LASER VELOCITY MODULATION SPECTROSCOPY OF THE $^3\Delta(3d4s)$ - $X^3\Phi(3d^2)$ VISIBLE SYSTEM OF $TiCl^+$ IN THE VISIBLE RANGE AND CHARACTERIZATION OF THE SPIN-ORBIT STRUCTURE.

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A single mode cw dye laser along with velocity modulation detection was used to record the absorption spectrum of the the visible system of $TiCl^+$ produced in an ac glow discharge between 17 100 and 18 600 cm^{-1} with a gas mixture of $He/TiCl_4$. The translational temperature can be estimated to be about 800 K inducing narrow line shape. The rotational structure of the (0,0) and (1,0) vibrational bands has been observed and fully analysed for the main isotopomer $Ti^{35}Cl^+$ as well as the (0,0) and (1,0) bands for Ti^{37} Cl^+. A set of molecular parameters has been obtained which includes the spin-orbit parameters thanks to the observation of the forbidden $^3\Delta_2$ - $^3\Phi_2$ and $^3\Delta_3$ - $^3\Phi_3$ intercombination transitions[a]. The $X^3\Phi(3d^2)$ state was found to be perturbed. Additional spectra have been recorded with a better sensitivity in the same spectral range. In this communication we will report the observation of new bands. Among them, hot bands have already been identified, involving the $v'' = 1$ levels. The detailed analysis of the spectrum in this range is currently performed in order to determine a set of unperturbed molecular parameters for the ground state. Efforts are also in progress for producing other Ti - containing ions by introduction of a reactive gas into the discharge, in relation with the astrophysical interest of Ti containing compounds.

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