[QMS2020 invited talk]

Probing the unconventional superconductivity in Sr_2RuO_4

Stuart Brown

Department of Physics and Astronomy, UCLA, Los Angeles, CA USA
email: brown@physics.ucla.edu

The stoichiometric, layered perovskite Sr_2RuO_4 is widely considered a model unconventional superconductor, owing to its emergence from a Fermi Liquid normal state with modest renormalizations. The analogy is supported further by evidence for time reversal symmetry breaking, and a corresponding two-component order parameter analogous to the superfluid ^{3}He-A. An increase in critical temperature by a factor 2.5 incurred by application of a small uniaxial stress motivated us to study the evolution of the normal and superconducting states using ^{17}O NMR. Under stressed conditions, the normal state Knight shifts are consistent with tuning the Fermi energy through a van Hove singularity, which is also accompanied by a weak Stoner factor enhancement. Moreover, an empirical relationship between the broad thermal crossover to the Fermi Liquid regime and proximity to the vHs is implied. A reduced superconducting spin polarization for in-plane magnetic fields and all strain values studied rules out the proposed chiral state. Ongoing experiments indicate an alternative proposal called the helical state is an unlikely possibility, further tightening of constraints on the superconducting state order parameter is a priority.