

## ACTION-SPECTROSCOPIC STUDIES OF TRANSIENT CARBON-RICH MOLECULAR IONS

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**Abstract.** Carbon-rich material is of importance in diverse scientific areas such as material science, structural chemistry, theoretical chemistry and astrochemistry. In space, carbon-rich molecular chains both in their neutral and charged forms are abundant ingredients of molecular clouds and circumstellar shells. In this talk, recent efforts towards laboratory spectroscopic characterization of positively charged carbon-rich molecular ions will be presented. These species were observed as products of electron impact ionization of suitable precursor gases using infrared/millimeter-wave techniques and 22-pole ion trap instruments in combination with a collection of action spectroscopy schemes. Low-resolution studies were performed using infrared photo dissociation (IRPD) of ion-rare gas clusters (Figure 1). High spectral resolution was obtained when using laser induced inhibition of complex growth (LIICG), rotational state selective attachment of helium and infrared-millimeter wave double resonance techniques (see, e.g., Asvany and Schlemmer 2021, for a recent review).

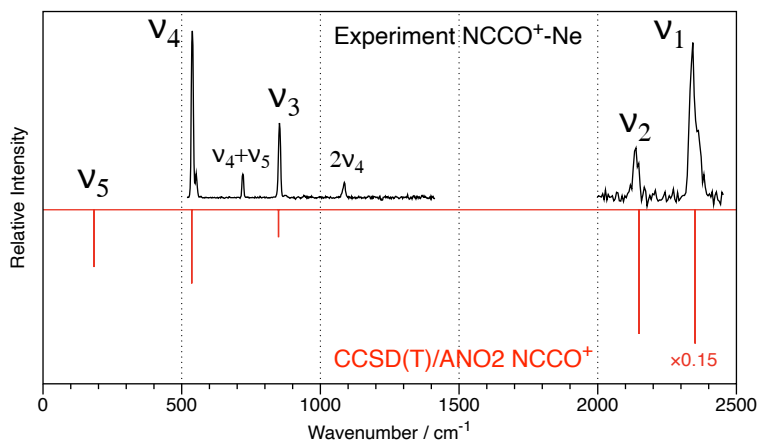


Figure 1: IRPD spectrum of the weakly bound complex of the linear  $\text{NCCO}^+$  molecular ion and one Ne atom obtained with the FELion apparatus (Jusko et al. 2019) connected to the Free Electron Laser for Infrared eXperiments, FELIX, vs. a calculated stick spectrum of the bare  $\text{NCCO}^+$  ion.

### References

- Asvany, O., Schlemmer, S. : 2021, *Phys. Chem. Chem. Phys.*, **23**, 26602.  
 Jusko, P., Brünken, S., Asvany, O., Thorwirth, S., Stoffels, A., van der Meer, L., Berden, G., Redlich, B., Oomens, J. Schlemmer, S., : 2019, *Faraday Discuss.* **217**, 172.