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Spectroscopy of Vibrational States in Diatomic Iodine Molecules
MARY MULHOLLAND, CHARLES H. HARRILL, R. SETH SMITH, Francis Marion University — This project is focused on understanding the vibrational structure of iodine, which is a homonuclear diatomic molecule. A 20 mW, 532 nm cw diode laser was used to selectively excite neutral iodine molecules to a higher energy electronic state. By performing spectroscopy on the transitions from this state to a lower energy electronic state, the data only showed those vibrational bands which connect the two electronic states. Since a number of vibrational levels are populated in the higher energy electronic state, the transitions to all of the allowed vibrational levels in the lower energy electronic state provided sufficient data to determine the vibrational structures of both states. Emission spectra were collected with an Ocean Optics USB4000 Compact CCD Spectrometer. The spectrometer had a range of 500 - 770 nm with a resolution of approximately 0.5 nm and was sensitive enough to resolve the vibrational states in diatomic iodine molecules. The results were compared to a simple harmonic oscillator model.

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