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Field-Induced Orbital Antiferromagnetism in Mott Insulators

K.A. AL-HASSANIEH, C.D. BATISTA, Los Alamos National Laboratory, G. ORTIZ, Indiana University, Bloomington, L.N. BULAEVSKII, Los Alamos National Laboratory — We report on a new electromagnetic phenomenon that emerges in Mott insulators. The phenomenon manifests as antiferromagnetic ordering due to orbital electric currents which are spontaneously generated from the coupling between spin currents and an external homogenous magnetic field. This novel spin-charge-current effect provides the mechanism to measure the so-far elusive spin currents by means of unpolarized neutron scattering, nuclear magnetic resonance or muon spectroscopy. We illustrate this mechanism by solving a half-filled Hubbard model on a frustrated ladder.

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