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*"
- 3.8 GPA

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*
- 3.8 GPA (54 hrs.)

Angelo State University (2001 - 2005)
- B.S., Applied Physics (May 2005)
- 3.6 GPA

Experience

NASA Langley Research Center
Postdoctoral Research Scientist, Space Radiation Program Element (Aug 2018 - present)

Oak Ridge National Laboratory (ORNL)
Postdoctoral Research Associate, Nuclear Security Modeling Group (Sept 2015 - Aug 2018)
Nuclear Engineering Science Laboratory Synthesis intern, NSED/RNSD (May - July 2014)

Pacific Northwest National Laboratory (PNNL)
Next Generation Safeguards Initiative intern, NSD/GSTP (June - Aug 2015)

Center for Nuclear Security Science & Policy Initiatives (NSSPI)
Graduate Research & Teaching Assistant, Dept. of Nuclear Engineering (Aug 2011 - May 2015)

Air Force Institute of Technology (AFIT)
Graduate Research Assistant, Dept. of Engineering Physics (Sept 2008 - Dec 2010)

Air Force Research Laboratory (AFRL)
Research Physicist, 711th HPW/RH Warfighter Interface Division (June 2005 - Sept 2008)

Projects/Roles

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
- Conducted a feasibility study for monitoring waste pipes for radiation sources with gamma detectors
- 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)
- Participated in the Nuclear Fuel Cycle Experience (NFE) in Japan conducted by NSSPI
- Conducted gamma spectroscopy measurements of used Three-Mile Island fuel at ORNL as part of a project to determine a possible source of shipper-receiver differences (SRD) in spent fuel

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

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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
- Officer In Charge of optical measurement lab, maintained and operated equipment worth over $250K
- Served as lead officer on over 50 military funeral details as part of the Base Honor Guard, providing leadership and mentorship for 30 assigned enlisted members
- Led helmet compatibility evaluation study of the Joint Service Aircrew Mask (JSAM), saved $1.5M for chem/bio mask program, identified fitting flaws and ensured crew safety
- Led operational evaluation of 172 panoramic night-vision goggles – transitioned to A-10s
- Developed experimental procedures and executed over 500 trials documenting the effects of helmet-mounted displays on combatants situational awareness

Publications – Journal Articles

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.” In review by *Nuclear Technology* (submitted Feb. 4, 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, no. 3 (2018)

Stewart, Ian R., Andrew D. Nicholson, Daniel E. Archer, Michael J. Willis, Mathew W. Swinney, Irakli Garishvili, and William R. Ray. "Understanding and quantifying the systematic effects of clutter within a radiation detection scene." *Journal of Radioanalytical and Nuclear Chemistry* 318, no. 1 (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, no. 1 (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 $Li_2B_4O_7$." *Applied Surface Science* 257, no. 8 (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 ($Li_2B_4O_7$) crystals: Oxygen vacancies and lithium vacancies." *Journal of Applied Physics* 107, no. 11 (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, DELFIC, RITRACKS/RITCARD
Other Software:	MS Office, LaTeX, GammaVision, Genie2000, PeakEasy

Awards/Honors

Air Force Commendation Medal for meritorious service while assigned to the Battlespace Visualization Branch, Warfighter Interface Division, 711th HPW/RH, AFRL, Wright-Patterson AFB, Ohio (Oct 2008)

Air Force Achievement Medal for service as an officer of the Base Honor Guard, 88th Services Division, Wright-Patterson AFB, Ohio (May 2007)

Company Grade Officer of the 4th quarter (1 of 55) for the Human Effectiveness Directorate - AFRL (2006)

Graduated with Cum Laude and Dean’s List (all 8 semesters) from Angelo State University (May 2005)

Carr Academic Scholarship and USAF ROTC Scholarship to attend Angelo State University (2001)