

Hadronic Matrix Elements for Muon $g-2$ in Lattice QCD

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The muon anomalous magnetic moment is a subject of intense focus for theoretical and experimental particle physics at this time. This quantity is especially sensitive to new physics, so the current tension with Standard Model predictions makes the anomalous magnetic moment especially exciting. The muon $g - 2$ can be measured with high precision, and predictions from theory must be similarly precise to be informative. However, some pieces of the theory prediction that include hadronic matrix elements are difficult or impractical to determine experimentally, and predictions from models lack robustly quantitative statements about the uncertainty. To circumvent this issue, these hadronic matrix elements may be determined precisely with lattice QCD. In this talk, I will give an overview of recent developments in lattice QCD to address the hadronic matrix elements, including the hadronic light-by-light (HLbL) and hadronic vacuum polarization (HVP) diagrams. With these improvements to the theory, it will be possible to match the expected experimental precision in time for the completion of the Fermilab $g - 2$ experiment.

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