VUV-FT SPECTROSCOPY OF THE $a^3\Pi - X^1\Sigma^+$ CAMERON BAND SYSTEM IN THE CO MOLECULE

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The study of carbon monoxide is of considerable importance in modelling the evolution of nebulae, stars, planets and exoplanets, as well as entire galaxies, due to the second-largest abundance of this molecule in the universe after the molecular hydrogen.[1] Cameron system, $a^3\Pi - X^1\Sigma^+$ is the subject of very intense study to understand of a daylight of the Mars atmosphere.[2,3,4]

This work is aimed to obtain the highest energy, non-perturbed band among all the hot bands of the $a^3\Pi - X^1\Sigma^+$ Cameron system in the CO molecule, namely the (3, 0), as well as to precisely analyze the $a^3\Pi(v = 3)$ vibrational level. For this purpose, the VUV-FT absorption technique was used by employing the wave-front-division spectrometer working as the end station on the DESIRS beamline (SOLEIL synchrotron).[5,6] The wavenumbers of the 9 rotational branches of the band under consideration were thus obtained. Based on the effective Hamiltonian and using the PGOPHER program[7], the accurate rotational and Λ-doubling molecular constants as well as spin-orbit, spin-rotation, and off-diagonal spin-spin coupling constants of the $a^3\Pi(v = 3)$ level were obtained. The ro-vibronic terms of $a^3\Pi(v = 3)$, based on the experimental transition frequencies, were calculated.

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