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Hadronic contributions to $g - 2$ of the muon – theory

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The first new experimental results on the anomalous magnetic moment of the muon from Fermilab, published in April 2021, confirm the tension with the Standard Model prediction, now at 4.2σ . The uncertainty in the theory prediction is by far dominated by hadronic effects. I discuss how different important contributions can be made more precise by using rigorous theoretical constraints, especially due to analyticity: this includes hadronic vacuum polarisation due to 3π and $\pi^0\gamma$ intermediate states, and hadronic light-by-light scattering via the largest individual contribution therein, the π^0 -pole term. The latter is determined in terms of the π^0 transition form factor, for which a representation that incorporates all low-lying singularities and matches correctly onto the asymptotic behaviour expected from perturbative QCD has been derived. Further, ongoing, extensions of this work will briefly be mentioned.

Collaboration

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