Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Kinematics and Thermodynamics of an Interacting 2D Fermi Gas

PAUL DYKE, KRISTIAN FENECH, TYSON PEPPLER, MARCUS LINGHAM, SASCHA HOINKA, CHRIS VALE, Swinburne University of Technology — Ultracold gases of fermionic atoms have become an important paradigm for studying many-body quantum phenomena. One example is a two-component 2D ultracold Fermi gas with tunable interactions that will allow the study of the Bardeen-Schrieffer-Cooper to Berzinskii-Kosterlitz-Thouless superfluid crossover. To effectively investigate this area we need to establish the conditions for which an interacting Fermi gas subject to tight transverse confinement behaves kinematically 2D. We will present results that indicate both a geometric and interaction driven departure from the 2D regime as the atom number and interaction strength are varied, allowing us to identify the regime where interacting systems are kinematically 2D. This provides the parameter range where we investigate the 2D equation of state (EoS) where all atoms are confined to the transverse ground state. We adapt a scheme previously used for the 3D unitary Fermi gas and 2D Bose gas to obtain the density EoS and other thermodynamical variables.

Paul Dyke
Swinburne University of Technology

Date submitted: 30 Jan 2015 Electronic form version 1.4