

Einladung  
zum Laser- und Quantenoptikseminar

**Freitag, 22.06.2018, um 10:00 Uhr**

**Raum 46-387/388**

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## **Ultracold inelastic and reactive few-body collisions**

Understanding inelastic and reactive collisions on the quantum level is a long-standing goal for both physicists and chemists. I will discuss experimental results on two different few-body processes obtained with ultracold samples of atoms and molecules, respectively.

In a first set of measurements we have investigated the recombination of three neutral rubidium atoms resulting in a dimer and a free atom. For these measurements both the preparation of the reactants and the detection of the product dimers take place in a quantum state-resolved manner. As an essential tool enabling such state-to-state chemistry experiments we have developed a method to probe diatomic molecular product states qualitatively as well as quantitatively. The resolution achieved so far even allows for the identification of hyperfine and magnetic quantum numbers of the formed dimers. On the basis of the observed final product population distribution we formulate propensity rules for the three-body recombination process.

In the second part of the talk I will present studies of inelastic collisions of metastable ultracold triplet molecules in the vibrational ground state. The experiments are performed with nonpolar Rb<sub>2</sub> dimers which are trapped in an array of quasi-1D potentials and prepared in precisely-defined quantum states. Using a simple model we can understand the molecular decay dynamics and extract reaction rate coefficients. I will show results both for nonrotating molecules that are prepared in the energetically absolutely lowest triplet hyperfine level and molecules with two quanta of rotational angular momentum. These results are compared to those obtained for vibrationally highly excited Feshbach molecules.

Der Gast wird betreut von Prof. Dr. A. Widera  
GÄSTE SIND HERZLICH WILLKOMMEN!