Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

THz Differential Radar for Detection of Weak Molecular Absorption Lines in Bio-Aerosol HAMID JAVADI, JPL, CA, ELLIOTT BROWN COLLABORATION[1], ELAYNE BROWN COLLABORATION[2] — THz frequency range (300-3000 GHz) promises unique capabilities and advantages for detection of trace gases and biological aerosols immersed in the atmosphere. Techniques used for microwave atmospheric remote sensing can be used within the atmospheric transmission windows to carry out standoff detection of biological markers in real time. THz spectroscopy has been used as an important new tool in investigations of atmospheric molecular gases and a wide range of airborne biological materials. We have embarked upon development of field deployable THz differential radar. Bio-aerosols are the most difficult analytes to face due to their heterogeneity in size, toxicity, and bio/chemical composition. JPL has demonstrated monolithic solid-state THz sources with impressive output power. The sources are enabled by W-band power amplifiers and planar Schottky diode multipliers. These, together with room temperature detectors (based on the same technology), allow one to make a compact and robust transmitter/receiver with sufficient sensitivity and frequency agility to carry out detailed investigation of various molecular vapors and bio-aerosols at standard temperature and pressure. Current status of the THz differential radar technology development effort along with future trends will be presented.

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Date submitted: 10 Jan 2006 Electronic form version 1.4