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Evidence for a finite temperature phase transition in a bilayer quantum Hall system A.R. CHAMPAGNE, J.P. EISENSTEIN, Caltech, L.N. PFEIFFER, K.W. WEST, Bell Labs — We study the Joshepson-like interlayer tunneling signature of the quantum Hall bilayer excitonic state at total filling factor $\nu_T = 1$ as a function of the layer separation, interlayer charge imbalance and temperature. The tunneling amplitude collapses to zero as either the temperature or interlayer spacing is increased. The interlayer tunneling amplitude dependences on the layer spacing at various temperatures are very similar, but the layer separations where the tunneling disappears scale linearly with temperature. Our results offer evidence [1] that a finite temperature phase transition separates the interlayer coherent phase from incoherent phases which lack strong interlayer correlations. The phase boundary is found to be re-entrant as a function of charge imbalance thus suggesting an intricate competition between the interlayer coherent phase and various independent layer states. This work was supported by the NSF and the DOE.
[1] A.R. Champagne, J.P. Eisenstein, L.N. Pfeiffer, K.W. West, Cond-mat/0709.0718

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