Spin-dependent gauge fields in atomic gases
Ian Spielman, JQI, NIST and University of Maryland

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Gauge fields are ubiquitous in Physics. For example, in the context of high energy physics, they are the fundamental carrier of forces; while in condensed matter systems the associated physical fields (electrical and magnetic) are essential in creating and understanding many-body phenomena. These fields can depend on internal — spin — degrees of freedom, and in material systems these spin-dependent gauge fields are often manifest as spin-orbit coupling (SOC).

Here I present our experimental work synthesizing SOC for ultracold neutral atoms. I will first show how we use the light-matter interaction to engineer gauge terms in the atomic Hamiltonian, and then how to make these depend on spin. Finally, I will show that these couplings can be equivalently considered in the language of magnetism, and in this language we observe a range of itinerant magnetic transitions in our bosonic system.

Speaker's web page

Subcalendar:
Physics Colloquia

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