



**Title:**  
**Watching isolated molecules  
change their shape**

**Speaker:**  
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**Abstract:**

All known forms of animal vision rely on one particular molecule – the retinal chromophore. This chromophore has remarkable quantum properties which makes it ideal for photon detection: it has a tunable absorption that covers the entire visible spectrum and following photon absorption it undergoes a photoisomerization which is ultrafast, highly efficient and specific.

In order to understand the quantum mechanical workings of this chromophore (and others), it is beneficially to study the chromophore when it is completely isolated from the surroundings – in the gas phase. To do this, we use action spectroscopy, tools which originate from atomic and nuclear physics which include accelerators, ion traps and ion storage rings.

Recently, a new set of tools is entering our field that originate from ion mobility spectroscopy (IMS). IMS allows one to separate different isomers or different structural features of a chromophore based on their collisional cross-section. Using two stages of IMS-IMS one can directly observe structural changes in isolated molecules.

In this talk an introduction to the fields of action and ion mobility spectroscopy will be given with application and exemplified with studies on the retinal chromophore which help us understand the quantum mechanical basis for vision.

**References**

1. [“Measurement of the stabilities of isolated retinal chromophores”](#) L. Musbat, M. Nihamkin, Y. Toker, J. M. Dilger, D. R. Fuller, T. J. El-Baba, D. E. Clemmer, S. Sarkar, L. Kronik, A. Hirshfeld, N. Friedman, and M. Sheves, Phys. Rev. E 95 (2017), 012406.
2. [“Direct Measurement of the Isomerization Barrier of the Isolated Retinal Chromophore”](#), J. Dilger, L. Musbat, M. Sheves, A. B. Bochenkova, D. E. Clemmer, Y. Toker, Ang. Chemie Int. Ed. **127** (2015), 4830-4834. (Frontispiece)

**Date & Location:**  
**Tuesday, October 31<sup>st</sup>, 2017, 11:00**  
**Lecture room, Physics Building (ground floor)**



**YDSEEP WEEKLY SEMINAR**

