SENSITIVE FLUORESCENCE SPECTROSCOPY OF JET COOLED $^{15}$NO$_2$

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A spectroscopic setup designed for high resolution spectroscopy of jet cooled $^2$O$^9$N$^2$O isotopologues is described with the aim to obtain high quality laboratory spectra for the study of the mass independent effect in this triatomic molecule. A special piezo valve allows operation at minimal gas consumption and time gated fluorescence spectroscopy is used as a highly sensitive detection technique. The performance of the setup is demonstrated on the first $A^2B_2 - X^2A_1$ rovibronic transitions of $^{15}$N$^{16}$O$_2$ measured in a jet. The gas consumption is as low as 0.025 mg per cm$^{-1}$ spectral range. Special efforts have been made to extend applications to lower energies, using a LN$_2$ cooled germanium detector.