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Phase Diagram of a 1-D Spin-Imbalanced Fermi Gas[1] MELISSA REVELLE, YEAN-AN LIAO, ANN SOPHIE C. RITTNER, TOBIAS PAPROTTA, RANDALL G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005, S.K. BAUR, E.J. MUELLER, Laboratory of Atomic and Solid State Physics, Cornell University — Spin-imbalance in a quantum gas typically destroys superfluidity, but theory suggests that there exists an exotic superfliud state (FFLO) where pairs form with finite center-of-mass momentum. In 3D, the FFLO state is predicted to occupy only a small region of the phase diagram, while in 1D the FFLO state is pervasive[2]. We create a spin-imbalanced Fermi gas of ^{6}Li in 1D tubes by using a 2-D optical lattice. The central region of each tube is a partially spin-polarized gas surrounded by wings of either a fully polarized or fully paired gas depending on the spin imbalance[3]. The phase diagram is a function of polarization and chemical potential extracted from *in situ* images of the spatial distribution. This diagram is well described by finite temperature Bethe Ansatz theory, suggesting that these partially polarized regions are the 1D equivalent of FFLO states.

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