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Charmed hadron spectroscopy on the lattice for $N_f = 2 + 1$ flavours

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Quantum Chromodynamics (QCD) has been accepted as the theory that describes the strong interactions, i.e., the interactions between quarks and gluons. QCD is an asymptotically free theory, hence, perturbation theory can be applied in the high energy regime, where many successful quantitative predictions have been made.
The description of low energy QCD phenomena i.e, in the strong-coupling regime, for example, the spectrum of hadrons, poses the problem of solving the theory non perturbatively. Formulating the theory on a discrete

space-time grid enables numerical simulations to be performed using Monte Carlo techniques. Lattice QCD makes it possible to study low energy properties of QCD from first principles.

Experimental observations of the spectroscopy of hadrons containing charm quarks have undergone a renaissance in recent years. The triggering point was the discovery of several new narrow charmonium resonances close to the $D\bar{D}$ thresholds and new narrow D_s mesons close to the DK thresholds. More results are expected to appear in the next few years from currently running experiments, e.g. Belle, BES-III and LHCb and the future PANDA experiment at the FAIR facility at the GSI.

We study the spectra of charmonium, charm-light mesons, singly and double charmed baryons using Lattice QCD.

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