

**Opportunity Title:** Physics Post-Doctoral Research Participant -

Electromagnetic Studies of Explosives Lab (EMXLAB)

**Opportunity Reference Code:** TSL-EMXLAB-2015-2602

**Organization** U.S. Department of Homeland Security (DHS)

**Reference Code** TSL-EMXLAB-2015-2602

**How to Apply** A complete application package consists of:

- A complete application
- A resume
- Thesis/dissertation abstract
- Official Transcript

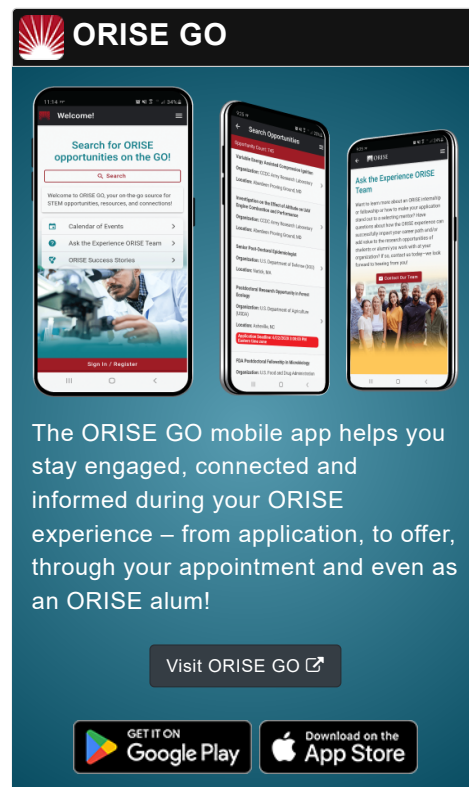
An official transcript is defined as a transcript issued by the Registrar's Office that includes all of the following:

- Official university markings such as the registrar's signature, university logo or stamp, letterhead or watermark, etc.;
- Name of the academic institution;
- Name of the student;
- For current students, the official transcript must include recent coursework and grades. For postgraduate candidates, the official transcript should include the graduation date and degree awarded.

If you have questions, send an email to [DHSed@orau.org](mailto:DHSed@orau.org).


Please list the reference code of this opportunity in the subject line of the email.


**Description** The Electromagnetic Studies of Explosives Laboratory (EMXLAB) has an opening for a Postdoctoral Research Participant. The proposed research is focused on determining the limits of detection of laser spectroscopy for trace detection. The goal is to address the limits of proposed standoff systems for the trace contamination amounts that recent research has identified for vehicle and personnel borne Improvised Explosive Devices (IED). In this instance, standoff can be from just centimeters to meters. The project as designed is not focused on any particular laser spectroscopy. We may start with Raman spectroscopy to confirm recently published data or an early approach may include determining relative cross sections as a function of excitation frequency or target amount, but this could be Raman, Laser Induced Fluorescence, QCL IR absorption, or any other non-destructive technique. The TSL Trace Laboratory will be providing quantitative samples and quality control for trace explosive amounts. The question is open ended, and we will work with the Trace group and the incoming participant to identify promising research approaches. The goal is not to develop a new technique, but to identify the limiting steps in using proposed laser spectroscopy for trace detection. Emphasis is on understanding and advancing the state-of-the-art in these technologies to improve security and operational implementation. There is also the opportunity to make Raman measurements and





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assign lines for new materials that have not previously been investigated.

The EMXLAB is well equipped to perform this research, and includes two optical tables, a Nd:YAG pumped dye laser that operates from 220-900 nm, a Nd:YAG pumped OPO laser that operates from 205-2250 nm, two QCL lasers, a 0.55 meter Horiba spectrometer with CCD camera, PMT, and solid state detector, halogen tungsten light source, sample compartment, a vacuum system with pulsed nozzle and QRFMS, assorted meters, lock-in amplifier, IR cameras, assorted optics, and a dedicated computer. The Participant will also have an eight core Macintosh Pro with 64 GB of RAM, with Spartan, Gaussian, and Mathematica installed.

For additional information about the Transportation Security Laboratory (TSL) Visiting Scientist Program Program, please visit <http://orau.gov/TransportationLabProgram/>

**Technical Questions:**

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The TSL Visiting Scientist Program is administered by the Oak Ridge Institute for Science and Education.

**Qualifications** Applicants must have received a doctoral degree within five years of the desired starting date in physics or a related field of study.

Applicants must be US Citizens.

**Eligibility Requirements**

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree received within the last 60 month(s).
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 👁)
  - **Computer, Information, and Data Sciences** (16 👁)
  - **Engineering** (27 👁)
  - **Physics** (16 👁)