Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

1D-3D Crossover in a Spin-Imbalanced Fermi Gas[1] MELISSA REVELLE, BEN A. OLSEN, JACOB FRY, RANDALL G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005 — We experimentally study the phases of an ultracold two-spin component gas of atomic fermions (^{6}Li) confined to 1D tubes formed by a 2D optical lattice. The atoms are prepared in the lowest two hyperfine sublevels where their interactions are tuned by a Feshbach resonance. We previously observed phase separation into a partially-polarized superfluid core and either fully-paired or fully-polarized wings (depending on the spin polarization)[2]. In 3D, the phase separation is inverted, such that the cloud center is fully paired[3]. We investigate the transition from a 1D to 3D gas by varying the lattice depth and interaction strength which changes the ratio of the tunneling rate between the tubes to the pair binding energy. We are exploring a region of parameter space that is believed to be the most promising region for the exotic FFLO superfluid phase[4].

[1]Supported by DARPA, NSF, and ONR
[2]Y.A. Liao et al., Nature 467, 567 (2010).
[3]G. B. Partridge et al., Science 311, 503 (2006); Y. Shin et al., Phys. Rev. Lett. 97, 030401 (2006).
[4]M. Parish et al., PRL 99, 250403 (2007).

Melissa Revelle
Rice University

Date submitted: 14 Nov 2014 Electronic form version 1.4