Contribution ID: **29** Type: **talk**

Pionless Effective Field Theory in the Flavor SU(3) Symmetric Limit

Tuesday, 28 June 2022 15:40 (20 minutes)

Bridging the gap between nuclear physics and its fundamental theory, quantum chromodynamics (QCD), is of great importance. Since QCD is non-perturbative at low energies, lattice simulations, dubbed LQCD, are the only viable way to obtain ab initio QCD predictions for low energy nuclear physics.

These calculations are done, however, in a finite box, and are limited only to systems composed of a few particles. Here, we use baryonic effective field theory (EFT), designed to provide a low energy description of QCD using baryonic degrees of freedom, to extrapolate the lattice results from finite to infinite volumes, and to extend QCD-based predictions to larger systems. The calculations are done in the limit of SU(3) flavor symmetry, where the mass of the up and down quarks is set to be equal to that of the strange quark.

We construct the relevant EFT at leading order and fit it to the available LQCD results. This EFT is then used to extrapolate the results to the continuum limit. Moreover, we predict the energy in a two-body irreducible representation which cannot be resolved in the current LQCD calculations, and postdict the ^{4}He energy, finding it consistent with LQCD results. We show that doing a few more three baryons LQCD calculations would enable us to fix the entire EFT coefficients and thus to predict the whole spectrum of light nuclei and hypernuclei.

Primary authors: BAZAK, Betzalel (Racah Institute of Physics, The Hebrew University); Mr LEVESON, Michael (Racah Intitute of Physic, The Hebrew University)

Presenter: BAZAK, Betzalel (Racah Institute of Physics, The Hebrew University)

Session Classification: 2; Tue-III