## Resonant Raman spectroscopy of nitrogen-doped single-walled carbon nanotubes (N-SWNT) P76

Sara D. Costa[1], Theerapol Thurakitseree[2], Shigeo Maruyama[2], Cristiano Fantini[1], Marcos Pimenta[1]

*1 Dept. of Physics, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil (sdcosta@fisica.ufmg.br)*
*2 Dept. of Mechanical Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, Japan*

Vertically aligned nitrogen-doped single-walled carbon nanotubes (N-SWNT) were investigated via resonant Raman spectroscopy. In order to have a basis for comparison, two samples were used in the experiments: one grown with pure ethanol (SWNT) and another one grown with a mixture of ethanol/acetonitrile as feedstock (N-SWNT) [1]. Different laser energies in the ultraviolet, infrared and visible ranges (from 1.53 to 3.8 eV), were used to excite the sample and investigate its resonant behaviour. In order to create a map of the transition energy versus the radial breathing mode frequency, tuneable lasers were employed and a Raman spectrum was acquired every 2 nm.

The effects of the incorporation of nitrogen on the electronic and phonon structures were studied. Despite the low amount of nitrogen incorporated (0.2%), shifts in the optical transitions of the nanotubes were detected, showing modifications in the electronic properties upon doping. Additionally, the D and G' bands dispersive behaviour was studied.

[1] T. Thurakitseree, C. Kramberger, P. Zhao, S. Aikawa, S. Harish, S. Chiashi, E. Einarsson, S. Maruyama, Carbon 50 (2012) 2635-2640

## Shot noise in suspended graphene at high magnetic fields P77

Antti Laitinen, Daniel Cox and Pertti Hakonen

*Aalto University, Finland (daniel.cox@aalto.fi)*

Graphene is an intriguing semimetal with, ideally, massless Dirac fermions as the carriers of electrical current. Recently the fractional quantum Hall state was observed in suspended graphene sheets having a mobility on the order of $10^5$ $cm^2/Vs$. Shot noise is one way to study the nature of charge transport in 2DEG and in graphene. It yields complementary information to conductance, and it has been employed to verify that the Landau level filling factor determines the effective charge of carriers in a 2DEG [1,2]. We have started such shot noise experiments on graphene. Our preliminary data display distinct noise around the field-induced transport gap. Correlations between noise and conductance have been analysed and the results are discussed in the light of the theories on the Quantum Hall effect.

[1] L. Saminadayar, D. C. Glattli, Y. Jin and B. Etienne, Phys. Rev. Lett. 79, 2526 (1997)
[2] R. de-Picciotto, M. Reznikov, M. Heiblum, V. Umansky, G. Bunin and D. Mahalu, Nature (London) 389, 162 (1997)