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Does the Vortex Glass Exist in Two Dimensions? CHARLES E. CREFFIELD, University College London, JOSE P. RODRIGUEZ, California State University at Los Angeles — The nature of phase coherence in two-dimensional vortex lattices with random point pins is studied at the extreme type-II limit via the corresponding XY model with uniform frustration. In particular, after taking the Villain approximation, we perform numerical Monte Carlo simulations of the resulting non-neutral Coulomb gas ensemble over the square lattice at low temperature [1]. Identical δ-function pinning centers equal in number to the total number of vortices are also located at random throughout the model grid. A phase-coherent Bragg glass exists at the lowest levels of disorder pinning, with no unbound dislocations quenched in. Upon an increase in the strength of the pinning disorder, this phase becomes unstable to hexatic vortex glass states that show a diminished phase coherence, as well as to hexatic vortex liquid states that show no phase coherence at all. Yet stronger pinning disorder unbinds quenched-in pairs of disclinations, which results in a (pinned) vortex liquid phase that shows only short-range translational and orientational order.

[1] C.E. Creffield and J.P. Rodriguez, Phys. Rev. B **67**, 144510 (2003).

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