CARS AND INFRARED STUDIES OF THE $\nu_1$, $\nu_2$ AND $\nu_4$ BANDS OF $^{34}\text{S}^{18}\text{O}_3$

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We are engaged in a comprehensive investigation of the spectroscopic properties of sulfur trioxide, an important participant in reactions in the upper atmosphere. The fundamental modes and several hot bands of the isotopic variants ($^{32}\text{S}^{18}\text{O}_3$, $^{34}\text{S}^{16}\text{O}_3$, and $^{34}\text{S}^{18}\text{O}_3$) have been investigated using high resolution infrared spectroscopy and coherent anti-Stokes Raman scattering. For all isotopic variants, the Raman-active symmetric stretching mode $\nu_1$ shows complex Q-branch patterns due to indirect Coriolis couplings, $l$-resonances, and Fermi resonances with dark $\nu_2$, $\nu_6$ combination/overtone levels. Essential to modeling the interactions of these levels with $\nu_1$ is the understanding of the fundamental vibrations that make up these levels. The analysis of the $\nu_2$, $\nu_6$ infrared active fundamental vibrations of $^{34}\text{S}^{18}\text{O}_3$ will be presented, along with efforts to model the complex $\nu_1$ CARS spectrum using information derived from studies of hot bands involving $\nu_2$ and $\nu_6$. 