

Abstract for an Invited Paper
for the MAR06 Meeting of
The American Physical Society

Spin 1/2 fermions on spin-dependent optical lattices¹

ANDREW HO, School of Physics and Astronomy, Birmingham University

We study the phase diagram of one-dimensional two-component (i.e. pseudo-“spin”-1/2) ultracold atomic Fermi gas. The two atom species can have different hopping or mass. A very rich phase diagram for equal densities of the species is found, containing Mott insulators with various quasi-long-range-order, superfluids and perhaps phase separation. We also discuss coupling such 1D systems together and the experimental signatures of the phases. In particular, we compute the “spin”-structure factor at small momentum, which should reveal a “spin” gap.

¹Supported by EPSRC(UK) and Leverhulme Trust (UK)