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How much strangeness is needed for the axial-vector form factor of the nucleon?

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We consider the axial-vector together with its induced pseudo-scalar form factor of the nucleon as computed from the chiral Lagrangian with nucleon and isobar degrees of freedom. The form factors are evaluated at the one-loop level, where particular emphasis is put on the use of on-shell masses in the loop expressions. Our results are presented in terms of a novel set of basis functions that generalize the Passarino–Veltman scheme to the case where power-counting violating structures are to be subtracted. The particularly important role of the isobar degrees of freedom is emphasized. We obtain a significant and simultaneous fit to the available Lattice QCD results based on flavour SU(2) ensembles for the baryon masses and form factors up to pion masses of about 500 MeV. Our fits includes sizeable finite volume effects that are implied by using in-box values for the hadron masses entering our one-loop expressions. We conclude that from flavour SU(2) ensembles it appears not possible to predict the empirical formfactor at the desired precision. Effects from strange quarks are expected to remedy the situation.

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