Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Phase Diagram of A One Dimensional Spin-Imbalanced Fermi Gas[1] YEAN-AN LIAO, ANN SOPHIE C. RITTNER, TOBIAS PAPROTTA, WENHUI LI, RANDALL G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005 — We study a 1D polarized Fermi gas by confining a two spin-component Fermi gas of ^{6}Li atoms in a 2D optical lattice. The lattice forms an array of tubes with weak axial confinement. Polarization is varied by changing the relative spin populations. In 3D, we observed phase separation in which an unpolarized superfluid core was surrounded by a normal polarized gas[2]. In 1D, however, theory predicts an inverted phase separation, where a central partially polarized (FFLO) superfluid is surrounded by wings that are either fully polarized or an unpolarized superfluid depending on the spin imbalance[3]. We will present our results and compare with the theoretical phase diagram.

[1]Supported by DARPA, NSF, ONR, the Keck and Welch Foundations
[2]G. B. Partridge et al., Science 311, 503-505 (2006); G. B. Partridge *et al.*, *Phys. Rev. Lett.* **97**, 190407 (2006).
[3]G. Orso, Phys. Rev. Lett. 98, 070402 (2007); H. Hu et. al, Phys. Rev. Lett. 98, 070403 (2007)

Yean-an Liao
Rice University

Date submitted: 23 Jan 2009 Electronic form version 1.4