

Leading hadronic contribution to the muon magnetic moment from lattice QCD

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Over twenty years ago, in an experiment at Brookhaven National Laboratory, physicists detected what seemed to be a discrepancy between measurements of the muon's magnetic moment and theoretical calculations of what that measurement should be, raising the tantalizing possibility of physical particles or forces as yet undiscovered. The Fermilab team has announced 2021 and then in 2023 that their precise measurement supports this possibility. The reported significance for new physics was first 4.2 sigma and according to the latest result it is 5.1 sigma, just slightly above the discovery level of 5 sigma. However, an extensive new calculation of the muon's magnetic moment using lattice QCD by the BMW-collaboration reduces the gap between theory and experimental measurements. The lattice result appeared in Nature on the day of the first Fermilab announcement. In this talk both the theoretical and experimental aspects are summarized with two possible narratives: a) probable discovery or b) Standard Model re-enforced. Some details of the lattice calculation are also shown.

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