Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Theory of superconductivity in multiwall carbon nanotubes ENRICO PERFETTO, CNISM, Universta' di Roma Tor Vergata (Italy), JOSE GONZALEZ, CSIC-Madrid (Spain) — Recently superconductivity has been observed at 12K in multiwall carbon nanotubes (MWNTs). The key feature in the experimental setup is that almost all the shells in the MWNTs are electrically active. Here we propose a model for the MWNTs where the electrons live in a large number of coupled one- dimensional systems, reminiscent of the hexagonal Fermi surface of the MWNTs. We pay attention to the competition between the screened Coulomb repulsion and phonon-mediated electron- electron interaction. The low-energy behaviour of the model is studied with one-loop renormalization group. We find that by lowering the energy scale the inter-shell Cooper pair tunnelling amplitude grow large, inducing a superconducting instability with p-wave order parameter. The phase diagram shows that the superconducting phase dominates for large radii of the MWNTs and by doping the system. At low doping and small radius a competition with charge density wave instability is observed.

Enrico Perfetto
CNISM, Universta' di Roma Tor Vergata (Italy)

Date submitted: 16 Nov 2006 Electronic form version 1.4