

Spintronics: Electrons, Spins, Computers and Telephones

by

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Abstract:

Spintronics is a new field of research which exploits the influence of the electron spin on electronic transport. It is well known for the giant magnetoresistance of the magnetic multilayers and its application to the hard disc drives, but it has also revealed many other interesting effects. In my talk, I will review some of the most promising directions of today: spin transfer phenomena, spintronics with semiconductors, molecular spintronics, single electron spintronics, Spin Hall Effect (SHE) and Quantum Spin Hall Effect (QSHE). In a spin transfer experiment, for example, one manipulates the orientation of a nanomagnet by transfusing spin angular momentum from a spin-polarized electronic current to the nanomagnet. This electronic spin transfusion can be used to switch the magnetization (with near applications to the writing of magnetic memories) or to generate oscillations in the radio-wave frequency range (with promising applications in telecommunications). Spintronics with semiconductors aims to some fusion between conventional electronics and spintronics, while molecular spintronics turns out to be a possible way to go “beyond CMOS”. Single electron spintronics, SHE and QSHE have also very interesting prospects.

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4/F, Cheng Yick-chi Building
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All are Welcome