

CAVITY RING DOWN ABSORPTION OF OXYGEN IN AIR AS A TEMPERATURE SENSOR

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The A-band of oxygen has been measured at low resolution at temperatures between 90 K and 373 K using the phase shift cavity ring down (PS-CRD) technique. For temperatures between 90 K and 295 K, the PS-CRD technique presented here involves an optical cavity attached to a cryostat. The static cell and mirrors of the optical cavity are all inside a vacuum chamber at the same temperature of the cryostat. The temperature of the cell can be changed between 77 K and 295 K. For temperatures above 295 K, a hollow glass cylindrical tube without windows has been inserted inside an optical cavity to measure the temperature of air flowing through the tube. The cavity consists of two highly reflective mirrors which are mounted parallel to each other and separated by a distance of 93 cm. In this experiment, air is passed through a heated tube. The temperature of the air flowing through the tube is determined by measuring the intensity of the oxygen absorption as a function of the wavenumber. The A-band of oxygen is measured between 298 K and 373 K, with several air flow rates. Accuracy of the temperature measurement is determined by comparing the calculated temperature from the spectra with the temperature obtained from a calibrated thermocouple inserted at the center of the tube.