

WEEKLY CALENDAR

February 6-10, 2012

DEPARTMENTAL COLLOQUIUM

"Quantum Hall Effect without applied field in Complex Magnetic Structures"

3:40 PM, February 9, 2012
109 Nicholson Hall

Ivar Martin
Los Alamos National Laboratory

Host: Ilya Vekhter

• *Refreshments served at 3:15 PM in 232 (Library) Nicholson Hall* •

When electrons move in a magnetic material, their transport can be profoundly affected by scattering off magnetic ions. Converse is also true: electrons themselves can define the magnetic state into which the system orders. Even though typically these magnetic states are simple – e.g. ferromagnetic or antiferromagnetic – sometimes, complex so-called chiral magnetism can appear. In this talk I will present several examples of two- and three-dimensional itinerant models of magnetism that exhibit such complex non-coplanar ordering, and will describe possible material realizations.

Non-coplanar itinerant magnets are expected to exhibit highly unusual transport phenomena that stem from a quantum coherent effect of non-coplanar magnetic ordering on electrons, which is similar to the Aharonov-Bohm effect. It can lead to the spontaneous quantum Hall effect and ground-state electrical and spin currents. The equivalent strength of the orbital magnetic field can exceed 10^4 Tesla. The stable topological excitations (magnetic vortices) in these states can carry fractional electronic charge and spin and realize anyonic exchange statistics.

Congratulations To:

A. U. Landolt who has been elected by the American Astronomical Society membership as a Category I member of the United States National Committee - International Astronomical Union (USNC-IAU) Committee for a three year term, October 2012 through October 2015. The USNC-IAU serves, through the National Academy, as the liaison between U.S. astronomers and the international community and organizations.

Publications:

1. "An axiomatic formulation of the Montevideo interpretation of quantum mechanics," Rodolfo Gambini, Luis Pedro Garcia-Pintos, **Jorge Pullin**, Studies in History and Philosophy of Modern Physics, 42 (2011) 256-263.