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Does a Bose-Glass State Exist in Commercial High-T_c Wires?[1]
JOSE P. RODRIGUEZ, California State University at Los Angeles — The hypothesis that the vortex lattice induced by perpendicular magnetic field in films of PLD-YBCO is in a thermodynamic Bose glass state accounts for the inverse-square-root power law shown by the critical current density versus perpendicuar magnetic field.[0] We study here how robust such a state is to the addition of point pinning centers. This is done by first calculating the tilt modulus of the "pristine" Bose-glass state. It is found to diverge at long-wavelength along the magnetic-field/correlated-defect direction. A Larkin-Ovchinnikov analysis then yields a 2D/3D phase transition in collective pinning that is first-order. In particular, a *broken* Bose glass state characterized by finite Larkin domains, within which correlated pinning centers remain effective, exists at strong enough point pinning, at small enough coherence lengths. A signature of the broken glass state is found in the dependence shown by the critical current with film thickness along the c axis, which is predicted to crossover from [1] 2D to 3D collective-pinning behavior at a film thickness equal to the longitudinal Larkin scale L_c.
[1] J. Rodriguez & M. Maley, Phys. Rev. B **73**, 094502 (2006).

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