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Physical and cut-off effects of heavy charm-like sea quarks

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We simulate a theory with two dynamical $O(a)$ improved Wilson quarks whose mass M is close the charm quark mass and at three values of the lattice spacing ranging from 0.066 to 0.038 fm. This theory is a prototype to study the decoupling of heavy quarks. We measure the mass and cut-off dependence of ratios of gluonic observables defined from the Wilson flow or the static potential. The size of the $1/M$ corrections can be determined and disentangled from the lattice artifacts. The difference with the pure gauge theory is in the percent range when two quarks with a mass of the charm quark are present.

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