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Nuclear Theory

The two-nucleon electromagnetic charge operator in chiral effective field theory (χEFT) up to one loop

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The electromagnetic charge operator in a two-nucleon system is derived in chiral effective field theory (χEFT) up to order $e\, Q$ (or N4LO), where Q denotes the low-momentum scale and e is the electric charge. The specific form of the N3LO and N4LO corrections from, respectively, one-pion-exchange and two-pion-exchange depends on the off-the-energy-shell prescriptions adopted for the non-static terms in the corresponding potentials. We show that different prescriptions lead to unitarily equivalent potentials and accompanying charge operators. Thus, provided a consistent set is adopted, predictions for physical observables will remain unaffected by the non-uniqueness associated with these off-the-energy-shell effects.

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