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Intermediate window observable for the hadronic vacuum polarization contribution to the muon $g - 2$ from $O(a)$ improved Wilson quarks

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With the publication of the new measurement of the anomalous magnetic moment of the muon, the discrepancy between experiment and the data-driven theory prediction has increased to 4.2σ . Recent lattice QCD calculations predict values for the hadronic vacuum polarization contribution that are larger than the data-driven estimates, bringing the Standard Model prediction closer to the experimental measurement. Euclidean time windows in the time-momentum representation of the hadronic vacuum polarization contribution to the muon $g - 2$ can help clarify the discrepancy between the phenomenological and lattice predictions.

We present our calculation of the intermediate distance window contribution using $N_f = 2 + 1$ flavors of $O(a)$ improved Wilson quarks. We employ ensembles at six lattice spacings below 0.1 fm and pion masses down to the physical value. We present a detailed study of the continuum limit, using two discretizations of the vector current and two independent sets of improvement coefficients.

Our result at the physical point displays a tension of 3.8σ with a recent evaluation of the intermediate window based on the data-driven method.

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