



# 563rd ASRC Seminar

Date: 13:30 - 15:00, 29th August

Location: Meeting room 103, ASRC Building

Speaker: Kazumasa Hattori

(Institute for Solid State Physics University of Tokyo)

Title: Triplet superconductivity near a  
transverse saturation field

We investigate triplet superconductivity induced by transverse fluctuations in an Ising ferromagnet under high transverse magnetic fields[1]. We introduce a toy model for ferromagnetic superconductor URhGe [2,3] and examine its triplet superconductivity. URhGe [3] shows ferromagnetism and superconductivity inside the ferromagnetic state. When applying magnetic fields ( $\parallel$ b-axis) perpendicular to the direction of the spontaneous magnetic moments ( $\parallel$ c-axis), in addition to the superconductivity surviving below 2 T, another superconductivity appears at higher fields between  $\sim$  9 to 14 T. The high-field superconductivity is considered to be one mediated by spin-flip fluctuations of the ferromagnetic moments, while no theoretical investigations have been done so far.

The purpose of this work is to clarify the nature of the high-field superconductivity in URhGe. On the basis of BCS-type model where interactions between electrons are assumed to be magnon-exchange one constructed via a spin-wave approximation in an XXZ model under transverse fields. We find that its d-vector of the triplet superconductivity varies as the field increases and shows an interesting variation near the saturation field where the localized ferromagnetic moment is fully polarized in the transverse direction. The superconducting "dome" in the temperature and the magnetic field plane shows peculiar shape and the  $T_c$  is strongly enhanced near the saturation field, which is qualitatively consistent with the experimental results [2,3]. We also would like to discuss a possible realistic corrections to our theory such as longitudinal fluctuations near the saturation field, which is suggested by the magnetization curve.

[1] KH and H.Tsunetsugu, PRB 87, 064501 (2013). [2] See, recent review: D.Aoki and J.Flouquet, JPSJ 81, 011003 (2012). [3] F.Hardy and A.D.Huxley, PRL 94, 247006 (2005), F.Levy, I.Sheikin, and A.Huxley, Nat. Phys. 3, 460 (2007), F.Levy, I.Sheikin, B.Grenier, C.Marcenat, and A.Huxley, J. Phys.: Cond. Matt. 21, 164211 (2009).



<Contact>

Yo Tokunaga (81-3525)

Advanced Science Research Center

