MICHAEL B. R. SMITH

809 Jade Road, Knoxville, TN 37919 **865-314-9717** **smithmb@ornl.gov**

WORK EXPERIENCE

Nov 2019 – Present **Nuclear Space Systems Engineer** (Advanced Nuclear System Safety & Licensing Group)
Oak Ridge National Laboratory, Oak Ridge, TN

- Lead multiple projects involving radiation simulations of radioisotope power systems, fission power systems, galactic cosmic rays, solar particle events, and trapped radiation belts for spaceflight applications.
- Support multiple terrestrial and aerospace nuclear projects for The National Aeronautics and Space Administration, Department of Energy, Department of Defense, and private sector by providing consultation and analytical solutions for space-based nuclear power systems.
- Lead multiple augmented reality and data visualization projects for defense-related activities, radiological training tools, and general ionizing radiation phenomena.

May 2017 – Nov 2019 **Post Master Research Associate** (Advanced Reactors and Engineering Group)
Oak Ridge National Laboratory, Oak Ridge, TN

- Developed the Radioisotope Power System Dose Estimation Tool (RPS-DET) software for NASA's RPS Program Office (RPSPO) to characterize radiation from RPS-powered spacecraft.
- Served on the Dynamic Radioisotope Power System Integrated Product Team for NASA's RPSPO competitive procurement of dynamic convertor technologies.

Jan 2016 - May 2017 **Graduate Teaching and Research Assistant**
University of Tennessee, Department of Nuclear Engineering, Knoxville, TN

- Served as lead teaching assistant for a team of ten nuclear engineering graduate students
- Participated in the development and analysis of MCNP6 simulations of the surface radiation environment on Mars for a collaborative project hosted by the Southwest Research Institute.

Nov 2012 - Dec 2015 **Lab Technician** (Neutronics Team & Personal Protection Systems (PPS) Team)
Spallation Neutron Source (SNS), Oak Ridge National Laboratory, Oak Ridge, TN

- Developed and completed a data mining project to identify neutron background fluctuations observed in the target building of the SNS.
- Authored, edited, revised, and physically performed safety procedures for many SNS instruments as part of the PPS team's beamline safety certification process.

Apr 2007 – Aug 2011 **Manned Submersible Pilot and Boat Captain**
Atlantis Submarines, Lahaina, Maui, HI

- Piloted a 48 passenger, US Coast Guard Certified, manned submersible. Regularly participated in surface operations, life-support maintenance, and underwater navigation techniques.

ACADEMIC EDUCATION

June 2016 – May 2017 **UNIVERSITY OF TENNESSEE, Knoxville, TN**

- Master of Science in Nuclear Engineering, Knoxville, TN

Jan 2012 – May 2016 **UNIVERSITY OF TENNESSEE, Knoxville, TN**

- Bachelor of Science in Nuclear Engineering, Knoxville, TN

TECHNICAL EDUCATION

Jan 2006 – Dec 2006 **SANTA BARBARA CITY COLLEGE**
- Marine Diving Technology, Santa Barbara, CA

Sept 2007 **US COAST GUARD 100 TON MASTERS LICENSE**
- Maritime Institute, Newport Beach, CA

May 2007 – May 2009 **US COAST GUARD SUBMERSIBLE ENDORSEMENT**
- Atlantis Submersible Pilot Training Program, Maui, HI

SKILLS

- Extensive experience with nuclear modeling software such as MCNP and SCALE.
- Extensive experience with programming languages such as MATLAB and Python.
- Extensive experience with maritime working environments involving the operation of surface and subsurface vehicles, mixed-gas surface supplied diving, hyperbaric chamber operation, emergency/rescue operations, and offshore rigging.
- Extensive experience with interagency cooperative activities involving nuclear space technologies and information.
- Extensive experience with managing multi-disciplined groups and projects involving personnel at political, programmatic, research, technician, and administrative capacities.
- Experience with micro-controller programming, analog and digital sensors, circuit design/development, soldering, data-acquisition, and experimental lab procedures.
- Experience with lab and field practices involving radiation detection, detector calibration, pulse chain diagnostics, and nuclear data analysis.

RECENT PUBLICATIONS, PRESENTATIONS, and PROFESSIONAL ACTIVITIES

Publications (Journals[a], peer-reviewed conference papers[b], technical reports[c], patents[d], and book chapters[e]):

- [b] Nelson, N.B., **Smith, M.B.R.**, Heilbronn, H.L., Peplow, D.E., Swinney, M.W., "*The Sensitivity of Three Terrestrial Bacteria to a Multi-Mission Radioisotope Thermoelectric Generator*", Transactions of the American Nuclear Society, International Conference on Radiation Shielding and 21st Topical Meeting of the Radiation Protection and Shielding Division, Seattle, WA, Sept. 25–29, 2022.
- [b]**Smith, M.B.R.**, Greenwood, M.S., Nelson, N.B., Thompson, N.A., Peplow, D.E., "*Virtual Interaction with Physics Enhanced Reality (VIPER): Using Augmented Reality to Visualize and Interact with Ionizing Radiation Data*", Transactions of the American Nuclear Society, ANS Summer Meeting, Los Angeles, CA, June 12–16, 2022.
- [e]**Smith, M.B.R.**, Collins, E.D., DePaoli, D.W., Gallego, N.C., Heilbronn, L.H., Jensen, C.L., Romanoski, G., Ulrich, G.B., Wham, R.M., Whiting, C.E., "*Chapter 5: Nuclear Physics, Radioisotope Fuels, and Protective Components*", "*Radioisotope Thermoelectric Generators and Thermoelectric Technologies for Space Exploration*", Wiley Publishing, Submitted for publication, 2022
- [e]Whiting, C.E., **Smith**, **M.B.R.**, Caillat, T., "*Chapter 9: Modern Analysis Tools and Techniques for RTGs*" "*Radioisotope Thermoelectric Generators and Thermoelectric Technologies for Space Exploration*", Wiley Publishing, Submitted for publication, 2022
- [c]Swinney, M., **Smith, M.B.R**., "*Methods for Estimating Dose from Galactic Cosmic Rays and Jovian Radiation Belts on Reduced-Order Monte Carlo Geometries*", ORNL/TM/-2021/2125, Oak Ridge National Laboratory (ORNL) Technical Report, 2022.
- [c]Douglas E. Peplow, Cihangir Celik, Charles R. Daily, Nicholas J. Prins, Georgeta Radulescu, **Michael B. R. Smith**, R. Blake Wilkerson, *Shielding Analysis to Support the X-energy Mobile Reactor Design – Phase IB*, ORNL/TM-2022/2392, Oak Ridge National Laboratory, Oak Ridge, Tennessee, February 2022. (UCNI)
- [b]**Smith, M.B.R**., Swinney, M., "*Modeling Ionizing Radiation for Spaceflight Dynamic Radioisotope Power Systems*" , Proceedings of the IEEE Aerospace Conference, Big Sky MT, March 5–12, 2022.

- [b]S. Oleson, P. Schmitz, L. Qualls, **M.B. Smith**, T. Colozza, L. Tian, B. Klefman, S. Kom, M. Chaiken, T. Packard, J. Fittje, J. Gyekenyesi, E. Turnbull, "*A Dynamic Radioisotope Power System for a Pressurized Lunar/Mars Rover*", Proceedings of the Nuclear and Emerging Technologies for Space (NETS) Conference, Cleveland OH, May 8–12, 2022.
- [c]Oleson, S.R., Burke, L.M., Mason, L.S., Colozza, A.J., Fittje, J.E., Yim, J.T., **Smith, M.**, Packard, T.W., Klefman, B.T., Gyekenyesi, J.Z., Faller, B.F., Schmitz, P.C., Smith, D.A., Tian, L., Austin, C.R., Simon, W.P., Heldman, C.R., Theofylaktos, O., Schmid, C.L., Parkey, T.J., Weckesser, N.J., Jackson, L.A., "*Compass Final Report: Nuclear Electric Propulsion (NEP) – Chemical Vehicle 1.2*", NASA/TM-20210017131, NASA Glenn Research Center, Technical Report, 2021.
- [b]L. Mason, S. Oleson, P. Schmitz, L. Qualls, **M. Smith**, B. Aide, J. Navarro, "*Nuclear Power Concepts for High-Power Electric Propulsion Missions to Mars*", Proceedings of the Nuclear and Emerging Technologies for Space (NETS) Conference, Virtual, April 26–30, 2021.
- [b]M.S. Greenwood, **Smith, M.B.R**., "*Method for Visualizing Radiation Data Using Unreal Engine*", Transactions of the American Nuclear Society, Vol. 123, 2020, ANS Virtual Winter Meeting, Nov. 16–19.
- [c]**Smith, M.B.R**., Peplow, Douglas E., Lefebvre, R.A., and Wieselquist, W., "*Radioisotope Power System Dose Estimation Tool (RPS-DET) User Manual*". United States. Aug. 2019, doi:10.2172/1560442.
- Rader, J., **Smith, M.B.R**., "*Nuclear Thermal Propulsion Dynamic Modeling with Modelica*", Proceedings of the Nuclear and Emerging Technologies for Space Conference, Richland WA, 2019
- **Smith, M.B.R.**, Peplow, D., "*Nuclear Considerations for the Application of Lanthanum Telluride in Future Radioisotope Power Systems*", Proceedings of the IEEE Aerospace Conference, Big Sky MT, 2019
- **Smith, M.B.R.**, "*The Radioisotope Power System Dose Estimation Tool (RPS-DET)*", Proceedings of the Nuclear and Emerging Technologies for Space, Las Vegas NV, 2018
- [d]Lehl, J., **Smith, M.B. R.**, "Methods and Systems for Maintaining a Constant Depth", US 10,028,492 B2, patent issued July 24th, 2018
- [a]Daniel Matthia, D.M. Hassler…**Michael Smith**…et al, *"The Radiation Environment on the Surface of Mars- Summary of Model Calculations and Comparison to RAD Data"* Life Sci. Space Res., 2017.
- [a]Hunter N. Ratliff, **Michael B. R. Smith**, and Lawrence Heilbronn, "*Simulation of the GCR spectrum in the Mars curiosity rover's RAD detector using MCNP6*," Life Sci. Space Res., vol. 14, pp. 43–50, Aug. 2017.
- [c]*Mining Archived HYSPEC User Data to Analyze the Prompt Pulse at the SNS*
Oak Ridge National Laboratory Technical Document, Oak Ridge TN, 2015. ORNL/TM-2015/238

Invited Public Speaking and Presentations:
- Speaker at NASA's Planetary Protection Steering Committee Workshop, Virtual, June 7th, 2022.
- Panelist on "Space Applications for Nuclear Energy", Advanced Reactors Summit VII & Technology Trailblazers Showcase, Knoxville TN, Feb 12th, 2020
- Speaker, "Nuclear Space Sciences at ORNL", Friends of ORNL (FORNL) Luncheon Lecture, University of Tennessee Resource Center, Oak Ridge, TN, Feb 11th, 2020
- Speaker, "Activities at Oak Ridge National Laboratory in Nuclear Space Sciences", ORION Astronomy and Physics Education, Roane State Technical Community College, Oak Ridge, TN Aug 21st, 2019

Teaching:
- SCALE Software Training, *Source Terms and Radiation Shielding for Spent Fuel Transportation and Storage Applications*, Paris, France (Virtual), April 19-23, 2021
- *NE 597 Radioisotope Power Systems*, University of Tennessee's Department of Nuclear Engineering special topics class, Knoxville, TN, Aug. 24th – Dec. 4th, 2019

Professional Activities:
- Technical Co-Chair and Session Chair for the Nuclear and Emerging Technologies for Space (NETS) conference. Cleveland OH, April 2022.
- Session Chair for the IEEE Aerospace conference. Big Sky MT, March 2022.