

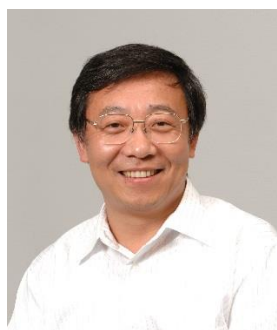


Seminar

Possible physics behind $\phi_0/3 = hc/6e$ oscillations in CsV_3Sb_5

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时间: 2024年3月19日 (周二) 下午3:00

Venue: Room w563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

For the first time Wang et al. demonstrated remarkable magneto resistance oscillations with period $\phi_0/3$ in Little-Parks experiment based on Kagome superconductor CsV_3Sb_5 [1]. We have performed an analysis based on the Ginzburg-Landau free-energy functional involving repulsive Josephson-type couplings between three PDW orders [2,3]. In a ring geometry we unveil that, as a series of intermediate states, phase of one SC order parameter winds 2π more or less than the other two ones around the ring, which yields free-energy minima at magnetic flux of integer multiples of $\phi_0/3$. It is clarified that these intermediate states are stabilized by a novel Higgs-Leggett mechanism, which induces domain walls (DW) between domains with Z_2 chirality [4,5]. At low temperatures DW are expelled from the system resulting in free energy minima only at integer multiples of ϕ_0 . Our theory provides a possible explanation to the recent Little-Parks experiments in Kagome material CsV_3Sb_5 . Various novel physical phenomena will also be discussed [6].

References

- [1] J. Ge et al., arXiv:2202.20352 (2022).
- [2] L.-F. Zhang, Z. Wang and X. Hu, arXiv:2205.08732 (2022).
- [3] J.-T. Jin et al., Phys. Rev. Lett. **129**, 167001 (2022).
- [4] X. Hu and Z. Wang, Phys. Rev. B **85**, 064516 (2012).
- [5] S.-Z. Lin and X. Hu, Phys. Rev. Lett. **108**, 177005 (2012).
- [6] F.-F. Song and G.-M. Zhang, Phys. Rev. Lett. **128**, 195301 (2022).

About the speaker

Xiao HU, University of Tokyo, PhD (1990); World Premium Initiative Center of Materials Nanoarchitectonics (MANA), Principle Investigator; National Institute for Materials Science (NIMS), Group Leader; Japan Science and Technology Agency (JST) CREST Topology, Project Leader; University of Tsukuba, Professor.

His major is theory of condensed matter physics. He has been working in University of Tokyo, Tohoku University, NIST (USA), before moving to NIMS in 1996. He was known by his outstanding contributions to first-order melting transition of Abrikosov vortex lattice in type-II superconductors, novel dynamics states in intrinsic Josephson junctions in high-Tc cuprates and THz electromagnetic radiation, characterization and manipulation of Majorana quasiparticles in topological superconductors, material design of topological nodal-line semimetals and antiferromagnetic topological insulators, proposal of topological photonic crystal based on semiconductor, and realization of high-performance topological cavity surface emitting laser (TCSEL). He has published important papers in Physical Review Letters, Nature Communications and Nature Nanotechnology, etc., and wrote review articles in Advances in Physics, Advanced Materials, and Superconductor Science and Technology.