CNR NANO
ISTITUTO NANOSCIENZE CONSIGLIO NAZIONALE DELLE RICERCHE

Seminar Series

March 1, 2012 – 5.00 pm

CNR NANO S3, Modena

Roland Wiesendanger

**Institute of Applied Physics and Interdisciplinary Nanoscience Center Hamburg,
University of Hamburg, D-20355 Hamburg, Germany**

"Imaging and Manipulating Single and Interacting Spins on Surfaces: Towards Atomic-Scale Spintronic Devices"

The developments of novel magnetic materials as well as spin-based electronics are hot topics of current research in nanoscale science. Both research fields could profit tremendously from atomic-scale insight into magnetic properties and spin-dependent interactions at the atomic level. Based on the development of spin-polarized scanning tunneling microscopy (SP-STM) [1] we have recently established the novel method of single-atom magnetometry [2,3] which allows the measurement of magnetization curves and the determination of magnetic moments on an atom-by-atom basis. While the sensitivity level of single-atom magnetometry is below one Bohr magneton, it can easily be combined with the atomic-resolution imaging and manipulation capabilities of conventional STM, thereby offering a novel approach towards a rational material design based on the knowledge of the atomic-level properties and interactions within the solid state. Moreover, an atom-by-atom design and realization of all-spin logic devices [4] has recently been demonstrated by our group based on the combined knowledge derived from surface physics, nanoscience, and magnetism. Alternatively, self-assembly of atomic magnetic chains on nanostructured substrates has been employed in order to create model-type systems for atomic-scale information transfer based on the concept of vector-spin chirality.

[1] R. Wiesendanger, Rev. Mod. Phys. **81**, 1495 (2009).
[2] F. Meier et al., Science **320**, 82 (2008).
[3] L. Zhou et al., Nature Physics **6**, 187 (2010).
[4] A. A. Khajetoorians et al., Science **332**, 1062 (2011).

The seminar will be transmitted by videoconference to all NANO Centers.
Info: segreteria@nano.cnr.it – t. 059 2055629