Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Possible interaction driven topological phases in (111) bilayers of $LaNiO_3$ YING RAN, KAI-YU YANG, Department of Physics, Boston College, Chestnut Hill, MA, 02467, WENGUANG ZHU[1], DI XIAO, SATOSHI OKAMOTO, Materials Science and Technology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, ZIQIANG WANG, Department of Physics, Boston College, Chestnut Hill, MA, 02467 — We use the variational mean-field approach to systematically study the phase diagram of a bilayer heterostructure of the correlated transition metal oxide $LaNiO_3$, grown along the (111) direction. The Ni^{3+} ions with d^7 (or e_g^1) configuration form a buckled honeycomb lattice. We show that as a function of the strength of the on-site interactions, various topological phases emerge. In the presence of a reasonable size of the Hund's coupling, as the correlation is tuned from intermediate to strong, the following sequence of phases is found: (1) a Dirac half-semimetal phase, (2) a quantum anomalous Hall insulator (QAHI) phase with Chern number one, and (3) a ferromagnetic nematic phase breaking the lattice point group symmetry. The spin-orbit couplings and magnetism are both dynamically generated in the QAHI phase.

[1]Department of Physics and Astronomy, University of Tennessee, Knoxville, Tennessee 37996

Ying Ran
Department of Physics, Boston College, Chestnut Hill, MA, 02467

Date submitted: 11 Nov 2011 Electronic form version 1.4