**Novel Terahertz Sensing System**  
Technology #14073

**Applications**

This invention is a terahertz sensing system and its remote sensing applications, including explosive detection, vibrometry, concealed weapons detection, hyper-spectral imaging, and medical imaging. The sample’s composition can be acquired by analyzing the reflection, scattering, and absorption spectra in the terahertz region.

**Problem Addressed**

Detecting terahertz radiation is extremely slow and difficult process, which is why a need exists for improved systems for and methods of sensing terahertz radiation. Also prior systems with serial architectures are limited to detecting stationary objects.

**Technology**

The invented system collects terahertz radiation scattered from a target and upconverts the collected radiation to optical frequencies. A frequency-domain spectrometer senses spectral components of the upconverted signal in parallel to produce a spectroscopic measurement of the entire band of interest in a single shot. The detected spectrum can then be used to derive information about spectroscopic characteristics of the sample. Because the spectrometer detects different spectral components of the measurement signal in a parallel manner, the system can measure moving samples and fast events.

**Advantages**

- Can measure a complete spectrum once per pulse, resulting in much higher scan speeds (e.g., thirty times higher if the system measures thirty frequency components in parallel) due to its parallel architectures
- Can detect moving object due to the ability to measure a spectrum on a “single shot” basis
- Can measure terahertz spectra at standoff, making them better suited to concealed weapons detection and other imaging applications

**Categories For This Invention:**

- Lincoln Laboratory
- Photonics
- Sensors (Photonics)
- Imagers
- Life Sciences
- Imaging
Intellectual Property:
Terahertz sensing system and method
Issued US Patent
9,200,959
Terahertz sensing system and method
Issued US Patent
8,514,393

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