A Mean Field Calculation of Thermal Properties of Simple Nucleon Matter on a Lattice

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abstract Thermal properties of single species nucleon matter are investigated assuming a simple form of the nucleon-nucleon interaction. The nucleons are placed on a cubic lattice, hopping from site to site and interacting through a spin-dependent force, as in the extended, attractive Hubbard model. A mean field calculation in the Hartree-Fock Bogoliubov approximation suggests that the superfluid ground state generated by strong nucleon pairing undergoes a second-order phase transition to a normal state as the temperature increases. The calculation is shown to lead to a promising description of the thermal properties of low-density neutron matter. A possibility of a density wave phase is also examined.