DIRECT OBSERVATION OF $b_2$ VIBRATIONAL LEVELS IN THE $^1B_2 \tilde{C}$ STATE OF SO$_2$: PRECISE MEASUREMENT OF $\nu_3$ LEVEL STAGGERINGS

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The $^1B_2 \tilde{C}$ STATE OF SO$_2$ has been the subject of extensive investigation because it is important in the atmospheric photodissociation of SO$_2$. The state has a double-minimum potential in the dissociation coordinate, $\nu_3$, arising from vibronic interactions, leading to a staggering of vibrational levels with $\nu_3$ odd vs. even. We report the first direct observations of the $\nu_3$ fundamental and of other levels with $b_2$ vibrational symmetry (odd $\nu_3$). Our work has made use of LIF, IR-UV double resonance, and coherent MODR techniques. Implications of the precision measurement of $\nu_3$ staggerings to the determination of double-minimum potential barrier and to vibronic coupling will be discussed.