

Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Single-shot, high-resolution terahertz diagnostic and its applications to laser-plasma interactions KI-YONG KIM, BALAKISHORE YELLAMPALLE, GEORGE RODRIGUEZ, JAMES GLOWNIA, Los Alamos National Lab — We have developed a single-shot terahertz (THz) diagnostic capable of measuring free-space electromagnetic pulse fields in the THz frequency range with unprecedented temporal resolution. Using the chirped probe electro-optic sampling technique, combined with the Fourier retrieval algorithm that we recently developed, we have achieved the transform-limited temporal resolution (50 fs in case of our Ti:sapphire laser system). With our technique, the temporal resolution is mainly limited by the spectral bandwidth of the probe pulse, regardless of the probe chirp rate. The diagnostic can be used for many applications where single-shot laser operations are strongly demanded. As preliminary applications of the diagnostic, we have investigated the characterization of coherent THz radiation from laser-produced plasma ablation on solid targets and laser-induced shocked ionic crystals. We have also studied its application to laser-plasma-based electron accelerators in which we can measure the electron bunch length in a single-shot. High-field-strength THz sources can greatly benefit from these applications. This work was partially supported through the LANL LDRD program office.

Ki-Yong Kim
Los Alamos National Lab

Date submitted: 21 Jul 2005

Electronic form version 1.4