

FT-IR MEASUREMENTS OF NH₃ LINE INTENSITIES IN THE 60 – 550 CM⁻¹ USING SOLEIL/AILES BEAMLINE

KEEYOON SUNG, *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA*; SHANSHAN YU, *Molecular Spectroscopy, Jet Propulsion Laboratory, Pasadena, CA, USA*; JOHN PEARSON, *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA*; LAURENT MANCERON, *Beamline AILES, Synchrotron SOLEIL, Saint-Aubin, France*; F. KWABIA TCHANA, *LISA, CNRS, Universités Paris Est Créteil et Paris Diderot, Créteil, France*; OLIVIER PIRALI, *AILES beamline, Synchrotron SOLEIL, Saint Aubin, France*.

Ammonia (NH₃) has been found ubiquitous, *e.g.*, in the interstellar medium, low-mass stars, Jovian planets of our solar system, and possibly in the low temperature exoplanets. Their spectroscopic line parameters are essential in the accurate interpretation of the planetary and astrophysical spectra observed with Herschel, SOFIA, ALMA, and JWST.

In our previous paper^a, the NH₃ line positions in the far-IR region were studied for the ground state and ν_2 in an unprecedented accuracy, which revealed significant deficiencies in the NH₃ intensities, for instance, some weak $\Delta K = 3$ lines were predicted to be 100 times stronger. Measurement of line intensity for these lines in a consistent manner is demanded because the $\Delta K = 3$ forbidden lines are only way other than collisions and *l*-doubled states to excite NH₃ to $K > 0$ levels. Recalling that NH₃ transition lines in the high *J* and *K* up to 18 were detected toward the galactic center in the star forming region of Sgr B₂, their accurate intensity measurements are critical in explaining the observed high *K* excitation, which will provide insights into radiative-transfer *vs.* collision excitation mechanics of interstellar NH₃.

For this, we obtained a series of spectra of ¹⁴NH₃ in the 50 – 550 cm⁻¹ using a Fourier-transform spectrometer, Bruker 125HR, and AILES beam line at Synchrotron SOLEIL, France. Line positions, intensities, and pressure-broadened half-widths have been measured using non-linear least squares spectrum fitting algorithm. In this presentation we report and discuss preliminary results of line position and intensity measurements for the inversion transitions in the ground state, ν_2 , $2\nu_2$, ν_4 and for the vibration-rotation transitions of ν_2 , $2\nu_2$, ν_4 , $2\nu_2 - \nu_2$, $\nu_4 - \nu_2$ and $\nu_4 - 2\nu_2$ in this region. Comparison of the new measurements with the current databases and *ab initio* calculations will be discussed.

^aS. Yu, et al. J. Chem. Phys. (2010) 174317/1-174317/14.