Christopher L. Brady

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Research Interests

- Inverse uncertainty quantification (UQ) in radiation transport models
- Sensitivity analysis, calibration, validation, and UQ for predictive models
- Machine learning applications to nuclear science
- Monte Carlo simulations
- Criticality safety analysis

Education

PhD in Nuclear Engineering   **expected 2026**
North Carolina State University at Raleigh, NC, USA   GPA: 3.95/4.0
Thesis: *"Inverse Uncertainty Quantification in Radiation Transport Models with Machine Learning"*

MS in Nuclear Engineering   **2023**
North Carolina State University at Raleigh, NC, USA   GPA: 3.8/4.0
Thesis: *"Criticality Safety Analysis of a Spiral Plate Heat Exchanger for Molten Salt Reactors"*

BS in Nuclear Engineering   **2007**
United States Military Academy at West Point, NY, USA   GPA: 3.06/4.0

Professional Experience

North Carolina State University

Graduate Student   **2020-Present**
North Carolina State University, Raleigh, NC

- Research focused on developing scientific machine learning methodologies for inverse UQ of nuclear data in radiation transport simulations under the Consortium of Nuclear Forensics (CNF).
- Collaborated with GE Hitachi on MCNP criticality safety analysis of a molten salt spiral plate heat exchanger.
- Completed projects involving modular Bayesian inverse UQ on simulated nuclear data; sensitivity analysis and UQ in Nusselt number prediction models; reinforcement learning optimization of fuel assemblies; MCNP criticality safety analysis of a plutonium storage facility; fuel assembly burn-up simulations using CASMO/SIMULATE; molten salt reactor materials considerations; heat transfer considerations in TRISO fuel pebbles.
- Collaborated on the design of a molten salt crucible for thermal property characterization with ultrafast laser spectroscopy. Principally responsible for design of crucible, vacuum chamber, furnace, and instrumentation.

Research Assistant   **Summer 2024**
Oak Ridge National Lab, Oak Ridge, TN

- Performed global sensitivity analysis of bulk Plutonium production responses to a variety of reactor operating conditions using a large collection of high fidelity reactor simulations.

Department of the Army Civilian

Training Plans Specialist   **2018-2019**
Grafenwoehr Training Area, Germany

- Member of a three-person team responsible for the planning and oversight of multinational training exercises across Eastern Europe.
- Primary planner for multiple airborne airfield seizures across four countries involving over 4,000 Soldiers. Negotiated land usage agreements with partner nation representatives and coordinated required resources.
- Created a digital information system to coordinate subordinate unit priorities, track resource allocation, and synchronize events across the entire organization.

United States Army

Special Forces Unit Deputy Director   **2016-2017**
Eglin Air Force Base, FL and Afghanistan
- Directed a multidisciplinary staff and oversaw the training and resourcing of 6 Special Forces Teams; managed a budget exceeding $100K; managed the facilities and life support requirements of a 500-person camp.
- Principal adviser to Afghan National Army Special Operations unit tasked with overseeing all special operations in South, Southwest and West Afghanistan; led a multinational advisory team to develop operational, intelligence, and logistical capability while synchronizing over 100 special operations across 11 provinces.
- Lead planner for over 25 training exercises focused on special operations core activities; planned a Southern Command focused pre-mission training exercise incorporating land, sea and air infiltration platforms, live fire and sim-munition exercises, ISR and close air support (CAS) enablers, and live role players.

Future Operations Planner   **2015-2016**
Camp Integrity, Kabul, Afghanistan
- Action officer for planning the deliberate move of NATO Special Operations Headquarters for Afghanistan from Camp Integrity, Kabul to Bagram Airfield with uninterrupted command and control of ongoing operations.
- Action Officer for planning a major organizational restructuring of Special Operations Forces across Afghanistan.
- Coordinated the Pre-Deployment Site Survey and personally escorted incoming General Officers and command team to engagements at multiple locations across Afghanistan.
- Wrote, staffed and distributed over 150 organizational directives; created a digital database to quickly search and recover all directives across the organization.

Special Forces Team Leader   **2013-2015**
Eglin Air Force Base, FL and Afghanistan
- Commanded a 12-person special forces team with a direct-action focus and maritime infiltration capability; conducted combat operations across Southern Afghanistan, leading over 60 combat recon patrols, 6 high-risk operations, 40 key leader engagements and 20 district town hall meetings.
- Advised an Afghan National Army Brigade, 2 Afghan Local Police units, and 2 Afghan Uniformed Police units; targeted operations led to a significant reduction in attacks within the area compared to previous years.
- Led the team through Special Forces Advanced Urban Combat Course, external evaluations, and Pre-Mission Training; team certified for deployment to Afghanistan.

Deputy Operations Manager   **2010-2011**
Joint Base Elmendorf Richardson, AK
- Advised the Operations Manager in all matters pertaining to operations, organization, and training; directed personnel and efforts in the preparation of all organizational directives, plans, reports, and briefings; coordinated fixed and rotary wing assets in support of airborne operations.
- Developed, staffed, and distributed unit tactical standard operating procedures (SOP) and training support SOPs; clarified responsibilities and procedures that enhanced unit effectiveness and mission accomplishment.
- Created multiple digital information systems to track progress on training, plans, orders, taskings, & resource allocations; synchronized enterprise short / long-range calendars; identified & resolved training conflicts.

Unit Deputy Director   **2009-2010**
Joint Base Elmendorf Richardson, AK and Afghanistan
- Managed logistics, maintenance, administration, property accountability, operational readiness, and general life support for a 285-person forward operating base as deputy director of a 131-person unit deployed to Afghanistan; served as unit director for 2 months in the director's absence.
- Led and managed a task force of over 200 US and Afghan security forces to secure election sites in Terwa District; led 17 combat patrols, conducted 48 Key Leader Engagements, and participated in 34 district town hall meetings.

- Oversaw the execution of 17 contracts as the Contracting Office Representative; managed all pay agent activities overseeing the transfer of over $50K;
- Developed forecasting model that predicted an impending critical fuel shortage early enough to avoid operational interruptions; received ¿ 140 tons of fuel through aerial parachute delivery.

Platoon Leader 2008-2009

Joint Base Elmendorf Richardson, AK and Afghanistan

- Trained, managed, and tactically employed a 39-person Infantry Platoon. Led the platoon during combat operations in support of Operation Enduring Freedom in Paktika Province, Afghanistan.

Conference Proceedings

1. **Brady, C.** & Wu, X., (2024), Improving the Quality of Nuclear Data for Radiation Transport Simulations in Nuclear Forensics Applications, In: Proceedings of NNSA UPR, College Station, TX, USA, Canada, June 4-6
2. **Brady, C.**, Murray, W., Moss, L., Zino, J. Saito, E. & Wu, X., (2023), Criticality Safety Analysis of a Spiral Plate Heat Exchanger for Molten Salt Reactors, In: Proceedings of M&C-2023, Niagara Falls, Canada, August 13-17

Refereed Journal Publications

1. **Brady, C.**, Murray, W., Moss, L., Zino, J. Saito, E. & Wu, X., (2024). Design Considerations and Monte Carlo Criticality Analysis of Spiral Plate Heat Exchangers for Molten Salt Reactors. Progress in Nuclear Energy, 173:105266
2. Akins, A., Furlong, A., Kohler, L., Clifford, J., **Brady, C.**, Alsafadi, F., and Wu, X. (2024). ARTISANS – Artificial Intelligence for Simulation of Advanced Nuclear Systems for Nuclear Fission Technology. Nuclear Engineering and Design, 423:113170

Technical Skills

- **Languages:** Python • MATLAB • R • Mathematica
- **Nuclear Codes:** MCNP6.2 • OpenMC • CASMO/SIMULATE
- **Software:** Microsoft Office Suite • Linux • LaTeX

Training and Awards

Ranger School • Special Forces Language School (Urdu) • Special Forces Advanced Urban Combat Course • Special Forces Qualification Course • Special Forces Officer Course • Detachment Leaders Course • Survival, Evasion, Resistance, and Escape - High Risk Level C • Maneuver Captain's Career Course • Infantry Basic Officer Leader Course • Airborne Course • Air Assault Course

Bronze Star Medal (3) • Joint Service Commendation Medal • Army Commendation Medal (2) • Army Achievement Medal (2) • Combat Infantryman Badge • Expert Infantryman Badge