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Study on the systematic effects on $b \rightarrow c$ inclusive semileptonic decays

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We discuss the calculation of the inclusive semileptonic decay for the process $B_s \rightarrow X_c l \nu_l$ using lattice QCD, which could be decisive in understanding the long-standing tension between inclusive and exclusive determinations of the CKM matrix element, $|V_{cb}|$. In this talk, we investigate the main sources of systematic uncertainty in these decays, including the impact of Jacobi smearing at the source and sink, variations in source–sink separation, and the intrinsic uncertainties of the inclusive reconstruction method itself. To investigate the latter, we restrict the reconstruction of the inclusive decay rate to just the excited-state contributions. We achieve this by treating the ground-state contributions as an exclusive decay with well-controlled conventional techniques. Systematic effects from the reconstruction then only affect excited-state contributions. Where these are sub-dominant, a suppression of systematic effects is expected. We show results based on Chebyshev reconstruction, which are part of a larger effort towards a first phenomenologically relevant computation of the inclusive decay rate in the continuum and infinite-volume limits.

Parallel Session (for talks only)

Quark and lepton flavor physics

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