CFEL SCIENCE

SEMINAR

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Building 28c, seminar room

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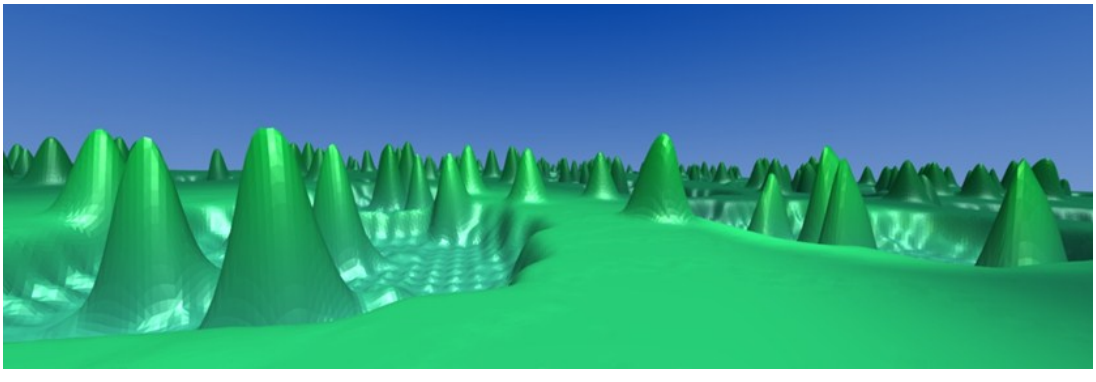
Imaging magnetization dynamics at atomic dimensions

An intriguing property of magnetism is the possibility to create long-lived stable magnetization by coupling ensembles of atomically small magnetic moments that are themselves unstable. We will discuss how scanning tunneling microscopy can be used to explore the emergence of spin stability in few-atom nanostructures.

The STM's ability to move individual atoms makes it possible to construct arrays of interacting spins atom by atom. As the arrays increase in size they transition from fast quantum-mechanical spin systems to classical magnets. Inelastic electron tunneling spectroscopy at low temperatures and all-electronic pump-probe measurement schemes enable us to map the time-dependent evolution between different spin states at nanosecond speed and μeV energy resolution. We study the atomic-scale properties of quantum tunneling of magnetization (*Science* **329** 1628, 2010) and a quantized analogue to spin-transfer torque for individual atoms (*Nature Physics* **6** 340, 2010).

At CFEL we will extend the time-resolving STM techniques to detect and manipulate other transient processes on the atomic scale such as long-lived vibrational excitations in molecules or fluctuating charge and spin order on surfaces.



Fe, Mn and Co atoms on a surface of Cu_2N / Cu (100).

Host: Jochen Küpper, CFEL General Seminar