

New Insights on Low Energy πN Scattering Amplitudes

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Collaboration

Abstract content

The S - and P - wave phase shifts of low-energy pion-nucleon scatterings are analysed using production representation of partial wave S matrix, in which they are decomposed into various terms contributing either from poles or branch cuts. We estimate the left-hand cut contributions with the help of tree-level perturbative amplitudes derived in relativistic baryon chiral perturbation theory up to $\mathcal{O}(p^2)$. It is found that in S_{11} and P_{11} channels, contributions from known resonances and cuts are far from enough to saturate experimental phase shift data – strongly indicating contributions from low lying poles undiscovered before, and we fully explore possible physics behind. On the other side, no serious disagreements are observed in the other channels.

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