DOPPLER-FREE TWO-PHOTON ABSORPTION EXCITATION SPECTROSCOPY AND THE ZEEMAN EFFECT OF THE $A\ ^1B_{2u} \leftarrow X\ ^1A_{1g}\ 14_0^1$ BAND OF C_6D_6

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A Doppler-free excitation spectrum and the Zeeman effect of the $A\ ^1B_{2u}(v_{14} = 1) \leftarrow X\ ^1A_{1g}(v = 0)$ transition of C_6D_6 have been measured by means of two-photon absorption spectroscopy with counter-propagating light beams of identical wavelength within an external cavity. Rotational lines were fully resolved, and 1357 Q_Q lines of $J = 0 - 64, K = 0 - 64$ have been assigned, and the molecular constants of the $A\ ^1B_{2u}(v_{14} = 1)$ state have been determined. Perturbations centerd at $K = 28 - 29$ were observed for $J \geq 30$, and these are identified as originating from the perpendicular Colioris interaction. The Zeeman splittings for lines of a given J were observed to increase proportionally to K^2 and reach a maximum at $K = J$. This demonstrates that the magnetic moment lies along the c axis (perpendicular to the molecular plane). The magnetic moment of the $A\ ^1B_{2u}(v_{14} = 1, J = 64, K = 64)$ level was determined to be 0.011 μ_B. The Zeeman splittings of the $K = J$ levels were observed to increase linearly with J. From the analysis, the magnetic moment is shown to be originating mostly from mixing of the $S_1\ ^1B_{2u}$ and $S_2\ ^1B_{1u}$ states by the J-L coupling (electronic Coriolis interaction). The Zeeman splitting which could be identified as originating from a singlet-triplet interaction was not observed.