Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Study of the antiferromagnetism in electron-doped cuprate superconductors with disorder C. S. TING, XIN-ZHONG YAN, QINGSHAN YUAN, Texas Center for Superconductivity, University of Houston — On the basis of the Hubbard model, we study the antiferromagnetic (AF) properties in electron-doped cuprates using the fluctuation-exchange approach. Taking into account the spin fluctuations in combination with the impurity scattering effect due to the randomly distributed dopant-atoms, we formulate the theory of antiferromagnetism in the system. By self-consistently solving the integral-equations for the Green's function, the Neel's temperature is determined by the condition that the Goldstone mode from the transverse spin susceptiblility first appears as the temperature is lowered. Our numerical calculation shows that the Goldstone mode always is pinned at (pi,pi), insensitive to the doping level. We also calculate the onset temperature of the pseudogap formation which is due to the antiferomagnetic fluctuations, the single particle spectral density, the Fermi surface evolution with doping concentration, and the staggered magnetization. It is shown that the results obtained by the present approach are in very good agreement with the experiments. In the present approach, the density of states (DOS) of the antiferromagnetic phase exhibits a zero-energy peak in the under-doped region.

C. S. Ting
Texas Center for Superconductivity, University of Houston

Date submitted: 05 Dec 2006 Electronic form version 1.4