

Chez Pierre

Presents ...

Wednesday, December 4, 2013

1:30pm

MIT Room 4-331



Special Chez Pierre Seminar

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"Magnetic properties of sub-gap states in superconductor-semiconductor nanowire structures"

Low-band-gap semiconductor nanowires constitute a versatile platform for superconductor-semiconductor devices. Such hybrid devices, conjugating macroscopic superconducting properties and electrically tunable microscopic degrees of freedom, offer the opportunity to access a wide range of unexplored quantum phenomena and mesoscopic effects. In particular, great interest has recently been drawn by the possibility to create Majorana-fermion quasiparticles that could allow for topologically protected quantum computation. In this talk, I will present recent experimental results obtained with hybrid superconductor-semiconductor devices fabricated mainly from InAs/InP core/shell nanowires. Special attention will be devoted to the magnetic properties of the sub-gap states in these systems and to the intriguing competition between Coulomb interactions, Kondo correlations, and the superconducting proximity effect. Implications to current research on Majorana fermions will as well be discussed.

References:

- [1] S. De Franceschi, L.P. Kouwenhoven, C. Schönberger, W. Wernsdorfer, "Hybrid superconductor-quantum dot devices", *Nature Nanotechnology* 5, 703 (2010).
- [2] E. J. H. Lee, X. Jiang, R. Aguado, G. Katsaros, C. M. Lieber, and S. De Franceschi, "Zero-bias anomaly in a nanowire quantum dot coupled to superconductors", *Phys. Rev. Lett.* 109, 186802 (2012).
- [3] E. J. H. Lee, X. Jiang, M. Houzet, R. Aguado, C. M. Lieber, and S. De Franceschi, "Probing the spin texture of sub-gap states in hybrid superconductor-semiconductor nanostructures", arXiv:1302.2611 (2013).