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**Detection limit improvement for iodine Cordes-Band based hypersonic density measurements** JACK MILLS, Old Dominion University, ROBERT BALLA, Nasa Langley Research Center, LEPHSA VUSKOVIC, Old Dominion University — Measurements in the wake region created by models in supersonic and hypersonic flows are required in order to understand a variety of problems in aerodynamics. In this experiment we investigated the properties of using broadband excitation, as opposed to narrowband excitation, using an ArF laser as a means for increasing the detection limit of density measurements in air. The mechanism for this involves Iodine Cordes-Band spectroscopy. Laser excitation of the Cordes bands of $I_2$ and the resulting emission involve a myriad of rotational, vibrational and electronic energy levels. $I_2$ is optically pumped to the D state where approximately 85% of the emission regardless of buffer gas pressure results from D and D' transitions. In pure $I_2$ McLennan-band emission dominates with the peak signal near 321nm. As the air pressure increases, collisions with air transfer the population from the D to D' state where that emission produces the 340nm band. As the air pressure increases the 321nm emission is rapidly quenched and the D' emission dominates (340nm). This provides a pressure dependent signal contribution. The goal is to improve the current detection limit by an order of magnitude by using a broadband laser beam instead of the narrowband beam. This should increase the detection limit by an order of magnitude.

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