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Structural Studies of Metastable and Ground State Vortex Lattice Domains in MgB_2[1] E.R. DE WAARD, S.J. KUHN, C. RASTOVSKI, M.R. ESKILDSEN, University of Notre Dame, A. LEISHMAN, Kent State University, C.D. DEWHURST, Institut Laue-Langevin, France, L. DEBEER-SCHMITT, K. LITTRELL, Oak Ridge National Laboratory, J. KARPINSKI, EPFL, Switzerland, N.D. ZHIGADLO, ETH, Switzerland — Small-angle neutron scattering (SANS) studies of the vortex lattice (VL) in the type-II superconductor MgB_2 have revealed an unprecedented degree of metastability that is demonstrably not due to vortex pinning, [C. Rastovski *et al.*, Phys. Rev. Lett. **111**, 107002 (2013)]. Application of an AC magnetic field to drive the VL to the ground state revealed a two-step power law behavior, indicating a slow nucleation of ground state domains followed by a faster growth. The dependence on the number of applied AC cycles is reminiscent of jamming of soft, frictionless spheres. Here, we report on detailed structural studies of both metastable and ground state VL domains. These include measurements of VL correlation lengths as well as spatially resolved SANS measurements showing the VL domain distribution within the MgB_2 single crystal. We discuss these results and how they may help to resolve the mechanism responsible for stabilizing the metastable VL phases.

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