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Studies of Heavy dibaryons and QCD topology from Lattice QCD

Monday, October 28, 2024 4:30 PM (1 hour)

In this talk, I will present recent developments in heavy quark dibaryons and QCD matter under extreme conditions. There has been significant interest recently in studying heavy quark exotic states, particularly with numerous lattice QCD calculations focusing on tetraquarks. Additionally, there have been multiple studies on dibaryons containing heavy quarks.

I will focus on two recent calculations. The first involves two-flavor deuteron-like dibaryons with heavy quarks in the spin triplet channel, where ground state results for different combinations of heavy flavors will be discussed. The second calculation examines the ground states of two-flavor heavy dibaryons in the spin singlet channel. I will also present evidence suggesting the emergence of heavy quark spin symmetry in these systems.

QCD topological susceptibility at high temperatures (~ 1 GeV) is of great interest for axion studies. Such calculations can only be reliably performed using lattice QCD. I will introduce a novel Hybrid Monte Carlo (HMC) algorithm that computes the temperature dependence of susceptibility in pure glue within a single lattice calculation. To extend such calculations to include fermions, high-precision scale setting methods are required. I will present a method that achieves percent-level accuracy in scale setting directly at finite temperature.

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