

Colloquium

SFB 956

Conditions and Impact of Star Formation

30 May 2022

Monday 3:30 pm

Physikalische Institute Köln

Lecture Hall III

Zülpicher Straße 77 | 50937 Cologne

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High Resolution Infrared Spectroscopy of Molecular Ions of Astrophysical Interest

Molecular ions are at the heart of the formation routes of more complex molecules in the ISM. At the low temperatures and densities prevalent there, only binary reactions with no activation barrier are likely to proceed, and ion-molecule reactions fall generally into this category. Molecular ions are also tracers of the physical conditions of their environment, such as the degree of ionization or the fraction of gas in molecular form.

Although most of the identifications of molecules, including ions, in the ISM have been done using observations in the radiofrequency domain, the observations and laboratory experiments in the infrared region provide very valuable information. On the one hand, IR frequency measurements can provide accurate predictions of rotational transitions to be observed in space or in the laboratory, and, furthermore, ground-based observations in the IR are one of the few available means left to study light hydrides in the ISM.

I will describe the experimental approach followed in our laboratory to study the spectrum of molecular ions, i.e. high resolution tunable infrared laser absorption in hollow cathode electrical discharges, together with some contributions of our lab in this field. I will also comment on ongoing work on the implementation of magnetic fields on the experiment and future prospects.

