A NEW BROADBAND CAVITY ENHANCED FREQUENCY COMB SPECTROSCOPY TECHNIQUE USING GHz VERNIER FILTERING.

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We present a new approach to Cavity Enhanced - Direct Frequency Comb Spectroscopy where the full emission bandwidth of a Titanium:Sapphire laser is exploited at GHz resolution. The technique is based on a low-resolution Vernier filtering obtained with an appreciable –actively stabilized– mismatch between the cavity Free Spectral Range and the laser repetition rate, using a diffraction grating and a split-photodiode [b]. This particular approach provides an immunity to frequency-amplitude noise conversion, reaching an absorption baseline noise in the 10^{-9} cm^{-1} range with a cavity finesse of only 3000. Spectra covering 1800 cm^{-1} ($\sim$ 55 THz) are acquired in recording times of about 1 second, providing an absorption figure of merit of a few 10^{-11} cm$^{-1}/\sqrt{Hz}$. Initially tested with ambient air, we report progress in using the Vernier frequency comb method with a discharge source of small radicals.

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[b] Rutkowski *et al, Opt. Lett., 39(23)2014*