

Spin gating of mesoscopic devices

Professor

Mats Jonson

Department of Physics, University of Gothenburg

日時: 2016年5月20日(金) 16:00~17:00 場所:東京大学工学部2号館 3F 31A会議室



Electrical currents through nanoscale devices can easily be controlled electrostatically by using "gate electrodes". When charged ("charge gating") these give rise to electric fields that couple to the charge of the electrons via the Coulomb interaction and can therefore be used (for example) to turn on and off the so called Coulomb blockade of electron tunneling and hence the current in mesoscopic devices. Since electrons carry spin (a tiny magnetic moment) as well as charge it is interesting to consider whether one could manipulate electronic currents by coupling to the spin of the electrons ("spin gating") rather than to their charge. In this talk two potential spin-gating mechanisms will be considered. These are (i) the magnetic exchange interaction in magnetic devices and (ii) the spin-orbit coupling ("Rashba effect"), which is prominent in low-dimensional conductors. Possible implementations of spin gating, involving spin-flip assisted electro- and photo-mechanical effects, "Rashba spin splitting" of single electrons and Cooper pairs, and spin-gating of superconducting weak links, will be discussed.

本件連絡先:

東京大学大学院工学系研究科「機械システム・イノベーション」プログラム(GMSI) 「最先端融合科学イノベーション教育研究コンソーシアム」(CIAiS) 東京大学大学院工学系研究科機械工学専攻 教授 丸山 茂夫 GMSIプログラム事務局 E-mail: office@gmsit.u-tokyo.ac.jp Phone: 03-5841-0696