数学与系统科学研究院

计算数学所学术报告

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报告题目：

Spin-polarized transport in ferromagnetic materials

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报告地点：　科技综合楼三层 **311**

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Abstract:

Magnetic storage devices rely on the fact that ferromagnetic materials are typically bistable, and that it is possible to switch between different states by applying a magnetic field. The discovery of the Giant Magneto-Resistance effect has enabled the use of layered ferromagnetic materials in magnetic devices, such as magnetic memories (MRAMs). Even in the absence of thermal effects, there are limitations in the storage capacity of such devices due to the fact that as the size is decreased, the magnitude of the switching field increases, due to an increase in shape anisotropy. Given that magnetic fields have long range interactions, the density of such devices is limited. A new mechanism for magnetization reversal in multilayers was proposed by Slonczweski and Berger. In this new mechanism, an electric current flows perpendicular to the layers. The current is polarized in the first layer, and the polarization travels with the current to the second layer, where it interacts with the underlying magnetization. Since currents are localized in each cell, long range effects can be reduced. In this talk we will discuss the connection between several models for the description of the spin transfer torque at different physical scales. Specifically, we connect the quantum and kinetic descriptions with the help of the Wigner transform, and the kinetic and diffusion models by a specific parabolic scaling. Numerical examples will presented to illustrate the applicability and limit of the different models.

欢迎大家参加！