

Abstract Submitted  
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**Thermal melting of two dimensional finite vortex lattice**<sup>1</sup> LESLIE BAKSMATY, Rice University, UZI LANDMAN, Georgia Institute of Technology, HAN PU, Rice University — We present a two dimensional study of a vortex lattice using the self-consistent Hartree-Fock-Bogoliubov formalism within the Popov approximation. Our physical model is a rotating trapped condensate with a tight axial confinement. At constant rotation we solve for the equilibrium configuration of successively higher temperatures until all the vortices have disappeared from the system and the condensate fraction becomes very small. We observe discontinuities in thermodynamic quantities, such as chemical potential, as temperature is raised, which are closely correlated with sudden changes in the structure of the vortex lattice and the sudden loss of vortices to the surrounding thermal cloud. As well as being directly relevant to the finite vortex lattices in trapped gases, this work could have implications for the physics of Neutron stars, high temperature superconductors and studies of structural phase transitions in general.

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