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Data-driven dispersive analysis of the $\pi\pi$ and πK scattering for physical and unphysical pion masses

Tuesday, May 18, 2021 1:00 PM (30 minutes)

We present a data-driven analysis of the resonant S-wave $\pi\pi \to \pi\pi$ and $\pi K \to \pi K$ reactions using the partial-wave dispersion relation. The contributions from the left-hand cuts are accounted for in a model-independent way using the Taylor expansion in a suitably constructed conformal variable. The fits are performed to experimental and lattice data as well as Roy analyses. For the $\pi\pi$ scattering we present both a single- and coupled-channel analysis by including additionally the $K\bar{K}$ channel. For the latter the central result is the Omn\'es matrix, which is consistent with the most recent Roy and Roy-Steiner results on $\pi\pi \to \pi\pi$ and $\pi\pi \to K\bar{K}$, respectively. By the analytic continuation to the complex plane, we found poles associated with the lightest scalar resonances $\sigma/f_0(500)$, $f_0(980)$, and $\kappa/K_0^*(700)$ for the physical pion mass value and in the case of $\sigma/f_0(500)$, $\kappa/K_0^*(700)$ also for unphysical pion mass values. The obtained Omn\'es functions are used for the description of the double-virtual photon-photon scattering to two pions up to 1.5 GeV.

Collaboration

Primary authors: DEINEKA, Oleksandra (Johannes Gutenberg University Mainz); Dr DANILKIN, Igor (Johannes Gutenberg University Mainz); Prof. VANDERHAEGHEN, Marc (Johannes Gutenberg University Mainz)

Presenter: DEINEKA, Oleksandra (Johannes Gutenberg University Mainz)

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