

MEASUREMENTS @ MM-/SUB-MM-WAVE SPECTROSCOPY LABORATORY OF BOLOGNA: ROTATIONAL SPECTROSCOPY APPLIED TO ATMOSPHERIC STUDIES

CRISTINA PUZZARINI, *Dep. Chemistry 'Giacomo Ciamician', University of Bologna, Bologna, Italy.*

The physico-chemistry of the Earth's atmosphere has been one of the main subjects of studies over last years. In particular, the composition of the atmosphere is indeed very important to understand chemical processes linked to depletion of stratospheric ozone and greenhouse effect. The vertical concentration profiles of atmospheric gases can be provided by remote sensing measurements, but they require the accurate knowledge of the parameters involved: line positions, transition intensities, pressure-broadened half-widths, pressure-induced frequency shifts and their temperature dependence. In particular, the collisional broadening parameters have a crucial influence on the accuracy of spectra calculations and on reduction of remote sensing data.

Rotational spectroscopy, thanks to its intrinsic high resolution, is a powerful tool for providing most of the information mentioned above: accurate or even very accurate rotational transition frequencies, accurate spectroscopic as well as hyperfine parameters, accurate pressure-broadening coefficients and their temperature dependence. With respect to collisional phenomena and line shape analysis studies, by applying the source frequency modulation technique it has been found that rotational spectroscopy may provide very good results: not only this technique does not produce uncontrollable instrumental distortions or broadenings, but also, having an high sensitivity, it is particularly suitable for this kind of investigations.

A number of examples will be presented to illustrate the work carried out at the Laboratory of Millimeter/submillimeter-wave Spectroscopy of Bologna in the field of atmospheric studies.