Abstract Submitted
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$\nu = 1$ **bilayer in a periodic potential**[1] GANPATHY MURTHY, University of Kentucky, JIANMIN SUN, HERBERT FERTIG, Indiana University, NOAH BRAY-ALI, University of Kentucky — The clean $\nu = 1$ quantum Hall bilayer is an excitonic superfluid. Experimentally, due to disorder, the counterflow conductivity σ_{CF} remains finite even at the lowest T and the zero-bias peak has finite width. We mimic the nonperturbative effects of disorder [1] by a periodic potential[2] which couples, in a spin-only model, to the topological density $\mathbf{n} \cdot \partial_x \mathbf{n} \times \partial_y \mathbf{n}$(=charge density). We find a set of ground state phase transitions as the potential strength increases, with increasing local charge density. The transitions are weakly first order, with a new, quadratically dispersing, charge-carrying mode which represent incipient meron-antimeron pairs forming in regions of large potential gradient. These modes can become nearly gapless at and near the transition, which we argue leads to a strong suppression of the interlayer tunneling h. We demonstrate that near the transitions vortex-antivortex pairs become easy to create, leading to a strong suppression of T_{KT} . We discuss an effective theory that incorporates both the Goldstone mode and the new, quadratically dispersion mode.

[1] H. A. Fertig and G. Murthy, prl **95**, 156802 (2005).
[2] G. Murthy and S. Sachdev, prl **101**, 226801 (2008).

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