Contribution ID : **38** Type : **not specified**

Extracting scattering phase shifts of KN scattering using lattice QCD

We present a lattice QCD calculation of the K^+n scattering length and effective range in the S-wave channel. This study employs the CLQCD gauge configurations (ensemble F24P29) with a pion mass of $M\pi \approx 300$ MeV and a lattice spacing of $a \approx 0.1053$ fm. By computing the finite-volume energy spectrum of the KN system—obtaining 5-6 distinct energy levels in both the center-of-mass frame and several moving frames—and applying the Lüscher finite-volume formalism, we extract the corresponding scattering phase shifts. From these phase shifts, the scattering length and effective range are determined.

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