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WEEKLY CALENDAR

October 6-10, 2014

DEPARTMENTAL COLLOQUIUM

"Microscopic driving forces in electron liquid-crystal transitions: a case studied in $La_{1/3}Ca_{2/3}MnO_3$"

3:30 PM October 9, 2014
109 Nicholson Hall

Jing Tao
Brookhaven National Laboratory

Host: Jiandi Zhang

• Refreshments served at 3:10 PM in 232 (Library) Nicholson Hall •

Strongly correlated materials possess many remarkable properties, such as high-T_c superconductivity in cuprates and colossal magnetoresistance in doped manganites, arising from the complex interplay between spin, charge, orbital and lattice degrees of freedom. Electron liquid crystal (ELC) phases provide unique descriptions to characterize the electronic structures and elucidate the underlying physics in correlated materials from symmetry perspective. Although ELC phases have been proposed to play a key role in interpreting the structure-property relationship in a wide range of correlated materials, the nature of the transition between such phases has received little experimental attention.

$La_{1/3}Ca_{2/3}MnO_3$ is an excellent candidate to study ELC phases and infer the roles of various degrees of freedom in material's properties from a wealth of emergent phenomena in this material including the electronic inhomogeneities at the nanoscale. Using transmission electron microscopic tools with recently developed techniques, we explored ELC phase transitions in $La_{1/3}Ca_{2/3}MnO_3$ and obtained direct observations of the transitions via the formation of defects and electronic phase separation. In particular, we found that charge inhomogeneity is accounted for the mechanism of electronic smectic-nematic phase transition, while the electronic nematic to isotropic phase transition is driven by charge inhomogeneity and strain effect in this material.

PUBLICATIONS:

1. "Follow up Observations of SDSS and CRTS Candidate Cataclysmic Variables", by Szkody, Paula; Everett, Mark E.; Howell, Steve B.; **Landolt, Arlo U**.; Bond, Howard E.; Silva, David R.; Vasquez-Soltero, Stephanie, 2014, Astronomical Journal, 148, 63.

2. "Scalable Boson Sampling with Time-Bin Encoding Using a Loop-Based Architecture", Keith R. Motes, Alexei Gilchrist, **Jonathan P. Dowling** and Peter P. Rohde, Phys. Rev. Lett. 113, 120501 – Published 18 September 2014.