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Title:Direct-comb molecular spectroscopy with accurate, resolved comb teeth over 43 THz

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Abstract:We demonstrate a dual-comb spectrometer using stabilized frequency combs spanning 177 to 220 THz (1360 to 1690nm) in the near infrared. Comb-tooth-resolved measurements of amplitude and phase generate over  $4 \times 10^5$  individually resolved spectral elements at 100MHz point spacing and kilohertz-level resolution and accuracy. The signal-to-noise ratio is 100 to 3000 per comb tooth. Doppler-broadened phase and amplitude spectra of CO<sub>2</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, and H<sub>2</sub>O in a 30m multipass cell agree with established spectral parameters, achieving high-resolution measurements with optical bandwidth generally associated with blackbody sources. © 2012 Optical Society of America.

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Main heading:Molecular spectroscopy

Controlled terms:Carbon dioxide

Uncontrolled terms:Amplitude spectra - Blackbody sources - Frequency combs - High-resolution measurements - Multipass cell - Near Infrared - Optical band width - Signal to noise - Spectral element - Spectral parameters

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