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RBC/UKQCD HVP isospin breaking corrections

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In the recent muon $g-2$ white paper update, the hadronic vacuum polarization (HVP) contribution—which dominates the theoretical uncertainty—is evaluated as an average of different lattice QCD calculations. Since lattice simulations are mostly carried out in isospin symmetric QCD, corrections due to the mass difference of the up and down quarks and the coupling to photons have to be accounted for. These isospin breaking effects are of order 1% and can be treated as corrections to the result for the HVP contribution in isospin symmetric QCD. In the current estimate of the HVP contribution, these effects are a large source of uncertainty due to the extensive computational cost to compute all occurring Wick contractions and degrading signal-to-noise behaviour especially for quark disconnected diagrams.

I present the current status of the calculation of isospin breaking corrections in the HVP contribution for the RBC/UKQCD Collaboration. We use a dataset of stochastically sampled all-to-all propagators to construct all necessary Wick contractions for the electromagnetic and strong isospin breaking effects. We employ different versions of QED on the lattice, such as QED_L, QED_r and QED_\infty to check for consistency.

Parallel Session (for talks only)

Quark and lepton flavor physics

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