Colloquium

Department of Physics, Temple University

Topological magnetism

Prof. Predrag Nikolic,
George Mason University

Abstract

Topology has many incarnations in materials: from quantum Hall liquids in two-dimensional electron gases, to topological insulators, semimetals and superconductors crafted by the spin-orbit coupling. Combined with topology, Coulomb interactions can produce some of the most exotic quantum states found in nature, said to possess "topological order". The only unambiguous physical realization of topological order to date is found in fractional quantum Hall liquids. However, the search for it in magnetic and other correlated materials is vigorous. I will talk about a theoretical pursuit of these exotic states in three-dimensional paramagnetic and magnetic materials, where the spin-orbit coupling plays a crucial role. Perhaps the most promising candidate at this time is samarium hexaboride (SmB6), a topological Kondo insulator with very puzzling collective mode or disorder-related dynamics at low energy scales. Other more distant candidates include topological magnets with non-collinear or skyrmion ordering, and perhaps also quantum spin-ice systems. My talk will introduce the basic phenomenology of topological order, include a survey of experimental efforts and theoretical ideas regarding the mentioned materials, and present some new outlook into exotic topological physics.

Monday, April 22, 2019 at 3:00 pm
SERC, Room 116
Refreshments served at 2:45 pm