COMB-ANCHORED, CAVITY RING-DOWN SPECTROSCOPY OF THE 1.27 μm BAND OF O_2

HELENE FLEURBAEY, ZACHARY REED, ERIN M. ADKINS, DAVID A. LONG, JOSEPH T. HODGES,
Material Measurement Laboratory, National Institute of Standards and Technology, Gaithersburg, MD, USA.

New measurements of the $a^1\Delta_g \leftarrow X^3\Sigma_g^-$ band of oxygen ($^{16}O_2$) at 1.27 μm will be presented, improving on a previous study [Mendonca et al., Atmos. Meas. Tech. 12, 35-50 (2019)].

Spectra were acquired by frequency-stabilized cavity ring-down spectroscopy over a 160 cm^{-1} wave number range (7792 cm^{-1} to 7952 cm^{-1}). The frequency axis was anchored to a Cs-clock-referenced optical frequency comb through a heterodyne beat note between the comb and the probe laser at about 20 points across the wave number range. The probe laser was phase locked to the frequency comb prior to measuring the beat note frequency in order to improve the accuracy, yielding a 10-Hz uncertainty in the ring-down cavity free spectral range and a 50-kHz absolute frequency uncertainty for all mode orders. Six air-broadened spectra were recorded, at pressures ranging from 3.3 kPa to 100 kPa. They were analyzed with custom multi-spectrum fitting software based on the HAPI python library, using the speed-dependent Nelkin-Ghatak profile.

The resulting line shape parameters reveal important discrepancies with the HITRAN2016 values. These results will also be compared to those reported in recent studies by the Grenoble group [Konefał et al., JQSRT 241, 106653 (2020) and Tran et al., JQSRT 240, 106673 (2020)].