

FELIX SPECTROSCOPY OF LIKELY ASTRONOMICAL MOLECULAR IONS:  $\text{HC}_3\text{O}^+$ ,  $\text{C}_2\text{H}_3\text{CNH}^+$ , and  $\text{C}_2\text{H}_5\text{CNH}^+$

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Infrared signatures of three molecular ions of relevance to the interstellar medium and planetary atmospheres have been detected at the Free Electron Laser for Infrared eXperiments, FELIX, at Radboud University (Nijmegen, The Netherlands) in combination with the 4K FELion 22-pole ion trap facility. Mid-infrared vibrational modes of protonated tricarbon monoxide,  $\text{HC}_3\text{O}^+$ , protonated vinyl cyanide,  $\text{C}_2\text{H}_3\text{CNH}^+$ , and protonated ethyl cyanide,  $\text{C}_2\text{H}_5\text{CNH}^+$ , were detected using resonant photodissociation of the respective Ne-complexes by monitoring the depletion of their cluster mass signal as a function of wavenumber. The infrared fingerprints compare very favorably with results from high-level quantum-chemical calculations performed at the CCSD(T) level of theory.