

凝縮系物理学ゼミナール

Condensed Matter Seminar

(※ seminar is held online via zoom)

Date: 13:30-15:00, Wednesday, 28 April 2021

“Topological crystalline superconductivity in locally noncentrosymmetric CeRh_2As_2 ”

Speaker:

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Abstract:

Recent discovery of superconductivity in CeRh_2As_2 clarified an unusual H-T phase diagram with two superconducting phases [1]. Surprisingly, these phase diagrams was predicted in theoretical work about locally noncentrosymmetric superconductors [2]. And the experimental observation has been interpreted based on the even-odd parity transition. Indeed, the inversion symmetry is locally broken at the Ce site, and CeRh_2As_2 molds a new class of exotic superconductors. The low-temperature and high-field superconducting phase is a candidate for the odd-parity pair-density-wave state, suggesting a possibility of topological superconductivity as spin-triplet superconductors are.

In this talk, we first derive the formula expressing the Z_2 invariant by the number of Fermi surfaces on a glide invariant line. Next, we discuss the results of a first-principles calculation for the electronic structure of CeRh_2As_2 . Combining the results, we show that the field-induced odd-parity superconducting phase of CeRh_2As_2 is a platform of topological crystalline superconductivity [3].

References:

- [1] S. Khim et al., arXiv:2102.02735 (2021).
- [2] T. Yoshida, M. Sigrist, and Y. Yanase, Phys. Rev. B 86, 134514 (2012).
- [3] K. Nogaki, A. Daido, J. Ishizuka, and Y. Yanase, arXiv:2102.08088 (2021).