Contribution ID: **136** Type: **Plenary talk in the main Conference**

Application of dispersive techniques in the analysis of experimental and lattice spectroscopy data

Friday, 3 November 2023 12:00 (30 minutes)

We present a data-driven analysis of the 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. Our central result is the hadronic Omnes functions, which allows us to find the poles associated with the lightest scalar resonances $\sigma/f_0(500)$ and $\kappa/K_0^*(700)$ for the physical and unphysical pion mass values.
The obtained coupled channel $\{\pi\pi, K\bar{K}\}$ Omnes matrix is used to describe the double-virtual photon-photon scattering to two pions, which is required for the dispersive implementation of the $f_0(980)$ resonance to $(g-2)_\mu$. In addition, we consider the $a_0(980)$ resonance. Since the hadronic data in the $I = 1\{\pi\eta, K\bar{K}\}$ channel is not available, the Omnes function is obtained using the fits to the different sets of experimental data on two-photon fusion processes with $\pi\eta$ and $K\bar{K}$ final states.

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Session Classification: Conference talks