

Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Phase diagram of a population-imbalanced attractive Fermi gas in the 1D-3D crossover regime SATYAN BHONGALE, George Mason University, LESLIE BAKSMATY, HAN PU, Rice University — Phase diagram of a population imbalanced attractive Fermi gas in the 1D-3D dimensional crossover regime is obtained via deriving a multi-channel inter-atomic scattering pseudopotential. Such a phase diagram has strong implications for the observation of FFLO superfluidity within trapped fermions. Recent experiment with ultra-cold Li6 have mapped the phase diagram for 1D attractive fermions [Nature 467, 567 (2010)], however the superfluid property is yet to be confirmed. While the signature of FFLO in 1D is predicted to coincide with micro-phase separated domains, the feasibility of direct experimental identification of the domain walls remains questionable due to strong fluctuations. On the other hand, in 3D, fluctuations may be neglected, but the FFLO corresponds to just a tiny sliver of the phase diagram. Moreover, the topology of the phase diagram is drastically different in the two extreme dimensional limits. We show how the 1D and 3D dimensional limits are connected and indicate the possible new physics in the crossover regime.

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Date submitted: 09 Feb 2011

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