Physikalisches Institut
Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg

IRTG-Seminar

PD Dr. Melanie Schnell

Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany

"Coherent population transfer in chiral molecules using tailored microwave pulses"

Most molecules of biochemical relevance are chiral. Even though the physical properties of two enantiomers are nearly identical, they can exhibit completely different biochemical effects, such as different odor in the case of carvone. In nature and as products of chemical syntheses, chiral molecules often exist in mixtures with other chiral species. The analysis of these complex mixtures to identify the molecular components, to determine which enantiomers are present, and to measure the enantiomeric excesses (ee) remains a challenging task for analytical chemistry.

In collaboration with Dave Patterson and John Doyle from Harvard University, we recently experimentally demonstrated a new method of differentiating enantiomeric pairs of chiral molecules in the gas phase. It is based on broadband rotational spectroscopy and is a three-wave mixing process that involves a closed cycle of three rotational transitions. The phase of the acquired signal bares the signature of the enantiomer, as it depends upon the product of the transition dipole moments, and the signal amplitude is proportional to the ee. A unique advantage of our technique is that it can also be applied to mixtures of chiral molecules, even when the molecules are very similar. It also bears the potential for enantiomer separation, as was recently shown in experiments on enantiomer-selective population transfer. In my lecture, I will introduce the technique and give an update on the recent developments.

Tuesday, July 4, 2017, 6:00 p.m., HS II,
Physics high rise, Hermann-Herder-Str. 3

UNI FREIBURG

Contact:
Dr. Betty Lischke
IRTG / Cold Controlled Ensembles in Physics and Chemistry
Phone: +49 761 203 97666
E-mail: irtg-coco-coordination@physik.uni-freiburg.de