OBSERVATION OF THE SINGLET-TRIPLET PAIR OF THE 4P RYDBERG STATE OF SO_2 AND THE REASSIGNMENT OF THE SO_2 RYDBERG SERIES

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Rydberg states of the SO_2 molecule, in the region 78500-81000 (cm^{-1}), have been studied. The triplet $\tilde{G}$ state is observed by accessing the triplet-manifold, using two-color resonance enhanced multiphoton ionization (REMPI) spectroscopy. The Rydberg $\tilde{G}$ state is assigned to be 4p, it was based on our observation and the singlet-type Rydberg states from previous studies, and as well as the consideration of a semiclassical model. Using the term values and corresponding quantum defects as the measure of characterizing the Rydberg states, the reassignment has been made to higher Rydberg states studied previously. The dynamics information, such as intramolecular relaxation and dissociation, were extracted from both the broadened ro-vibrational spectra and the change of the fragmentation pattern of the different ionization pathways.