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Gradient Flow Renormalisation for Meson Mixing and Lifetimes

Friday 21 June 2024 12:00 (20 minutes)

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 outline the idea to use fermionic gradient flow to first non-perturbatively renormalise matrix elements describing meson mixing or lifetimes and subsequently combining these results with a perturbative calculation to match to the $\overline{\text{MS}}$ scheme.

Early results at the D_s mass scale will be shown and compared to literature for both D_s lifetimes and short distance effects in neutral D mixing.

Future prospects towards the B scale will also be discussed.

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