Opportunity Title: Spectroscopic Imaging Postdoctoral Fellowship
Opportunity Reference Code: CCDC-AMC-2019-0001

Organization U.S. Department of Defense (DOD)

Reference Code CCDC-AMC-2019-0001

How to Apply Components of the online application are as follows:

- Profile Information
- Educational and Employment History
- Essay Questions (goals, experiences, and skills relevant to the opportunity)
- Resume (PDF)
- Transcripts/Academic Records - Click here for detailed information about acceptable transcripts
- Recommendation

Submitted documents must have all social security numbers, student identification numbers, and/or dates of birth removed (blanked out, blackened out, made illegible, etc.) prior to uploading into the application system.

If you have questions, send an email to ARMY-RDECOM@ORISE.ORAU.gov. Please list the reference code of this opportunity in the subject line of the email.

All documents must be in English or include an official English translation.

Description The Army's Combat Capabilities Development Command (CCDC) Aviation and Missile Center (AvMC), located at Redstone Arsenal, AL, is the Army's premier laboratory for developing, testing, and sustaining next generation aviation and missile technologies with specialized scientific and engineering laboratories. Applicants to this opportunity will perform research in a laboratory at a major research university performing basic research in close collaboration with one of AvMC's senior research scientists.

These projects will develop and explore novel spectroscopic imaging techniques, primarily in the terahertz and ultraviolet spectral regions. Each project will use one-of-a-kind spectrometers or imagers to perform state-of-the art research, as specified below. At least two applicants will be selected to perform research on the project(s) of their choosing:

- Project 1 will build on a recently invented method for mapping strain fields in opaque composite materials using embedded terahertz frequency metamaterials and spectroscopic ellipsometry. This innovative project will design metamaterials with variable strength break junctions so that regions of incipient composite failure may be detected and located and catastrophic damage may be prevented. This research will be performed at Duke University.
- Project 2 will enhance the performance of a one-of-a-kind high resolution terahertz frequency radar whose propagation distance may be adjusted by small changes in frequency in a manner that depends on the atmospheric dew point. This project will work to improve one of the highest resolution radars ever built to perform non-destructive testing of targets and to map terrain as a covert navigation aid. This research could be performed at Duke University, Rice University, Univ. of Colorado, AvMC, or the Army Research Lab in Adelphi, MD.
- Project 3 will explore a one-of-a-kind, high numerical aperture, all-reflective confocal microscope with sub-micron resolution throughout the ultraviolet and visible region. Research using this unique microscope will explore carrier excitation and relaxation dynamics using ultrafast emission and Raman spectroscopy of single nanoparticle semiconductors, plasmonic metals, and hybrid systems. This research will be performed at Rice University.
- Project 4 will explore a novel remote sensing methodology based on infrared/terahertz double

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resonance spectroscopy, first in a controlled laboratory setting and then at an outdoor laser test facility. This project will demonstrate for the first time the unprecedented molecular recognition specificity in trace gas clouds predicted by theoretical models. This research will be performed at the University of Central Florida in partnership with Ohio State University and the Pacific Northwest National Laboratory.

Appointment Length

This appointment is a twelve month research appointment, with the possibility to be renewed for additional research periods. Appointments may be extended depending on funding availability, project assignment, program rules, and availability of the participant.

Participant Benefits

Participants will receive a stipend to be determined by CCDC AvMC. Stipends are typically based on the participant's academic standing, discipline, experience, and research facility location. Other benefits may include the following:

- Health Insurance Supplement. *Participants are eligible to purchase health insurance through ORISE.*
- Relocation Allowance
- Training and Travel Allowance

Nature of Appointment

The participant will not enter into an employee/employer relationship with ORISE, ORAU, DOD, or any other office or agency. Instead, the participant will be affiliated with ORISE for the administration of the appointment through the ORISE appointment letter and Terms of Appointment.

Qualifications

Postdoctoral applicants must have a Ph.D. in experimental physics, optics, or electrical engineering with an emphasis in terahertz or optical spectroscopy and experience with imaging.

Areas of additional emphasis for each project are indicated below.
Project 1: Experience with electromagnetic modeling and design of metamaterials, possibly finite element modeling of strain.
Project 2: Experience with radar, including microwave, millimeter wave, and/or terahertz electronics.
Project 3: Experience with ultrafast spectroscopy, preferably also optical interferometry or confocal laser microscopy.
Project 4: Experience with ultrafast spectroscopy and molecular spectroscopy.

Eligibility Requirements

- **Degree:** Doctoral Degree received within the last 60 months or currently pursuing.
- **Discipline(s):**
  - **Engineering** (27 👁)
  - **Physics** (16 👁)
- **Age:** Must be 18 years of age