Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Pairing in Asymmetrical Fermi Systems with Intra- and Inter-Species Correlations[1] RENYUAN LIAO, KHANDKER QUADER, Department of Physics, Kent State University — Motivated by ultracold fermions, we study pairing in two-species Fermi systems with unequal population. We include both inter-species "singlet" and intra-species "triplet" pairing interactions. Using the equation of motion method, we derive two-point correlation functions, from which various physical quantities can be extracted. We self-consistently solve the resulting coupled mean-field equations for superfluid gap functions and chemical potentials, and study the effects of "triplet" correlations on various quantities at T=0 and finite-T. By imposing stability conditions, we construct a phase diagram across the BEC-BCS regimes; it is dramatically different from that without triplet correlations: the BCS singlet superfluid state can sustain a finite polarization, P. For larger P, we find phase separation in BCS and BEC regimes. A superfluid phase exists for all P deep in the BEC regime.

[1]Partially supported by ICAM

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Date submitted: 20 Nov 2006 Electronic form version 1.4