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The anomalous magnetic moment of the muon

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The difference between experiment and Standard-Model theory for the anomalous magnetic moment of the muon is, at over 3σ , an important hint for new physics. The muon $g-2$ is sensitive to virtual effects of possible new particles and interactions, because it arises from quantum-mechanical loop effects in the Standard Model and therefore places important constraints on Standard-Model extensions. The Fermilab E989 experiment, which recently started running, and the planned J-PARC E34 experiment aim to reduce the experimental uncertainties by a factor of four. To leverage this anticipated improvement in experimental precision, and determine unambiguously whether or not new-physics effects contribute to this quantity, the theoretical errors must be made more reliable and reduced to a commensurate level. The Muon $g-2$ Theory Initiative was formed in 2017 to provide platforms that facilitate interactions between the different groups to consolidate the Standard-Model prediction and map out strategies for reducing the theory errors to keep pace with experiment. I will review the current status of Standard Model theory for this quantity and map out the future prospects.