

# PROBING THE PHYSICS OF THE FRACTIONAL VORTEX STATE IN NOVEL SUPERCONDUCTORS

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4:00 P.M. NSH 118  
(Refreshments at 3:30 P.M. NSH 202)

Since its discovery in 1911, superconductivity continues to be in the forefront of condensed matter physics research. Despite the great success of the Bardeen, Cooper and Schrieffer (BCS) theory in explaining conventional superconductivity, there exists a large family of unconventional superconductors for which the microscopic mechanisms that describe the superconducting state are not well understood. In my talk, I will present recent experimental data that supports the presence of a novel fractional vortex state predicted to exist in the unconventional superconductor strontium ruthentate (SRO). Unlike conventional superconductors, in which the electrons form spin singlet pairs, the electrons in SRO form spin triplet pairs. It is thought that this type of superconductivity can support half-quantum vortices (HQVs), characterized by the simultaneous winding of the spin and charge phase of the superconducting order parameter. Besides being of basic interest, the spin and charge winding of HQVs have unique topological properties required for generating topologically protected quantum states. I will discuss advances in ultrasensitive cantilever magnetometry which allow for the investigation of these unusual vortices in mesoscopic samples of SRO.

Colloquium

All interested persons are cordially invited to attend.