Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Density waves and supersolidity in rapidly rotating atomic Fermi gases GUNNAR MOLLER, NIGEL R. COOPER, University of Cambridge — We study theoretically the low-temperature phases of a two-component atomic Fermi gas with attractive s-wave interactions under conditions of rapid rotation [1], a problem related to the discussion of high-field superconductivity in the solid state [2]. The regime of interest for atomic gases differs substantially from solid state conditions: the rotation does not lead to any Zeeman splitting which might suppress high-field SC order; the short-range interactions allow density wave order to develop (contrary to long-range Coulomb interactions). We show that the low-temperature phases of an atomic Fermi gas with attractive interactions involve an interesting interplay between CDW and superconducting phases. In the extreme quantum limit, when only the lowest Landau level is occupied, we employ a renormalization group approach [3] to show that the system is unstable to CDW order along the rotation axis. At lower rotation rates, we show how CDW and SC can coexist, leading to supersolid behaviour.
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Date submitted: 08 Feb 2008 Electronic form version 1.4