SINGLE QUANTUM-STATE RESOLVED COLLISION RELAXATION CROSS SECTION OF HIGHLY VIBRATIONALLY EXCITED SO_2 MEASURED BY KINETIC QUANTUM BEAT SPECTROSCOPY

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The collision relaxation cross section of highly vibrationally excited SO_2 at energies around 45,000 cm^1, which is just below the dissociation limit, has been measured for several $single$, highly vibrationally excited levels. The measurement was conducted on rotationally cooled SO_2 in supersonic jet condition using quantum beat spectroscopy. Quantum beat in laser induced fluorescence from the $\tilde{C}$ state is due to vibronic coupling between zero-order rovibronic levels of $\tilde{C}$ and $\tilde{X}$ states and can be analyzed to give the decay rate constants of the high vibrational levels of the $\tilde{X}$ state. It is found that the collision relaxation cross section of the single highly vibrationally excited level shows a strong correlation with the corresponding vibronic coupling matrix element, likely reflecting that the part of the vibrational character of the single high vibrational level that gives a larger coupling with the $\tilde{C}$ state also provide a stronger transition dipole moment contribution to its collision relaxation.