

# *Chez Pierre*

Presents ...

**Monday, February 13, 2012**

**12:00pm**

**MIT Room 4-331**



## **SPECIAL CHEZ PIERRE SEMINAR**

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### **"Exploring magnetism at the single atom level "**

With the development of sub-Kelvin high-magnetic field STM, two complementary methods, namely spin-polarized scanning tunneling spectroscopy (SP-STs) [1] and inelastic STs (ISTS) [2-3], can address single spins at the atomic scale. While SP-STs reads out the projection of the impurity magnetization, ISTs detects the excitations of this magnetization as a function of an external magnetic field. They are thus the analogs of magnetometry and spin resonance measurements pushed to the single atom limit. In this talk, I will review the recent developments in this field, ranging from newly studied material systems like semiconductors [3], and demonstrate how single atom magnetometry (SAM) can be combined with an atom-by-atom bottom-up fabrication to realize complex atomic-scale magnets with tailored properties as well as all-spin based atomic-scale technology. I will also discuss the application of these techniques to explore the impact of itinerant electrons on the magnetization dynamics of single atoms as well as the magnetization dynamics of strongly exchanged coupled systems. Finally, I present an outlook toward future applications to novel materials like topological insulators.

- [1] R. Wiesendanger, RMP, 81, 1495 (2009);
- [2] A. J. Heinrich, et al., Science, 306, 466 (2004);
- [3] A.A. Khajetoorians, et al., Nature, 467, 1084 (2010);
- [4] A.A. Khajetoorians, et al., PRL, 106, 037205 (2011);
- [5] A.A. Khajetoorians, et al., Science, 332, 1062 (2011)