# O 34: Magnetic Adatoms on Surfaces (MA jointly with O)

Time: Tuesday 15:00–16:00 Location: BEY 118

**Invited Talk** O 34.1 Tue 15:00 BEY 118

**Manipulating the magnetic properties of single atoms on surfaces** — •Alexander Ako Khajetoorians — Institute of Applied Physics, Hamburg University, Hambury, Germany

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. We have recently demonstrated that it is possible to reliably combine single atom magnetometry with an atom-by-atom bottom-up fabrication to realize complex atomic-scale magnets with tailored properties [4-6] on metallic surfaces [1,7]. In this talk, I will address recent developments in probing the spin excitations and magnetization curves of atoms on a multitude of non-magnetic surfaces, and the effects of hydrogenation on the magnetic state of such atoms. Finally, I will discuss investigations of the magnetization dynamics [6] of coupled spins as probed with spin-resolved STM. [1] A.A.K., et al. , PRL, 106, 037205 (2011); [2] A. J. Heinrich, et al. , Science, 306, 466 (2004); [3] A.A.K, et al. ,Nature, 467, 1084 (2010); [4] A.A.K., et al., Nature Physics, 8, 497 (2012) [5] A.A.K., et al. , Science, 332, 1062 (2011), [6] A.A.K., et al.,Science, 339, 55 (2013), [7] A.A.K., et al, PRL, 111, 126804 (2013).

**Invited Talk** O 34.2 Tue 15:30 BEY 118

**Spin Interaction of Atoms studied with Ultrafast STM** — •Sebastian Loth — Max Planck Institute for the Structure and Dynamics of Matter, Hamburg — Max Planck Institute for Solid State Research, Stuttgart

Spin-dependent interaction between magnetic atoms produces a variety of quantum phenomena ranging from superposition ground states and magnetic tunneling to quantum criticality. In this talk we will show that time-resolving scanning tunneling microscopy (STM) makes it possible to study these effects experimentally.

We engineer experimental representations of different Spin Hamiltonians by assembling transition metal atoms into arrays of different shape and elemental composition on the surface of a thin insulator/metal substrate. Inelastic electron tunneling and all-electronic pump-probe spectroscopy at GHz frequencies quantifies the energy level structure, energy loss mechanisms and spin lifetimes of the interacting spins [Science 329, 1628 (2010)]. Using this technique we identified a new approach to suppress magnetic tunneling in antiferromagnetic spin chains triggered by a phase transition from a singlet ground state to classical magnetic states [Science 335, 196 (2012)]. Magnetic tunneling can also be enhanced by combining atoms with different spin magnitude into chains that exhibit spin-correlated singlet ground states even at several nanometers length.

The time-domain information further enables non-local measurements of magnetic states shedding light onto possible pathways to controllably interact with atom-sized quantum spins.