

Abstract Submitted  
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**1D-3D Crossover in a Spin-Imbalanced Fermi Gas**<sup>1</sup> MELISSA REVELLE, BEN A. OLSEN, RANDALL G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005 — We have previously mapped the phase diagram of a 1D spin-imbalanced Fermi gas by confining lithium atoms in an array of tubes using a 2D optical lattice.<sup>2</sup> Within each tube we observed separation of the atoms into a partially polarized superfluid core and fully paired or fully polarized wings (depending on the spin polarization). In 3D, the phase separation is inverted, such that the cloud center is fully paired.<sup>3</sup> We investigate the transition from a 1D to 3D gas by smoothly varying the lattice depth which changes the tunneling between the tubes. This allows us to study how the spin density changes as a function of inter-tube coupling. Progress will be reported.

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<sup>2</sup>Y.A. Liao et al., *Nature* 467, 567 (2010).

<sup>3</sup>G. B. Partridge et al., *Science* 311, 503 (2006); Y. Shin et al., *Phys. Rev. Lett.* 97, 030401 (2006).

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