Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Multiple Pairing in the BCS Model J.D. FAN, Southern University, YURIY MALOZOVSKY, JD Duz Institute for Superconductivity — We study Cooper's paring for more than two particles in terms of the BCS model. We consider the multiple pairing in terms of the BCS Hamiltonian in a quiescent Fermi sea model and in the BCS ground state. Although there is no interaction between Cooper pairs in terms of the BCS Hamiltonian, yet we show that four particles are paired and form a bound state in the singlet state with just twice the bound state energy of a single Cooper's pair. The four-particle bound state only exists as the result of the Pauli principle and the sharp Fermi edge. We have also shown that the smearing of the Fermi edge due to $\Delta(k)$ as it is in the BCS ground state weakens the pairing of either two or four particles. We show that in the particle-hole channel there exists the multiple particle-hole resonance for four particles and four holes in a quiescent Fermi sea model similar to the case of two particles and two holes resonance. There is no particle-hole resonance in the BCS ground state as shown, which means that the particle-hole resonance is removed by $\Delta(k)$ due to smearing of the Fermi distribution. The wave function for the multiple-pairing model is discussed as well.

J. D. Fan

Date submitted: 19 Nov 2007 Electronic form version 1.4