Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Effects of the Non-linearity of the Electronic Bands on the Double-Resonance Raman Features of Graphite and Carbon Nanotubes
EDUARDO BARROS, ANTONIO SOUZA FILHO, JOSUE MENDES FILHO, UFC-Brasil, LUIS GUSTAVO CANCADO, ADO JORIO, UFMG-Brasil, GEORGII SAMSONIDZE, GENE DRESSELHAUS, MILDRED DRESSELHAUS, MIT — The second-order Raman feature that is observed for graphite at $\sim$2450 cm^{-1} for 2.41 eV excitation energy (E_L) has been explained by considering a double-resonance Raman process originating from a near-K-point phonon. [1] However, the negative dispersion with laser energy ($\partial\omega/\partial E_L$) observed for this peak has not yet been successfully explained. In the present work, we explain the negative dispersion of the 2450 cm^{-1} peak with laser energy by considering a non-linear energy dispersion for the electrons close to the K-point of the Brillouin zone. Also, the slope of the dispersion of the 2450cm^{-1} feature with laser energy is shown to be associated with the presence of a Kohn anomaly at the K-point of the phonon dispersion associated with both the G'-band and this $\sim$2450 cm^{-1} peak [2]. Therefore, the results obtained in this work provide indirect experimental evidence for the presence of the Kohn anomaly in graphite and enables a measurement of the electron-phonon coupling. The discussion is extended to the effects of the Kohn anomaly and the non-linear electronic dispersion on the electronic and vibrational properties of carbon nanotubes. [1] Shimada et al. Carbon, *submitted* [2] Piscanec et al. Phys. Rev. Lett., *accepted*

Eduardo Barros
Federal University of Ceara

Date submitted: 30 Nov 2004 Electronic form version 1.4