

A Quantum Bose Gas in Two Dimensions

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We confine a quantum degenerate gas of Na atoms in a single 2-D layer and study the phase transition that occurs as we change the temperature and density. We find the location of the phase transition to be in good agreement with the theoretically calculated Berezinskii-Kosterlitz-Thouless transition. We also observe a cross-over between a thermal gas and a non-superfluid quasi-condensate as well as the sharp phase transition to what appears to be a superfluid quasi-condensate. For long time-of-flight after releasing the 2-D gas we see a distribution with three components that we identify as thermal, non-superfluid quasi-condensate, and superfluid quasi-condensate.