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Study of tetraquarks with a bottom and a charm quark using lattice quantum chromodynamics

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The proliferating list of experimentally discovered heavy quark exotic hadrons calls for urgent first principles theoretical investigations. We present a status update of our ongoing calculation of tetra-quark states composed of a bottom and a charm quark in isospin $I=0$, axial-vector ($J^P = 1^+$) channel using first principles Lattice Quantum Chromodynamics.

These calculations are performed on the state-of-the-art MILC ensembles with dynamical up/down, strange and charm quark fields realized using a highly improved staggered quark action. The valence quarks are realized using an overlap action for quark masses ranging from light to the charm sector, whereas bottom quark evolution is studied in a non-relativistic QCD framework. We find a strong evidence for an energy level below the elastic threshold possibly hinting an attractive interaction between the bottom and charm mesons, which may further indicate the presence of charmed-bottomed tetra-quarks.

Session

Heavy Ions and QCD

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