DEVELOPMENT OF A DUAL-COMB SPECTROMETER FOR ROTATIONALLY-RESOLVED MEASUREMENTS OF THE VIBRATIONAL OVERTONE OF BENZENE

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Optical frequency combs have proven to be a powerful tool in precision molecular spectroscopy due to their unique blend of a coherent, low-noise spectral source and the broad bandwidth they offer. One particularly useful technique to take full advantage of the high-resolution potential of these devices is dual-comb spectroscopy, in which two frequency combs with slightly different repetition rates are heterodyned together to generate an interferogram, akin to the signal an FTIR produces, through which the optical spectrum can be retrieved.

We have constructed a pair of fiber-based optical frequency combs in-house at Connecticut College, one of which has an adjustable repetition rate, for use in a dual-comb spectrometer. We will present details on the two frequency combs, report our progress toward this dual-comb spectrometer, and discuss its future implementation in conducting rotationally-resolved measurements of the 1.65 μm vibrational overtone of benzene in a supersonic beam apparatus.