



Condensed Matter Colloquium

Thursday, March 4, 2014

2 pm, Room 1201



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***SPONTANEOUS QUANTUM HALL EFFECT AND
FRACTIONALIZATION IN ITINERANT CHIRAL
MAGNETS***

When electrons move in a magnetic material, their transport can be profoundly affected by scattering off magnetic ions. Converse is also true: Itinerant 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 chiral magnetism can appear.

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.

In this talk I will present several examples of two- and three-dimensional itinerant models of magnetism that exhibit complex non-coplanar ordering even in the absence of spin orbit interaction; I will describe possible material realizations.

Refreshments at 1:30 pm in Room 1305F

HOST: Vladimir Manucharyan

