

ANALYSIS OF THE METHANE CH STRETCH OVERTONE USING INFRARED HIGH RESOLUTION COHERENT TWO DIMENSIONAL SPECTROSCOPY

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Methane is an important and heavily studied molecule because of its significance in astronomy, energy, and climate change. Studies of methane as a model are also important because it is the simplest hydrocarbon. For many molecules, the fundamental vibrational modes are well understood, but overtones and combination bands are often difficult to accurately identify. At higher frequencies there is significant congestion due to combination bands and overtones overlapping, making it difficult to determine which modes are responsible for each line. We have used a newly developed technique called IR HRC2DS to investigate the overtone region of CH stretches in methane. This technique uses a broadband source with wavelengths spanning the CH overtone region (5950-7000 cm^{-1}) and a tunable source scanning the CH fundamental (2900-3100 cm^{-1}). Coupling these two modes gives doubly resonant features which could allow us to confirm several frequencies from the CH overtones of methane, and to calculate the Coriolis constants for these overtones.