

Transportation Security Lab Rotational Spectroscopy

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Transportation Security Laboratory (TSL) is seeking to host one or more National Science Foundation (NSF) student scientists with a background in physics, physical chemistry or electrical engineering to collaborate with TSL's Applied Research Division. The TSL is involved in research to further the detection of bulk and trace quantities of explosives and other contraband.

- **Project Duration:** TBD
- **Start Date:** Summer or Fall 2018
- **Location:** Atlantic City, New Jersey

Project Overview

Selected students will build a chirped-pulse fourier transform microwave (CP-FTMW) spectrometer. They will be expected to interpret technical publications in the open literature to assemble a spectrometer and collect initial spectra of molecules in the vapor phase. This project may include, but is not limited to, the following tasks:

- Developing software code for performing RF measurements with various hardware such as oscilloscopes, amplifiers, switches, and network analyzers.
- Identify candidate species for testing of microwave spectrometer performance and comparing to external databases such as the high-resolution transmission (HITRAN) molecular absorption database.
- Participate in the design of the spectrometer, including optimization of components on-hand and identification and acquisition of hardware necessary to complete and improve existing spectrometer designs.
- Analyze microwave spectra to determine rotational constants of molecules, and ultimately, their vapor phase structure.

Qualifications

Degree in physics, physical chemistry, or electrical engineering. Knowledge of spectroscopy and/or RF components not necessary but highly advantageous.

Eligibility Requirements

- Citizenship: U.S. Citizen Only
- Degree: Bachelor of Science or higher
- Discipline(s): Physics, physical chemistry, or electrical engineering

Contact

For more information see <https://www.dhs.gov/science-and-technology/transportation-security-laboratory> or contact [Dr. Jeffrey Barber](#)