STIMULATED EMISSION PUMPING (SEP) SPECTROSCOPY APPLIED TO THE METHOXY RADICAL

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Methoxy radical, CH_3O is a widely studied and benchmark molecule, both for its spectroscopy and its role in chemical reactions. It possesses a ground ^2E state which is distorted by the Jahn-Teller interaction and split into $^2E_{1/2}$ and $^2E_{3/2}$ components by the spin-orbit interaction. The LIF spectra of the $\tilde{A}^2A_1$–$\tilde{X}^2E$ transitions is well-known, but under jet expansion conditions the $E_{1/2}$ component is not observed because it is $\sim$60cm^{-1} higher than $E_{3/2}$ and not populated. A feasible way to study the features of the $\tilde{X}^2E_{1/2}$ level is to use the Stimulated Emission Pumping (SEP) technique. We have combined our high-resolution laser-induced fluorescence (LIF) spectroscopic ($\Delta\nu$ $\sim$200MHz) with a moderate-resolution laser ($\Delta\nu$ $\sim$0.2cm^{-1}). These lasers are controlled by a computer program, which permits both the pump and dump lasers to be fired at specified delays after the photolysis laser producing CH_3O. SEP spectra of CH_3O were recorded with a resolution of $\approx$300MHz linewidth and measured with a precision $<$100MHz and these data were included in a global data (LIF, SEP, microwave) fitting to determine the parameters of the $\tilde{X}^2E_{1/2}$ state. The previous assignment of parity for the $^2E_{1/2}$ state is modified and the value of the spin-orbit splitting revised.