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Charmed meson masses and decay constants from CLQCD ensembles

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We present the determination of the charm quark mass, the masses, and decay constants of charmed mesons using thirteen 2+1 flavor gauge ensembles at five different lattice spacings $a \in [0.05, 0.11]$ fm, 8 pion masses $m_\pi \in (130, 360)$ MeV, and several values of the strange quark mass, which facilitate us to do the chiral and continuum extrapolation. These ensembles are generated through the stout smeared clover fermion action and Symanzik gauge actions with the tadpole improvement. By absorbing the discretization errors into the masses and field normalization of the charm quark, we manage to suppress the discretization error of the charmed meson mass and all the S-wave open charmed meson decay constants to a few percent or even less at lattice spacing 0.1 fm. Moreover, discretization errors for other quantities are also significantly reduced. The continuum extrapolated charm quark mass, $m_c(m_c) = 1.2933(72)(95)$ GeV in $\overline{\text{MS}}$ scheme, is determined using QED-subtracted D_s meson mass and non-perturbative renormalization. Predictions of the open and close charm mesons using this charm quark mass agree with the experimental values at 0.1-0.5% level uncertainty. We obtained $D_{(s)}$ decay constants and also by far the most precise $D^*_{(s)}$ decay constants $f_{D^*} = 0.2292(26)(17)$ GeV and $f_{D^*_s} = 0.2691(30)(03)$ GeV.

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