CAVITY RING-DOWN SPECTROSCOPY WITH INTERBAND CASCADE OPTICAL FREQUENCY COMBS

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The spectrum of an optical frequency comb is composed of many equidistant lines, which is a natural match for enhancement cavities. Cavity ring-down spectroscopy is known to be a robust and highly sensitive technique, although it is challenging to implement with optical frequency combs. Here we demonstrate a new approach to performing direct frequency comb cavity ring-down spectroscopy in the CH stretching region using an interband cascade optical frequency comb. These chip-scale devices generate combs with large repetition rates (10 GHz), which enables mode-resolved detection using Vernier spectroscopy. The decay of each comb mode can be obtained as the comb is being scanned, providing sensitive and broadband detection. Here we demonstrate the effectiveness of this technique for trace gas detection and discuss the overall performance.