JET-COOLED NO_2 SPECTRUM AROUND THE DISSOCIATION THRESHOLD D_0 ($\sim 25128\ cm^{-1}$)

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The Cavity Ring Down Spectroscopy (CRDS) technique is a unique tool for probing non fluorescing absorbing molecular species. High resolution in achievable in the blue-UV energy region by intracavity frequency doubling a CW laser source (here a Ti:Sa) and by using a seeded supersonic jet (slit nozzle) expansion.

The NO_2 radical is known to strongly absorb in the blue energy range. However, if a LIF signal can be easily detected up to the dissociation threshold D_0 ($NO_2 \rightarrow NO(^2\Pi_{1/2}) + O(^3P_2)$), above, a lack of fluorescence is observed which is typical of a photodissociation process. The usual techniques for level detection above the dissociation threshold (PHOFEX or Fluorescence Depletion Pumping, for example) are based on pulsed sources (laser bandwidth limited). At the opposite, the CW CRDS technique (residual Doppler width: $\sim 400\,\mathrm{MHz}$) allows to probe resonances above the threshold without laser bandwidth limitation. Resonances, whose the width spreads from $\sim 0.055\,\mathrm{cm}^{-1}$ (corresponding to a dissociation time of $\sim 200\,\mathrm{ps}$) just above D_0, to larger shapes ($\sim 1\,\mathrm{cm}^{-1}$) without clear structure $10\,\mathrm{cm}^{-1}$ higher, are identified.