



Innsbruck Physics Colloquium

Photodetachment and radiative electron attachment to molecules of astrophysical interest

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A first-principle theoretical approach to study the process of radiative electron attachment (REA) is applied to the negative molecular ions CN^- , C_3N^- , C_5N^- , C_4H^- , C_6H^- , and C_2H^- . Among these anions, the first five have been observed in the interstellar space. Cross sections and rate coefficients for formation of these ions by REA to the corresponding neutral radicals are calculated. For completeness of the theoretical approach, two pathways for the process have been considered: (i) A direct pathway, in which the electron in collision with the molecule spontaneously emits a photon and forms a negative ion in one of the lowest vibrational levels, and (ii) an indirect, or two-step pathway, in which the electron is initially captured through non-Born-Oppenheimer coupling into a vibrationally resonant excited state of the anion, which then stabilizes by radiative decay. The contribution of the indirect pathway to the formation of cosmic anions was found to be negligible in comparison to the direct mechanism. The obtained total rate coefficients of radiative electronic attachment at 30 K for the considered ions are ranging in the interval $0.7\text{-}10 \times 10^{-16} \text{ cm}^3/\text{s}$. The rates weakly depend on temperature between 10 K and 100 K. The validity of our calculations is verified by comparing the present theoretical results with data from recent photodetachment experiments performed in Innsbruck.

A DK-ALM pre-talk will be given by

Nina Bersenkowitsch

Photodissociation of doped sodium chloride clusters.

Snacks will be provided in between the pre-talk and the colloquium.

DK-ALM Pre-Talk: 16:30 h

**Colloquium: Tuesday, 8.11.2016, at 17:15 h
in lecture hall C**

Innsbruck Physics Colloquium, Organisation: M. Beyer, R. Kissmann, H.-C. Nägerl, A. Reimer