Abstract Submitted
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Evolution of Vortex Phase diagram in heavy ion irradiated YBCO[1] R. XIE, A. RYDH[2], U. WELP, W.-K. KWOK, Material Science Division, Argonne National Laboratory, M.R. ESKILDSEN, Department of Physics, University of Notre Dame, LISA PAULIUS, Department of Physics, Western Michigan University — We present a systematic study of the effect of columnar defects induced by heavy ion irradiation on the vortex phase diagram of single-crystal YB2Cu3O7 using ac-specific heat measurements obtained with a micro-calorimeter. The first order vortex melting line where the vortex lattice transforms into a vortex liquid at intermediate magnetic fields is tracked by the peak in the specific heat. In our pristine untwinned YBCO crystal, the vortex melting line extends from a lower critical point Hlcp=0.2T to an upper critical point Hucp > 6T. The crystal was cleaved into several pieces and then irradiated along the c-axis with 1.4GeV Pb ions with different dose matching fields, B_Φ ranging from 100G to 3000G. We explored the behavior of Hucp and Hlcp in the presence of increasing columnar defects to determine whether the transformation of the first order melting line to higher order occurs abruptly at a defect threshold value or continuously with increasing amount of defects.

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