

SUPERSONIC JET CAVITY RING DOWN SPECTROSCOPY OF MOLECULES IN THE MID INFRARED

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Many molecular compounds of spectroscopic interest are difficult to produce or can only be produced *in situ* with low production rates, e.g., transient species. One way to produce such species is to use a discharge nozzle in combination with a supersonic jet expansion. The hereby rotationally cooled spectra increase the line intensity at low rotational quantum numbers and ease the detection of absorption features. Nevertheless, the detection of rare species remains difficult and requires an extremely sensitive detection scheme. The Cavity Ringdown (CRD) technique with its high sensitivity is ideally suited to address this kind of problem. In addition, CRD spectroscopy can also be used to detect very weak molecular rovibrational transitions of otherwise well-known stable molecules.

While CRD spectroscopy of supersonic jets is no new idea, the application to wavelengths in the mid-IR ($2.5\mu\text{m}$ - $4.5\mu\text{m}$), where -O-H, -N-H and \equiv C-H stretching vibrations can be investigated, only got possible in recent times with the availability of suitable laser sources and highly reflective dielectric mirrors for this wavelength region.

Here, we report about our progress in building up a CRD spectrometer operating in the mid infrared range utilizing a tunable cw-OPO laser system with high-quality cavity mirrors ($R > 99.99\%$) between $3\mu\text{m}$ - $3.4\mu\text{m}$. First spectroscopic results will be presented.