THE MILLIMETER- AND SUBMILLIMETER-WAVE SPECTRUM OF TRANS-GAUCHE DIETHYL ETHER ($C_2H_5OC_2H_5$)

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The spectra of diethyl ether which yielded the astrophysical data base for the trans-trans conformer[a] spawned the discovery and the assignment of the millimeter- and submillimeter spectrum of the trans-gauche species in the frequency range from 110 GHz to 360 GHz. After the assignment of 1105 lines arising from the rotational transitions in the ground vibrational state of the trans-trans conformer, it became clear that at least one more conformer of diethyl ether must exist together with rotational transitions arising from molecules in excited vibrational states of perhaps both conformers. In this talk, we will report and discuss in detail the spectra of diethyl ether taken with two distinctly different spectrometers, their calibration procedures, the assignments of the trans-gauche transitions and the analysis of the combined data.

[a] I. Medvedev, M. Winnewisser, F. C. De Lucia, E. Herbst, E. Yi, L. P. Leong, R. P. A. Bettens, E. Białkowska-Jaworska, O. Desyatnyk, L. Pszczołkowski, and Z. Kisiel, ApJ Supplement Series 148:593-597, 2003