



Service Academies and ROTC Research Associates

<i>Potential Projects, 2024</i>			
Mentor Name(s)	Project Title	Project Synopsis	Level of Clearance Req. *S, TS, CNWDI?
Joel Kulesza	Nuclear Weapon Effect Nomograms	The student will develop tools and an analysis process that will permit informed and rapid assessments of complicated nuclear-weapon-effects situations. The task relies on the Python programming language (which will be taught if not already known) and certain undergraduate level calculus and linear algebra. A physics understanding will be helpful but is not strictly necessary. The work product scales easily so students that are available for relatively short appointments will be able to produce something notable. The programming and analysis skills learned will be transferable to other tasks.	S/CNWDI

Beth Lindquist, Laurie Triplett	Nuclear Weapon Effects and Data Science	Nuclear explosions have unique effects on their environment (surrounding structures, electronics, biological organisms, etc.). We can use computational tools to make predictions about nuclear weapon effects for scenarios of interest. For this project, we will use machine-learning and data science tools to interpret and discover patterns in nuclear weapon effects data. The mentee can expect an introduction to the physics of nuclear weapons as well as machine learning and data science.	S/CNWDI
Lucero, Kimberly	Network Monitoring, Configuration Changes, and Troubleshooting Project	The student will learn all about our network and how it works, providing them a great learning experience. We are implementing a new monitoring tool (Solarwinds) and the student will help configure the switches using SNMP strings and also learning how network reporting works. They will learn our core infrastructure and how everything works to support the mission of the laboratory. They will learn our complex infrastructure and how we fix any issues that arise.	S/CNWDI
Lucero, Kimberly	Network Segmentation project	Identify Operational Technologies (OT) and Industrial Control Systems (ICS) on the network and work with the customers to migrate the system to a secure enclave on the network.	S/CNWDI

Lucero, Kimberly	Application and Server monitoring project	Assist in configuring applications and servers in the new monitoring solution. Configure the system to integrate with the Service Now ticketing system and Everbridge alerting system. The student will also engage with other divisions to ensure their systems are being monitored and delivering the capability required to ensure maximum uptime and availability.	S/CNWDI
Lucero, Kimberly	New computer and storage equipment install and configuration	The student will assist in deploying and configuring the additional capacity into existing computer and storage solutions.	S/CNWDI
Danielle Mares	Military Stockpile and Operations - Weapons Engineering Science Technology	The Military Stockpile and Operations group seeks an undergraduate student to help develop their Weapons Engineering Science Technology Education Center (WESTEC). MSO can provide hands on experience for this student to learn about LANL weapons systems as they help us develop hands on training classes. This student would be introduced to the role LANL plays in collaborating with the Joint Nuclear Weapons Publications System (JNWPS) for Technical Publications (TP). This student will have the opportunity to help coordinate the resolution and official LANL positions for Unsatisfactory Reports (URs).	TS / CNWDI

Wilbert Weijer	Turbulence at the sea floor and its implications for sedimentation	Particulate matter, including biogenic detritus ('marine snow'), microplastics, and fluvial and aeolian sediments, is ubiquitous in the ocean. Most of these particulates end up on the sea floor, where they feed or pollute benthic ecosystems, and form sedimentary deposits. The process of sedimentation is complex, but depends largely on the degree of turbulence in the bottom boundary layer. In this project we will use matlab or python to analyze the characteristics of bottom stress in a range of ocean models. We will look at spatial distribution of mean bottom stress, and the characteristics of its variability. We will also look at how these features change over time in the historical period from 1958 to 2018. In particular, we are interested in so-called benthic storms, or short-lived periods of enhanced turbulence at the sea floor, caused, for instance, by ocean eddies. Our aim is to interpret this information in terms of sediment fluxes to the bottom, for instance by comparing with published maps of sediment thickness and grain size distributions on the sea floor.	None

Dr. Corey Gerving	Modal Analysis	As part of component analysis, vibrational measurements are taken at varying amplitudes and frequencies. This data is archived until it can be analyzed for trends. This project will import component vibrational mode data, conduct numerous numerical computations, produce summary output, and develop conclusions based on the results.	S/CNWDI
Jasper, Jon Kigar	Weapons Project Management - Equipment and Construction	The management of equipment installation and construction projects at the laboratory is critical to meet Pit Mission deliverables and to expand our production capacity. Many projects resemble combat/war campaigns: the planning, logistical support structure, leadership, and the iron law of first contact (all plans are worthless once project execution begins). Through this internship, students will be introduced to the laboratory and will learn the lab's core missions, lab culture, and actually contribute to work being done. Projects & programs are the main delivery vehicle for nearly everything the US Government does; students in this internship will learn important principles to apply to their later work as a soldier/sailor/airman, and beyond when/if they leave the services.	S/CNWDI

Jianxin Zhu	Digital Quantum Simulations of Driven Quantum Matter	Using quantum hardware like IBM quantum to study quantum phases with a time-dependent electric or magnetic field	None
Jose Tabarez & Art Barnes	HTCM	Evaluation of E1 and E3 effects from HEMP on transmission system	TS/CNWDI
Art Barnes & Jose Tabarez	PeMS	Harmonic analysis on unbalanced distribution systems	TS/CNWDI
Derek Armstrong	Parallel Optimization for Expensive Simulations	<p>Evaluation of optimization strategies for system design to meet specified objectives.</p> <p>With a particular focus on situations where the simulations (or objective function) are very computationally expensive and only a relatively few number (100s) of simulation evaluations are possible. The optimization strategies will be aided by quick running surrogates that can predict simulation output. Evaluate different surrogates (such as Gaussian Processes) and sampling strategies (i.e., design space search strategies) for parallel optimization applied to system design.</p>	S/CNWDI

Steven Senator, Hunter Easterday, Anna Mataleena Pietarila Graham, Ben Santos	Trinity Job Scheduling Analysis, Simulation and Visualization	For this project, the student will run analysis, simulations, and visualization tools for a High Performance Computing workload management project. The data for these experiments and simulations will be from the Trinity supercomputer cluster, similar to prior work on other systems. These data were generated on Trinity's management plane. The work product will be a presentation, poster and visualization of these data.	TS/CNWDI
Alex Cleveland	Explosives Materials Project: TATB and PBX 9502	This internship focuses on cradle-to-grave applications of TATB. We are working to synthesize TATB using environmentally friendly conditions, formulate the material to PBX 9502, then press and test the newly formulated material. The environmentally friendly synthesis pathway allows for the continuous production of TATB and eliminates hazardous materials that harm the environment and the operator. We are also looking at new binders for TATB formulations to replace hazardous PFAS-based binder systems that will lead to new PBX formulations.	S/CNWDI
Jonathan Fischer	Nuclear and non-nuclear facility upgrades project	This internship will consist of nuclear and non-nuclear facility upgrades, mainly HVAC replacements and services.	S/CNWDI

David Miranda, Arnold Guevara, Jonathan Theye	Security Vulnerability Project	What we offer is a project in nuclear security vulnerability analyses. These analyses are complex in that the objective of the project is to develop protection measures that are effective, repeatable and enable nuclear operations. The project participant would gain invaluable experience in facility and asset characterization, threat capability, courses of action, recommendation development and risk management. To make recommendations will require familiarization and use of threat modeling and knowledge of response plans.	S/CNWDI
Duane Lopez	Systems Engineering / Requirements Engineering Project: Validation, Traceability, Compliance, Weapons Design Lifecycle, an Artifacts	The project is associated with Weapon programs, legacy and new. The selected individual focus on Systems Engineering with an emphasis on Requirements Engineering. He/She will learn about requirement validation, traceability, compliance, the weapon design lifecycle, the artifacts that are produced and maintained throughout the lifecycle, and the stakeholders along with their roles and responsibilities. If the individual is cleared, he/she will learn about the form, fit, and function of the weapon systems and components designed at LANL, and participate in conversations between LANL, NNSA, and the DOD service organizations.	S/CNWDI

Tim Goorley	Nuclear Weapons Effects	Review historic reports and photographs of actual above ground nuclear tests to consider implications of nuclear weapons detonations for today's military forces.	S/CNWDI
Nathan Hart	Special Nuclear Material Characterization	When analyzing subcritical systems, neutron multiplicity is used to characterize the sample's special nuclear material (SNM). Recently-added tools at our disposal provide a new way to assess multiplicity measurements. The student would be performing a study of this new method by running advanced scientific computer codes on LANL's high performance computing systems to determine its potential to improve our global security work.	S/CNWDI
Quaye Quartey	Plutonium Science Safeguards Project	TA-55 Facility Operations' Mission is to provide Plutonium Science and Manufacturing, and their tenants, with Safe, Secure, Compliant and Available Facilities. We strive for continuous improvement by fostering a learning organization with strong values for safety, people and cost effectiveness. Projects with this directorate would involve evaluating facilities operations planning for safety, security, and compliance issues and seeking to improve the issues faced within these facilities.	S/CNWDI

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Mark Richard Anthony		ALDPI has the 30PPY mission which would be very interesting to a student who will benefit from the Mega project experience my directorate can offer.	S/CNWDI
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