MO 6: Quantenkontrolle 2

Zeit: Montag 16:30–17:00 Raum: VMP 6 HS-G

MO 6.1 Mo 16:30 VMP 6 HS-G

The von Neumann representation as a basis for coherent control experiments — •Christoph Stolzenberger[1], Stefan Ruetzel[1], Susanne Fechner[1], Frank Dimler[1], David J. Tannor[2], and Tobias Brixner[1] — [1]Institut für Physikalische Chemie, Universität Würzburg, Am Hubland, 97074 Würzburg, Germany — [2]Department of Chemical Physics, Weizmann Institute of Science, 76190 Rehovot, Israel

Laser pulse representations in phase space, i.e. in a joint-time-frequency representation, are a convenient way to simultaneously show both temporal and spectral features. A novel representation, which is based on an idea of von Neumann, for describing more intuitively shaped ultrashort laser pulses, was recently introduced by our group.

Here we demonstrate applications in pulse shape optimizations using evolutionary algorithms and in generating intuitive fitness landscapes. For this purpose we carried out a demonstration experiment using the cooperative second-harmonic signal of two time delayed copies of the shaped pulse as feedback.

Moreover we used this basis for the study of the excitation efficiency of the laser dye molecule IR-140 in solution. Results of chirp dependent fluorescence measurements are compared to those obtained by excitation with pulses defined in the von Neumann plane.

MO 6.2 Mo 16:45 VMP 6 HS-G

Alignment of coupled rotors with strong, non-resonant laser pulses — •Monika Leibscher, Johannes Floss, and Thomas Grohmann — Institut für Chemie und Biochemie, Freie Universität Berlin, Germany

Molecular rotation can be effectively controlled by intense laser pulses. The resulting alignment of rigid molecules has been studied intensively during the last years. Recently, it has been demonstrated that internal degrees of freedom of non-rigid molecules with low torsional barrier can also be controlled with intense laser pulses, leading to alignment of molecular torsion [1]. Here, we investigate in detail the dynamics of hindered torsion induced by short, intense laser pulses. We employ a two-dimensional model system, assuming that the molecules have already been aligned along one axis. The prospects of effective torsional alignment, depending on the molecular potential and the interaction strength are explored. We find that the maximal alignment depends in a non-monotonic way on the interaction strength. For molecules with identical nuclei at symmetric positions, the dynamics of molecular rotation and torsion depends strongly on the nuclear spin of the molecules [2,3]. Therefore, we also investigate the nuclear spin selective dynamics and its effect on molecular alignment for combined rotational and torsional motion.

References: [1] S. Ramakrishna, T. Seideman, Phys. Rev. Lett. 99, 103001 (2007). [2] S. Fleischer, I. S. Averbukh, Y. Prior, Phys. Rev. Lett. 99, 093002 (2007). [3] O. Deeb, M. Leibscher, J. Manz, W. von Muellern, T. Seideman, ChemPhysChem 8, 322, (2007).