

604th ASRC Seminar

Date: 13:30–14:30 November 6

Location: Meeting Room 302, ASRC bldg.

Speaker: Dr. Shun TAKANO (Institute for solid state physics, University of Tokyo)

Title: **^{11}B and ^{27}Al NMR studies on YbAlB_4**

Abstract: Heavy fermion systems have been studied over decades with great interest in unconventional superconductivity and non-Fermi liquid behavior in the vicinity of quantum

critical point (QCP). Beta- YbAlB_4 , a first Yb-based heavy electron superconductor [1], is known to show quantum criticality (QC) at zero magnetic field and ambient pressure as indicated by the divergent susceptibility and specific heat [2], which also be a mixed valence compound with the average valence of 2.75 [3]. The critical valence fluctuation was theoretically proposed as the mechanism for the QC [4]. Nuclear Magnetic Resonance (NMR) is an effective probe for low energy spin fluctuations. Here we report results of comprehensive ^{11}B and ^{27}Al NMR results in beta- YbAlB_4 . We looked for a microscopic evidence for the QC by the measurements of the nuclear spin-lattice relaxation rate ($1/T_1$). We found that the value of $1/(T_1T)$ was slightly enhanced as lowering magnetic field applied along the c-direction down to 0.6 T. This result is possibly related to the enhancement of imaginary part of dynamical susceptibility toward QCP.

[1] S. Nakatsuji et al., Nature Physics 4 603 (2008)

[2] Y. Matsumoto et al., Science 331 316 (2011)

[3] M. Okawa et al., Phys. Rev. Lett. 104 247201 (2010)

[4] S. Watanabe and K. Miyake, Phys. Rev. Lett. 105 186403 (2010)

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