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

\[ I(J^P) = \frac{1}{2}(1^-) \]
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.

#### N(2090) Breit-Wigner Mass

<table>
<thead>
<tr>
<th>VALUE (MeV)</th>
<th>DOCUMENT ID</th>
<th>TECN</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\approx 2090$ OUR ESTIMATE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1928±59</td>
<td>MANLEY</td>
<td>IPWA</td>
<td>$\pi N \to \pi N \ &amp; \ N \pi \pi$</td>
</tr>
<tr>
<td>2180±80</td>
<td>CUTKOSKY</td>
<td>IPWA</td>
<td>$\pi N \to \pi N$</td>
</tr>
<tr>
<td>1880±20</td>
<td>HOEHLER</td>
<td>IPWA</td>
<td>$\pi N \to \pi N$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• • • We do not use the following data for averages, fits, limits, etc. • • •</td>
</tr>
<tr>
<td>1822±43</td>
<td>VRANA</td>
<td>DPWA</td>
<td>Multichannel</td>
</tr>
<tr>
<td>1897±50±30</td>
<td>PLOETZKE</td>
<td>SPEC</td>
<td>$\gamma p \to p \eta'(958)$</td>
</tr>
</tbody>
</table>

#### N(2090) Breit-Wigner Width

<table>
<thead>
<tr>
<th>VALUE (MeV)</th>
<th>DOCUMENT ID</th>
<th>TECN</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>414±157</td>
<td>MANLEY</td>
<td>IPWA</td>
<td>$\pi N \to \pi N \ &amp; \ N \pi \pi$</td>
</tr>
<tr>
<td>350±100</td>
<td>CUTKOSKY</td>
<td>IPWA</td>
<td>$\pi N \to \pi N$</td>
</tr>
<tr>
<td>95±30</td>
<td>HOEHLER</td>
<td>IPWA</td>
<td>$\pi N \to \pi N$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• • • We do not use the following data for averages, fits, limits, etc. • • •</td>
</tr>
<tr>
<td>248±185</td>
<td>VRANA</td>
<td>DPWA</td>
<td>Multichannel</td>
</tr>
<tr>
<td>396±155±35</td>
<td>PLOETZKE</td>
<td>SPEC</td>
<td>$\gamma p \to p \eta'(958)$</td>
</tr>
</tbody>
</table>

#### N(2090) Pole Position

**Real Part**

<table>
<thead>
<tr>
<th>VALUE (MeV)</th>
<th>DOCUMENT ID</th>
<th>TECN</th>
<th>COMMENT</th>
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</thead>
<tbody>
<tr>
<td>2150±70</td>
<td>CUTKOSKY</td>
<td>IPWA</td>
<td>$\pi N \to \pi N$</td>
</tr>
<tr>
<td>1937 or 1949</td>
<td>LONGACRE</td>
<td>IPWA</td>
<td>$\pi N \to N \pi \pi$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• • • We do not use the following data for averages, fits, limits, etc. • • •</td>
</tr>
<tr>
<td>1795</td>
<td>VRANA</td>
<td>DPWA</td>
<td>Multichannel</td>
</tr>
</tbody>
</table>

**−2×Imaginary Part**

<table>
<thead>
<tr>
<th>VALUE (MeV)</th>
<th>DOCUMENT ID</th>
<th>TECN</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>350±100</td>
<td>CUTKOSKY</td>
<td>IPWA</td>
<td>$\pi N \to \pi N$</td>
</tr>
<tr>
<td>139 or 131</td>
<td>LONGACRE</td>
<td>IPWA</td>
<td>$\pi N \to N \pi \pi$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• • • We do not use the following data for averages, fits, limits, etc. • • •</td>
</tr>
<tr>
<td>220</td>
<td>VRANA</td>
<td>DPWA</td>
<td>Multichannel</td>
</tr>
</tbody>
</table>
**N(2090) ELASTIC POLE RESIDUE**

<table>
<thead>
<tr>
<th>VALUE (MeV)</th>
<th>DOCUMENT ID</th>
<th>TECN</th>
<th>COMMENT</th>
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</thead>
<tbody>
<tr>
<td>40±20</td>
<td>CUTKOSKY</td>
<td>80</td>
<td>IPWA (\pi N \rightarrow \pi N)</td>
</tr>
</tbody>
</table>

**N(2090) DECAY MODES**

<table>
<thead>
<tr>
<th>Mode</th>
<th>(\Gamma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\Gamma_1)</td>
<td>(N\pi)</td>
</tr>
<tr>
<td>(\Gamma_2)</td>
<td>(N\eta)</td>
</tr>
<tr>
<td>(\Gamma_3)</td>
<td>(\Lambda K)</td>
</tr>
<tr>
<td>(\Gamma_4)</td>
<td>(N\pi\pi)</td>
</tr>
<tr>
<td>(\Gamma_5)</td>
<td>(\Delta\pi)</td>
</tr>
<tr>
<td>(\Gamma_6)</td>
<td>(\Delta(1232)\pi), D-wave</td>
</tr>
<tr>
<td>(\Gamma_7)</td>
<td>(N\rho)</td>
</tr>
<tr>
<td>(\Gamma_8)</td>
<td>(N\rho), (S=1/2), S-wave</td>
</tr>
<tr>
<td>(\Gamma_9)</td>
<td>(N\rho), (S=3/2), D-wave</td>
</tr>
<tr>
<td>(\Gamma_{10})</td>
<td>(N(\pi\pi)_{S=0})</td>
</tr>
<tr>
<td>(\Gamma_{11})</td>
<td>(N(1440)\pi)</td>
</tr>
</tbody>
</table>

**N(2090) BRANCHING RATIOS**

<table>
<thead>
<tr>
<th>(\Gamma(N\pi)/\Gamma_{total})</th>
<th>(\Gamma_1/\Gamma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VALUE</td>
<td>DOCUMENT ID</td>
</tr>
<tr>
<td>0.10±0.10</td>
<td>MANLEY</td>
</tr>
<tr>
<td>0.18±0.08</td>
<td>CUTKOSKY</td>
</tr>
<tr>
<td>0.09±0.05</td>
<td>HOEHLER</td>
</tr>
<tr>
<td>0.17±0.03</td>
<td>VRANA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(\Gamma(N\eta)/\Gamma_{total})</th>
<th>(\Gamma_2/\Gamma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VALUE</td>
<td>DOCUMENT ID</td>
</tr>
<tr>
<td>0.41±0.04</td>
<td>VRANA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>((\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}) in (N\pi \rightarrow N(2090) \rightarrow \Lambda K)</th>
<th>((\Gamma_1\Gamma_3)^{1/2}/\Gamma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VALUE</td>
<td>DOCUMENT ID</td>
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<tr>
<td>not seen</td>
<td>SAXON</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>(\Gamma(\Delta(1232)\pi, D-wave)/\Gamma_{total})</th>
<th>(\Gamma_6/\Gamma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VALUE</td>
<td>DOCUMENT ID</td>
</tr>
<tr>
<td>0.01±0.01</td>
<td>VRANA</td>
</tr>
</tbody>
</table>

\[ \Gamma(N, S=1/2, S\text{-wave})/\Gamma_{\text{total}} \]

<table>
<thead>
<tr>
<th>VALUE</th>
<th>DOCUMENT ID</th>
<th>TECN</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.36 ± 0.01</td>
<td>VRANA 00</td>
<td>DPWA</td>
<td>Multichannel</td>
</tr>
</tbody>
</table>

\[ \Gamma(N, S=3/2, D\text{-wave})/\Gamma_{\text{total}} \]

<table>
<thead>
<tr>
<th>VALUE</th>
<th>DOCUMENT ID</th>
<th>TECN</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01 ± 0.01</td>
<td>VRANA 00</td>
<td>DPWA</td>
<td>Multichannel</td>
</tr>
</tbody>
</table>

\[ \Gamma(N(\pi\pi)^I=0 S\text{-wave})/\Gamma_{\text{total}} \]

<table>
<thead>
<tr>
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<th>TECN</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02 ± 0.01</td>
<td>VRANA 00</td>
<td>DPWA</td>
<td>Multichannel</td>
</tr>
</tbody>
</table>

\[ \Gamma(N(1440)\pi)/\Gamma_{\text{total}} \]

<table>
<thead>
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<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02 ± 0.01</td>
<td>VRANA 00</td>
<td>DPWA</td>
<td>Multichannel</td>
</tr>
</tbody>
</table>

\( N(2090) \) FOOTNOTES

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

\( N(2090) \) REFERENCES

- 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 84 PR D30 904 D.M. Manley et al. (VPI)
- CUTKOSKY 80 Toronto Conf. 19 R.E. Cutkosky et al. (CMU, LBL) IJP
- Also 79 PR D20 2839 R.E. Cutkosky et al. (CMU, LBL)
- SAXON 80 NP B162 522 D.H. Saxson et al. (RHEL, BRIS) IJP
- HOEHLER 79 PDAT 12-1 G. Hohler et al. (KARLT) IJP
- Also 80 Toronto Conf. 3 R. Koch (KARLT) IJP
- LONGACRE 78 PR D17 1795 R.S. Longacre et al. (LBL, SLAC)