



DIRECTION DES SCIENCES DE LA MATIERE,  
INSTITUT RAYONNEMENT MATIÈRE DE SACLAY

SERVICE DE PHYSIQUE ET DE CHIMIE DES SURFACES ET DES INTERFACES

**SEMINAIRE** \*

**Mercredi 10 juin 2009 à 11h00**

Bâtiment 466, salle 111 - CEA Saclay, 91191, Gif sur Yvette

## **First-principles electronic structure predictions for semiconductor spintronics**

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Studying the electronic structure and magnetic properties of novel materials has been a driving force for new technologies and fundamental understanding of nature. In this talk, I will present our studies in the emerging technology of semiconductor spintronics. Using our recently developed first principles methods, we have shown that the electronic structure of ferromagnet-semiconductor interface induces intriguing, newly discovered behavior of spin dependent tunneling electrons. These effects can introduce a new class of spintronic devices and proved to be extremely valuable in interpreting recent experimental measurements. I will also introduce the Quasiparticle self-consistent GW electronic structure method (G=Green's function, W=screened Coulomb interaction). This method provides exciting new capabilities for first principles prediction of material parameters and fundamental understanding of their electronic structure. I will demonstrate this on several examples related to semiconductor spintronics. Future plans that involve first-principles and semiempirical approaches for the study of electronic and magnetic properties at the nanoscale will be discussed.

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