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,


Chih-Chun Chien  
University of Chicago  

Date submitted: 01 Dec 2006  
Electronic form version 1.4