



581st ASRC Seminar

Date: 11:00 ~ 12:00, 9 January

Location: Meeting Room 302, ASRC bldg.

Speaker: Prof. Hiroshi Yasuoka

(Advanced Science Research Center, JAEA)

Title: NMR in Chiral Spin System

- Toward the Skymion Physics -

The magnetic Skyrmions or Skyrmion lattice in solids is of great interest to future spintronics technology. It is well known by now those states are realized in chiral magnets and in the ordered state near the phase boundary. Typical example of those includes FeGe, MnSi and Cu_2OSeO_3 . These compounds has the same space group (cubic and chiral) $P2_13$, although the atomic configuration is different between FeGe, MnSi and Cu_2OSeO_3 , and order helimagnetically at around 280K, 30K and 60K, respectively. These helical states undergoes a saturated itinerant ferromagnetic for FeGe and MnSi or insulating ferrimagnetic state at around 0.2 T, 0.6 T and 0.3 T at low temperature, respectively.

We have setup a project and conducted to explore the static and dynamical nature of the Skyrmions by zero-field (or small field) on-site NMR (on ^{57}Fe or $^{36,56}\text{Cu}$, or ^{55}Mn) technique.

In this talk, we will focus to demonstrate how the ^{57}Fe -NMR in FeGe approaches to the Skyrmion physics. ^{57}Fe NMR was performed on crushed single crystals of 98% ^{57}Fe enriched FeGe material between 1.6 K and near the ordering temperature in zero and small applied magnetic fields. Phase boundaries in the ordered state are identified, and chiral dynamics in the helical, conical and induced ferromagnetic phases are obtained from the temperature dependence of the hyperfine field, spin-lattice and spin-spin relaxation rates.

References:

S. Seki, X. Z. Yu, S. Ishiwata and Y. Tokura, *Science*, 336 (2012) 198

X. Z. Yu, N. Kanazawa, Y. Onose, K. Kimoto, W. Z. Zhang, S. Ishiwata, Y. Matsui and Y. Tokura, *Nature Materials* 10 (2011) 106

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