ANDREW CONANT

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R&D Associate Nuclear Engineer
Department of Energy TS/SCI Clearance ◇ Oak Ridge National Laboratory

RESEARCH INTERESTS

Computational neutronic modeling and simulation of a wide variety of reactors; reactor design and analysis; research reactor operation; spent fuel characterization and depletion; sensitivity and uncertainty analysis; advanced computational method deployment; antineutrino detection and monitoring; nuclear forensics; nuclear nonproliferation and safeguards; nuclear policy and security issues; nuclear engineering training and workforce development.

CURRENTLY FUNDED RESEARCH PROJECTS

All research funded by the National Nuclear Security Administration (NNSA)
Office of Defense Nuclear Nonproliferation (DNN)

$250k	**Lab PI**	Reactor simulations for fission gas concentrations
$500k	**Lab Co-PI**	Development of mobile neutrino detection system for reactor monitoring
$300k	**Team Lead**	Validation of physics simulations for graphite-moderated, gas-cooled reactors
	Contributor	Design optimization of Mo-99 production subcritical assembly
	Contributor	Reactor source term analysis for nuclear security of advanced reactors
	Contributor	Calculation of source terms for facility effluent production

EDUCATION

Georgia Institute of Technology
Ph.D. in Nuclear Engineering *Jan 2016 - Aug 2019*
GPA: 4.00/4.00
Minor in Nuclear Security & Nonproliferation
Dissertation: "Antineutrino Spectrum Characterization and Sensitivity Using Neutronic Simulations of the High Flux Isotope Reactor"

M.S. in Nuclear Engineering *Aug 2014 - Dec 2015*
GPA: 4.00/4.00
Thesis: "Sensitivity and Uncertainty Analysis of Pu and Cs Isotope Ratios in BR3 Core 4A/B Fuel Rod"

B.S. in Nuclear & Radiological Engineering *Aug 2010 - May 2014*
Minor in French
GPA: 3.85/4.00

EXPERIENCE

Oak Ridge National Laboratory Oak Ridge, TN
R&D Associate Nuclear Engineer *Aug 2021 - Present*

- Demonstrated neutronic-thermal hydraulic coupling of MPACT and AGREE codes
- Served as task lead for modeling & simulation of Magnox reactors
- Developed source term calculations for gaseous effluents during reactor operation
- Created scripts to calculate neutrino flux predictions for suite of detection scenarios
- Optimized neutronic design of subcritical Mo-99 production reactor for NA-23

Postdoctoral Research Associate in Nuclear Engineering M&S *Aug 2019 - July 2021*

- Performed simulations of graphite Magnox reactors using deterministic and Monte Carlo codes
- Calculated criticality, power distributions, and plutonium content as a function of burnup
- Compared Magnox simulations between codes and tested on various platforms
- Created activation and fuel flux libraries in a variety of reactors
- Developed progression problems of Magnox reactors to benchmark MPACT code
- Executive member of NuTools study to evaluate potential utility of neutrino detectors for safeguards
- Calculated non-fuel antineutrino contributions at HFIR
- Assisted in spectral flux adjustment for foils activated in HFIR

HFIR Nuclear Safety Intern *May 2016 - Aug 2016, June 2018 - July 2019*

- Simulated reactor models to generate reaction rates for antineutrino production
- Calculated activation rates of structural materials and targets
- Contributed to neutronic analysis for the November 2018 HFIR event
- Aided with calibration of PROSPECT antineutrino detector
- Calculated poison concentrations in beryllium reflector for safety calculations
- Analyzed fuel plate homogeneity data and methodology for overloaded regions

Lawrence Livermore National Laboratory Livermore, CA
Nuclear Forensics Intern *May 2014 - Aug 2014*

- Modeled a PWR fuel assembly in MCNP to examine axial distributions of plutonium isotopes
- Performed parametric studies of reactor conditions on isotope concentrations
- Learned optimization strategies for simulating reactor models in MCNP
- Prepared and presented results to laboratory scientists in poster and presentation format

Areva, Inc. Lynchburg, VA
Engineering Intern, Core Design & Analysis *May 2013 - July 2013*

- Compared automated statistical processes to current reactivity bias calculations for reload licensing
- Calculated nuclear analysis parameters using diffusion codes
- Learned nuclear industry operations, reload licensing processes, and regulatory safety policies

SKILLS

Computer Languages	Python, MATLAB, Perl, R
Simulation Codes	SCALE (KENO, Shift, ORIGEN, NEWT, COUPLE, SAMPLER) MPACT, MCNP, Serpent, HFIRCON, ADVANTG, AGREE
Software	Linux OS, bash, MPI, LaTeX, git
Languages	French - reading, writing, speaking
Teaching	Lecturer: Reactor Physics, Problems in Proliferation
Certifications	Engineer in Training (EIT)

AWARDS

Nuclear Nonproliferation International Safeguards Fellowship	*2017-2019*
Nuclear Engineering Student Delegation 2018 Member	*2018*
American Nuclear Society Graduate Scholarship	*2017, 2018*
Roy G. Post Foundation Graduate Student Scholarship	*2018*
Department of Energy Nuclear Energy IUP Graduate Fellowship	*2014-2017*

Georgia Tech Sam Nunn Security Program Fellowship	*2016-2017*
American Nuclear Society SSC Commendation for Leadership	*2015*
Nuclear Regulatory Commission Nuclear Engineering Scholarship	*2013-2014*
University of Nevada, Las Vegas Radiochemistry Summer School	*2012*
Nuclear Energy University Programs (NEUP) Scholarship	*2012-2014*

JOURNAL PUBLICATIONS (*INDICATES CORRESPONDING AUTHOR)

W. Cassata, B. Isselhardt, **A. Conant**, J. Charboneau, and K. Carney. "Noble gas constraints on spent fuel irradiation histories." *Journal of Radioanalytical and Nuclear Chemistry.* (Jun 2023).

M. Savina, B. Isselhardt,D. Shulaker, M. Robel, **A. Conant**, and B. Ade. "Simultaneous isotopic analysis of fission product Sr, Mo, and Ru in spent nuclear fuel particles by resonance ionization mass spectrometry." *Scientific Reports.* (Mar 2023).

B. Wilson, **A. Conant**, T. Ulrich, A. Kercher, L. Sadergaski, T. Gerczak, A. Nelson, C. Petrie, J. Harp, and A. Shields. "Nuclear fuel irradiation testbed for nuclear security applications." *Frontiers in Nuclear Engineering.* (Feb 2023).

A. Andriamirado et al (PROSPECT Collaboration). "Improved Short-Baseline Neutrino Oscillation Search and Energy Spectrum Measurement with the PROSPECT Experiment at HFIR." *Phys. Rev. D.* (Dec 2020).

A. Andriamirado et al (PROSPECT Collaboration). "Improved Short-Baseline Neutrino Oscillation Search and Energy Spectrum Measurement with the PROSPECT Experiment at HFIR." *Phys. Rev. D.* (Dec 2020).

*__A. Conant__ et al (PROSPECT Collaboration). "Nonfuel Antineutrino Contributions in the High Flux Isotope Reactor." *Phys. Rev. C.* 101. (May 2020).

J. Ashenfelter et al (PROSPECT Collaboration). "The Radioactive Source Calibration System of the PROSPECT Reactor Antineutrino Detector." *Nuc. Inst. Meth. A.* 944. (June 2019).

J. Ashenfelter et al (PROSPECT Collaboration). "Measurement of the Antineutrino Spectrum from 235U Fission at HFIR with PROSPECT." *Phys. Rev. Lett.*. 122. (June 2019).

J. Ashenfelter et al (PROSPECT Collaboration). "The PROSPECT Reactor Antineutrino Experiment." *Nuclear Instruments and Methods in Physics Research Section A.* 922, 1. (April 2019).

J. Ashenfelter et al (PROSPECT Collaboration). "A Low Mass Optical Grid for the PROSPECT Reactor Antineutrino Detector." *Journal of Instrumentation.* 14, 04. (April 2019).

J. Ashenfelter et al (PROSPECT Collaboration). "Lithium-loaded Liquid Scintillator Production for the PROSPECT Experiment." *Journal of Instrumentation.* 14, 03. (March 2019).

J. Ashenfelter et al (PROSPECT Collaboration). "First Search for Short-Baseline Neutrino Oscillations at HFIR with PROSPECT." *Phys. Rev. Lett.* 121, 251802 (December 2018).

M. Robel, B. Isselhardt, E. Ramon, A. Hayes, A. Gaffney, L. Borg, R. Lindvall, A. Erickson, K. Carney, T. Battisti, **A. Conant**, B. Ade, H. Trellue, and C. Weber. "A Composite Position Independent Monitor of Reactor Fuel Irradiation Using Pu, Cs, and Ba Isotope Ratios." *Journal of Environmental Radioactivity.* 195, pp 9-19 (September 2018).

J. Ashenfelter et al (PROSPECT Collaboration). "Performance of a segmented 6Li-loaded liquid scintillator detector for the PROSPECT experiment." *Journal of Instrumentation*, 13 (June 2018).

B. Littlejohn, **A. Conant**, D. Dwyer, A. Erickson, I. Gustafon, and K. Hermanek (2018). "Impact of Fission Neutron Energies on Reactor Antineutrino Spectra," *Physical Review D.* 97, 073007. (April 2018).

A. Conant, A. Erickson, M. Robel, & B. Isselhardt (2017). "Sensitivity and Uncertainty Analysis of Plutonium and Cesium Isotopes in Modeling of BR3 Reactor Spent Fuel," *Nuclear Technology*, 197:1, 12-19. (February 2017).

J. Ashenfelter et al (PROSPECT Collaboration). "The PROSPECT Physics Program." *Journal of Physics G: Nuclear and Particle Physics*, 43 (October 2016).

TECHNICAL REPORTS

A. Conant, N. Luciano, B. Ade, C. Gentry, and B. Collins. "Plutonium Production Reactor Progression Problems: Magnox Neutronics Benchmarks." ORNL/TM-2021/1984. (September 2021).

T. Akindele, N. Bowden, R. Carr, **A. Conant**, M. Diwan, A. Erickson, M. Foxe, B. Goldblum, P. Huber, I. Jovanoviv, J. Link, B. Littlejohn, P. Mumm, and J. Newby. "NuTools: Exploring Practical Roles for Neutrinos in Nuclear Energy and Security - Final Report." (August 2021).

T. Holschuh, W. Windes, **A. Conant**, and J. Navarro. "Impact of Flux Wire Selection on Neutron Spectrum Adjustment." INL/EXT-21-64191-Rev000. (August 2021).

B. Betzler, E. Davidson, G. Davidson, T. Evans, S. Wilson, S. Mosher, G. Ilas, C. Daily, **A. Conant**, D. Chandler. "Reactor Physics Modeling of the Cycle 483 Event in the High Flux Isotope Reactor." ORNL/TM-2018/1102. (December 2018).

BOOK CHAPTERS

A. Conant. (2019) "Additive Manufacturing and WMD Proliferation." *Disruptive and Game Changing Technologies in Modern Warfare*. Part of the Advanced Sciences and Technologies for Security Applications. Switzerland: Springer, Cham. DOI: https://doi.org/10.1007/978-3-030-28342-1.

REFEREED CONFERENCE PAPERS

C. Gentry, V. Seker, B. Ade, **A. Conant**, N. Luciano, K. S. Kim, B. Collins, T. Downar. "Development and Performance Simulations of MPACT-AGREE Code Coupling Interface for MAGNOX Reactors." M&C 2021. Raleigh, NC. October 2021.

B. Ade, N. Luciano, **A. Conant**, C. Gentry, S. Stimpson, B. Collins, K. S. Kim, R. Mills. "Development of MPACT for Full-Core Simulations of Magnox Gas-Cooled Nuclear Reactors." Physics of Reactors (PHYSOR) 2020. Cambridge, United Kingdom. March 2020.

N. Luciano, B. Ade, K. S. Kim, **A. Conant**. "MPACT Verification with Magnox Reactor Neutronics Progression Problems." Physics of Reactors (PHYSOR) 2020. Cambridge, United Kingdom. March 2020.

A. Conant & A. Erickson. "Candidates for Non-Fuel Antineutrino Emissions in the High Flux Isotope Reactor." ANS Annual Meeting. Minneapolis, MN. June 2019.

A. Conant & A. Erickson. "Reactor Simulation of Evolution in Detector Baseline for Antineutrino Monitoring at the High Flux Isotope Reactor." Advances in Nonproliferation Technology and Policy Conference. Orlando, FL. November 2018.

A. Conant, P. Mumm, & A. Erickson. "Safeguards Impacts of Antineutrinos from Activation of Structural Elements in Power and Research Reactors." PHYSOR. Cancun, Mexico. April 2018.

A. Conant, P. Mumm, & A. Erickson. "Comparison of Aluminum Activation Rates in HFIR and NBSR for Antineutrino-Based Safeguards." 2017 American Nuclear Society Winter Meeting. Washington, D.C. November 2017.

M. Robel, B. Isselhardt, E. Ramon, A. Hayes, A. Gaffney, R. Lindvall, K. Carney, **A.Conant**, & A. Erickson. "A Position Independent Monitor of Reactor Fuel Irradiation Using Pu and Cs Isotope Ratios." 6th Asia-Pacific Sumposium on Radiochemistry. Jeju Island, Korea. September 2017.

A. Conant. "HFIR Core Modeling and Analysis for PROSPECT Reactor Antineutrino Experiment." American Nuclear Society Winter Meeting. Las Vegas, NV. November 2016.

A. Conant, A. Erickson, & M. Robel. "Sensitivity and Uncertainty Analysis of Modeled Pu and Cs Isotope Ratios in a Test Pressurized Water Reactor." 2015 American Nuclear Society Winter Meeting. Washington, D.C. November 2015.

A. Conant, M. Robel, & A. Erickson. "Reactor Modeling of Pu and Cs Isotope Ratios in Pressurized Water Reactor Fuel Assemblies." Poster. 2014 American Nuclear Society Winter Meeting. Anaheim, CA. November 2014.

COURSE INSTRUCTION

NRE 3208: Reactor Physics II (2 lectures)	Spring 2018	28 students
GT 1000: Georgia Tech Freshmen Seminar	Fall 2017	11 students
GT 1000: Georgia Tech Freshmen Seminar	Fall 2016	11 students
GT 1000: Georgia Tech Freshmen Seminar	Fall 2015	14 students
GT 1000: Georgia Tech Freshmen Seminar	Fall 2014	17 students

GUEST LECTURES

"Nuclear Fuel Cycle and Nonproliferation Regime." Georgia Institute of Technology. INTA 3102: Problems in Proliferation. Atlanta, GA. September 2021, January 2020, & January 2018.

LEADERSHIP

American Nuclear Society

Oak Ridge/Knoxville Treasurer — *June 2021 - Present*

· Managed finances and assisted in community outreach

Oak Ridge/Knoxville Executive Committee Member — *June 2020 - June 2021*

· Participated in monthly meetings to guide local programs and events

Student Sections Committee Member — *Aug 2017 - August 2020*

· Participated in selection of awards to students and conference host locations

· Served as Recruitment Subcommittee Chair and encouraged student participation

Student Program Co-Chair — *November 2018*

· Coordinated session assignments and other logistics for a national meeting

· Facilitated the attendance of 80 students at ANS Winter Meeting

Georgia Tech Student Section President — Apr 2013 - Apr 2015

· Supervised a team of 9 officers to put on professional, social, and outreach events

· Facilitated more than 15 outside-meeting events per year

· Organized agenda for biweekly meetings for 40-50 members

· Started a mentorship program for underclassmen

Georgia Tech Student Section Professional Development Chair — *Jan 2016 - May 2016*

· Organized workshops to advance professional and career skills of members

Georgia Tech Student Section Public Relations Chair — *Apr 2012 - Apr 2013*

· Organized professional speakers and tours of nuclear facilities

· Established expectation for professional speakers at each meeting

Georgia Tech Leadership Education and Development

Leadership Fellow — *Aug 2017 - May 2018*

· Coached 4 undergraduate students in leadership skills over a semester

· Instructed leadership development courses for first-year students

GT 1000 First Year Seminar
Instructor *Aug 2014 - Dec 2017*

· Prepared course material in assisting first-year students transition to college
· Coordinated expectations and grading with co-instructor and team leaders
· Facilitated small-group discussion of topics to include resumes, career paths, and time management

Georgia Tech Department of Housing
Resident Advisor *Aug 2012 - May 2014*

· Supervised the living situation of 50 people each year
· Created a safe and positive community that connected students, faculty, and staff
· Resolved conflict and led hall programs to promote academic, social, and professional development

Georgia Tech Student Center
Guest Services Manager *Jan 2012 - May 2014*

· Supervised operations of a 100,000 square foot building
· Set up meeting rooms and activity space for small- and large-scale events
· Implemented communication and conflict resolution skills to handle customer needs

Georgia Tech Center for Academic Enrichment Jan 2012 - May 2013
1-to-1 Tutor *Atlanta, GA*

· Tutored 5-8 individual students per week in physics, statistics, and thermodynamics
· Developed communication skills and understanding of learning styles