EXTENDING THE MILLIMETER/SUBMILLIMETER ROTATIONAL SPECTRUM OF GROUND STATE PYRUVIC ACID

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Pyruvic acid ($C_3H_4O_3$, or $HOOCOCCH_3$) is one of the main reactants in the Krebs Cycle of biological systems where sugar is metabolized and glucose is converted to lactic acid. Its presence in carbonaceous meteorites has already been confirmed, and its abiotic formation in experimental ice analogs implies the potential for exogenous delivery to planets via comets and asteroids. Therefore, it is important to have a complete experimental spectrum within the same wavelengths of astronomical telescopes to facilitate detections of pyruvic acid. Previous work on pyruvic acid reported the spectrum from 160 GHz to 314 GHz. At room temperature, these measurements only cover part of the Boltzmann peak. Additionally, with the spectral coverage now available at telescopes ranging up to and beyond 1 THz, measurements covering a significantly broader region of the molecular spectrum are required. Newly-developed experimental capabilities and sensitivities have since allowed for more sensitive measurement of the rotational transitions in this same wavelength regime and beyond. This work remeasures and extends the spectrum of pyruvic acid from 90 GHz up to 1 THz. Spectral prediction and fitting was conducted using the ERHAM program based on the previous work. Reanalysis using XIAM was then performed due to key advantages and disadvantages in each program. The results of the spectral study and analysis of pyruvic acid from 90 GHz to 1 THz will be presented.