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Pion electric polarizability from Lattice QCD

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Electromagnetic polarizabilities are important parameters for understanding the interaction between photons and hadrons. For pions these quantities are poorly constrained experimentally since they can only be measured indirectly. New experiments at CERN and Jefferson Lab are planned that will measure the polarizabilities more precisely. Lattice QCD can be used to compute these quantities directly in terms of quark and gluons degrees of freedom,
using the background field method. We present results for the electric polarizability for two different quark masses, light enough to connect to chiral perturbation theory. These are currently the lightest quark masses used in polarizability studies. For each pion mass we compute the polarizability at four different volumes and perform an infinite volume extrapolation. For one ensemble, we also discuss the effect of turning on the coupling between the background field and the sea quarks.

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