Graduate Program in Spintronics Seminar

“Controlling magnetism by interface engineering”

Dr. Liza Herrera DIEZ

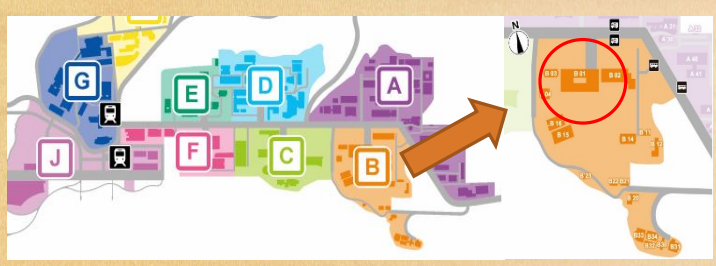
C2N: CENTRE FOR NANOSCIENCE AND NANOTECHNOLOGY
CNRS- UNIVERSITÉ PARIS SUD – UNIVERSITÉ PARIS SACLAY

Time : 2:00pm-3:30pm

Date : Friday, June 7, 2019

Venue: Seminar Room 2 :407

Education and Research Building,
Materials Science and Materials Processing,
Graduate School of Engineering




Materials Science and Engineering
Education and Research Building (B01)

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Controlling magnetism by interface engineering

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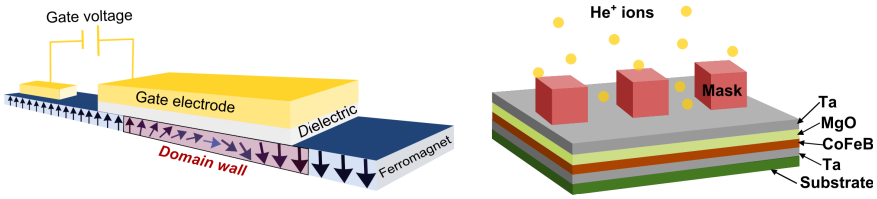

Reliable control of magnetic anisotropy and domain wall motion in technologically relevant magnetic materials is at the heart of a variety of emerging practical applications in spintronics. In particular, modulating the velocity of a magnetic domain wall and constraining its motion at predefined positions is a key aspect in the development of novel magnetic devices in view of applications ranging from magnetic sensors to magnetic memories.
In this seminar I will present our recent results on domain wall motion control by tuning the perpendicular magnetic anisotropy (PMA) and the Dzyaloshinskii Moriya interaction (DMI) using electric (E) fields [1,2] and He^+ ion irradiation [3,4] in Ta/CoFeB/MgO and Pt/Co/HfO_2 layers. The impact of the modulation of PMA and DMI is observed in magnetic domain wall motion in the creep regime and beyond. I will discuss how this is intimately related to the structural/electronic characteristics of the magnetic thin film interfaces; which underlines the critical importance of interface engineering in the design of high performing spintronics devices.

[1] L. Herrera Diez *et. al. 'Non-volatile ionic modification of the Dzyaloshinskii Moriya Interaction' Under review 2019.*
[2] Y. Liu *et. al., 'Electric field controlled domain wall dynamics and magnetic easy axis switching in liquid gated CoFeB/MgO films' J. Appl. Phys.* **122**, 133907 (2017).
[3] L. Herrera Diez. *et. al., 'Enhancement of Dzyaloshinskii-Moriya interaction and domain wall velocity through interface intermixing in Ta/CoFeB/MgO' Physical Review B* **99**, 054431 (2019).
[4] L. Herrera Diez *et. al.,* '*Controlling magnetic domain wall motion in the creep regime in He+-irradiated CoFeB/MgO films with perpendicular anisotropy'Appl. Phys. Lett.* **107**, 032401 (2015).

Liza Herrera Diez has an interdisciplinary background in physics and chemistry. She studied physical chemistry at the National University of Cordoba (Argentina) and conducted her doctoral studies at the Max-Planck Institute for Solid State Research while enrolled in the physics doctoral school at École Polytechnique Fédérale de Lausanne (2008-2010). During this time she performed studies on magnetic domain wall dynamics and magneto-transport in devices based on diluted ferromagnetic semiconductors. From 2011 to 2012 she worked as a postdoctoral researcher at Institut Néel in Grenoble. During this postdoctoral stay she worked on electric field control of magnetic anisotropy and domain wall dynamics in ferromagnetic field-effect transistor devices. Since 2013 she is a CNRS researcher at C2N and her main scientific interests are oriented towards the control of domain wall dynamics in multifunctional nanodevices.