

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Local structural aspects of the metal-insulator transition in CuIr_2S_4 from total scattering x-ray study E. BOZIN, A.S. MASADEH, H.J. KIM, P. JUHAS, S.J.L. BILLINGE, Michigan State University, J.F. MITCHELL, Argonne National Laboratory — A thiospinel CuIr_2S_4 exhibits a metal-insulator (MI) transition at $T=230$ K, with simultaneous spin-dimerization and charge-ordering [1]. The transition can also be driven by extended exposure to the x-rays at low T [2, 3]. Total x-ray scattering study of CuIr_2S_4 was carried out using 100 KeV synchrotron beam and rapid acquisition pair distribution function (RAPDF) approach. The RAPDF results indicate consistency of the local and average structure at high T . At 100 K long x-ray exposure melts the long-range order (LRO) of the dimerization pattern, without affecting the local structure, in agreement with diffuse scattering result [3]. The dependence of the LRO related superlattice peak intensity on the exposure time reveals that the melting occurs within approximately 15 seconds of exposure under experimental conditions used. At 100 K the LRO is recovered without temperature increase quickly after the cessation of the beamtime exposure. Results on Cr doped samples will be addressed as well. [1] P.G. Radaelli *et al.*, Nature **416**, 155 (2002). [2] V. Kiryukhin *et al.*, Phys. Rev. Lett. **97**, 225503 (2006). [3] H. Ishibashi *et al.*, Phys. Rev. B **66**, 144424 (2002). This work is supported by the NSF under grant DMR-0304391. ANL is supported under DOE contract No. DE-AC02-06CH11357.

Emil Bozin
Michigan State University

Date submitted: 29 Nov 2007

Electronic form version 1.4