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Ultrafast Time- and Phase-Resolved Second Harmonic Generation JAMES MCIVER, CHANGMIN LEE, DARIUS TORCHINSKY, NUH GEDIK, MIT, GEDIK GROUP TEAM — Ultrafast pump-probe experiments typically measure the changes in the amplitude of the probe light after it interacts with a sample as a function of pump time delay. However, measured amplitude change is typically a result of multiple processes happening in the sample. It is usually not possible to isolate these different processes from the measured amplitude response. Here we show using GaAs and Bi2Se3 as test samples that by probing interferometrically, phase information about the pump-probe signal can also be acquired. We find that different components of the signal in general have different optical phases associated with them, which can be isolated by changing the path length difference within the interferometer. We show that phase information about second harmonic light generated by the sample can also be obtained and we report progress toward realizing simultaneous phase- and time-resolved second harmonic pump-probe measurements.

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