-}p$ |

[33] From $(\Gamma_4\Gamma_6)^{1/2} = 0.056 \pm 0.034$ assuming $B(\rho_3(1690) \rightarrow \pi\pi) = 0.24$.

### $\Gamma(\omega\pi)/[\Gamma(\omega\pi)+\Gamma(\rho\rho)]$ $\Gamma_{3}/(\Gamma_{3}+\Gamma_{11})$

| VALUE | DOCUMENT ID | | TECN | CHG | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.22±0.08 | CASON | 73 | HBC | − | 8,18.5 $\pi^{-}p$ |

### $\Gamma(\eta\pi^{+}\pi^{-})/\Gamma_{\text{total}}$ $\Gamma_{7}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **seen** | FUKUI | 88 | SPEC | 8.95 $\pi^{-}p \rightarrow \eta\pi^{+}\pi^{-}n$ |

### $\Gamma(a_2(1320)\pi)/\Gamma(\rho(770)\eta)$ $\Gamma_{10}/\Gamma_{8}$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **5.5±2.0** | AMELIN | 00 | VES | 37 $\pi^{-}p \rightarrow \eta\pi^{+}\pi^{-}n$ |

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