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Time-reversal symmetry breaking in the superconducting low carrier density quasi-skutterudites

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Low carrier density superconductors have emerged as intriguing subjects of study, as they challenge our existing understanding of superconductivity while offering valuable insights into its underlying mechanisms. The complex structure of the Remeika phases, coupled with the superconductivity and low carrier concentrations, presents a unique opportunity to investigate the superconducting ground state in materials having low carrier densities.

In this presentation, I will discuss recent investigations using muon spin relaxation and rotation (μ SR) techniques on these compounds. These studies have revealed the presence of a complex superconducting gap and indications of time reversal symmetry breaking. These findings indicate that electron-electron interactions play a crucial role in stabilizing the pairing mechanism, highlighting the unconventional nature of these low carrier density superconductors.

References:

A. Kataria, J. A. T. Verezhak, O. Prakash, R. K. Kushwaha, A. Thamizhavel, S. Ramakrishnan, M. S. Scheurer, A. D. Hillier, and R. P. Singh, Phys. Rev. B 107, L100506 (2023)

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