Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Electron Spin Resonance as a route to Spin-Gap detection in Carbon Nanotubes DARRYL H. NGAI, ANDRE' LECLAIR, EUN-AH KIM, Cornell University — The recent observation of a charge-neutral excitation gap in ultraclean carbon nanotubes[1] raises the intriguing possibility of a phase with gapless charge spectrum and gapped spin spectrum: the Luther-Emery liquid. We note that ESR would be an ideal probe to directly test whether the observed gap is a spin-gap, as it probes the non-local correlations of conduction electron spins. We focus on the Luther-Emery point ($K_s = 1/2$, also known as free fermion point) where an explicit calculation of relevant spin-spin correlation function is possible, to calculate the ESR signal in a Luther-Emery liquid. At high frequencies of $\omega > 2\Delta_s$ where Δ_s is the spin-gap, the ESR signal of the Luther-Emery liquid will exhibits a second peak at magnetic fields away from the resonance condition of $B = \omega/\mu_B g K_s$. We discuss how to measure the spin-gap from the location of this additional peak as a function of applied field strength.

[1]V. V. Deshpande *et al.*, Science **323**, 106 (2009)

Darryl H. Ngai
Cornell University

Date submitted: 11 Nov 2011 Electronic form version 1.4