MILLIMETER AND SUBMILLIMETER WAVE SPECTRA OF THE HCOO\(^{13}\)CH\(_3\) ISOTOPOLOG OF METHYLFORMATE IN THE GROUND STATE AND IN THE FIRST EXCITED TORSIONAL STATE.

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The detection of nineteen new rotational transitions of the parent molecule of methylformate (HCOOCH\(_3\)) in the second lowest excited torsional mode (\(\nu_t = 2\)) was recently reported in Orion-KL\(^a\), as well as the detection of eighty new lines corresponding to the two \(^{18}\)O isotopologs of methylformate in their ground states\(^b\). The laboratory work on HCOO\(^{13}\)CH\(_3\) was continued\(^c\). A wide spectral range from 50 to 940 GHz was recorded in Lille with the submillimeter-wave spectrometer based on harmonic generation of a microwave synthesizer source, using a multiplication chain of solid state sources (50-100 and 150-940 GHz) and a backward wave oscillator (100-150 GHz), and coupled to a 2.2 m cell. The absolute accuracy of the line positions is better than 30 kHz up to 630 GHz and 50 kHz above. The two states (\(\nu_t = 0\) and 1) were fitted together using the RAM Hamiltonian of the BELGI program and a new set of 45 parameters was accurately determined. The fit contains 7050 lines corresponding to the ground state up to \(J = 78\) and \(K_a = 34\) and 1907 lines related to \(\nu_t = 1\) up to \(J = 59\) and \(K_a = 24\). The detection of new \(\nu_t = 1\) lines in Orion KL will be reported and discussed.

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