O 43: Surface Dynamics II

Time: Wednesday 11:15–12:15 Location: WIL B122

O 43.1 Wed 11:15 WIL B122

Field induced noise spectra in ion traps — •H.R. Sadeghpour[1], A. Safavi-Naieni[1,2], P. Weck[3], and P. Kral[1,4] — [1]ITAMP, Harvard-Smithsonian CfA, Cambridge, MA 02138 — [2]Dept. of Physics, MIT, Cambridge, MA 02139 — [3]Dept of Chemistry, UNLV, Las Vegas, NV — [4]Iqoqi, Austrian Academy Of Sciences, Insbruck, Austria

Electric field noise from fluctuating dipoles adsorbed on surfaces is a significant problem in a number of subfields of physics, ranging from precision measurements, nanomechanics and measurements of weak forces. We describe a first-principles calculations of the dipole properties fluctuating on surfaces, and the electric field noise spectral dependence on distance, frequency and temperature of the ion trap. We discuss implications for the ion trap experiments.

O 43.2 Wed 11:30 WIL B122

Anisotropy in time-resolved electron diffraction of bismuth films — •Carla Streubühr, Manuel Ligges, Thorsten Brazda, Uwe Bovensiepen, Ping Zhou, and Dietrich von der Linde — Universität Duisburg-Essen, Deutschland

With time-resolved electron diffraction we have investigated the excitation and relaxation of lattice vibrations in thin bismuth films after optical excitation with femtosecond laser pulses. Due to the property of the transmission electron diffraction from thin films, we are able to observe several diffraction orders at the same time. This provides us a complete view of the atomic motion.

The experiments showed a change in the diffraction intensity up to 300 ps after optical excitation, which depends on the azimuth angle of the diffraction order. This anisotropy depends on the polarization of the excitation pulses. We attribute this anisotropic intensity change to the excitation of polarized lattice vibrations by optical pulses. Possible excitation mechanisms of these lattice vibrations are impulsive stimulated Brillouin- or Raman- scattering.

O 43.3 Wed 11:45 WIL B122

Optical-induced CDW-phase-transition in $1T$-$TiSe_2$ probed by Time-Resolved High Harmonic Photoemission — •Timm Rohwer[1], Stefan Hellmann[1], Martin Wiesenmayer[1], Christian Sohrt[1], Ankatrin Stange[1], Matthias Kalläne[1], Stefan Mathias[2], Kai Rossnagel[1], Lutz Kipp[1], and Michael Bauer[1] — [1]Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel — [2]JILA, University of Colorado and NIST, Boulder, USA

Time- and angle-resolved photoemission was employed to monitor the ultrafast dynamics consequent to the photoexcitation of a charge density wave (CDW) phase in the transition metal dichalcogenide $1T$-$TiSe_2$. The application of XUV high harmonic pulses (43 eV) allows us to record photoemission transients covering the full size of the first Brillouin zone. The excitation fluence dependence of the ultrafast breakdown of a (2×2×2) superstructure characteristic for the $1T$-$TiSe_2$ CDW phase was investigated and response times up to values less than 30 fs were observed. The origin of this breakdown is assigned to a build up of electronic screening by the transient generation of free charge carriers.

O 43.4 Wed 12:00 WIL B122

How Fast Does a Lead Monolayer Cool? — •Annika Kalus, Simone Möllenbeck, Sung Sakong, Anja Hanisch-Blicharski, Martin Kammler, Peter Kratzer, and Michael Horn-von Hoegen — Department of Physics and Center for Nanointegration Duisburg-Essen (CeNIDE), Universität Duisburg-Essen, D-47057 Duisburg, Germany

We employ ultra fast time-resolved electron diffraction to analyze the vibrational dynamics of adsorbates on surfaces on a ps-timescale upon excitation by a fs laser pulse. Surface sensitivity is achieved by a reflection geometry of high energy electrons (RHEED) and time resolution by a pump probe setup.

Two different reconstructions of Pb on Si were prepared: the $(\sqrt{3} \times \sqrt{3})$ reconstruction with a coverage of 4/3 monolayers (ML) and the $(\sqrt{7} \times \sqrt{3})$ reconstruction with a coverage of 1.2 ML. All experiments were performed at 90K. Upon excitation with 50fs laser pulses at 800nm both reconstructions show a sharp drop of intensity in all reconstruction spots due to the Debye-Waller effect. The intensity reversibly recovers on two different time scales. The short time constant of 100ps is attributed to the deexcitation of the Si-Pb mode with an energy of 4meV and is in good agreement with molecular dynamic simulations. The long time constant of 3ns is assigned to a low frequency Pb-Pb mode with an energy of 2meV. The weak coupling of this mode to the Si substrate is explained by the small overlap of this mode with the density of phonon states in Si. The vibrational amplitude of these excited modes shows a strong non-linear dependence on the laser fluence.