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Pion electric polarizabilities from lattice QCD

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We report a first principle lattice calculation of the pion electric polarizability α_π . First, we derive the master formula, which relate the pion polarizabilities with the position space hadronic Compton tensor, $\langle \pi | J_\mu(x) J_\nu(0) | \pi \rangle$. Then, the hadronic tensor is calculated using Domain Wall fermions directly at physical pion mass. The gauge ensembles are generated by the RBC-UKQCD collaborations. The finite volume effects are exponentially suppressed by the spatial extent of the lattice. We have studied the finite volume and also the discretization effects with different lattice volumes and lattice spacings.

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