



CEA - Saclay 91191 Gif-sur-yvette Cedex  
**Service de Physique de l'Etat Condensé - UMR 3680**

## **SÉMINAIRE**

Mercredi 4 février 2015 à 11h15

**Orme des Merisiers SPEC, Salle Itzykson, Bât.774**

### **Aurélie Solignac**

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## **Exchange bias stability against temperature and field perturbations**

Work done during my postdoc in the Department of Applied Physics, Center for NanoMaterials, Eindhoven University of Technology, The Netherlands.

Due to their high sensitivity, magnetic field sensors based on Giant or Tunnel Magnetoresistance could be advantageously used for applications, e.g. for automotive industry. In these sensors, the coupling between a ferromagnetic and an antiferromagnetic layer, so-called exchange bias, is used to magnetically pin one of the magnetic layers. Exchange bias is most sensitive to field and temperature perturbations which can be present in industrial applications, and its stability against these perturbations, in order to be improved, has to be better understood.

The exchange bias properties, as the exchange bias field, the coercivity, and the stability versus temperature and field, are strongly dependent on the grains size and orientation of the polycrystalline antiferromagnetic layer, as well as on the interface properties. We are particularly interested in understanding the role of the interface on the exchange bias properties. Indeed, rather unexplored 'spin-clusters' have been recently shown to be present at the interface between ferromagnetic and antiferromagnetic layers. Although these spin-cluster entities are magnetically frozen at low temperature, they may strongly influence the high temperature exchange bias properties, especially their thermal and field stabilities.

In this work, we theoretically and experimentally investigated the physical origin of these spin clusters, focusing on their impact on exchange bias robustness against temperature and field. We combined simulations which take into account a thermal after-effect in the polycrystalline antiferromagnetic layers and measurements performed on PtMn/Co exchange biased bilayers in which the spin cluster density is influenced by the growth conditions.

A coffee break will be served at 11h00. The seminar will be given in English.