



Contribution ID: 185

Type: **Talk**

The three-loop hadronic vacuum polarization in chiral perturbation theory

Tuesday 4 November 2025 14:50 (20 minutes)

Hadronic vacuum polarization is a key observable in low-energy QCD, and is famously the greatest contributor to theoretical uncertainty in the muon magnetic moment. Its long-distance part in particular is a weak point of the current best lattice QCD computations. We compute it to next-to-next-to-next-to-leading order in chiral perturbation theory, capturing the lowest-energy hadronic contributions to unprecedented precision and opening the door for improved control over lattice finite volume effects. The result depends on a small number of low-energy constants, whose values are under control. This calculation pushes the envelope of high-order chiral perturbation theory and of the evaluation of multiloop integrals with massive propagators, thereby extending the toolbox for precision calculations in very low-energy QCD.

Parallel Session (for talks only)

Hadronic and nuclear spectrum and interactions

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Session Classification: Hadronic contribution to the magnetic moment of muon