Abstract Submitted
for the CAL10 Meeting of
The American Physical Society

Frequency-stabilized cavity ring-down spectroscopy DAVID A. LONG, Division of Chemistry, California Institute of Technology, Pasadena, CA, DANIEL K. HAVEY, Process Measurements Division, National Institute of Standards and Technology, Gaithersburg, MD, MITCHIO OKUMURA, Division of Chemistry, California Institute of Technology, Pasadena, CA, CHARLES E. MILLER, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, JOSEPH T. HODGES, Process Measurements Division, National Institute of Standards and Technology, Gaithersburg, MD — Frequency-stabilized cavity ring-down spectroscopy (FS-CRDS) is an ultrasensitive variant of traditional cw-CRDS whereby the optical cavity length is actively stabilized to an external frequency reference. This in turn stabilizes the cavity's free spectral range which provides an extremely stable, linear, and accurate frequency axis for our spectra. FS-CRDS is particularly well-suited to molecular lineshape studies. We have recently applied FS-CRDS to O_2 and CO_2 transitions in the near-infrared which are of great importance in remote sensing. Spectral signal-to-noise ratios as high as 28,000:1 have been achieved, allowing for observation of subtle lineshape effects, such as speed-dependence and collisional narrowing, and measurement of spectral parameters to the 0.1%-level. In the O_2 A-band we have also observed ultraweak electric quadrupole transitions as well as hyperfine structure (for the ^{17}O-containing isotopologues).

David A. Long
Division of Chemistry, California Institute of Technology, Pasadena, CA

Date submitted: 29 Sep 2010 Electronic form version 1.4