Hunter Ratliff

Nuclear Engineer, Researcher, and Code Developer

32 years old

Bergen, Norway

available upon request

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linkedin.com/in/hunter-ratliff

United States citizenship

Norwegian residence

Skills

Languages

- English ●●●●●
- Norwegian ●●○○○

Programming

- Python, Jupyter ●●●●●
- Fortran (IV/77/90/08) ●●●●○
- MATLAB ●●●●○
- C++ ●●○○○
- CMD/Bash scripting ●●●○○
- Git, GitHub ●●●●○

Nuclear / Scientific

- PHITS, MCNP6/X/5 ●●●●●
- DCHAIN (activation) ●●●●●
- SCALE/ORIGEN ●●○○○
- ROOT ●●●○○

Other

- LaTeX, TikZ, MetaPost ●●●●●
- Microsoft Office Suite ●●●●●
- DOS/Unix CLI, SSH ●●●●○
- HPC (MPI/OpenMP, Slurm) ●●●●○
- HTML, CSS, Markdown ●●●○○

Summary

Hunter is a nuclear engineer with experience in radiation transport simulations using PHITS and MCNP, activation and decay calculations, scientific code development in Python and Fortran, neutron and gamma-ray detection and imaging, space radiation modeling, cosmic-ray-like ion accelerator experiments, and analysis and visualization of large experimental and modeled datasets. He also has interests in radiation protection and shielding, radiotherapy, and radioisotope production.

Experience

Oct. 2024 – present — **Researcher** — Western Norway University of Applied Sciences (HVL)
Modeling relevant to proton therapy and associated range verification and imaging detection systems for experiment design and AI training; software tool development; continuation of work outlined below.

Aug. 2021 – Aug. 2024 — **Postdoctoral Fellow** — Western Norway University of Applied Sciences (HVL)
Development, Monte Carlo modeling, experimental deployment, and data analysis of a prototype detector that is sensitive to and can image neutrons and gamma rays characteristic of those produced in patients receiving proton radiotherapy (for beam range verification).

Apr. 2019 – Aug. 2021 — **Postdoctoral Fellow** — Japan Atomic Energy Agency (JAEA)
Member of the PHITS particle transport code team as the lead developer of the DCHAIN-PHITS activation, buildup, burnup, and decay code coupled to PHITS. Implemented modern decay and cross section libraries, uncertainty propagation, reaction tracking, tetrahedral and 3-D grid mesh geometry support, performance improvements, new input/output features, and more into DCHAIN. Authored the user guide/manual and assisted with user support for DCHAIN-PHITS.

May 2015 – Feb. 2019 — **Graduate Research Assistant** — The University of Tennessee, Knoxville
Conducted accelerator experiments emulating radiation conditions within spacecraft, characterized resulting neutron spectra, and modeled the experiments in MCNP. Also modeled the Martian surface's radiation environment from galactic cosmic rays in MCNP and PHITS and modernized the CLSQ Fortran IV decay analysis code in Python.

Aug. 2015 – Dec. 2016 — **Graduate Teaching Assistant** — The University of Tennessee, Knoxville
Lead laboratory experience portions of courses within the Nuclear Engineering Department, further developing skills in troubleshooting radiation detectors and associated pulse chain equipment, teaching, communication, and providing constructive guidance to students.

Education

May 2015 – Dec. 2018 — **Ph.D. in Nuclear Engineering** — The University of Tennessee, Knoxville
Grade: A (4.0/4.0)
Organized, conducted, and analyzed data from 400 hours of beam experiments at the NASA Space Radiation Laboratory in Brookhaven National Laboratory, characterizing the neutron environment within (emulated) spacecraft bombarded by cosmic rays using established time-of-flight and newly developed deconvolution techniques. This required substantial scripting to filter and process the raw data into spectra and to generate, run, and process MCNPX/6 models of the experiment. Further detailed dose analyses were explored to draw conclusions on optimal spacecraft shielding materials, thicknesses, and configurations to minimize risk to astronauts.

May 2015 – Dec. 2016 — **M.S. in Nuclear Engineering** — The University of Tennessee, Knoxville
Grade: A (4.0/4.0)
Designed and conducted MCNP6 simulations of the galactic cosmic ray-induced radiation environment on the Martian surface, modeling the individual particle spectra and dosimetric data as seen by the Radiation Assessment Detector onboard the Mars Curiosity Rover.

Aug. 2011 – May 2015 — **B.S. in Nuclear Engineering** — The University of Tennessee, Knoxville
Grade: A (3.94/4.0)
Designed a plate-fuel research reactor relevant to nuclear propulsion fuels testing and modeled its criticality and shielding in MCNP for a proposed critical experiment facility as a final design project.

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Specialties

- Programming and scripting
- Monte Carlo methods/simulation
- Data analysis and visualization
- Documentation and presentation
- Nuclear data processing/formatting
- Web design/online tool development

Professional Bio

Hunter studied for a BS in nuclear engineering at the University of Tennessee from 2011 to 2015 and, when presented with interesting space radiation research opportunities, continued with his graduate studies at UTK, earning a PhD in late 2018. Afterward, he moved to Japan in early 2019 to join the PHITS code development team at the Japan Atomic Energy Agency. In 2021 he then moved to Norway to research neutron/γ-ray imaging for proton radiotherapy at The Western Norway University of Applied Sciences.

Personal Bio

After living his entire life in the US state of Tennessee, Hunter made his first trip abroad: moving to Japan. Since, he has wholly enjoyed exploring the scenery, cultures, and languages everywhere he has lived. New experiences in travel, cuisine, and forces of nature have truly opened his eyes to the staggering variety of experiences the world has to offer on his now-international journey through life.

Other

- Norway category B driving license
- Eagle Scout, Boy Scouts of America
- Uni. pedagogy education HVL/ALU
- Degrees, certificates, and any other documents available upon request

Selected Publications (full list: hratliff.com/publications/)

2024 **The Backscatter Gating method for time, energy, and position resolution characterization of long form factor organic scintillators**
H.N.Ratliff, T. Kögler, G. Pausch, L.M. Setterdahl, K. Skjerdal, J. Turko, and I. Meric, J. Instrum., 19, P07002, Jul. 2024.

2024 **Characterization of organic glass scintillator bars and their potential for a hybrid neutron/gamma ray imaging system for proton radiotherapy range verifcation**
J. Turko, R. Beyer, A.R. Junghans, I. Meric, S.E. Mueller, G. Pausch, H.N.Ratliff, K. Römer, S.M. Schellhammer, L.M. Setterdahl, S. Urlass, A. Wagner, and T. Kögler, J. Instrum., 19, P01008, Jan. 2024.

2024 **Recent improvements of the Particle and Heavy Ion Transport code System – PHITS version 3.33**
T. Sato, Y. Iwamoto, S. Hashimoto, T. Ogawa, T. Furuta, S. Abe, T. Kai, Y. Matsuya, N. Matsuda, Y. Hirata, T. Sekikawa, L. Yao, P. Tsai, H.N. Ratliff, H. Iwase, Y. Sakaki, K. Sugihara, N. Shigyo, L. Sihver, and K. Niita, J. Nucl. Sci. Technol., 61:1, 127-135, Jan. 2024.

2023 **Development of scalable deconvolution methods for determining secondary target neutron yields from dual-thick-target cosmic-ray ion accelerator experiments**
H.N.Ratliff, N.A. McGirl, M.R. Beach, L.A. Castellanos, M.S. Clowdsley, L.H. Heilbronn, C. La Tessa, J.W. Norbury, A. Rusek, M. Sivertz, A.P. Srikrishna, H. Wang, and C. Zeitlin
Nucl. Instrum. Methods Phys. Res., B, 544, 165121, Nov. 2023.

2023 **Double-differential primary target neutron yields from dual-thick-target proton and heavy ion accelerator experiments**
H.N. Ratliff, N.A. McGirl, M.R. Beach, L.A. Castellanos, M.S. Clowdsley, L.H. Heilbronn, C. La Tessa, J.W. Norbury, A. Rusek, M. Sivertz, A.P. Srikrishna, H. Wang, and C. Zeitlin
Nucl. Instrum. Methods Phys. Res., B, 542, 87–94, Sep. 2023.

2023 **A hybrid multi-particle approach to range assessment-based treatment verification in particle therapy**
I. Meric, E. Alagoz, L.B. Hysing, T. Kögler, D. Lathouwers, W.R.B. Lionheart, J. Mattingly, J. Obhodas, G. Pausch, H.E.S. Pettersen, H.N. Ratliff, M. Rovituso, S.M. Schellhammer, L.M. Setterdah, K. Skjerdal, E. Sterpin, D. Sudac, J.A. Turko, and K.S. Ytre-Hauge
Scientific Reports, 13, 6709, Apr. 2023.

2020 **Modernization of the DCHAIN-PHITS activation code with new features and updated data libraries**
H.N. Ratliff, N. Matsuda, S. Abe, T. Miura, T. Furuta, Y. Iwamoto, T. Sato
Nucl. Instrum. Methods Phys. Res., B, 484, 29–41, Dec. 2020.

2017 **Simulation of the GCR spectrum in the Mars Curiosity Rover's RAD detector using MCNP6** *H.N. Ratliff, M.B.R. Smith, and L.H. Heilbronn*
Life Sciences in Space Research, 14, Suppl. C, 43–50, Jun. 2017.

2017 **The radiation environment on the surface of Mars - Summary of model calculations and comparison to RAD data**
D. Matthiä, D.M. Hassler, W. de Wet, B. Ehresmann, A. Firan, J. Flores-McLaughlin, J. Guo, L.H. Heilbronn, K. Lee, H.N. Ratliff, R.R. Rios, T. Slaba, M.B.R. Smith, L.W. Townsend, T. Berger, G. Reitz, R.F. Wimmer-Schweingruber, and C. Zeitlin, Life Sci. Space Res., 14C, 18–28, Jun. 2017.

References

available upon request