Photodissociation in the first absorption band of alkyl nitrite molecules

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The photodissociation of polyatomic molecules, which is understood as the breaking of atom bonds through the absorption of photons, is one of the major chemical processes where both photons and molecules interfere. These chemical reactions are prevalent in nature, such as in the combustion of certain fuels, their involvement in interstellar and atmospheric chemistry, and their appearance as intermediaries in hydrocarbon reactions [1, 2]. So, the fundamental understanding of the chemical processes involved is paramount to predict and improve desired effects.

There are several experimental techniques that are very helpful to study of photodissociation of these molecules. Two of the most used are the Velocity Map Imaging technique (VMI) and Direct Current Slice Imaging (DC Slicing). In a general way, they work by breaking the molecular bond with photons at certain wavelengths producing two radicals, and then ionizing the desired radical with photons at another wavelength to extract it through electrostatic fields. DC slicing produces a better resolution, and its basis will be further detailed since it was the most used for the studied molecules.

Preliminary results for the different photodissociation channels of the alkyl nitrite molecules of CH_3ONO and $C_3H_7NO_2$ are obtained. Both molecules are broken so that NO radicals are produced and then excited for detection. The given results are analyzed in terms of their ratios of the populated vibrational levels for different electronic and vibrarotational states. Excitation wavelengths are chosen according to the absorption spectra of each molecule.

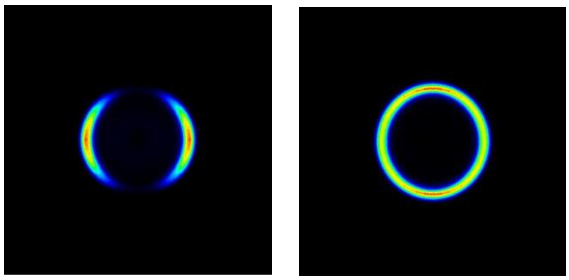

Figure: NO fragment from CH_3ONO molecule for XX and ZZ polarization

References

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