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## An improved Nd:YAG laser pumped setup for vacuum ultra violet spectroscopy of carbon monoxide molecules

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### Abstract content <br> &nbsp; (Max 300 words)

Vacuum ultra violet (VUV) spectroscopy of carbon monoxide (CO) is an ongoing project at the Laser Research Institute (LRI) [1, 2, 3]. The main objective is detection of forbidden singlet-triplet transitions of CO for which experimentally measured wavelengths are not available.

Tunable VUV light is generated via four-wave mixing of two dye laser beams in a magnesium vapour medium. The VUV light is used to selectively excite single rovibronic transitions of the CO molecules in the cooled sample (supersonic jet) while scanning the VUV wavelength and recording a laser induced fluorescence (LIF) excitation spectrum.

Recently new laser equipment, including a Nd:YAG pump laser and a modern dye laser, has been acquired, providing narrower bandwidth, shorter pulse duration and higher pulse energies. Due to higher energies, prism based beam steering was needed which in turn raised polarisation concerns which are discussed. An intra-cavity etalon is used in an attempt to further narrow the laser bandwidth. LIF spectra recently produced are analysed and discussed. We compare the current system and improvements thereof to experiments done previously at the LRI. With the new equipment there is a possibility that spectral lines that were undetectable by the previous system may be detected.

[1] Steinmann, C., Rohwer, E., & Stafast, H. 2003, ApJ, 590, L123

[2] Du Plessis, A., Rohwer, E., & Steenkamp, C. 2007, J. Mol. Spectrosc., 243, 124

[3] Dickenson, G., Nortje, A., Rohwer, E., Steenkamp, C. & Du Plessis, A. 2010, ApJL, 714, L268

### Apply to be<br> considered for a student <br> &nbsp; award (Yes / No)?

Yes

### Level for award<br>&nbsp;(Hons, MSc, <br> &nbsp; PhD)?

PhD

### Main supervisor (name and email)<br>and his / her institution

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

No

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