

THE MILLIMETER- AND SUBMILLIMETER-WAVE SPECTRUM OF METHYL FORMATE (HCOOCH₃)

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Methyl formate is a three-fold internal rotor with a dense and complex rotational-torsional spectrum. The molecule is a well-known interstellar species, often called an “interstellar weed,” and tends to be localized in so-called hot cores of giant molecular clouds. Hot cores are regions that are associated with areas of high mass star formation; they are both warmer and denser than the ambient interstellar medium. Using both our standard klystron-based spectrometer and our new fast scan spectrometer (“FASSST”), we have measured many new lines of the rotational-torsional spectrum belonging to both the *A* and *E* ground torsional substates through rotational quantum number $J = 50$. The newly measured lines have been combined with previous data to form a set consisting of over 2000 lines. This data set has been fit to the accuracy of the experiments with an internal axis method similar to that previously applied to methanol. The spectral constants obtained from the fit allow us to predict the frequencies of many additional lines through 700 GHz.