

Colloquium

SFB 956

Conditions and Impact of Star Formation

15.07.2013

Monday 4:00 pm

Physikalische Institute Köln

Lecture Hall III

Zülpicher Straße 77 | 50937 Köln

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Towards Astrochemistry in the Lab: Low-Temperature Chemistry in Merged Neutral Beams

During the past 15 years many groups have invested in the optimization of the control of neutral molecular beams. One primary goal has been to produce molecules that are translationally and internally cold, and one of the main target applications are molecular collisions at temperatures in the 1 K-range and below. This temperature range to date has not been reached using crossed-beam techniques, even with decelerated beams. Nevertheless, there is tremendous interest in studying that range, both for the fundamental investigation of molecular scattering dynamics, and for quantitative laboratory-studies of interstellar chemistry.

To avoid the problems inherent to crossed-beams studies at low temperatures we are instead using merged neutral beams. This allows to work with the full density and low temperature provided by a supersonic expansion. By merging two beams we can reach relative velocities in the moving frame-of-reference corresponding to temperatures considerably below 1 K. While we do not have to decelerate beams, we still greatly benefit from the technological developments in the field of cold-molecules by using two guides to overlap the molecular beams. These guides, one being magnetic while the other one electric, at the same time control the direction of the beam and purge the molecular sample from all particles with unsuitable Stark- or Zeeman shift, and the resulting samples will be, to a very high degree, pure to a single rotational state of one particular species.

