

Theory status for the muon $g-2$ experiment

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There is a long-standing tension between the experimental measurement and the standard model theory calculation of the muon anomalous magnetic moment. This tension may be caused by the presence of new particles at very high energies beyond the reach of direct detection in other experiments. In order to shed further light on this exciting possibility of new physics, the Fermilab experiment E989 will soon substantially reduce the uncertainty in the experimental measurement of the muon anomalous magnetic moment. A similar reduction in uncertainty of the theory prediction of the standard model of particle physics is needed. I will review the current status of the theory effort with focus on its largest challenge: a first-principles calculation of the hadronic contributions.