

CEA - Saclay 91191 Gif-sur-yvette Cedex  
Service de Physique de l'Etat Condensé  
**SÉMINAIRE**

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**Mercredi 6 octobre 11h15**

**Orme des Merisiers SPEC Salle Itzykson, Bât.774**

**Franck Condon blockade in a suspended nanotube quantum dot**

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Measurements through nanoelectromechanical systems and single-molecule junctions have shown that electronic transport is strongly influenced by the mechanical motion, leading to transport assisted by emission of vibrons. Furthermore, a strong electron-vibron coupling is expected to lead to a suppression of transport through the vibronic ground state, known as Franck-Condon blockade [1].

Here we report on transport in a quantum dot formed in a suspended carbon nanotube device [2]. Due to the high quality of the sample we can make a quantitative comparison between experiment and theory. We observe a strong suppression of electron transport through the vibronic ground state, and give an equivocal confirmation of Franck-Condon blockade in suspended nanostructures [3]. However, calculation using the Anderson-Holstein do not reproduce quantitatively the data. The discrepancy could be understood by taking into account the spatial extent of the electron and vibron wave functions, giving rise to Franck-Condon factors which are asymmetric between both tunnel barriers [4].

This work has been realized in collaboration with C. Stampfer, K. Ensslin, K. Inderbitzin, L. Durrer, C. Hierold, E. Mariani, M. G. Schultz, F. von Oppen, F. Cavaliere and M. Sassetti.

[1] J. Koch and F. von Oppen, Phys. Rev. Lett. 94, 206804 (2005)

[2] C. Stampfer, A. Jungen, R. Linderman, D. Oberfell, S. Roth and C. Hierold, Nano Lett. 6, 1449 (2006)

[3] R. Leturcq, C. Stampfer, K. Inderbitzin, L. Durrer, C. Hierold, E. Mariani, M. G. Schultz, F. von Oppen and K. Ensslin, Nature Physics 5, 327 (2009)

[4] F. Cavaliere, E. Mariani, R. Leturcq, C. Stampfer and M. Sassetti, Phys. Rev. B 81, 201303 (2010)

A coffee break will be served at 11h00. The seminar will be given in English.