Hunter Ratliff

Nuclear Engineer,
Code Developer

- 27 years old
- Tokai, Ibaraki, Japan
- available upon request
- hratliff.com
- contact@hratliff.com
- United States citizenship

Skills

Languages

🇺🇸 English	● ● ● ● ●
🇯🇵 Japanese	● ● ○ ○ ○

Programming

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

Nuclear / Scientific

MCNP6/X/5, PHITS	● ● ● ● ●
ROOT	● ● ● ● ○
SCALE/ORIGEN	● ● ● ○ ○
Geant4	● ● ○ ○ ○

Other

LaTeX, TikZ, MetaPost	● ● ● ● ○
Microsoft Office Suite	● ● ● ● ○
Windows local systems	● ● ● ● ●
Unix remote systems	● ● ● ● ○
HTML, CSS, Markdown	● ● ● ● ○

Summary

Hunter is a nuclear engineer whose experience is predominantly with radiation transport simulations using MCNP and PHITS, code development in Python and Fortran, hadron accelerator experiments, analysis and visualization of large datasets, activation and decay calculations, and space radiation modeling. He also has interests in radiation protection and shielding, radioisotope production, and nuclear medicine.

Experience

Apr. 2019 – present
Postdoctoral Fellow — Japan Atomic Energy Agency (JAEA)
Member of the PHITS particle transport code development team, serving as the current lead developer of the DCHAIN-PHITS activation, buildup, burnup, and decay code coupled to and distributed alongside 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 assists 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. Other projects included modeling the Martian surface's radiation environment from galactic cosmic rays and solar particle events in MCNP and PHITS and modernizing 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.

May 2014 – Aug. 2014
Engineering Student Intern — Oak Ridge National Laboratory
Ran, debugged, and composed documentation for an in-house computational fluid dynamics code written in C++ and Fortran.

Education

May 2015 – Dec. 2018
Ph.D. in Nuclear Engineering — The University of Tennessee, Knoxville
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
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
Designed a reactor 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 nuclear engineering at the University of Tennessee from 2011 to 2015 at an undergraduate level and, when presented with very interesting space radiation research opportunities, continued on with his graduate studies at UTK, graduating at the end of 2018. Afterward, he moved to Japan in early 2019 to join the PHITS code development team at the Japan Atomic Energy Agency.

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 thoroughly enjoyed exploring the local scenery, culture, and language. New experiences in travel, cuisine, and forces of nature (earthquakes) have truly opened his eyes to the staggering variety of experiences the world has to offer. He is enthusiastic about learning other languages and cultures on his now-international journey through life.

Other ——————

American Nuclear Society member

🚗 Tennessee Class D driver's license

🌲 Eagle Scout, Boy Scouts of America

📑 Degrees, certificates, and any other documents available upon request

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

2021 **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, *(in internal review)*

2021 **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, *(in internal review)*

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 Sciences in Space Research, 14, Suppl. C, 18–28, Jun. 2017.

Honors and Awards

2015 – 2018	Chancellor's Distinguished Graduate Fellowship	Univ. of Tennessee
2011 – 2015	Chancellor's Honors Program	Univ. of Tennessee
2013 – 2014	Eastland Family Engineering Scholarship	
2013	US Nuclear Regulatory Commission Scholarship	
2012 – 2013	Energy*Solutions* Corporation Engineering Scholarship	
2011 – 2012	Tennessee Society of Professional Engineers Scholarship	

Hobbies

Coding	Leveraging the power of scripting to automate everyday tasks like resizing desktop wallpapers to a desired aspect ratio, managing file properties, backing up data, and more.
Web design	Constructing and tinkering with his personal website hratliff.com, custom HTML browser new tab page, and online-viewable interactive Jupyter notebooks with scientific applications.
Mixology	Responsibly exploring the diverse world of cocktails and mixed drinks, learning about the history of the ingredients and many recipes.
Edutainment	Watching educational documentaries and videos on a wide variety of topics including geography, mountaineering, exploration, technology, construction, engineering, linguistics, wood/metalworking, business, geopolitics, travel, chemistry, mathematics, food, and history.

References

available upon request