Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Field-Induced Orbital Antiferromagnetism in Mott Insulators
KHALED AL-HASSANIEH, CRISTIAN BATISTA, Los Alamos National Laboratory, GERARDO ORTIZ, Indiana University, LEV BULAEVSKII, Los Alamos National Laboratory — We report on a new electromagnetic phenomenon that emerges in Mott insulators, i.e., materials that do not conduct electricity because of strong electronic Coulomb repulsion. 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 detect 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, a simple but nontrivial case of strongly interacting electrons.

Khaled Al-Hassanieh
Los Alamos National Laboratory

Date submitted: 19 Nov 2009 Electronic form version 1.4