Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Biot-Savart correlations in layered superconductors KUMAR RAMAN, UC Riverside, VADIM OGANESYAN, CUNY Staten Island, SHIVAJI SONDHI, Princeton University — We discuss the superconductor to normal phase transition in an infinite layered type-II superconductor in the limit where Josephson coupling between layers is negligible. We model each plane as a neutral gas of thermally excited pancake vortices and assume the Biot-Savart interaction between vortices is the dominant mechanism for coupling the layers. Using the real-space renormalization group, we demonstrate that the transition in this model is a Kosterlitz-Thouless transition driven by the unbinding of pancake vortices. We study the high temperature phase using a Debye-Huckel type mean field theory. We find that while the long range interaction leads to correlations between the planes, the screening within the individual layers is not significantly different from an isolated two-dimensional system. This overall picture places some claims expressed in the literature on a more secure analytical footing and also resolves some conflicting views. Experimental implications will be discussed.

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Date submitted: 21 Nov 2008 Electronic form version 1.4