

Abstract Submitted
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Vortex States of a Dirty Quantum Hall Bilayer¹ DEREK K.K. LEE, Blackett Laboratory, Imperial College London, UK, PAUL R. EASTHAM, Dept of Physics, Trinity College Dublin, Ireland, NIGEL R. COOPER, Cavendish Laboratory, Univ of Cambridge, UK — We study the ground state of a quantum Hall bilayer at filling $\nu=1/2+1/2$ in the presence of strong but smooth disorder. We argue that there is a characteristic disorder strength below which vortices will be rare and above which they proliferate. In the strong-disorder regime the system can be understood as an emulsion of vortex-antivortex crystals. We will discuss the implications for the observation of counterflow superfluidity and critical currents in these systems. These include a dramatic suppression of tunneling and a new disorder-induced lengthscale in the emulsion due to phase disorder.

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