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**Terahertz Spectroscopy of Water Vapors, Chemical Vapors and Ionized Air** BENJAMIN GRABER, US. Naval Research Laboatory, RONGJIA TAO, Temple University, DONG HO WU, US. Naval Research Laboatory — In the past, a few research groups have demonstrated that terahertz spectroscopy could be a useful tool for the identification of chemicals. However most of those demonstrations have been done with solid-phase or liquid-phase chemicals. There are little demonstrations for the detection and identification of chemicals in the gas-phase, as it is very difficult in part due to the presence of water-absorption lines in the terahertz frequency range. As the water absorption lines predominate in the 0.1 - 2THz spectral range, and can interfere with already weak terahertz signatures generated by chemical vapors, it is often very hard to obtain meaningful terahertz spectrum of chemical vapor. Regardless we recently have been able to obtain some terahertz spectra of chemical vapors and ionized air produced by several different ionization sources, including corona discharge and nuclear isotopes. Throughout data analysis we learned that water molecules, nitrogen and oxygen molecules play very important roles in these terahertz spectra. In this presentation we will discuss our experiments and the roles of these molecules.

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