MA 14: Invited Talks (joint seesion with O) Bruno / Göring

Time: Tuesday 14:00–15:00 Location: H10

Invited Talk MA 14.1 Tue 14:00 H10

Controlling magnetism and self-organization of adatoms on surfaces by using quantum interferences — •Patrick Bruno, Valeri Stepanyuk, Nikolay Negulyaev, and Larissa Niebergall — Max Planck Institute of Microstructure Physics, Halle, Germany

Due to the presence of a surface state, a quasi-free two-dimensional electron gas (2DEG) floats on the (111) surface of noble metals. This 2DEG mediates long-range oscillatory interactions among adatoms, and therefore controls to a large extent the formation of magnetic nanostructures on such surfaces. The competition between this long-range inter-adatom interaction and the adatom-surface interaction gives rise to a wide variety of structures, depending on the nature of adatoms, on their density, on temperature, on the presence of atomic steps, etc. These processes have been studied theoretically by using a combination of first-principles and kinetic Monte-Carlo methods. We have also investigated the spin-polarization and the exchange interaction among adatoms mediated by the 2DEG, as well as how they can be influenced by using quantum confinement and quantum interferences.

V. S. Stepanyuk et al., Phys. Rev. Lett. 94, 187201 (2005)
N.N. Negulyaev et al., Phys. Rev. B 74, 035421 (2006)
L. Niebergall et al., Phys. Rev. Lett. 96, 127204 (2006)
V.S. Stepanyuk et al., Phys. rev.. Lett. 97, 186403 (2006)
P. Wahl et al., Phys. Rev. Lett (in press, 2007)

Invited Talk MA 14.2 Tue 14:30 H10

XMCD in TM Oxides: Are there hidden orbital moments in magnetite? — •Eberhard Goering — Max-Planck-Institiut für Metallforschung, Heisenbergstraße 3, 70569 Stuttgart

X-ray magnetic circular dichroism has become a powerful tool, used by scientists to gain a deep microscopic understanding of magnetism in an element specific and very sensitive manner. Sum-rules, based on integral spectral intensities, provide average spin- and orbital- magnetic moments in a quantitative way. It has been shown, that the shape of the spectra could be used to go beyond sum rules, providing a more detailed understanding of the magnetic polarization of different parts of the unoccupied band structure. The theoretical fundament for this approach has been recently theoretically confirmed. To exemplify the potential of this ansatz, absorption spectroscopy results of Magnetite will be presented, showing hidden orbital magnetism at the Fe site. This is very important, because orbital ordering and orbital magnetism is believed to play a key role in the understanding of the Verwey transition. On the other the hand, this transition plays also a fundamental and important role in solid state physics, which has been discussed frequently in the literature in the past decades.