STUDIES ON THE PHOTO-DISSOCIATION AND SYMMETRY OF THE $\widetilde{D}$ STATE OF SO_2^+

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Pure parent ions, SO_2^+ $\tilde{X}^2A_1(000)$, were prepared by [3+1] multiphoton ionization of SO_2 molecules at 380.85 nm. The photodissociation process and the symmetry of the excited states of SO_2^+ molecular ions was investigated by measuring the photofragment SO^+ excitation (PHOFEX) spectrum in ultra-violet (UV) (282-332 nm) and the visible (562-660 nm) wavelength ranges, respectively. The $\widetilde{D}(v_100), \widetilde{D}(0v_20) \leftarrow \widetilde{X}^2A_1(000)$ transitions of SO_2^+ were assigned in the PHOFEX spectrum in the UV range. By comparing the resolved PHOFEX spectrum in UV range to the continuous PHOFEX spectrum in visible range, it is deduced that around the $\widetilde{D}$ state of SO_2^+ there exists a repulsive state (α^2A_2) converging to the dissociation limit of $SO^+(X^2\pi) + O(^3P_g)$, and the coupling between SO_2^+ $\widetilde{D}$ and $SO_2^+(\alpha^2A_2)$ leads to the dissociation to $SO^+(X^2\pi) + O(^3P_g)$. The symmetry of the $\widetilde{D}$ state is $\widetilde{D}^2B_1$.

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