CALCULATIONS AND FIRST QUANTITATIVE LABORATORY MEASUREMENTS OF O_2 A-BAND ELECTRIC QUADRUPOLE LINE INTENSITIES AND POSITIONS

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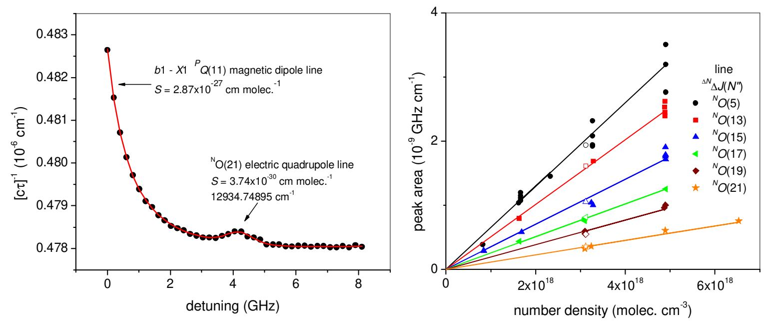
Frequency-stabilized cavity ring-down spectroscopy (FS-CRDS) was utilized to make quantitative laboratory-based measurements of electric quadrupole transitions within the $^{16}O_2$ A-band. We report the first observations of eight extremely weak (line intensities ranging from 3x10^{-30} to 2x10^{-29} cm molec.$^{-1}$) transitions within the NO, PO, and RS branches. New theoretical calculations of line intensities and positions are also presented and compared to these measurements.



Left: Measured spectrum (symbols) and Voigt fit (line) of electric quadrupole line in the wings of the $PQ(11)$ hot band, magnetic dipole line. Peak signal-to-noise ratio on electric quadrupole line is 16:1.
Right: Fit-derived peak areas vs. number density for the NO branch electric quadrupole lines.