Physical Sciences Seminar

Probing molecules: From an ensemble to a single one

Sarah M. Skoff

Atominstitut, Vienna University of Technology,Center for Cold Matter, Imperial College London

Host: Johann Georg Danzl

Molecules come in a huge variety with some consisting only of a small number of atoms while others form the complex building blocks for phenomena like life itself. Understanding molecules in more detail, starting from the simplest ones, and aiming to exploit the various properties, also of complex molecules, is of interest to a wide range of fields from chemical physics and life sciences to quantum information. For many applications of molecules, good control of them is essential, which in turn often requires low temperatures. The complex internal structure of most molecules prohibits laser cooling and therefore other techniques are being developed. Buffer gas cooling represents a versatile method that allows direct cooling of a large variety of molecular species and yields high fluxes of cold molecules at temperatures of a few Kelvin. I will present how such buffer gas sources can be implemented and how they can be used for spectroscopy and as an ideal starting point for further cooling or trapping stages.Embedding dye molecules in solids is another means to gain control of a complex molecular system and utilize some of its favourable properties. This approach makes it possible to probe an individual molecule without the need for ensemble averaging. I will show how optical nanofibers can be used to address individual molecules and present the significant effect even a single molecule can have on the light field. I will also show how this nanofiber-based platform can be combined with a fiber-integrated cavity to enhance this light-matter interaction further.

Tuesday, May 8, 2018 10:30am - 12:00pm

Meeting room 2nd floor / Lab Bldg East (I06.02.403)

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