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IAP-SEMINAR

EINLADUNG

Termin: **Dienstag, 10.5.2011 um 16:00 Uhr**
Ort: **Technische Universität Wien,
Institut für Angewandte Physik,
Seminarraum 134A, Turm B (gelbe Leitfarbe), 5. OG
1040 Wien, Wiedner Hauptstraße 8-10**

Vortragender: **Prof. Dr. Franz J. Giessibl**
Institute of Experimental and Applied Physics,
University of Regensburg/Germany

Thema: **The art and science of atomic force microscopy**

Kurzfassung

For a long time, it was generally accepted that the spatial resolution of atomic force microscopy [1] is inferior to the resolution of scanning tunnelling microscopy. However, this paradigm has been challenged by experimental evidence showing that AFM can obtain subatomic spatial resolution [2] and a direct comparison of constant-height data of forces and tunnelling currents clearly showed that AFM can obtain higher spatial resolution than STM [3]. Recently, pentacene - an organic molecule consisting of five carbon hexagons - has been imaged with unprecedented resolution by AFM [4]. These breakthroughs in spatial resolution became possible by a detailed analysis of the physics underlying force microscopy and the transfer of the theoretical findings into an experimental device – the qPlus sensor - a force sensor based on a quartz tuning fork [5]. This sensor not only allows high-resolution force microscopy, it also enables combined STM and AFM measurements. These combined measurements show that on weakly conducting samples, a partial breakdown of the tunnelling barrier can occur – indicated by a reduced attractive electrostatic force component [6].

[1] S. Morita, R. Wiesendanger, E. Meyer (eds.) Noncontact Atomic Force Microscopy, Springer, Berlin (2002); S. Morita, F.J. Giessibl, R. Wiesendanger (eds.) NCAFM II, Springer, Berlin (2009).

[2] F.J. Giessibl, S. Hembacher, H. Bielefeldt, J. Mannhart, *Science* **289**, 422 (2000).

[3] S. Hembacher, F.J. Giessibl, J. Mannhart, *Science* **305**, 1066 (2004).

[4] L. Gross, F. Mohn, N. Moll, P. Liljeroth, G. Meyer, *Science* **325**, 1110 (2009).

[5] F.J. Giessibl, *Appl. Phys. Lett.* **73**, 3956 (1998).

[6] A. J. Weymouth, T. Wutscher, J. Welker, T. Hofmann, F.J. Giessibl, arxiv 1103.2226 (2011)

*Alle interessierten Kolleginnen und Kollegen sind zu diesem Seminar
(45 min mit anschließender gemeinsamer Diskussion) herzlich eingeladen.*

*F. Aumayr, U. Diebold e.h.
(Seminar-Chairpersons)*

*H. Störi e.h.
(LVA-Leiter)*