Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Towards Probing Homogeneous Strongly Interacting Fermi Gas YOAV SAGI, TARA DRAKE, RABIN PAUDEL, JOHN STEWART, JOHN GAEBLER, DEBORAH JIN, JILA, NIST and the University of Colorado — Superfluidity in strongly correlated matter is still an open question after many years of research. High Tc superconductors, for example, are known to exhibit a pseudo-gap phase above the critical temperature - a phase in which pairing exists in spite of the absence of long range order. An ultra-cold strongly interacting Fermi gas realizes a clean and controllable model system for studying these questions. It was shown recently that the normal state of a strongly interacting Fermi gas has a spectral behavior typical to a pseudo-gap phase [1]. One of the problems, however, which complicates the interpretation of these experiments is the inherent density inhomogeneity of the gas which arises due to the harmonic confinement. Here we present a technique to overcome this difficulty by spatially selecting only part of the cloud for interrogation while still retaining momentum resolution. We present measurements of the momentum distribution of a degenerate gas of 40K atoms revealing for the first time a truly sharp Fermi surface. We further extend the use of this technique to momentum resolved photo-emission spectroscopy and contact measurements.

[1] J. P. Gaebler, J. T. Stewart, T. E. Drake, D. S. Jin, A. Perali, P. Pieri, and G. C. Strinati, Nature Physics 6, 569-573 (2010).

Yoav Sagi
JILA, University of Colorado

Date submitted: 27 Jan 2012 Electronic form version 1.4