

Christopher L. Brady

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Research Interests

- Bayesian inverse uncertainty quantification (UQ) in nuclear data for radiation transport models
- Data assimilation, sensitivity analysis, calibration, validation, and UQ for nuclear models
- Machine learning applications to nuclear science
- Criticality safety analysis

Education

PhD in Nuclear Engineering	expected 2026
North Carolina State University at Raleigh, NC, USA	GPA: 3.9/4.0
Thesis: “ <i>Inverse Uncertainty Quantification of Nuclear Data in Radiation Transport Models</i> ”	
MS in Nuclear Engineering	2023
North Carolina State University at Raleigh, NC, USA	GPA: 3.9/4.0
Thesis: “ <i>Criticality Safety Analysis of a Spiral Plate Heat Exchanger for Molten Salt Reactors</i> ”	
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
<i>North Carolina State University, Raleigh, NC</i>	
<ul style="list-style-type: none">• 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 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
<i>Oak Ridge National Lab, Oak Ridge, TN</i>	
<ul style="list-style-type: none">• 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
<i>Grafenwoehr Training Area, Germany</i>	
<ul style="list-style-type: none">• 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.**, Asadchykh, S., Xie, Z. & Wu, X., (2025), Preliminary Results on Bayesian Inverse UQ for OECD/NEA WPNCs Subgroup 14 Benchmark Exercise for Error Recovery and Experimental Coverage, In: Proceedings of M&C-2025, Denver, CO, USA, April 27-30 (*accepted*)
2. **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, June 4-6
3. **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

- **Programming:** Python • MATLAB • R • Mathematica
- **Nuclear Codes:** MCNP • Serpent • OpenMC • CASMO/SIMULATE
- **Software:** Microsoft Office Suite • Linux • L^AT_EX

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