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Magnetic excitation spectra of a novel spin-orbit coupled Mott insulator Sr2IrO4

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Strong relativistic spin-orbit coupling (SOC) in 5d transition metal oxides provides a new route to realizing novel magnetic systems. Depending on the lattice geometry, expected magnetic systems range from conventional Heisenberg magnets to the more exotic Kitaev model and a topological Mott insulator. In the particular case of square lattice geometry relevant for Sr2IrO4, the superexchange interactions among the spin-orbit entangled electrons form a Heisenberg antiferromaget, rendering the low energy physics much akin to that in the high temperature superconducting curpates. In this talk, I will present the magnetic excitation spectra of Sr2IrO4, a magnon branch of which shows striking similarities to that in the cuprates. Further, novel high-energy, spin-orbit entangled modes are found in Sr2IrO4, which arise from interplay between spin-orbit coupling and electron correlations.

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Talk

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