Abstract Submitted
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Mapping the Non-Equilibrium Vortex Lattice Dynamics of MgB_2[1] JOSEPH ARCHER, University of Dallas, ELIZABETH DE WAARD, University of Notre Dame, NIKOLAI ZHIGADLO, JANUSZ KARPINSKI, Laboratory for Solid State Physics, ETH, CHARLES DEWHURST, Institut Laue-Langevin, MORTEN ESKILDSEN, University of Notre Dame — Small angle neutron scattering (SANS) studies of MgB_2 have discovered several metastable vortex lattice states, but so far the mechanism behind their metastability remains unknown. In this SANS study conducted at the Institut Laue-Langevin, MgB_2's F and L phases are explored through heating and cooling across their phase transition temperature, and each metastable state is driven to its respective ground state using an AC magnetic field. Since the internal energy of a single vortex domain does not account for the presence of a L metastable state, jamming between vortex domains is explored as a possible explanation. Characteristically of jammed systems, a numerical solution for the probability distribution of inter-particle force magnitudes due to vortex-vortex interactions is found to obey a stretched exponential form for large radii. Several quantitative comparisons are also made between the ideal jamming models and experimental mapping of the metastable decay of the L phase that are suggestive of their close relation.

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