



TECHNISCHE
UNIVERSITÄT
WIEN

Vienna University of Technology

INSTITUT FÜR
ANGEWANDTE PHYSIK
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IAP-SEMINAR

INVITATION

Date: **Tuesday, 28.10.2014**

Time: **16:00 p.m.**

Location: **Technische Universität Wien, Institut für Angewandte Physik, E134**
yellow tower „B“, 5th floor, Seminarraum 134A (room number DB05L03)
1040 Wien, Wiedner Hauptstraße 8-10

Lecturer: **Daniel Wastl**

University of Regensburg, Institute of Experimental and Applied Physics,
Regensburg/Germany

Subject: **Atomic resolution in air with a home-built qPlus atomic force microscope**

Abstract: Since its invention in 1986 the atomic force microscope (AFM) has been shown to be a powerful tool in surface science and surface chemistry. Up to now the most impressive results are achieved with AFM's running in UHV and at low temperature. I want to show the audience how one can achieve resolution comparable to UHV and low temperature systems in air or liquids.

The qPlus sensor is based on quartz tuning forks with stiffnesses of 1000 to 5000 N/m. This high stiffness allows stable oscillations with oscillation amplitudes as low as 10 pm in any environment. In ambient conditions, the relation between the oscillation amplitude and the drive signal reflects the environmental damping. By determining the effective quality factor, we can quantify the noise as a function of amplitude and optimize the scan parameters to reach the highest signal-to-noise ratio.

I will show applications of this method (Q-spectroscopy) on potassium bromide and on calcite, demonstrating true atomic resolution. One of the most important steps for us was to demonstrate the capability to image graphitic surfaces with atomic resolution and image single bonds between carbon atoms. We found a strong difference on graphite and graphene between the commonly-used tip material silicon (which is hydrophilic) and hydrophobic sapphire tips. Even with this high stiffnesses of the tuning forks we are sensitive enough to image physisorbed gas molecules on graphite.

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

*U. Diebold e.h.
(Seminar-Chairperson)*

*H. Störi e.h.
(LVA-Leiter)*