

Recent progress in the partial-wave analysis of the $\pi^- \pi^+ \pi^-$ final state at COMPASS

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Collaboration

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Abstract content

One of the main goals of the COMPASS experiment is to study the spectrum of light mesons. COMPASS has collected large data sets for a diffractive production of various final states using a 190 GeV negative hadron beam on a liquid hydrogen target. The flagship channel of this data is the process $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$, for which 46×10^6 exclusive events were recorded.

This dataset was subjected to a partial-wave analysis (PWA) using a large set of 88 partial waves and splitting the data into narrow bins of the reduced squared four-momentum transfer t' from the beam to the target. This partial-wave decomposition resolves the contributions to the process with an unprecedented level of detail. The PWA result was further analyzed by performing a resonance-model fit to extract the masses and widths of the contributing 3π resonances in a novel approach, using the information on the t' dependence of the partial wave amplitudes. One of the resonances that were included in the fit is the spin-exotic π_1 resonance, which was disputed in previous analyses.

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