Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Peak Effect in Polycrystalline Vortex Matter[1] IVO DIMITROV, NIKOS DANIILIDIS, CHARLES ELBAUM, Brown University, JEFF LYNN, National Institute of Standards and Technology, NCNR, XINSHENG LING, Brown University — The peak effect (PE) in J_c in weakly-disordered type-II superconductors is believed to mark the transition between a disordered vortex state and a quasi-ordered Bragg glass regime. Some strongly-disordered type-II superconductors, such as the binary alloy V-21at.%Ti, also exhibit "peak effect" at temperatures close to H_{c2}, despite lack of atomic long-range order and presence of sample composition inhomogeneities. SANS field-cooled measurements on a V-21at.%Ti sample show that both deep in the mixed state and close to the PE transition, there exist no long-range orientationally-ordered vortex lattices (VL's). The neutron scattering data analysis shows that the diffraction radial widths do not change significantly as a function of field, suggesting that VL states ordered on the scale of μm exist. We conjecture that the "peak effect" in V-21at.%Ti corresponds to the disordering of ordered VL Larkin domains. The V-21at.%Ti peak effect phase diagram is mapped via ac susceptometry. This measurement reveals that the peak effect disappears below a certain field, as has been reported in other superconductors.

[1]Supported by NSF-DMR 0406626

Ivo Dimitrov

Date submitted: 05 Dec 2006 Electronic form version 1.4