HIGH-RESOLUTION VUV AND VIS FT-SPECTROSCOPIES OF THE $^{12}C^{18}O$ ISOTOPOLOGUE: DEPERTURBATION ANALYSIS OF THE $A^1\Pi(v = 3)$ LEVEL

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The investigations are based on a experimental data from the two high-resolution FT methods: (1) VUV absorption spectroscopy with an accuracy ca. 0.03 cm^{-1} using the wave-front-division spectrometer working as the end station on the DESIRS beamline (SOLEIL synchrotron) and (2) emission, VIS spectroscopy with the accuracy of about 0.005 - 0.007 cm^{-1} of the Bruker IFS 125HR spectrometer (University of Rzeszów).

A deperturbation analysis of the $A^1\Pi(v = 3)$ level of $^{12}C^{18}O$ was performed using the PGOPHER code,[1] based on 575 observed transitions from the $A^1\Pi - X^1\Sigma^+(3, 0)$, $B^1\Sigma^+ - A^1\Pi(0, 3)$, $C^1\Sigma^+ - A^1\Pi(0, 3)$ bands and their extra-lines as well as on the previously analysed $B^1\Sigma^+ - X^1\Sigma^+(0, 0)$ and $C^1\Sigma^+ - X^1\Sigma^+(0, 0)$ transitions. As a result, 11 improved deperturbed molecular constants of the $A^1\Pi(v = 3)$, $a'^3\Sigma^+(v = 13)$, $d^3\Delta(v = 8)$, $D^1\Delta(v = 4)$ and $I^1\Sigma^-(v = 5)$ levels; 5 spin-orbit, 2 rotation-electronic (of the L-uncoupling type) and 2 off-diagonal spin-spin interaction parameters as well as 118 ro-vibronic terms, were obtained. The magnitudes of the intra-molecular interactions were also characterized by the $A^1\Pi(v = 3)$ and $a^3\Pi$ percentage characters. This work is a continuation of the studies on the $A^1\Pi$ state in the CO isotopologues, made by our team.[2,3] Moreover, the new results provide a significantly improved description of the $A^1\Pi(v = 3)$ level in $^{12}C^{18}O$ and its complex electronic structure relative to the previous investigation.[4]

Acknowledgments: RH thanks LASERLAB-EUROPE (grant numbers EUH2020-RIP-654148 and EC's-SPF-284464) and RWF thanks the US National Science Foundation (grant number CHE-1800410) for support of this research. The authors are grateful to the general and technical staff of SOLEIL synchrotron for running the facility and providing beam time under project numbers 20120653 and 20160118.

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p-number: p078 **Submitted on Mon, 12 Jun 2023 11:45:29 +0200**