

“THz spin currents for magnetic manipulation”

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Reducing energy dissipation while increasing speed in computation and memory is a long-standing challenge for spintronics research [1]. In the last 20 years, femtosecond lasers have emerged as a tool to control the magnetization of certain magnetic materials at the picosecond timescale [2]. Recently, new materials and new ultrafast mechanisms have been discovered that expand the possibilities of the field. Particularly, I will discuss some of our latests results where we show that ultrafast spin currents generated either by picosecond wide electrical pulses [3], or by ultrafast demagnetization [4,5] can be exploited to reverse the magnetization of a classical ferromagnet. These experiments show that spintronic phenomena can be exploited on picosecond time-scales and should launch a new regime of ultrafast spin torque studies and applications.

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- [3] Jhuria, K. et al. Spin-orbit torque switching of a ferromagnet with picosecond electrical pulses, *Nat. Electronics* 3, 680-686 (2020)
- [4] Remy et al., Energy efficient control of ultrafast spin current to induce single femtosecond pulse switching of a ferromagnet, *Adv. Sci.* 7, 23, 2001996 (2020)
- [5] Igarashi et al., Engineering single-shot all-optical switching of ferromagnetic materials, *Nano Lett*, 20, 8654-8660 (2020)

Education

- PhD in physics @ Laboratoire de Physique des Solides, Université Paris-Sud (France) 2011 – 2014
- Master degree in nanosciences @ l'Université de Paul Sabatier (Toulouse, France) 2010 – 2011
- Visiting scholar @ l'Université de Tohoku (Sendai, Japon) 2008 – 2009
- Engineering diploma @ l'Institut National des Sciences Appliquées (Toulouse, France) 2006 – 2011
- Spanish selectividad @ Ekitntza Ikastola (Donostia-San Sebastian, Spain) ... – 2006

Profesional experience

- CNRS permanent researcher [success rate < 11%] @ Institut Jean Lamour (Nancy) 12/2017 – present
- Postdoctoral fellow @ University of California, Berkeley (Berkeley, USA) 01/2015 – 12/2017
- CNRS researcher @ Laboratoire de Physique des Solides (Orsay, France) 10/2014 – 12/2014

A joint research unit

