A NEW COLLISION-INDUCED TRANSITION IN THE VACUUM ULTRAVIOLET SPECTRUM OF O\textsubscript{2}

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The collision-induced photoabsorption spectrum of O\textsubscript{2}, pressurised by He, is presented in the 1180–1340 Å-region. In addition to the collision-broadened wings of the dipole-allowed mixed Rydberg-valence transitions, we have found a series of diffuse peaks whose intensities depend linearly on the foreign-gas pressure. The observed peaks have been assigned as the (1,0)–(5,0) bands of the \( \Delta \Delta = 2 \) collision-induced \( 3\pi \piu \, 3\Delta \u \leftarrow X^{3} \Sigma_{g}^{-} \) Rydberg transition, partly on the basis of comparisons with the photoabsorption spectrum of metastable O\textsubscript{2}({\textsuperscript{1}}\Delta_{u}).\textsuperscript{4} The relative regularity of the spacings between the observed peaks supports the conclusions of Buenker and Peyerimhoff,\textsuperscript{b} in an \textit{ab initio} study, that there is little interaction between the \( 3\pi \piu \, 3\Delta \u \) Rydberg state and the \( A^{3} \Delta \u \) valence state, in contrast to the situation for the corresponding states of \( \text{A}^{3} \Pi \u \) and \( \text{B}^{3} \Pi \u \) symmetries. Although the complexity of this spectral region and the diffuseness of the bands precludes any detailed line-profile analyses, it is clear that the integrated intensity of the \( 3\pi \piu \, 3\Delta \u \leftarrow X^{3} \Sigma_{g}^{-} \) Rydberg system exceeds that of the collision-induced \( A^{3} \Delta \u \leftarrow X^{3} \Sigma_{g}^{-} \) valence system\textsuperscript{c} by at least an order of magnitude. Possible sources for this intensity are discussed.