Department of Physics Colloquium

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Quantum magnets in motion

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Magnetism provides a perfect ground to understand the emergence of new phases of matter and collective dynamics in quantum many-body systems. It contains very rich phenomena spanning from the most fundamental physics to the frontier technologies. The modern challenge in studying quantum magnets is that many of their essential features are “invisible” to direct experimental probes, such as topological and gauge structures, multipolar moment, and charge-neutral pseudospin degree of freedom, etc. In this talk, I address this challenge by exploring quantum magnets in “motion”, where theoretical modeling of dynamics, excitations, and fluctuations can achieve understanding and prediction of measurable features in spectroscopic and transport experiments. I will focus on two perspectives: revealing the spin dynamics in the enigmatic quantum magnetic phases in three dimensions using complementary analytical and numerical approaches [1-2]; and proposing new transport phenomena to detect excitations and fluctuations of topological origins [3-5]. I will also discuss how these studies may inspire future applications in quantum spintronics and quantum information.

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This colloquium will be held in-person, at SERC 116 unless announced otherwise.