Condensed Matter Seminar

Date: Feb. 12 (Tue.) 16:00 ～18:00

Speakers:

(1) Mr. **X-H. Wang** (GCOE&TU Delft)

(2) Dr. **J. Xiao** (GCOE&TU Delft)

Title:

(1) Spin/magnetization dynamics in selected hybrid nano-structures

(2) Charge pumping in magnetic tunnel junctions

Room: 2nd floor, IFCAM Bldg

Abstract (1):

Magnetoelectronic-circuit theory of electron transport in the ferromagnet-normal will be briefly discussed. Combined with Landau-Lifshitz-Gilbert equation, we analyze the dc-current-driven magnetization dynamics of spin-flip transistors in which the source-drain contacts are magnetized in selected directions [1, 2]. On the other hand, a ferromagnet can resonantly absorb rf radiation to sustain a steady precession of the magnetization around an internal or applied magnetic field. Under these resonant conditions, a dc voltage is generated at a normal-metal electric contact to a ferromagnet with spin-flip scattering [3], which has been confirmed by experiment [4]. This mechanism allows sensing of time-dependent magnetizations by established dc electronic techniques. Some caurrent research will be mentioned at the end.

[1] X.Wang, G. Bauer and A. Hoffman, PRB 74, 054436(2006)
[2] X.Wang, G. Bauer and T. Ono, JJAP, 45, 3863(2006)
[3]X.Wang, G. Bauer, B. van Wees, A. Brataas and Y. Tserkovnyak, PRL, 97, 216602 (2006)
[4] M.V. Costache, M. Sladkov, C. H. van der Wal, and B. van Wees, PRL, 97,216603 (2006)

Abstract (2):

We study theoretically the charge transport pumped by magnetization dynamics through epitaxial FIF and FNIF magnetic tunnel junctions (F: Ferromagnet, I: Insulator, N: Normal metal). We predict a small but measurable DC pumping voltage under ferromagnetic resonance conditions for collinear magnetization configurations, which may change sign as function of barrier parameters. A much larger AC pumping voltage is expected when the magnetizations are at right angles. Quantum size effects are predicted for an FNIF structure as a function of the normal layer thickness.

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