

SYCM 2 Heteronuclear cold molecules

Zeit: Samstag 14:30–16:30

Raum: HU Audimax

Hauptvortrag

SYCM 2.1 Sa 14:30 HU Audimax

Long-lived weakly bound molecules of fermionic atoms — ●GORA V. SHLYAPNIKOV — Laboratoire Physique Théorique et Modèles Statistique, Université Paris Sud, Bâtiment 100, 91405 Orsay Cedex, France — Van der Waals-Zeeman Instituut, Universiteit van Amsterdam, 1018XE Amsterdam, The Netherlands

Recent remarkable achievements in the physics of ultracold Fermi gases attracted a lot of attention and draw fascinating prospects for future studies. One of the most profound results is the creation and Bose-Einstein condensation of weakly bound bosonic molecules of fermionic atoms. I will discuss prospects related to heteronuclear molecules which are supposed to be formed in mixtures of different fermionic atoms. One of the aspects will be their polarization and thus the creation of dipolar Bose gases which are predicted to exhibit novel physics in the regime of quantum degeneracy.

Hauptvortrag

SYCM 2.2 Sa 15:00 HU Audimax

Electrostatics in action: controlling cold collisions of polar molecules — ●JOHN L. BOHN — JILA, University of Colorado, Boulder, CO 80309

One of the most impressive developments to come out of the study of ultracold atomic gases is the ability to influence scattering by applying a suitable magnetic field. In this talk I will describe how ultracold heteronuclear molecules will afford even greater opportunities to control scattering, because of their dipole moments. Indeed, applying combined electric and magnetic fields can alter collision cross sections and branching ratios by orders of magnitude. I will show how this is important to the basic problem of creating and handling cold molecules, as well as to applications such as control over chemical reactions.

Hauptvortrag

SYCM 2.3 Sa 15:30 HU Audimax

Cold molecules for studying cold chemical reactions — ●HANSJÜRGEN LOESCH, NING-NING LIU, and DIRK WEBER — Fakultät für Physik, Universität Bielefeld, Universitätsstraße 25, D-33615 Bielefeld

Elementary chemical reactions form an important and attractive field of application for cold molecules. Detailed experimental information about these processes at low collision energies deepens the insight into their dynamics and is crucial e.g. for a better understanding of the molecule formation mechanisms in cold interstellar gas clouds. Theoretical studies predict interesting quantum phenomena such as tunnelling and resonances. Candidates for first investigations are the three centre reactions of the type $A+BC \rightarrow AB+C$. There are now very efficient methods available to cool down the reagent atoms (A) and new techniques are being developed to produce cold molecules (BC). In this talk a novel technique for the formation of cold molecules is introduced. It is based on reactive collisions between metal atoms (K) and hydrogen-halide molecules (HBr) in the course of which cold salt molecules (KBr) are formed. So far, a significant flux of slow molecules (<30 m/s) has been observed. In addition, the rotating-nozzle-technique for the generation of cold molecules is briefly discussed and results obtained with our improved set-up are presented. To date, quasi-continuous beams of atoms and molecules with peak velocities near 30 m/s have been created.

Hauptvortrag

SYCM 2.4 Sa 16:00 HU Audimax

Mixture of ultracold lithium and cesium and photoassociation of cold LiCs — ●MATTHIAS WEIDEMÜLLER¹, STEPHAN KRAFT¹, JÖRG LANGE¹, PETER STAANUM^{1,2}, and ROLAND WESTER¹ — ¹Physikalisches Institut der Universität Freiburg, 79104 Freiburg — ²Institut für Quantenoptik, Universität Hannover, 30167 Hannover

We trap a mixture of ultracold lithium and cesium atoms in a quasi-electrostatic trap formed by the focus of a CO₂ laser beam. Elastic and inelastic processes between the two different gases are studied in detail. Possible routes to the formation of cold heteronuclear molecules in low vibrational states will be discussed and the status of the experiment will be presented.