

Séminaire

Jeudi 31 janvier

14h00

Amphithéâtre du C2N

“Spin torque driven oscillations of the reference layer in fully perpendicular magnetic tunnel junction”

Vadym LURCHUK

Spintec, Grenoble

Vadym Iurchuk¹, Ahmed Sidi El Valli¹, Nathalie Lamard¹, Jürgen Langer², Jerzy Wrona², Ioan-Lucian Prejbeanu¹, Laurent Vila¹, Ricardo Sousa¹ and Ursula Ebels¹

1. Univ. Grenoble Alpes, CEA, CNRS, Grenoble INP*, INAC-Spintec, 38000 Grenoble, France

* Institute of Engineering Univ. Grenoble Alpes

2. Singulus Technologies AG, 63796 Kahl am Main, Germany

Spin torque nano-oscillators (STNO) are nonlinear auto-oscillating systems known to produce steady state magnetization precession in the microwave range, when a spin-transfer torque (STT) balances the Gilbert damping of a magnetic layer. Using strong interfacial perpendicular magnetic anisotropy (PMA), for either the polarizer or the free layer in magnetic tunnel junctions (MTJ) based STNOs, high output power, large tunability and zero-field operation [1–4] were demonstrated. In contrast, STNOs based on fully perpendicular MTJs (pMTJs) are highly desirable due to their integrability with current CMOS and STT-MRAM technologies. Such integrated systems-on-chip are of interest for sensing, processing and wireless data transfer applications as they can offer reduction in power consumption.

In this seminar I will report on the experimental observation of STT-driven microwave signal generation in pMTJs that were optimized for MRAM application. Besides signal generation other rf functions such as injection locking, frequency modulation and signal detection are demonstrated. In conclusion, this demonstration gives prospect to use the same magnetic stack for MRAM and rf functions.

The authors acknowledge funding from the EU Horizon 2020 project GREAT (No. 687973).

- [1] W. Skowroński, et al, *Appl. Phys. Express* **5** 063005 (2012)
- [2] Z. Zeng, et al, *Sci. Rep.* **3** 1426 (2013)
- [3] B. Fang, et al, *AIP Adv.* **6** 125305 (2016)
- [4] S. Tamaru, et al. *Sci. Rep.* **5**, 18134 (2015)