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Using Gradient Flow to Renormalise Matrix Elements for Meson Mixing and Lifetimes

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Neutral meson mixing and meson lifetimes are theory-side parametrised in terms four-quark operators which can be determined by calculating weak decay matrix elements using lattice QCD.

While calculations of meson mixing matrix elements are standard, determinations of lifetimes typically suffer from complications in renormalisation procedures because dimension-6 four-quark operators can mix with operators of lower mass dimension and, moreover, quark-line disconnected diagrams contribute.

We present work detailing the idea to use fermionic gradient flow to non-perturbatively renormalise matrix elements describing meson mixing or lifetimes, which later is to be combined with a perturbative calculation to match to the $\overline{\text{MS}}$ scheme.

Topical area

Quark and Lepton Flavor Physics

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