CPP 11 Light induced phenomena II

Zeit: Montag 11:15–12:30 Raum: TU C230

CPP 11.1 Mo 11:15 TU C230

Direct Burning of Laser-Resonant Persistent Antiholes in the UV Absorption Spectrum of Anisole — •Mark Somoza and Josef Friedrich — Lehrstuhl für Physik Weihenstephan, TU München, 85350 Freising

Laser-induced persistent spectral antiholes have been observed in a small range of the uv absorption spectrum of anisole. The sample is anisole frozen at low concentrations into a cyclohexane host matrix. The observed antiholes are narrow lines (250 MHz) corresponding to increases absorption at the exact frequency of the laser irradiation and are permanent below 10K. Outside the region where antiholes were observed, neither holes nor antiholes could be created, even with high laser power. The mechanism behind this highly unusual phenomena may be a photoinduced configurationally change of the anisole within the host site.

CPP 11.2 Mo 11:30 TU C230

Light-induced mechanical and dielectrical changes in azobenzene polymer films. — •Norman Mechau, Marina Saphiannikova, and Dieter Neher — University of Potsdam, Institute of Physics-Soft Matter Physics, Am Neuen Palais 10, 14469 Potsdam

Photoinduced changes in the mechanical and dielectric properties of azobenzene polymer layers were measured utilizing the method of electromechanical spectroscopy. The measurements revealed a strong correlation between the time dependent behavior of the plate compliance and the dielectric constant under irradiation. Actinic light causes a light softening of the film, whereas ultraviolet irradiation results in an initial plasticization of the film followed by its hardening.

A semi-quantitative model based on the kinetics of the photoisomerization process in azobenzene polymers is proposed. We assume that both visual and ultraviolet irradiation increases the free volume in the layer due to photoisomerization. Additionally, ultraviolet light increases the modulus of the polymer matrix due to the presence of a high density of azobenzene moieties in the cis state. These assumptions allowed us to reproduce the time dependent behavior of the bulk compliance at different irradiation intensities, both for visual and ultraviolet light, with only two adjustable parameters.

CPP 11.3 Mo 11:45 TU C230

Holographic recording of more-dimensional gratings in photosensitised PMMA — •Rafael Meinhardt[1], Ansgar Draude[1], Hilmar Franke[1], and Roger A Lessard[2] — [1]Universität Duisburg-Essen, Abteilung Duisburg, Laboratorium für angewandte Physik, Lotharstr. 1, 47048 Duisburg — [2]COPL, departement de physique, university Laval, G1K7P4, Quebec, Canada

Volume phase holography is used for the recording of refractive-index patterns with the symmetry of a photonic crystal. As a recording material solid plates of PMMA, containing up to 10 wt% of residual monomer MMA doped with different photo-initiators have been used. Light-intensity patterns could be transferred into refractive-index patterns using the mechanism of the photo-induced residual polymerisation.

The recording has been performed via 2 different ways. First a consecutive method using a 2-beam holographic set-up was applied: While the first pattern is developing the sample is turned by an arbitrary angle and a second grating with a different lattice-constant was recorded. Three of such steps lead to a 3-dimensional grating.

For the second single-step method we used the interference of up to 4 beams. Simulations showed different more-dimensional light-intensity patterns depending on the orientation and the polarisation of the beams' wave-vectors.

The obtained gratings are characterised using a goniometer, different diffracted orders may be indexed according to their (h,k,l) Miller's indices. For the single-step method we were able to verify experimentally the simulated photonic structures.

CPP 11.4 Mo 12:00 TU C230

Theory of laser-driven many electron dynamics: Simulations for metallic model systems and small molecules — •Tillmann Klamroth, Pascal Krause, and Christian Huber — Universität Potsdam, Institut für Chemie, Theoretische Chemie, Karl-Liebknecht-Str 24-25, D-14476 Potsdam, Germany

We report simulations of laser-driven many electron dynamics by means of time-dependent configuration interaction methods, namely the configuration interaction singles method (CIS) and the CIS(D) method, in which doubly excited configuration are included perturbatively. These methods are many-electron approaches in which electron-electron-scattering is approximately accounted for.

We present applications to one-dimensional metallic model systems for simulations of laser-driven charge transfer in metal-insulator-metal contacts and of 2-photon-photoelectron-spectra for small metal slabs. The CIS(D) method is used to simulate electron dynamics of small (three-dimensional) molecules in intense laser fields.

CPP 11.5 Mo 12:15 TU C230

The Multi-Configuration Time-Dependent Hartree-Fock (MCTDHF) method for quantum chemical calculations — •Mathias Nest — Universität Potsdam

We discuss the Multi-Configuration Time-Dependent Hartree-Fock (MCTDHF) method as a tool for correlated quantum dynamical and electronic structure calculations. For the former, the time-dependent Schrödinger equation is solved in real time, for the latter it is solved in imaginary time. We present applications such as inverse photoemission spectroscopy and the calculation of eigenstates. The scaling behaviour and the natural potential expansion are discussed.