Contribution ID: **267** Type: **Talk**

Lattice QCD study on $\Lambda_c - N$ central and tensor potentials with physical masses

Wednesday, 31 July 2024 11:55 (20 minutes)

$\Lambda_c - N$ central and tensor potentials in the spin singlet channel ($^1S_0$) and the spin triplet coupled channel ($^3S_1 - {}^3D_1$) from lattice QCD by using HAL QCD method. We perform the first physical point simulation by employing gauge configurations generated by the HAL Collaboration at $m_\pi \simeq 137$ MeV, $m_K \simeq 502$ MeV, and $a \simeq 0.0844$ fm on 96^4 lattices (HAL-Conf-2023) in which a high statistical precision was achieved by 8000 Monte Carlo trajectories.

Our calculations of the $\Lambda_c - N$ show a weak mid-range attractive and short-range repulsive central potential, along with a weak tensor force. This is qualitatively similar to the previous results obtained by HAL QCD Collaboration at heavier pion masses, $m_\pi \simeq 410,\ 570,\ 700$ MeV, while the current results at the physical point indicate a shallower mid-range attraction compared to the previous results. With the ALICE upgraded for LHC Run-3, the increased statistics of charm baryons may enhance the feasibility to analyzing the $\Lambda_c - N$ interaction using both lattice QCD and experimental data. The present results at the physical point with the coupled-channel effect would also make a significant impact on the studies of $\Lambda_c - N$ interactions based on chiral effective field theory.

Primary author: ZHANG, Liang (RIKEN iTHEMS; SINAP, CAS)

Co-authors: DOI, Takumi (RIKEN); HATSUDA, Tetsuo (RIKEN)

Presenter: ZHANG, Liang (RIKEN iTHEMS; SINAP, CAS)

Session Classification: Hadronic and nuclear spectrum and interactions

Track Classification: Hadronic and Nuclear Spectrum and Interactions