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Hadronic contributions to muon $g-2$ from lattice QCD

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The Muon $g-2$ Experiment that just commenced running at Fermilab intends to probe the present 3-sigma tension between theory and experiment by reducing the experimental uncertainty by a factor of four. In order, however, to determine definitively whether any future observed deviation is due to new physics, the Standard-Model theory error must be brought to the same level of precision. Lattice QCD provides the only first-principles approach for calculating the hadronic contributions to the muon $g-2$, which are the dominant sources of error in the Standard-Model value. I review recent progress on lattice-QCD calculations of the hadronic contributions to the muon $g-2$, and also discuss future plans and prospects for reducing the theory error to the level of the Muon $g-2$ and planned J-PARC experiments.

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