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Vortex Imaging in $Ba(Fe_{0.93}Co_{0.07})_2As_2$ using Small Angle Neutron Scattering P. DAS, T.R. O'BRIEN, M.R. ESKILDSEN, University of Notre Dame, IN, USA, M. LAVER, NIST Center for Neutron Research, MD, USA, C.D. DEWHURST, Institut Laue-Langevin, France, N. NI, A. KREYSSIG, S.L. BUD'KO, P.C. CANFIELD, A.I. GOLDMAN, Ames Laboratory and Iowa State University, IA, USA — We report extended studies of the field dependence of the vortex configuration in superconducting $Ba(Fe_{0.93}Co_{0.07})_2As_2$ at $T \sim 0.1T_c$ (T_c = 21 K) using Small Angle Neutron Scattering (SANS). SANS measurements show a ring of scattering indicating a highly disordered vortex lattice mainly due to strong pinning in this material and a very broad rocking curve width. At lower applied fields (< 1 T) the measured scattering vectors (q) are close to the value expected for a hexagonal vortex lattice (VL) [M.R. Eskildsen *et al.*, Phys. Rev. B 79, 100501(R) (2009)] but with increasing fields it falls between q_{hex} and q_{square}. A deviation from the hexagonal VL can be related to a Fermi-surface or gap anisotropy in the basal plane. Moreover an exponential fit to the scattered intensity as a function of field for H > 1 T yields a significantly smaller slope than what was found for smaller fields. This work was supported by NSF grants DMR-0804887, PHY-0552843 and DMR-0454672, and DOE BES contract No. DE-AC02-07CH11358.

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