

MILLIMETER AND SUBMILLIMETER WAVE SPECTRA OF THE HCOO<sup>13</sup>CH<sub>3</sub> 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<sub>3</sub>) in the second lowest excited torsional mode ( $\nu_t = 2$ ) was recently reported in Orion-KL<sup>a</sup>, as well as the detection of eighty new lines corresponding to the two <sup>18</sup>O isotopologs of methylformate in their ground states<sup>b</sup>. The laboratory work on HCOO<sup>13</sup>CH<sub>3</sub> was continued<sup>c</sup>. 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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<sup>a</sup>S. Takano, Y. Sakai, S. Kakimoto, M. Sasaki, and K. Kobayashi *PASJ*. **64**, 89, 2012.

<sup>b</sup>B. Tercero, et al. *A & A*. **538**, A199, 2012.

<sup>c</sup>M. Carvajal, et al. *A & A*. **500**, 1109, 2009.