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Type: **Talk**

Lattice determination of the higher-order hadronic vacuum polarisation contributions to the muon g-2.

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We compute the next-to-leading order (NLO) hadronic vacuum polarisation (HVP) contribution to the muon anomalous magnetic moment, $a_\mu^{\text{hvp}}[\text{NLO}]$ in lattice QCD. The kernel functions required for the three NLO diagrams are considered in the time-momentum representation (TMR), following the methodology of Balzani, Laporta, and Passera. For higher-order (HO) corrections involving additional photon or lepton lines, we derive analytical expansions at short Euclidean times and numerical expansions at large times. The NLO contribution with two QCD insertions is analytically integrated, and the resulting expression is then expanded across different regions of the Euclidean time plane. We combine these kernels with vector two-point correlation functions computed on over 30 CLS ensembles with Wilson fermions. To control discretisation effects, we apply two different $\mathcal{O}(a)$ improvement schemes for the vector current, each using two discretisations, and employ time-window techniques to isolate the continuum-dominant contributions. On each ensemble, we apply finite-volume corrections using both the Hansen-Patella and Meyer-Lellouch-Lüscher approaches to match to a common reference volume, supplemented by a final correction step to infinite volume in the continuum limit. A combined chiral and continuum extrapolation yields our final result for $a_\mu^{\text{hvp}}[\text{NLO}]$.

Parallel Session (for talks only)

Quark and lepton flavor physics

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