DEVELOPMENT OF A HIGHER RESOLUTION TERAHERTZ TIME-DOMAIN SPECTROMETER

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We report on our development of a terahertz (THz) time-domain spectrometer employing asynchronous optical sampling (ASOPS) between two commercial Ti:Sapphire lasers operating with a repetition rate of approximately 80 MHz. THz time-domain spectrometers typically achieve control of sampling time delay via the use of mechanical delay lines, yielding a practically feasible resolution limit of several GHz. There are commercially available THz time-domain spectrometers employing ASOPS with GHz repetition rate lasers; they achieve 1 GHz resolution. The use of our lower repetition rate lasers, while introducing technical challenges, offers a theoretical resolution limit of 80 MHz, an important benefit for our primary application of collecting THz spectra in support of astronomy in the far-infrared. Technical data on instrument design and performance as well as initial spectra are to be presented.