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Inclusive semi-leptonic decays of charmed mesons with Moebius domain wall fermions

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We report on our progress in the non-perturbative calculation of the decay rates for inclusive semi-leptonic decays of charmed mesons from lattice QCD. In view of the long-standing tension in the determination of the CKM matrix elements V_{ub} and V_{cb} from exclusive and inclusive processes, recently, the method of lattice QCD has been extended towards the description of inclusive decays through, e.g. the Chebyshev approximation, as used in this work. Since QCD based methods require independent tests, we chose to focus on the charm sector, since it not only provides a rich set of experimental data, but also well defined CKM parameters.

We perform a pilot lattice simulation for the $D_s \rightarrow X_s \ell \nu$ and explore the possibilities of improving on existing techniques. Our simulation employs Moebius domain wall charm and strange quarks whose masses are tuned to be approximately physical and we cover the whole kinematical region. We report on our progress in analyzing different sources of statistical effects, such as the extrapolation of the kernel function chosen for the Chebyshev approximation as well as the influence on the analysis from the region close to the kinematical limit. Furthermore, we give an outlook on our future plans where we strive to increase the data towards including different charmed mesons and towards a study with fully controlled statistical effects.

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