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Finite Temperature Effects in Trapped Unitary Fermi Gases with Population Imbalance CHIH-CHUN CHIEN, QIJIN CHEN, YAN HE, KATHERYN LEVIN, University of Chicago — We study the finite temperature T behavior of trapped Fermi gases in the unitary regime and in the presence of a population imbalance with polarization p. We obtain a phase diagram in the p - T plane, which establishes various superfluid and normal phases. Our theory, which is consistent with the standard $T = 0$ calculations in the literature, incorporates the important effect of non-condensed pairs. These are essential in order to arrive at physically meaningful transition temperatures $T_c(p)$. Moreover, as a result of these non-condensed pairs our $T \leq T_c$ profiles evolve from the well documented featureless behavior at $p = 0$ to behavior which shows clear indications of the presence of a condensate at $p \neq 0$. We also show profiles and central densities in different regimes of the phase diagram, and detailed comparisons with recent experiments are presented,

1. C.-C. Chien, Q.J. Chen, Y. He, and K. Levin, *Intermediate temperature superfluidity in an atomic Fermi gas with population imbalance*, Phys. Rev. Lett. 97, 090402 (2006)

2. C.-C. Chien, Q.J. Chen, Y. He, and K. Levin, *Finite temperature effects in trapped Fermi gases with population imbalance*, Phys. Rev. A 74, 021602(R) 2006.

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