

LABORATORY INVESTIGATION OF ASTRONOMICAL REACTIVE SPECIES: THE VIBRATIONAL SATELLITES OF $c\text{-C}_3\text{H}_2$ RE-VISITED

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Cyclopropenylidene ($c\text{-C}_3\text{H}_2$) is one of the few polyatomic hydrocarbons ubiquitous in our galaxy, despite its reactive carbene nature (see e.g. [1]). Because it is so widely distributed in space, and because its ^{13}C , D, and D_2 isotopologues have also been detected (see e.g. [2]), $c\text{-C}_3\text{H}_2$ is an ideal probe of the physical conditions in various astrophysical objects. It is surprising though that its vibrational satellites have yet to be detected in the interstellar medium.

To enable the interstellar detection of vibrationally excited $c\text{-C}_3\text{H}_2$, and observe for the first time the elusive ν_4 and ν_9 vibrational modes, we have undertaken an extensive investigation of its spectrum from the centimeter to the submillimeter wavelengths, resulting in the observation of many new vibrational satellites in a promising spectral region for astronomical observations. Our measurements are supported by anharmonic rovibrational calculations using a high-quality ab initio potential energy surface, with particular attention paid to the ν_4/ν_9 Coriolis interaction.

[1] S. Spezzano *et al.*, *The Astrophysical Journal Supplement Series* **200**, 1 (2012)

[2] S. Spezzano *et al.*, *The Astrophysical Journal Letters*, **769**, L19 (2013)