Physikalisches Kolloquium des Fachbereich Physik
Arnimallee 14, D-14195 Berlin
Freitag, 13. Juni 2014, 15 h c.t., Hörsaal A (R. 1.3.14)

Signal Enhancement, Structural Dynamics and Chirality – Exploiting Polarization in Time-Resolved IR Spectroscopy

Jan Helbing, Institut für Chemie, Universität Zürich, Winterthurerstrasse 190, CH-8057 Zürich (jan.helbing@chem.uzh.ch)

Time-resolved infrared spectroscopy uses vibrational transitions as sensitive reporters of molecular structure and chemical dynamics. Both transient absorption and 2D-IR techniques employ linearly polarized light to directly access intramolecular angles and measure their changes in real time. On the other hand, vibrational circular dichroism (VCD), the difference in absorption of left- and right-handed circular polarized light, is a unique probe of the absolute configuration and conformation of chiral molecules in equilibrium. On the nanoscale, the remarkably large VCD signals of protein aggregates and synthetic nanostructures are particularly interesting, as they are due to long-range order but turn out to be surprisingly sensitive to small changes in environment or molecular composition.

Examples including the probing of solvation dynamics, intramolecular rotation and the structure of nanowires will illustrate the importance of polarization and common principles of multidimensional and chiral infrared spectroscopy. New polarization schemes, designed for the very challenging measurement of vibrational optical activity with high time resolution, can also greatly improve the sensitivity and versatility of more conventional non-linear IR-techniques.