M E S O N 2 0 2 3

Contribution ID: **146**   Type: **Invited parallel**

A coupled-channel system with anomalous thresholds and unitarity

Friday, 23 June 2023 16:45 (25 minutes)

A first non-perturbative and unitary treatment of multichannel systems with anomalous thresholds based on realistic potentials is presented. We consider the isospin one-half example system, with $D\pi$, $D\eta$, $D_s\bar{K}$, $D^*\pi$, $D^*\eta$, $D^*\bar{K}$ coupled channels in the $J^P = 1^-$ partial wave, chosen such that various phenomena that come with the opening of an anomalous threshold can be illustrated in a step-wise procedure by a suitable variation of up, down and strange quark masses. We use a set of low-energy constants in the chiral Lagrangian that were adjusted to a large set of lattice QCD results. At the physical point the D^* meson decays into the $D\pi$ channel and an anomalous threshold develops in the $D^*\pi \leftrightarrow D^*\eta$ reaction. The six phase shifts and inelasticity parameters are presented for various choices of the pion mass. For a pion mass of 150 MeV there are no anomalous thresholds encountered. The small change from 150 MeV to 145 MeV pion mass causes a dramatic impact of the anomalous threshold on the phase shifts showing that our results are highly relevant for the extrapolation of lattice QCD calculations towards the physical pion mass.

Collaboration

Primary author: LUTZ, Matthias F.M. (GSI Darmstadt)

Co-authors: KORPA, Csaba L.;   GUO, Xiao-Yu;   HEO, Yonggoo (GSI Darmstadt)

Presenter: LUTZ, Matthias F.M. (GSI Darmstadt)

Session Classification: Parallel session A4