SEMINAR ANNOUNCEMENT

Spintronics: from Spins to Devices
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Host: Prof Alfred Huan

Abstract:

About two decades ago, spintronics appeared on horizon marked by the discovery of giant-magnetoresistance (GMR), where the current flow is affected by the magnetization configuration. Just over one decade ago, the frontier of spintronics was pushed further by the prediction of spin-transfer effect, where the magnetization configuration is affected by the current flow. The current-induced spin-transfer torque can excite magnetization dynamics and even magnetization reversal in magnetic heterostructures. Inversely, we also found that a magnetization dynamics can induced a current flow due to the spin and charge pumping effect. When at thermal equilibrium without bias voltage, the electric noise in a magnetic heterostructure is found to be fundamentally different from that in a normal conductor. In normal conductors, there is only one noise source: thermal agitation of charge carriers, which causes the white Johnson-Nyquist noise. However, in magnetic heterostructures, there is another independent noise source: thermal agitation of the magnetization, which also contributes to the electric noise by spin and charge pumping effect. The noise power spectrum from the latter consists of two absorption lines at zero frequency and at the ferromagnetic resonance frequency on top of a white noise background. The relative intensities depend on the magnetization configuration.