Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Breakdown of Landau-Ginzburg-Wilson Scheme by Spontaneous Orbital Currents in Zero-gap Semiconductors[1]
MOYURU KURITA, YOUHEI YAMAJI, Department of Applied Physics, University of Tokyo, MASATOSHI IMADA, Department of Applied Physics, University of Tokyo and JST CREST — Critical phenomena of phase transitions are classified into a small number of universality classes. For understanding such symmetry-breaking transitions, a Landau-Ginzburg- Wilson (LGW) scheme greatly helps us. Here, we study the critical phenomena of topological Mott insulator (TMI)[1] where spontaneous orbital currents induced by electron correlation bring the system to topological insulator by formally following the spirit of LGW. Then an unconventional criticality surprisingly emerges around the quantum critical point of TMI: It is governed not only by the symmetry as in the LGW framework but also by topology through electron dispersions and spatial dimension. We demonstrate it by studying an extended Hubbard model on several lattices such as honeycomb and pyrochlore lattice[2] within the Hartree-Fock mean-field level. Both fully numerical calculations and analytical calculations using effective band dispersions are performed.
[1] S. Raghu *et al.*, Phys. Rev. Lett. **100** 156401 (2008)
[2] M. Kurita *et al.*, J. Phys. Soc. Jpn **80** 044708 (2011)

[1]This work is financially supported by HPCI Strategic Programs for Innovative Research (SPIRE)

Moyuru Kurita
Department of Applied Physics, University of Tokyo

Date submitted: 11 Nov 2011 Electronic form version 1.4