INSTITUTE SEMINAR

Friday, 24 January 2014 4.00 pm Fermion

Speaker:

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Title:

Novel Transport phenomena in hybrid junctions of Nanowires

Abstract:

In the first part of the talk I shall give a brief introduction to my field of research called “Mesoscale and Nanoscale Physics” highlighting the subfield of low dimensional systems with examples and experiments. In the next part, I shall talk about transport properties of hybrid superconducting junctions of one dimensional nanowires (NW). In particular, I shall demonstrate possible scenarios for production of pure spin current through such junctions.

I shall also show that (a) effects due to inclusion of electron electron interaction induced backscattering in the wire, and (b) competition between the charge transport via the electron and hole channels across the junction give rise to a non monotonic behavior of the sub gap conductance as a function of temperature. In the last part of the talk I shall introduce NW in the presence of Rashbaspin orbit interact ion, uniform magnetic field, and spatially modulated magnetic field.

Such fully gapped system can support fractional fermion (FF) bound states at the two ends of the NW. I shall discuss the transport and noise signatures of such FF bound states which has never been investigated so far in literature.

Reference:

[1] arXiv:1309.3738 (submitted to Phys. Rev. Lett.)

[2] Int. J. Mod. Phys. B, 27, 1330015 (2013)

[3] Europhys.Lett.81, 67001 (2008)

[4] Phys. Rev. B 77, 155418 (2008)
