# $N(2090)$ $S_{11}$

$I(J^P) = \frac{1}{2}(\frac{1}{2}^-)$ Status: *

OMITTED FROM SUMMARY TABLE

Any structure in the $S_{11}$ wave above 1800 MeV is listed here. A few early results that are now obsolete have been omitted.

The latest GWU analysis (ARNDT 06) finds no evidence for this resonance.

## *N*(2090) BREIT-WIGNER MASS

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **≈ 2090 OUR ESTIMATE** | | | | |
| 1928±59 | MANLEY | 92 | IPWA | $\pi N \to \pi N$ & $N\pi\pi$ |
| 2180±80 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 1880±20 | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 1822±43 | VRANA | 00 | DPWA | Multichannel |
| $1897 \pm 50 \,^{+30}_{-\ 2}$ | PLOETZKE | 98 | SPEC | $\gamma p \to p\eta'(958)$ |

## *N*(2090) BREIT-WIGNER WIDTH

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| 414±157 | MANLEY | 92 | IPWA | $\pi N \to \pi N$ & $N\pi\pi$ |
| 350±100 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 95± 30 | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 248±185 | VRANA | 00 | DPWA | Multichannel |
| $396 \pm 155 \,^{+35}_{-45}$ | PLOETZKE | 98 | SPEC | $\gamma p \to p\eta'(958)$ |

## *N*(2090) POLE POSITION

### REAL PART

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| 2150±70 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 1937 or 1949 | [1] LONGACRE | 78 | IPWA | $\pi N \to N\pi\pi$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 1795 | VRANA | 00 | DPWA | Multichannel |

### −2×IMAGINARY PART

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| 350±100 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 139 or 131 | [1] LONGACRE | 78 | IPWA | $\pi N \to N\pi\pi$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 220 | VRANA | 00 | DPWA | Multichannel |

## *N*(2090) ELASTIC POLE RESIDUE

### MODULUS $|r|$

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| $40 \pm 20$ | CUTKOSKY | 80 | IPWA | $\pi N \rightarrow \pi N$ |

### PHASE $\theta$

| *VALUE* (°) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| $0 \pm 90$ | CUTKOSKY | 80 | IPWA | $\pi N \rightarrow \pi N$ |

## *N*(2090) DECAY MODES

| | Mode |
|---|---|
| $\Gamma_1$ | $N\pi$ |
| $\Gamma_2$ | $N\eta$ |
| $\Gamma_3$ | $\Lambda K$ |
| $\Gamma_4$ | $N\pi\pi$ |
| $\Gamma_5$ | $\Delta\pi$ |
| $\Gamma_6$ | $\Delta(1232)\pi$, *D*-wave |
| $\Gamma_7$ | $N\rho$ |
| $\Gamma_8$ | $N\rho$, $S$=1/2, *S*-wave |
| $\Gamma_9$ | $N\rho$, $S$=3/2, *D*-wave |
| $\Gamma_{10}$ | $N(\pi\pi)^{I=0}_{S\text{-wave}}$ |
| $\Gamma_{11}$ | $N(1440)\pi$ |

## *N*(2090) BRANCHING RATIOS

### $\Gamma(N\pi)/\Gamma_{\text{total}}$ $\Gamma_1/\Gamma$

| *VALUE* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| $0.10 \pm 0.10$ | MANLEY | 92 | IPWA | $\pi N \rightarrow \pi N$ & $N\pi\pi$ |
| $0.18 \pm 0.08$ | CUTKOSKY | 80 | IPWA | $\pi N \rightarrow \pi N$ |
| $0.09 \pm 0.05$ | HOEHLER | 79 | IPWA | $\pi N \rightarrow \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $0.17 \pm 0.03$ | VRANA | 00 | DPWA | Multichannel |

### $\Gamma(N\eta)/\Gamma_{\text{total}}$ $\Gamma_2/\Gamma$

| *VALUE* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| $0.41 \pm 0.04$ | VRANA | 00 | DPWA | Multichannel |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \rightarrow N(2090) \rightarrow \Lambda K$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

| *VALUE* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| not seen | SAXON | 80 | DPWA | $\pi^- p \rightarrow \Lambda K^0$ |

### $\Gamma(\Delta(1232)\pi, D\text{-wave})/\Gamma_{\text{total}}$ $\Gamma_6/\Gamma$

| *VALUE* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| $0.01 \pm 0.01$ | VRANA | 00 | DPWA | Multichannel |

### $\Gamma(N\rho, S{=}1/2, S\text{-wave})/\Gamma_{total}$ $\Gamma_8/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $0.36 \pm 0.01$ | VRANA | 00 | DPWA | Multichannel |

### $\Gamma(N\rho, S{=}3/2, D\text{-wave})/\Gamma_{total}$ $\Gamma_9/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $0.01 \pm 0.01$ | VRANA | 00 | DPWA | Multichannel |

### $\Gamma(N(\pi\pi)^{I=0}_{S\text{-wave}})/\Gamma_{total}$ $\Gamma_{10}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $0.02 \pm 0.01$ | VRANA | 00 | DPWA | Multichannel |

### $\Gamma(N(1440)\pi)/\Gamma_{total}$ $\Gamma_{11}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $0.02 \pm 0.01$ | VRANA | 00 | DPWA | Multichannel |

## *N*(2090) FOOTNOTES

[1] LONGACRE 78 values are from a search for poles in the unitarized T-matrix. The first (second) value uses, in addition to $\pi N \rightarrow N\pi\pi$ data, elastic amplitudes from a Saclay (CERN) partial-wave analysis.

## *N*(2090) REFERENCES


| | | | | |
|---|---|---|---|---|
| ARNDT | 06 | PR C74 045205 | R.A. Arndt *et al.* | (GWU) |
| VRANA | 00 | PRPL 328 181 | T.P. Vrana, S.A. Dytman,, T.-S.H. Lee | (PITT+) |
| PLOETZKE | 98 | PL B444 555 | R. Ploetzke *et al.* | (Bonn SAPHIR Collab.) |
| MANLEY | 92 | PR D45 4002 | D.M. Manley, E.M. Saleski | (KENT) IJP |
| Also | | PR D30 904 | D.M. Manley *et al.* | (VPI) |
| CUTKOSKY | 80 | Toronto Conf. 19 | R.E. Cutkosky *et al.* | (CMU, LBL) IJP |
| Also | | PR D20 2839 | R.E. Cutkosky *et al.* | (CMU, LBL) |
| SAXON | 80 | NP B162 522 | D.H. Saxon *et al.* | (RHEL, BRIS) IJP |
| HOEHLER | 79 | PDAT 12-1 | G. Hohler *et al.* | (KARLT) IJP |
| Also | | Toronto Conf. 3 | R. Koch | (KARLT) IJP |
| LONGACRE | 78 | PR D17 1795 | R.S. Longacre *et al.* | (LBL, SLAC) |