

Shining Light on Collective Excitations in Strongly Interacting Materials

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Abstract: Strongly interacting condensed matter systems are characterized by a diverse range of phases and phenomena that can often be controlled via sophisticated device fabrication or external perturbations, such as magnetic fields, high pressures, etc. Perhaps the most interesting characteristic of the many phases exhibited by strongly interacting materials are their distinctive and often exotic collective excitations, including phonons, magnons, polarons, magnetic monopoles, Higgs modes, etc. In this talk, I'll discuss some of the collective excitations exhibited by various states of matter and describe some of the techniques useful for probing these excitations. I'll then focus on some of our group's work using pressure- and magnetic-field-tuned light scattering from magnons, phonons, and hybrid collective modes to elucidate the multi-functional properties of various strongly interacting magnetic materials.