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Spin-imbalance of ultracold Fermions in quasi-1D[1] ANN SOPHIE C. RITTNER, YEAN-AN LIAO, WENHUI LI, TOBIAS PAPROTTA, RANDALL G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005 — After the success of BCS theory, more exotic forms of superfluidity have generated large interest in the condensed matter and cold atoms community. One prominent example is the elusive Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) phase, a polarized superfluid that is predicted to occur when superconductors are subjected to a strong magnetic field. At present, there is only indirect experimental evidence of FFLO in the heavy fermion superconductor CeCoIn5. An alternate route to directly observe this phase is provided by ultracold spin-polarized Fermi gases. 3D polarized Fermi gases exhibit two distinct low temperature phases, an unpolarized superfluid and a polarized normal phase, which phase separate in an optical trap [2]. There is no experimental evidence for the FFLO phase in a 3D system, but it is predicted to occupy a larger region of the phase diagram in a quasi-1D system. We have implemented a 2D optical lattice in order to explore the phase diagram of a quasi-1D polarized Fermi gas.

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[2]Partridge et al., Science 311, 503 (2006)

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