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D10: Measuring charged particle polarizabilities on the lattice without background fields

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We show how to compute electromagnetic polarizabilities of charged hadrons on the lattice without using background fields. The low-energy behavior of the Compton scattering amplitude is matched to matrix elements of current-current four point functions. Working in momentum space, formulas for electric polarizability and magnetic polarizability are derived for both charged pion and proton. Lattice four-point correlation functions are constructed from quark and gluon fields to be used in Monte-Carlo simulations. The content of the functions is assessed in detail and specific prescriptions are given to isolate the polarizabilities.

Primary author: LEE, Frank (George Washington University)

Co-author: WILCOX, Walter (Baylor University)

Presenters: LEE, Frank (George Washington University); WILCOX, Walter (Baylor University)

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