621st ASRC Seminar

Date：10：30 ～ 12：00 Thursday, February 18

Location： 6th meeting room, Lab. Bldg. #1.

Speaker： Dr. Hiroshi Yasuoka
(Max Plank Institute for Chemical Physics of Solids)

Title：NMR on Itinerant Chiral Magnets: MnSi and FeGe
- Towards Skyrmion Physics –

Abstract: Skyrmions and skyrmion crystals are among the most fascinating magnetic textures in chiral magnets, yet the formation of these crystals and their magnetic excitations have not been fully explored. MnSi (Tc≈39K) and FeGe (Tc≈280K) with the B20 cubic structure are attractive targets for such studies since the static properties of their chiral and Skyrmion phases are well documented by now from many methods. It should also be noted that the magnetic electrons in these materials are known to be quite “itinerant”. Chiral magnetism in iterant electron systems has not been well understood because one could not adapt simple DM interaction naively to the chirality, and the host materials have non-centrosymmetric crystal structure.

After almost 40 years break of our NMR and μSR studies on MnSi, we have relaunched extended and more accurate measurements on 29Si NMR in single crystals and 29Si enriched MnSi powder. NMR measurements have also been performed on randomly oriented 57Fe enriched FeGe single crystals. These NMR results reveal the static and dynamical properties of the staggered magnetization (MQ) in the helical, the conical and the polarized states, through the hyperfine field and the spin lattice relaxation rate ($1/T1$). We found that temperature and external field dependences of MQ and 1/T1 in both MnSi and FeGe are in general accord with the extended SCR theory for itinerant helical magnets (Moriya, 1976), although the theory does not include the symmetry breaking in B20 crystal structure and the multi-band nature. Nevertheless, we believe that the present results give us one step towards the “Skyrmion physics”!

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Sadamichi Maekawa (81-5093)
Advanced Science Research Center