center for nanophysics and advanced materials

Condensed Matter Colloquium

Thursday, January 26, 2012

2 pm, Room 1201

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Spin currents and spin dynamics in metallic nanostructures

Spintronics aims to replace charge with spin as the main computational element in devices. Much effort is being devoted to understand how the electron spin is transferred through interfaces and to identify fundamental processes that modify the spin polarization or that can be used for spin manipulation. Lateral structures are a unique tool to study these phenomena because of the ease to fabricate them in multi-terminal configurations. In the first part of the talk, this will be illustrated with some of our experimental results in thin-film nonlocal spin devices, where the output voltage is exclusively determined by the spin degree of freedom and provides valuable information on spin-flip scattering mechanisms, spin-polarized tunneling, and spin Hall effects. In the second part of the talk, new aspects of thermoelectricity associated to spin effects will be addressed. Such effects are expected to be beneficial for energy conversion applications and for the search of novel pathways towards transporting spin information using magnons (spin-wave quanta). First, a spin ratchet at the single-electron level, which produces spin currents with no net bias or charge transport, will be described. Then a thermopile will be introduced that allows us to discriminate the magnon drag from other thermoelectric effects and to gather valuable knowledge about electron-magnon interactions.

Refreshments at 1:30 pm in Room 1305F

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