TERAHERTZ AND FAR-INFRARED SPECTROSCOPY OF HIGH-J TRANSITIONS OF THE GROUND AND $v_2 = 1$ STATES OF NH_3

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Since its first detection in 1968, ammonia was discovered as a major constituent of several planetary atmospheres. More recently, ammonia has been suggested in the atmosphere of cool brown dwarf [a] and is expected to be present in quantity in the atmospheres of many newly discovered exoplanets and brown dwarf stars where temperatures are in the order of 1000 K [b]. For such temperatures, spectroscopic knowledge of ammonia's IR spectrum needs to be improved both in term of line positions and intensities. Even for the two lowest vibrational levels (ground state and $v_2 = 1$) its large amplitude inversion motion complicates the spectral modelling and the experimental dataset have been (up to now) limited to low quantum numbers (J of about 20). We associated experimental results obtained from far infrared techniques[c,d] and terahertz spectroscopy[e] to obtain accurate energies for highly excited J levels (as high as J=35) in the ground state and $v_2 = 1$. This work significantly increases the experimental dataset available to support astronomical observations; we will present the techniques developed in this work as well as the spectral analysis and fit of the new dataset.

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