

PRECISION CAVITY-ENHANCED DUAL-COMB SPECTROSCOPY: APPLICATION TO THE GAS METROLOGY OF CO₂, H₂O, and N₂O.

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With inherent simplicity, mutual phase coherence, and a high degree of user control, electro-optic frequency combs are amenable to both dual-comb spectroscopy^a and cavity-enhanced comb spectroscopy.^b This combination of fast, multiplexed spectroscopy, with an effective absorption pathlength >1 km, is used here to perform line-by-line metrology of the gas-phase absorption spectra of CO₂, H₂O, and N₂O in the near-infrared. We report absolute transition frequency with precision better than 1 MHz in 1 s of spectral acquisition per transition using a comb with an instantaneous optical bandwidth of 6 GHz, tunable over the entire 6240-6370 cm⁻¹ range. A full model for the electric field transmitted through the enhancement cavity (even in the presence of strong molecular absorption and dispersion) will be discussed.

^aI. Coddington et al., *Optica* **3**, 414 (2016)

^bB. Bernhardt et al., *Nat. Photonics* **4**, 55 (2010)