THE INFRARED SPECTRUM OF CH_5^+ REVISITED

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The infrared spectrum of CH_5^+, originally collected and published over a decade ago, remains unassigned to this day owing to its complexity. CH_5^+ is a highly fluxional species that challenges the concept of molecular structure itself, and consequently the spectrum features no obvious patterns that would aid in assignment. Efforts toward extracting rotational energy level spacings using the four-line combination differences technique have been frustrated by the low precision of the spectrum, leading to a large number of coincidences in a combination differences analysis. Knowledge of energy level spacings could guide searches for its microwave spectrum, and consequently its detection in the interstellar medium where it is expected to be an important reactive species.

We have revisited the infrared spectrum of CH_5^+ using Noise Immune Cavity-Enhanced Optical Heterodyne Velocity Modulation Spectroscopy (NICE-OHVMS) with a cw-OPO laser. By combining our spectrometer with an optical frequency comb, we can measure line centers with much greater precision and accuracy than previously possible. In this talk, we will discuss progress toward remeasurement of the previously-published lines with NICE-OHVMS, and the implications of greater precision and accuracy for the combination differences analysis.