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Excitation spectroscopy with vibration selective detection for self-absorption free rovibronic spectra of CO

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Abstract content
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In this project the excitation and fluorescence wavelengths for carbon monoxide (CO) in the VUV region are investigated. The narrow spectral bandwidth of the light of our tunable VUV laser source (yielding high spectral resolution and high spectral brightness) allows detection of the fluorescence from weakly absorbing transitions, such as forbidden transitions (FT) of $C^{16}O$. The weak spectral lines of CO are important in astrophysics and laboratory data is lacking. Flow-cooling of CO in a supersonic jet makes it possible to do spectroscopy in conditions similar to conditions in space: collision-free and at temperatures down to a few Kelvin.

By incorporating a scanning monochromator into the existing system we recorded the CO fluorescence spectrum upon VUV excitation and measured self-absorption free rotational excitation spectra of CO in the VUV region. This information was used to accurately determine the temperature of the supersonic jet gas sample. Using the monochromator it was possible to increase the spectral resolution from 0.93 pm to 0.42 pm. The upgraded system has excellent potential for recording of weak forbidden transitions of CO and other molecular gases.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

No

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