# 538th ASRC Seminar

Date: 13:30 ～15:00, 15 January

Location: Meeting room 302, ASRC Building

Speaker: Prof. Yasutomo J. Uemura
(Dep. Physics, Columbia University)

Title: Multi-probe characterization of coexisting antiferromagnetic and superconducting orders in Ba(Fe,Ni)2As2 near the phase boundary

In unconventional superconductors such as high-Tc cuprate, FeAs and heavy fermion systems, the superconducting (SC) phase appears adjacent to the parent antiferromagnetic (AF) phase. To elucidate their interplay, one must clarify whether these two phases are overlapping in real space or intertwined with microscopic phase separation, and whether the same electrons are involved in both orders. Experimental studies on these questions have, however, often been limited because different probes have different sensitivities and spatial resolutions, sometimes detecting only one of the two orders. To overcome this feature, we have performed neutron scattering, muon spin relaxation (MuSR), Moessbauer effect, specific heat, optical conductivity and scanning tunneling microscopy (STM) measurements using the same single crystal specimens of Ba(Fe,Ni)2As2 near the AF-SC boundary. The combined results demonstrate a clear overlap of AF and SC order in the full volume fraction in real space. Upon further doping, static magnetism disappears with reduction of its volume fraction, while superconductivity persists in the full volume. These results are consistent with s+- symmetry of the superconducting order parameter, and raise questions regarding the possible role of quantum criticality in superconducting pairing.

Work performed in collaboration with
C.J. Arguello, J. Munevar, T. Goko, E. Andrade, B.A. Frandsen, L. Liu, F.L. Ning, A.N. Pasupathy, E. Rosenthal, H. Micklitz, J. Aguero, E. Baggio-Saitovitch, R. d'Ortenzio, T. Medina, T.J.S. Munsie, T.J. Williams, G.M. Luke, Pengcheng Dai, H.Q. Luo, X.Y. Lu, S. Carr, F. Ronning, E.D. Bauer, R.M. Fernandes, E. Uykur, S. Miyasaka, S. Tajima, M. Nakajima, S. Uchida

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