FT-SPECTROSCOPIES AND DEPERTURBATION ANALYSIS OF $^{13}C^{18}O$ FIRST EXPERIMENTAL EVIDENCE OF THE $A^1\Pi \sim a^3\Pi$ DIRECT INTERACTION

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The primary objective of this study was to perform a comprehensive investigation of the $A^1\Pi(v = 2)$ level in the $^{13}C^{18}O$ isotopologue. To achieve this goal, two comprehensive FT techniques were employed to acquire the spectra: *(i)* emission spectroscopy in the VIS region using the Bruker IFS 125HR FT-spectrometer at the University of Rzeszów, and *(ii)* VUV absorption spectroscopy using the wave-front-division spectrometer as the end station on the DESIRS beamline at the SOLEIL synchrotron.

A deperturbation analysis was performed for the $A^1\Pi(v = 2)$ level in $^{13}C^{18}O$ using the PGOPHER software[1], based on 961 observed transitions from the $A^1\Pi - X^1\Sigma^+(2, 0)$, $B^1\Sigma^+ - A^1\Pi(0, 2)$, $C^1\Sigma^+ - A^1\Pi(0, 2)$, $D^1\Delta - X^1\Sigma^+(3, 0)$, $a'^3\Sigma^+ - X^1\Sigma^+(12, 0)$, $a^3\Pi - X^1\Sigma^+(13, 0)$, $d^3\Delta - X^1\Sigma^+(7, 0)$, $e^3\Sigma^- - X^1\Sigma^+(4, 0)$ and $I^1\Sigma^- - X^1\Sigma^+(3, 0)$ systems. This analysis yielded 49 molecular parameters of the investigated levels, 33 encompassing molecular constants, 16 interaction parameters, and 429 ro-vibronic terms. During the analysis, the extra-lines of the $a^3\Pi(v = 13)$ level in the $A^1\Pi - X^1\Sigma^+(2, 0)$, $B^1\Sigma^+ - A^1\Pi(0, 2)$ and $C^1\Sigma^+ - A^1\Pi(0, 2)$ bands of $^{13}C^{18}O$ have been observed. Thus, the direct interaction between the $A^1\Pi$ and $a^3\Pi$ states was detected and analysed for the first time.

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