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The role of the strange quark in the $\rho(770)$ meson

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Recently, the GWU lattice group has evaluated high-precision phase-shift data for $\pi\pi$ scattering in the $I = 1$, $J = 1$ channel. Unitary Chiral Perturbation Theory describes these data well around the resonance region and for different pion masses. Moreover, it allows to extrapolate to the physical point and estimate the effect of the missing $K\bar{K}$ channel in the two-flavor lattice calculation. The absence of the strange quark in the lattice data leads to a lower ρ mass, and the analysis with $U\chi$ PT shows that the $K\bar{K}$ channel indeed pushes the $\pi\pi$ -scattering phase shift upward, having a surprisingly large effect on the ρ -mass. The inelasticity is shown to be compatible with the experimental data. The analysis is then extended to all available two-flavor lattice simulations and similar mass shifts are observed. Chiral extrapolations of $N_f = 2 + 1$ lattice simulations for the $\rho(770)$ are also reported.

Summary

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