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The 3-loop hadronic vacuum polarization in chiral perturbation theory

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We compute hadronic vacuum polarization, an observable whose precision limits several important tests of the Standard Model, using two-flavor chiral perturbation theory to three loops (next-to-next-to-next-to-leading order). Particular attention is given to the loop integrals, several of which are not found in literature, and which display a novel set of relations beyond what is found through integration by parts. Our result is intended to serve as a starting point for phenomenological calculations, as well as the computation of finite-volume corrections in lattice QCD.

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