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Electric polarization in correlated insulators REZA NOURAFKAN, GABRIEL KOTLIAR, Department of Physics & Astronomy, Rutgers University, Piscataway, NJ 08854-8019, USA, CONDENSED MATTER THEORY TEAM —
We derive a formula for the electric polarization of interacting insulators, expressed in terms of the full Green's functions of the system. We use the formula to investigate changes in the electric polarization of the half-filled ionic Hubbard model. Correlations work in favor of covalency and a small lattice deformation can trigger substantial changes in the electric polarization. At the onset of the anti-ferromagnetic phase, a small lattice distortion suppresses the staggered magnetization and simultaneously the electric polarization has a higher variation. This behavior is absent when the anti-ferromagnetic phase is fully established. We also find that the quasiparticle approximation is a reliable approximation for weak to intermediate interaction strengths.

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