

CAVITY RINGDOWN SPECTROSCOPY ON THE $b^1\Sigma_g^+ - X^3\Sigma_g^-$ ($v', 0$) BANDS ($v'=0-3$) OF O_2 -ISOTOPOMERS

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Cavity RingDown Spectroscopy (CRDS) has been used to investigate the $b^1\Sigma_g^+ - X^3\Sigma_g^-$ system of oxygen isotopomers. The absorption bands of this system are very weak due to the strongly forbidden character of gerade-gerade and $\Sigma^+ - \Sigma^-$ transitions, and they can only be observed via a magnetic dipole transition moment. The four allowed branches are a factor of 10^9 weaker than typical electric dipole allowed transitions. The high sensitivity (10^{-9} cm^{-1}), obtained even in a short cell ($< 1 \text{ m}$), makes CRDS ideal for spectroscopy on isotopically enriched samples.

Our studies yield updated or new values for the molecular constants of the $b^1\Sigma_g^+ - X^3\Sigma_g^-$ ($v', 0$) bands for $v'=0-3$ of oxygen isotopomers. These values may help to identify emission bands from excited vibrational levels of O_2 ($b^1\Sigma_g^+$), including minority isotopomers, as observed in the Earth's atmosphere^a and can aid in the interpretation of weak signals in the search for possible violation of the symmetrization postulate in $^{16}O_2^{bc}$.

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