Abstract Submitted
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Revealing the effect of edge contamination on vortex matter structure in a Nb single crystal with neutron diffraction techniques[1] HELEN HANSON, XI WANG, MICHAEL LUK, JING SHI[2], XINSHENG LING, Brown University, BRIAN MARANVILLE, CHARLES MAJKRZAK, NIST Center for Neutron Research — The vortex matter of type II superconductors provides a model system to study the effect of quenched random disorder on an elastic lattice, particularly in the framework of Bragg glass theory. Neutron scattering techniques are used to examine the structure of the vortex matter and to quantify the phase diagram. After measuring various thermal-magnetic histories, our data provided evidence for the edge contamination model in a Nb single crystal. Since surface oxidation is known to suppress the Bean-Livingston Surface barrier and the inhomogeneous distribution of surface impurities in Nb, we oxidize our sample surface and repeat our measurements. By comparing the data, we are able isolate the dynamic impact of the edge disorder from the static influence of bulk pinning. We discuss the various experimental obstacles in measuring the predicted Bragg glass state. We also report on Reverse Monte Carlo Refinement simulations modeling possible structures of our vortex matter.

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