

Gil Rubia

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EDUCATION

North Carolina State University | Ph.D. Nuclear Engineering | Raleigh, NC

GPA: 3.94 | August 2026 – Present

Virginia Commonwealth University | B.S. Mechanical Engineering, Nuclear Concentration | Richmond, VA

GPA: 3.94 | May 2026

RESEARCH EXPERIENCE

Undergraduate Researcher | Nuclear Security and Nonproliferation Laboratory, Virginia Commonwealth University | Richmond, VA | Aug 2024 – Aug 2026

- Developed **AlphaSpectraCNN**, a 1-D convolutional neural network (CNN) trained exclusively on MCNP6 Monte Carlo synthetic spectra that achieves **0.95% mean absolute error (MAE)** on experimental alpha spectra, enabling automated radionuclide identification and activity-fraction quantification
- Designed and validated an MCNP6 silicon-surface barrier detector transport model against experimental alpha-spectroscopy measurements; built a modular Python preprocessing pipeline—parsing MCNP6 F8 tally outputs, performing peak-matched energy calibration, rebinning to 1024-bin grids, and applying Gaussian smoothing—to generate reproducible labeled spectral databases across variable detector geometries and source conditions
- Scaled model development to VCU's HPRC Athena HPC cluster (SLURM); produced seven publication-quality figures for a journal manuscript submitted to *Radiation Measurements*

Undergraduate Researcher | SurFACE Laboratory, Virginia Commonwealth University | Richmond, VA | Jul 2023 – May 2024

- Fabricated core-shell powder compacts via HiPIMS magnetron sputtering; achieved a chromium shell thickness of ~52–56 nm confirmed by FIB cross-section analysis and EDX line scan
- Designed and executed systematic sintering experiments comparing conventional heating-rate and high heating-rate (HHR) induction furnace conditions at; core-shell HHR compacts achieved the highest sintered density ratio—a ~13% relative improvement in densification
- Performed comprehensive materials characterization using SEM/EDX analysis, metallographic preparation, and quantitative image analysis (ImageJ) to evaluate porosity trends, neck formation, and microstructural evolution
- Designed and fabricated a custom vacuum casting apparatus achieving a \$2,000 cost reduction using SolidWorks CAD and additive manufacturing

INDUSTRY EXPERIENCE

Physical Engineering Sciences R&D Intern | Afton Chemical | Richmond, VA | May – Aug 2024

- Developed and documented a standardized wear-measurement methodology subsequently adopted company-wide by the engineering sciences team; established repeatable test protocols and data reporting formats
- Executed tribological testing and surface metrology characterization of materials under controlled conditions; analyzed performance data to identify wear patterns and failure mechanisms
- Authored a comprehensive technical report documenting experimental methodology, results, and strategic recommendations; presented findings to a multidisciplinary engineering team and proposed next-phase research initiatives

PEER-REVIEWED JOURNAL PUBLICATIONS

- Rubia, G., Khatab, M., and Goddard, B. (2026). AlphaSpectraCNN: A Domain-Adaptive Convolutional Neural Network for Automated Radionuclide Identification and Activity Fraction Quantification from Alpha Particle Spectra. *Radiation Measurements* (Under review, RADMEAS-D-26-00249).

CONFERENCE PROCEEDINGS

- Rubia, G., Khatab, M., and Goddard, B. (2026). Convolutional Neural Network for Radionuclide Identification and Activity Quantification from Alpha Spectra. In *Proceedings of the 2026 ANS Student Conference*, College Station, TX, USA, Apr. 16–19.
- Rubia, G., Khatab, M., and Goddard, B. (2026). Convolutional Neural Network for Radionuclide Identification and Activity Quantification from Alpha Spectra. In *Proceedings of the 2026 Waste Management Symposia (WM2026)*, Phoenix, AZ, USA, Mar. 8–12. (poster)
- Rubia, G., Khatab, M., and Goddard, B. (2026). Transport Model Simulations of a Silicon-Surface Barrier Detector for Predictions of ^{232}U Activity Concentration. In *Proceedings of the 2026 ANS Student Conference*, Albuquerque, NM, USA, Apr. 3–5.
- Rubia, G., Lopez, C., and Castano, C.E. (2024). Sintering Kinetics of Compacted Core-Shell Nickel-Chromium Powder. In *Proceedings of The Minerals, Metals & Materials Society (TMS 2024)*, Orlando, FL, USA, Mar. 3–7.

TECHNICAL SKILLS

Nuclear & Simulation: MCNP6, MOOSE, SAM, CAFTA, InterSpec

Machine Learning: PyTorch, scikit-learn

Programming & Scientific Computing: Python (NumPy, SciPy, pandas, Matplotlib), SLURM, MATLAB

Experimental Methods: Alpha spectroscopy, NaI gamma spectrometry, SEM/EDX microscopy, metallographic preparation, tribological testing, surface metrology

Design & Manufacturing: SolidWorks, HiPIMS magnetron sputtering, 3-D printing / additive manufacturing

HONORS & AWARDS

- NC State University Provost's Doctoral Fellowship (2026)
- Goodnight Doctoral Fellowship, NC State University (2026)
- Roy G. Post Scholarship, Waste Management Symposia Foundation (2026)
- NNSA-IMPACT Scholarship, National Nuclear Security Administration (2025–2026)
- NRC MSIG Scholarship, U.S. Nuclear Regulatory Commission (2024–2026)
- VCU Deans' Scholarship, Virginia Commonwealth University (2022–2026)
- C. Kenneth and Dianne Wright Merit Scholarship in Engineering, Virginia Commonwealth University (2022–2026)
- Tau Beta Pi Engineering Honor Society (elected 2024)

PROFESSIONAL MEMBERSHIPS

American Nuclear Society (ANS) • The Minerals, Metals & Materials Society (TMS) • Tau Beta Pi Engineering Honor Society