

Spintronic based wireless communication

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PhD may follow: Yes

Summary :

One of the basic concepts of spintronics is the spin momentum transfer where spin polarized conduction electrons can transfer an angular spin-moment to the local magnetization of a thin ferromagnetic film. This magnetic momentum transfer is responsible for the excitation of high frequency (Gigahertz range) magnetization oscillations when a DC current is injected into a magneto-resistive device. Spintec is studying the spin momentum transfer concept from a fundamental point of view to better understand the non-linear magnetization dynamics of nanoscale devices, but also in context of applications. Namely, the effect can be used to generate microwave signals as well as to detect microwave signals. The combination of the two could lead to a novel concept for a wireless communication system, which is the object of study of this internship, followed by a PhD thesis.

Full description :

In the frame of an EC project MAGICAL (2015-2019), a wireless short range communication concept will be explored, that is based on the emission of electromagnetic waves via spin torque oscillators and the detection of this wave by a second spin transfer oscillator. In the first part of the project, the student will explore several detection schemes in context of the proposed application and will be carrying out numerical simulations. This will be followed by the realization of the devices (materials deposition and nanofabrication) and the characterization of the high frequency response of the devices. This work will be carried out in collaboration with the microwave components team of Spintec.

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Requested skills :

Motivated student with a sound background in solid state physics and/or nanosciences and keen to explore new concepts and ideas that are at the interface between physics (spintronics) and applications (microwave oscillators).