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Coherence Network in a Quantum Hall Bilayer H.A. FERTIG, Indiana University, GANPATHY MURTHY, University of Kentucky — We develop a model for conduction properties of a disordered quantum Hall bilayer near total filling factor $\nu = 1$. For single layers, fluctuations in the *local* filling factor due to quenched disorder are known to induce a network quasi-one-dimensional channels of quantum Hall liquid known as "Efros strips". In a bilayer system, a similar mechanism should be operative, and we make the further assumption that these strips seperate quasihole- and quasielectron-rich regions where interlayer coherence is effectively suppressed. The narrow strips seperating these regions potentially support the interlayer coherence; however, these regions will have solitons running across them that represent strings of overturned phase connecting charged vortices just inside the incoherent regions. When these strings are free to move, we demonstrate that the resulting system very naturally produces properties which are found in experiment but have so far eluded explanation: the apparent divergence in the "Josephson length" for current injected in a tunneling geometry, and the activated behavior in both diagonal and Hall conductivities in a counterflow geometry. In addition, the network displays interesting behavior at finite frequency that should allow experimental testing of this explanation for bilayer quantum Hall superfluidity. Effects of temperature on pinning and dephasing of the system will be discussed, as well as the possibility that the system is truly superfluid at zero temperature.

Herbert Fertig
Indiana University

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