

## K 2 Laserstrahlwechselwirkungen / Röntgenlaser

Zeit: Montag 17:00–17:45

Raum: 1003

K 2.1 Mo 17:00 1003

**Observation of lattice oscillations in Ge after femtosecond optical excitation** — •ULADZIMIR SHYMANOVICH, MATTHIEU NICOUL, KLAUS SOKOLOWSKI-TINTEN, STEPHAN KÄHLE, ALEXANDER TARASEVITCH, and DIETRICH VON DER LINDE — University Duisburg-Essen, Institut fuer experimentelle Physik, Lotharstr. 1, 47048 Duisburg

Ultrashort x-ray pulses offer a unique combination of atomic-scale spatial and temporal resolution, which permits direct measurements of structural transients on an ultrafast time-scale. We have applied time-resolved X-ray diffraction using ultrashort, multi-keV X-ray pulses to study coherent and incoherent lattice vibrations in optically excited semiconductors. Femtosecond bursts of Ti-K $\alpha$ -radiation (4.51 keV) are produced by focusing laser pulses of 120 fs duration onto the surface of a moving titanium wire. In an optical pump / X-ray probe configuration transient changes in X-ray diffraction from (111)-oriented, single-crystalline thin films of Germanium were measured. The transient Debye-Waller effect allowed us to follow directly the energy transfer from hot electrons to the lattice. The subsequent evolution of transient lattice strain exhibits a delayed onset and distinct features which cannot be explained within the framework of the usual thermo-acoustic model.

K 2.2 Mo 17:15 1003

**Generation of high order harmonics from surfaces in the relativistic regime** — •KONSTANTIN LOBOV, ALEXANDER TARASEVITCH, and DIETRICH VON DER LINDE — Universität Duisburg-Essen Institut für experimentelle Physik Lotharstr. 1 47048 Duisburg

Generation of high-order harmonics is now widely considered as a useful tool for the production of extreme ultra-violet radiation (or soft X-rays) and of attosecond light pulses. Using frequency-doubled pump pulses from a Titanium Sapphire laser with intensities above  $10^{19}$  W/cm<sup>2</sup> we observe transfer of high order harmonics generation from steep plasma gradients in the relativistic regime. High order harmonics are generated both with p-polarized and s-polarized pump pulses. Using two pulses a first pulse for the generation of the plasma and a second pulse for harmonic generation (fundamental and frequency doubled) the dependence of the harmonics energy on the plasma scale length is measured. At zero delay between the two pump pulses harmonics generation involving frequency mixing of two beams is observed. Angular distribution of high harmonics efficiency is recorded.

K 2.3 Mo 17:30 1003

**GRIP Ni-like Zr x-ray laser with PHELIX at GSI** — •DANIEL URSESCU<sup>1,2</sup>, BERNHARD ZIELBAUER<sup>3</sup>, PAUL NEUMAYER<sup>1,4</sup>, THOMAS KUEHL<sup>1,2</sup>, PETER NICKLES<sup>3</sup>, KEVIN CASSOU<sup>5</sup>, DAVID ROS<sup>5</sup>, ANNE KLISNICK<sup>5</sup>, and JAMES DUNN<sup>6</sup> — <sup>1</sup>GSI Darmstadt, Planckstr. 1 — <sup>2</sup>J.-Gutenberg Universitaet, Mainz — <sup>3</sup>MBI Berlin — <sup>4</sup>Universitaet Wuerzburg — <sup>5</sup>LIXAM Paris, France — <sup>6</sup>LLNL, Livermore, USA

Grazing incidence pumping scheme using Ni-like Zirconium x-ray laser was demonstrated at GSI using PHELIX preamplifier. Extensive optimization and characterization was performed. Comparison with 45° incidence angle of the main pump pulse on target is presented.