

Abstract Submitted  
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**Observation of Phase Defects of a quasi-2D BEC in a Single Dipole Trap** PIERRE CLADE, CHANGHYUN RYU, ANAND RAMANATHAN, KRISTIAN HELMERSON, WILLIAM PHILLIPS, National Institute of Standards and Technology — At finite temperature, in a homogeneous two dimensional bosonic gas, long range order is destroyed by thermal fluctuations. For interacting atoms, below a critical temperature, the gas is a superfluid with phase defects consisting of pairs of vortex-antivortex; above this temperature, when the pairs are unbound, the gas enters a normal phase. The nature of the superfluid transition in a non-homogeneous trapped gas has been a topic of some debate. We are studying sodium atoms in a single quasi-2D optical trap. This trap is formed by an elliptical red detuned laser beam and has an aspect ratio of 40. We image the single “pancake” from both sides and observe density fluctuations with time of flight as well as phase fluctuations using Bragg interferometry techniques. Preliminary results provide evidence of the formation of vortex-antivortex pairs in this system.

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