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Combining cw- CRDS and LIF with Laser Photolysis : an original set-up devotetd to the kinetic and spectroscopic studies of HOx radicals

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HOx radicals play a major role in atmospheric and combustion chemistry, monitoring its concentration in the atmosphere or during laboratory experiments has long been a goal. While OH radicals can be detected with high sensitivity and selectivity by LIF, most experiments devoted to the study of HO2 kinetics have been performed by UV-absorption spectroscopy. Unfortunately, UV absorption is not very selective due to an unstructured broad absorption band, often superposed by the absorption bands of other reaction partners.
We have recently built an experimental set-up permitting the selective and sensitive detection of HO2 radicals by coupling cw-CRDS (cavity ring down spectroscopy) in the near infrared to laser photolysis. HO2-radcials are generated by laser photolysis of different precursor (SOCl2 and COCl2 at 248 nm, Cl2 at 351 nm) in the presence of CH3OH and O2, its quantitative detection is performed by time-resolved cw-CRDS in the 2v1 band around 1500nm. An absolute calibration of the absorption coefficients have been obtained by measuring kinetic decays of the bimolecular self reaction. The absorption spectrum has been measured in the range 6600 – 6700cm-1.
The set-up has recently been upgraded by adding a detection of OH radicals by LIF to the system. First results using the combination of these two techniques will be presented.