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Heavy Meson Lifetimes from Gradient Flow

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Theoretical predictions for heavy meson lifetimes require high-precision determinations of the matrix elements involving four-quark operators using non-perturbative methods.

While similar operators relevant for neutral meson mixing have become standard for lattice QCD calculations, these lifetime operators suffer from complications in renormalisation where the dimension-six operators of interest mix with operators of lower mass dimension.

Fermionic gradient flow provides a renormalisation procedure where hadronic matrix elements on the lattice are evolved along the flow time and UV divergences are gradually removed.

The final result is obtained by matching to the $\overline{\text{MS}}$ scheme using the short-flow-time expansion.

This method can circumvent challenges on the lattice such as mixing with operators of lower mass dimension.

Exploiting renormalisation group equations to further quantify the scale dependence, we present results for the four-quark operators contributing to the D_s meson lifetime as well as prospects towards using this methodology for B mesons.

Parallel Session (for talks only)

Quark and lepton flavor physics

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