Abstract for an Invited Paper
for the OSS10 Meeting of
The American Physical Society

Single-Cycle Terahertz Pulses - Generation, Detection, and Applications to Imaging

THEODORE NORRIS, University of Michigan

Ultrafast lasers can be used to generate coherent single-cycle pulses with durations in the picosecond range, corresponding to bandwidths of several terahertz (THz). This talk will present several methods developed in our laboratory over the past few years to produce both single-cycle and multi-cycle pulses, with a recent emphasis on the generation of high average powers (approaching 1 milliwatt). I will then discuss how such pulses can be used to perform coherent three-dimensional imaging using two image reconstruction algorithms - time-reversal and model-based reconstruction. Finally, I will discuss how analogous THz pulses can be generated acoustically in solid-state media, and how the imaging techniques developed for electromagnetic THz pulses can be applied to picosecond ultrasonic imaging, thus opening the door to acoustic imaging at the nanoscale.