

Mathew Wayne Swinney

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- Education**
- Texas A&M University** (2011 - 2015)
- Ph.D., Nuclear Engineering (December 2015)
 - Dissertation title: *“Experimental and Computational Assessment of Trace Nuclide Ratios in Weapons Grade Plutonium for Nuclear Forensics Analysis”*
- Air Force Institute of Technology** (2008 - 2010)
- Nuclear Physics (Master’s level work) – Nuclear Weapons Effects, Instrumentation, and Physics
 - Primary research topic: *Defect Characterization, Scintillation Properties, and Neutron Detection Feasibility of Lithium Tetraborate*
- Angelo State University** (2001 - 2005)
- B.S., Applied Physics (May 2005)
- Experience**
- Oak Ridge National Laboratory (ORNL)** (Aug 2019 - present)
- R&D Associate Staff, Radiation Transport Group
Postdoctoral Research Associate, Nuclear Security Modeling Group (Sept 2015 - Aug 2018)
- NASA Langley Research Center** (Aug 2018 - July 2019)
- Postdoctoral Research Scientist, Space Radiation Program Element
- Pacific Northwest National Laboratory (PNNL)** (June 2015 - Aug 2015)
- Next Generation Safeguards Initiative intern, NSD/GSTP
- Center for Nuclear Security Science & Policy Initiatives (NSSPI)** (Aug 2011 - May 2015)
- Graduate Research & Teaching Assistant, Dept. of Nuclear Engineering
- Air Force Institute of Technology (AFIT)** (Sept 2008 - Dec 2010)
- Graduate Research Assistant, Dept. of Engineering Physics
- Air Force Research Laboratory (AFRL)** (June 2005 - Sept 2008)
- Research Physicist, 711th HPW/RH Warfighter Interface Division
- Projects/Roles**
- ORNL R&D Associate Staff (Aug 2019 - present)
- Created tools & models for estimating dose rates to spacecraft components from GCR, SPE, and trapped radiation belts incorporating various NASA models (GIRE3, SATRAD, HZETRN, etc.)
 - Created a tool for automatically creating MCNP inputs from water-tight lidar data for NNSA project
 - Developed a methodology for predicting power in critical dual-purpose canisters containing spent fuel in a repository using loosely coupled UNF-ST&DARDS, Shift, RELAP5, and PFLOTRAN models
 - Produced high-fidelity models for 4 backpack-based detector systems using an improved directional dose-response function for each system; delivered ~7000 sets of data for comparison to experiment
- NASA Postdoctoral Research Scientist (August 2018 - July 2019)
- Surveyed experimental data reporting the relative biological effectiveness of HZE particles and incorporated these into a data-focused methodology for improving the NASA Quality Factor model
- ORNL Postdoctoral Research Associate (September 2015 - August 2018)
- Developed a methodology for the characterization of naturally occurring radioactive material in an urban environment that was used in the Modeling Urban Scenarios & Experiments (MUSE) project
 - Reviewed historical nuclear weapons test reports and conducted calculations using modern fallout codes to prove that ground-based collection of fine particulates for volatile samples was feasible
- NSSPI Graduate Research Assistant (August 2011 - May 2015)
- Evaluated the irradiation of depleted uranium oxide fuel surrogates in the High Flux Isotope Reactor (HFIR) at ORNL using simulations (MCNP), gamma (HPGe) and mass spectroscopy (ICPMS)
 - Conducted gamma spectroscopy measurements of used Three-Mile Island fuel at ORNL

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AFIT Graduate Research Assistant (September 2008 - December 2010)

- Conducted optical absorption (UV, visible, IR) and luminescence (photo, thermal, and x-ray induced) measurements on lithium tetraborate crystals investigating possible neutron detection pathways
- Conducted Electron Paramagnetic Resonance (EPR) measurements in collaboration with West Virginia University to characterize the defects inherent in lithium tetraborate crystals
- Conducted irradiation experiments using the Ohio State University Nuclear Reactor Laboratory

AFRL Research Physicist (June 2005 - September 2008)

- Managed over \$2 Million in contracted research as part of the Small Business Innovative Research (SBIR) program, planning research and development; yielded two novel night vision architectures
- Served as the officer on 50+ funeral details with the Base Honor Guard, leading 30 enlisted members
- Directed operational evaluation of 172 panoramic night-vision goggles – transitioned to A-10s

Publications – Selected Journal Articles

Swinney, Mathew W., Santosh Bhatt, Gregory G. Davidson, Michael Nole, and Kaushik Banerjee. "Multiphysics modeling of a critical dual-purpose canister in a saturated geological repository." *Annals of Nuclear Energy* 175 (2022)

Crespo, Luis G., Slaba, Tony C., Kenny, Sean P., and Swinney, Mathew W. "Calibration of a radiation quality model for sparse and uncertain data." *Applied Mathematical Modeling* 95 (2021)

Peplow, Douglas E., Kaushik Banerjee, Gregory G. Davidson, Ian R. Stewart, Mathew W. Swinney, and Jackson N. Wagner. "Validation of the Shift Monte Carlo code for fixed-source radiation transport problems." *Nuclear Technology* 206 (2020)

Celik, Cihangir, Douglas E. Peplow, Gregory G. Davidson, and Mathew W. Swinney. "A directional detector response function for anisotropic detectors." *Nuclear Science and Engineering* 193 (2019)

Swinney, Mathew W., Douglas E. Peplow, Bruce W. Patton, Andrew D. Nicholson, Daniel E. Archer, and Michael J. Willis. "A methodology for determining the concentration of naturally occurring radioactive materials in an urban environment." *Nuclear Technology* 203 (2018)

Swinney, Mathew W., Charles M. Folden III, Ronald J. Ellis, and Sunil S. Chirayath. "Experimental and computational forensics characterization of weapons-grade plutonium produced in a fast reactor neutron environment." *Nuclear Technology* 197 (2017)

Xiao, Jie, N. Lozova, Ya B. Losovyj, D. Wooten, I. Ketsman, M. W. Swinney, et al. "Surface charging at the (100) surface of Cu doped and undoped $\text{Li}_2\text{B}_4\text{O}_7$." *Applied Surface Science* 257 (2011)

Swinney, M. W., J. W. McClory, J. C. Petrosky, Shan Yang, A. T. Brant, V. T. Adamiv, Ya V. Burak, P. A. Dowben, and L. E. Halliburton. "Identification of electron and hole traps in lithium tetraborate ($\text{Li}_2\text{B}_4\text{O}_7$) crystals: Oxygen vacancies and lithium vacancies." *Journal of Applied Physics* 107 (2010)

Teaching Experience

Partnership for Nuclear Security's (PNS) Nuclear Security and Safeguards Education Series, Pandit Deendayal Petroleum University (PDPU), Gandhinagar, Gujarat, India, January – February 2014

Graduate teaching assistant at Texas A&M University for Nuclear Reactor Theory (NUEN 601) and Monte Carlo Methods (NUEN 630) – 2013

Computing Proficiencies

Languages: Python, C++, MATLAB, Mathematica

Codes: MCNP, SCALE, ADVANTG, ORIGEN, Shift, UNF-ST&DARDS, DELFIC, OLTARIS

Other Software: MS Office, LaTeX, GammaVision, Genie2000, PeakEasy, CUBIT, VisIt