QUANTITATIVE ABSORPTION MEASUREMENTS USING CAVITY RING DOWN SPECTROSCOPY

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This paper investigates the effects of cavity design and laser bandwidth on quantitative cavity ring-down spectroscopy using the ^rR transitions of the $X(v=0)$ to $b(v=0)$ band of molecular oxygen. It is found that failure to account for laser bandwidth leads to systematic errors in the number densities determined from measured ring-down signals. By fitting the frequency integrated expression for the ring-down signal and using the measured laser lineshapes, excellent agreement between measured and and predicted number densities is found. The quantitative measurement of gas densities over a wide dynamic range will be presented.