



Development of High-Field Point Contact Andreev Reflection Methodology

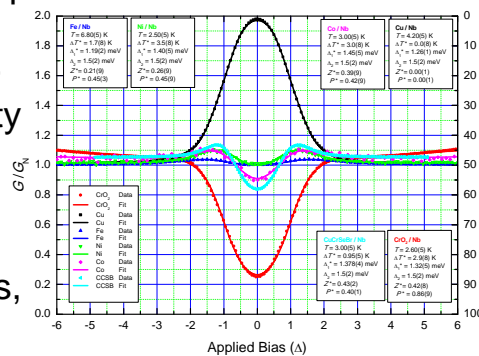
Research supervisor: Dr. Plamen Stamenov
Magnetism & Spin Electronics

Scientific Background / Current Research

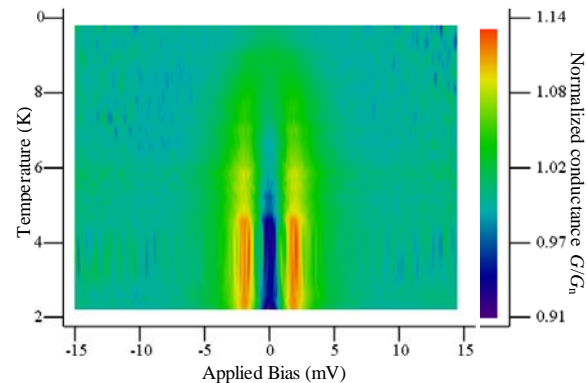
Point Contact Andreev Reflection (PCAR) is a method for determination of the *magnitude of the electron spin polarisation* close to the Fermi level in magnetic metals and degenerate semiconductors – a parameter of *critical importance* for their applications in spin electronic devices. The experiments involve the accurate measurements of the low-temperature differential conductance of *superconductor – metal* junctions and the determination of the characteristic current conversion at the interface (from Cooper pairs to normal quasi-electrons).

Project

The project will involve the construction of a new experimental setup, similar to the one shown on the right, for use in high magnetic fields (up to 14 Tesla); the development of theoretical understanding and modelling (fitting) tools for the experimental observations; and the measurement of spin-polarisation in a variety of novel materials, such as CoPt, FePd, Mn₃Ga, Mn₂Ga, Tm, and Gd, among others, with its sign.



Our "Textbook" examples of PCAR spectra.



Temperature evolution of the PCAR spectrum for bulk polycrystalline thulium. The data is gathered for ~ 1 minute.

Funding

Funding for this project has been approved and is available through the School of Physics, TCD. Prospective students can also apply for funding through the IRCSET, EMBARK initiative 2011 (by Wednesday 16th February at 5.00 pm (GMT/ UTC) 2011).

Contact details

stamenov.plamen@tcd.ie Room no.: SNIAM 0.08 tel. +353 1 896 2171

More information / References

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- G. T. Woods, R. J. Soulen, I. Mazin, B. Nadgorny, M. S. Osofsky, J. Sanders, H. Srikanth, W. F. Egelho, and R. Datla, *Phys. Rev. B* **70**, 154416 (2004).