

Opportunity Title: Experimental and Computational Chemical Physics Applied to CBRN Objectives

Opportunity Reference Code: AFSTFP-AFIT-2018-B5871

Organization U.S. Air Force

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How to Apply A complete application package consists of:

- An application
- A current resume/CV
- Transcript(s) – For this opportunity, an unofficial transcript or copy of academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. **Official Transcripts for Junior applicants must be sent to ORAU directly from the academic institution, including graduation date and degree awarded, and must be provided before the fellowship can begin.** All transcripts must be in English or include an official English translation.
- Three references

Additional documents to be uploaded must be in PDF format in a standard typeface no smaller than 12-point font, 1" margins, and double-spaced.

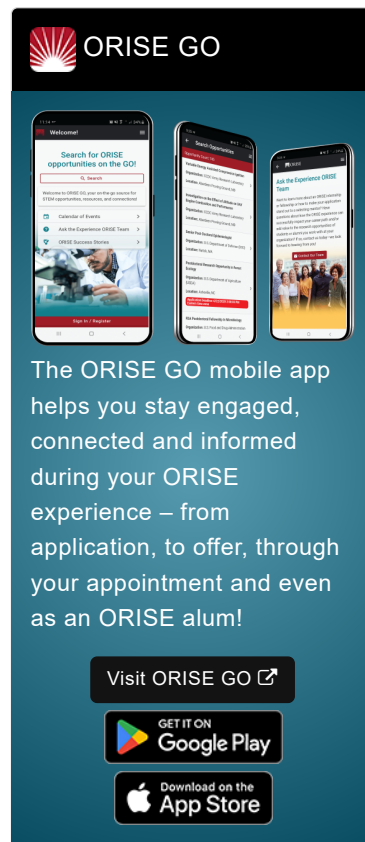
- Research Proposal (maximum of 10 pages)
- Dissertation Abstract (maximum of 1 page) *not required for Senior applicants*
- Summary of Previous and Current Research (maximum of 4 pages)
- List of Publications (maximum of 2 pages)

If you have questions, send an email to AirForceFellowships@orau.org. Please include the reference code for this opportunity in your email.

Description Experimental and theoretical methods of chemical physics are applied to SiC excitonics, positron spectrometry, and nuclear fuels spectrometry.

We create and employ quantum mechanics, especially density functional theory (DFT) and equation of motion coupled cluster (EOM-CC) and molecular dynamics (MD) methods, to model novel materials that are important to performance of future DOD information technology systems. We model positronic molecules and positrons in solid defects to predict positron spectrometry. We model optical and electrical properties of novel SiC nanomaterials for device applications in photonics and excitonics. We model uranium oxides and thorium oxides to interpret solid state and surface spectrometry of nuclear materials.

In our experimental effort we apply various positron spectrometry techniques to characterize uranium and thorium oxide single crystals. The positron spectrometry techniques that we employ are positron annihilation lifetime spectrometry (PALS), positron 2-gamma/3-gamma annihilation ratio spectrometry (PsARS), and simultaneous angular correlation of annihilation radiation (ACAR) and Doppler broadening of annihilation radiation (DBAR). Using the latter two techniques in combination with a slow positron beam permits surface characterization in addition to bulk



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solid-state characterization of single-crystal nuclear materials.

Research Advisor

Prospective applicants are encouraged to contact the opportunity's Research Advisor, listed below, to discuss the applicant's approach for responding to this research opportunity and to discuss their potential collaboration on the research opportunity.

Dr. Larry W. Burggraf, larry.burggraf@afit.edu, (937) 255-3636 Ext.4507

Qualifications Candidates must have a Ph.D., Sc.D., M.D., D.V.M., or academically equivalent research doctorate before beginning the fellowship.

Candidates must have U.S. citizenship. Research opportunities at AFRL, AFIT, and USAFA are open to U.S. citizens only. Qualified applicants will receive consideration without regard to race, creed, color, age, sex, or national origin.

Stipend rates are determined by Air Force officials, and are based on the applicant's academic and professional background. The fellow must show proof of health and medical insurance. Health insurance can be obtained through ORAU. The fellow will not enter into an employee/employer relationship with ORAU, USAF, or any other facility, office or agency. Instead, the participant will be affiliated with ORAU for the administration of the appointment through the ORAU appointment letter and Terms of Appointment.

For more information, please visit the Air Force STFP website at <https://AirForceFellowships.orau.org>.

- Eligibility Requirements**
- **Citizenship:** U.S. Citizen Only
 - **Degree:** Doctoral Degree.
 - **Discipline(s):**
 - **Chemistry and Materials Sciences** ([12](#))
 - **Computer, Information, and Data Sciences** ([16](#))
 - **Earth and Geosciences** ([21](#))
 - **Engineering** ([27](#))
 - **Environmental and Marine Sciences** ([12](#))
 - **Life Health and Medical Sciences** ([45](#))
 - **Mathematics and Statistics** ([10](#))
 - **Other Non-Science & Engineering** ([2](#))
 - **Physics** ([16](#))
 - **Science & Engineering-related** ([1](#))
 - **Social and Behavioral Sciences** ([18](#))