Physics Colloquium

Dr. Andriy Nevidomskyy

"Fun with Spins: From Haldane Chains to Quantum Spin Liquids in Spin-1 Magnets"

It has long been realized that the presence of magnetic frustration – the impossibility to simultaneously minimize competing terms in the energy functional – often serves as a catalyst for the formation of novel phases of matter such as the quantum spin liquids, in which long-range magnetic order has been destroyed by strong quantum fluctuations. While geometric frustration in spin-1/2 magnets has received much theoretical and experimental attention, the behaviour of spin-1 counterparts remains less explored. I shall begin by reviewing the properties of 1D spin-1 magnets, culminating with the discussion of the celebrated Haldane conjecture. We shall then continue on a journey of exploring the very interesting properties of frustrated spin-1 magnets in higher dimensions, summarizing what is known to date, complemented with the recent results of my own obtained using a combination of various analytical and numerical techniques. In particular, the possibility of quantum spin liquids and other competing quantum states in spin-1 systems will be discussed, with an outlook for materials where such behaviour may be found experimentally.

Andriy Nevidomskyy is a condensed matter theorist who is working in the field of frustrated magnetism, topological phases of matter and strongly correlated electron systems. After obtaining his Ph.D. at the University of Cambridge, UK in 2005, he continued research in the field of strongly correlated materials at the Université de Sherbrooke in Canada and at Rutgers University of New Jersey, before joining Rice University in 2010. Nevidomskyy is a recipient of the Cottrell Scholar Award from Research Corporation for Science Advancement, and the CAREER young investigator award from the National Science Foundation.

Thursday, May 6th at 4:25 via Zoom

If you are outside the Lehigh Physics Department, please email Professor Bitan Roy (bir218@lehigh.edu)