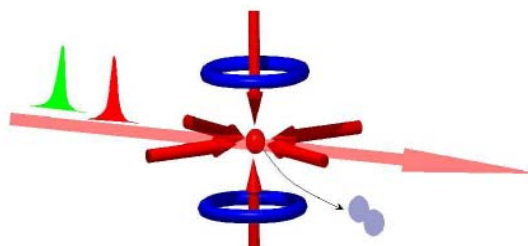




QUANTUM OPTICS SEMINAR

Title: Femtosecond Photoassociation of Ultracold Molecules
Speaker: Magnus Albert
Departments of Physics, Freie Universität, Berlin, Germany
Time: Friday, April 20, 11:15
Place: 1525-323



Abstract:

Ultracold molecular gases have become a rapidly developing field of research [1], with the ultimate goal of achieving complete control of their electronic, vibrational and translational state. As common laser-cooling schemes for atoms can not be used with the more complex structure of molecules, different techniques to produce molecules from ultracold atoms have been developed, e.g. Feshbach resonances or photoassociation of atomic collision pairs.

A novel approach suggests the application of the well developed femtosecond coherent control techniques to produce molecules in the ro-vibrational electronic ground state in a pump-dump scheme [2].

We present first experiments on the femtosecond photoassociation of ultracold Rb_2 -dimers. A pump-probe sequence of femtosecond pulses is applied to ultracold ($\approx 100\mu\text{K}$) ^{85}Rb atoms stored in a magneto-optical trap. The first pulse produces electronically excited Rb_2 -molecules which are subsequently ionised with a second pulse. Both the molecular ion count rate and the loss in the trap fluorescence were measured for different delay times and reveal coherent oscillation dynamics.

[1] See e.g. H.L. Bethlem and G. Meijer, *Int. Rev. Phys.Chem.* **22**, 73 (2003)

[2] C.P. Koch et al., *Phys. Rev. A* **73**, 043409 (2006)

[3] W. Salzmann et al., *Phys. Rev. A* **73**, 023414 (2006)

[4] U. Poschinger et al., *J. Phys. B* **39**, S1001 (2006)