Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Chemical pressure effect on dynamic spin properties in CrAs[1] M. MATSUDA, M. B. STONE, Quantum Condensed Matter Division, Oak Ridge National Laboratory, J.-G. CHENG, W. WU, F. LIN, J. L. LUO, Beijing National Laboratory for Condensed Matter Physics and Institute of Physics, Chinese Academy of Sciences, J.-Q. YAN, Material Science and Technology Division, Oak Ridge National Laboratory and University of Tennessee, Knoxville, K. MATSUBAYASHI, Y. UWATOKO, Institute for Solid State Physics, University of Tokyo — CrAs is an antiferromagnetic metal, which shows a helical spin structure accompanied by an abrupt lattice expansion at $T_{\mathrm{N}}\sim$260 K in ambient pressure. With applying pressure, the magnetic transition is suppressed and superconductivity appears with a maximum transition temperature of $\sim$2 K. Since Cr has the spin degree of freedom, elucidating the magnetic contribution to the superconductivity is crucial to understand the pairing mechanism. However, inelastic neutron scattering (INS) measurement under high pressure is challenging due to sample space limitation. Therefore, we studied chemical pressure effect by substituting As by P, which is found to be almost the same as the external pressure. We performed INS experiments in undoped and P-doped CrAs using powder samples. The results in the P-doped CrAs clearly indicate that the antiferromagnetic fluctuations still remain above the critical P content, where the long range magnetic order is suppressed, suggesting a coupling between the magnetism and the superconductivity.

[1]This research at ORNL's High Flux Isotope Reactor and Spallation Neutron Source was sponsored by the Scientific User Facilities Division, Office of Basic Energy Sciences, U.S. Department of Energy.

Masaaki Matsuda
Quantum Condensed Matter Division, Oak Ridge National Laboratory

Date submitted: 06 Nov 2015 Electronic form version 1.4