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Finite volume hadronic vacuum polarisation at arbitrary momenta

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The muon anomalous magnetic moment constitute one of the most important tension between experimental measurements and the Standard Model predictions. The dominant theoretical uncertainties is coming from hadronic contributions, therefore it is crucial to aim at determining precisely and reliably this quantity from lattice QCD. Most of the contributions to the leading hadronic contribution comes from the low q^2 sector of the hadronic vacuum polarization (HVP). Because of momentum quantization in finite volume, it is hard to compute the HVP at low momentum and generally one has to use models to describe this region which can introduce significant systematic errors. Here we propose a model-independent method to reconstruct the HVP at continuous momenta. Using sampling theory, we show that this reconstruction is exact up to corrections that decay exponentially fast with the pion mass times the lattice extent. We conclude by presenting preliminary numerical results and we compare them to model-dependent approaches.

Primary authors: Dr PORTELLI, Antonin (University of Southampton); Dr DEL DEBBIO, Luigi (University of Edinburgh)

Presenter: Dr PORTELLI, Antonin (University of Southampton)

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