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Study of the pion-mass dependence of ρ -meson properties in lattice QCD

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We collect spectra extracted in the $I = \ell = 1 \pi\pi$ sector provided by various lattice QCD collaborations and study the m_π dependence of ρ -meson properties using Hamiltonian Effective Field Theory (HEFT). In this unified analysis, the coupling constant and cutoff mass, characterizing the $\rho - \pi\pi$ vertex, are both found to be weakly dependent on m_π , while the mass of the bare ρ , associated with a simple quark-model state, shows a linear dependence on m_π^2 . Both the lattice results and experimental data can be described well.

Drawing on HEFT's ability to describe the pion mass dependence of resonances in a single formalism, we map the dependence of the phase shift as a function of m_π , and expose interesting discrepancies in contemporary lattice QCD results.

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