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Ultrafast Broadband Infrared Source for Nonlinear Infrared Spectroscopy[1] KRUPA RAMASESHA, ARITRA MANDAL, LUIGI DE MARCO, ANDREI TOKMAKOFF[2], Massachusetts Institute of Technology — Existing optical parametric amplifiers can generate 200cm-1 to 400 cm-1 of bandwidth at mid-infrared frequencies, which limit the use of these pulses for studying vibrational dynamics. We have developed a new broadband infrared source that can generate pulses with 1000 cm-1 of bandwidth, spanning most of the mid-infrared region of the spectrum. These pulses can allow us to simultaneously probe higher frequency vibrations like the OH stretch and the fingerprint region at lower frequencies. By focusing the first, second and third harmonics of a 25 fs 800 nm pulse in air to create a plasma, we have been able to generate infrared pulses with a broad spectrum ranging from 3 microns to 9 microns and a sub-100 fs pulse duration. This source can thus allow us to study dynamics that involve distinct vibrational transitions on ultrafast timescales. This presentation will discuss our efforts in characterizing the broadband infrared source and the progress we are making towards setting up a pump-probe 2D IR experiment using these broadband infrared pulses.

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