

JAMES E. BEVINS

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EDUCATION

Ph.D.	University of California, Berkeley Nuclear Engineering, with a minor in Nuclear Policy	2017
M.S.	Air Force Institute of Technology Nuclear Engineering	2011
B.S.	University of Tennessee Nuclear Engineering	2009

PROFESSIONAL HISTORY

Air Force Institute of Technology <i>Assistant Professor of Nuclear Engineering</i>	Aug. 2017 - Present <i>WPAFB, OH</i>
<ul style="list-style-type: none">• Researching detector development, nuclear weapon effects, post-detonation nuclear forensics, and neutron spectroscopy with an emphasis on optimized design of systems• Applications in nuclear security and nonproliferation, shielding, medical isotope production, and technical nuclear forensics	

University of California, Berkeley <i>Graduate Student/National Science Foundation Fellow</i>	Aug. 2014 - Aug. 2017 <i>Berkeley, CA</i>
<ul style="list-style-type: none">• Researched “Targeted Neutron Spectrum Modification for National Security Applications”: Developed an energy tuning assembly (ETA) concept that was designed to modify the NIF neutron energy spectrum to a more “weapon-like” neutron spectrum• Developed a novel metaheuristic optimization algorithm, Gnowee, that was implemented in a new nuclear design software, Coeus• Performed neutron spectroscopy experiments at the 88-Inch Cyclotron to characterize the ETA performance	

Sandia National Laboratory <i>Weapon Intern</i>	Mar. 2013 - Feb. 2014 <i>Albuquerque, NM</i>
<ul style="list-style-type: none">• Comprehensive technical, historical, and nuclear policy curricula designed to develop next generation of nuclear weapons experts and leaders through multi-agency interaction in coursework, site visits, and research projects• Research Project Titled: Criticality Analysis of US Pits under Accident Scenarios• Research Project Titled: An Automated Solid Model and MCNP Materials Import Scheme	

Air Force Nuclear Weapons Center <i>Nuclear Engineer/Physicist</i>	Apr. 2011 - Aug. 2014 <i>Kirtland AFB, NM</i>
<ul style="list-style-type: none">• Organized, conducted, and led multi-agency Air Force Nuclear Weapons Center efforts to review, update, improve, and develop nuclear hardness models and mission planning guidance used for nuclear weapons delivery• Planned, directed, performed, and reviewed nuclear weapon effects and survivability assessments in support of AF, DoD, and DOE acquisition efforts through analysis, simulation, and test for systems to include the Long Rang Stand-off (LRSO) missile, B61-12 nuclear bomb, Ground Based Strategic Deterrent (GBSD), and others	

- Designed, developed, reviewed, and implemented new analysis software and capabilities to address gaps and/or improve fidelity in AF efforts to model different operational concepts and threats thereby improving the effectiveness of new acquisitions while reducing costs
- Conducted, developed, managed, and reviewed program planning, Statements of Work (SOWs), Independent Government Cost Estimate (IGCEs), cost and technical proposals, deliverables, and performance reports
- Technical advisor to senior nuclear policy makers and acquisition officials

Air Force Institute of Technology

Jul. 2009 - Mar. 2011

Graduate Student

WPAFB, OH

- Researched “Characterization of a Boron Carbide Heterojunction Neutron Detector”: Developed an optimized semi-conducting boron carbide neutron detector
- Tested the degradation of sample devices in neutron fields at the Ohio State Research Reactor

Oak Ridge National Laboratory

Aug. 2008 - Jun. 2009

Nuclear Research Intern

Oak Ridge, TN

- Conducted modeling validation of liquid scintillator neutron coincidence detection scheme designed for security applications involving storage of highly enriched uranium
- Developed and modified existing energy deposition to detection event post-processing codes for MCNP-POLIMI

BWXT-Y12

Jun. 2006 - Sep. 2006

Criticality Safety Intern

Oak Ridge, TN

- Performed criticality safety analysis for processes involving uranium milling, dissolution, storage, transport, etc.
- Reviewed manufacturing procedures and practices for compliance with criticality safety guidelines and procedures
- Conducted material surveys to track and monitor build-up and loss of uranium

Alabama Army National Guard

Sep. 2001 - Aug. 2004

Explosive Ordnance Disposal Technical

Multiple Locations

- Deployment to Bosnia: June 2003- April 2004
- Naval School EOD: Sep 2002 - June 2003
- Basic Training: July 2002- Sep 2002

SELECTED HONORS AND AWARDS

Military:

Air Force Institute of Technology Company Grade Officer of the Quarter	2018
Air Force Meritorious Service Medal	2014
Squadron Officer School Distinguished Graduate, Outstanding Contributor, Top 1%	2014
USAF Modeling & Simulation Cross-Functional Team Award	2012
AFMC Analytic Team of the Year Award	2012
Nuclear Capabilities Directorate Company Grade Officer of the Year	2012
Nuclear Capabilities Directorate Company Grade Officer of the Quarter	2012
Exceptional Performer, Air Space Basic Course	2009
Global War on Terrorism Service Medal	2004
Army Commendation Medal	2004
Army Achievement Medal (x2)	2003, 2004
Honor Graduate, Explosive Ordnance Disposal School	2003

Academic:

Air Force Technical Applications Center Endowed Term Chair	2018
National Science Foundation Graduate Fellowship	2014-2017
Best Paper, NNSA University and Industry Technical Interchange	2016
Selected participant, Public Policy and Nuclear Threats Bootcamp	Jun.-Jul. 2015
IEEE Nuclear and Plasma Sciences Society Graduate Scholar Award	2011
Louis F. Polk Finalist	2011
Tau Beta Pi Honor Society	2010
Chancellors Academic Achievement Award	2007
Nuclear Engineering Outstanding Freshman, Sophomore, and Junior Awards	2005-2007

GRADUATE STUDENT SUPERVISION

Graduate Student Supervision: Successfully chaired 2 MS students committees. I currently chair 1 PhD student's and 3 Masters students' committees.

PhDs Chaired/In Progress (Start Year Listed):

2018 Robert Olesen, Nuclear Engineering

PhDs Committee Member/In Progress (Start Year Listed):

2017 Matthew Recker, Nuclear Engineering

MS Chaired/Completed:

2018 Jonathan Sundman, Operations Management

2018 Jason Stickney, Nuclear Engineering

MS Chaired/In Progress (Start Year Listed):

2017 Amy Hoybook, Nuclear Engineering

2017 Nicholas Quartemont, Nuclear Engineering

2017 Bryan Egner, Nuclear Engineering

MS Committee Member/Completed:

2018 Zachary Condon, Nuclear Engineering

2018 Robert Olesen, Nuclear Engineering

RESEARCH GRANTS

Obtained support grants and awards in kind for various agencies for research, education, and equipment totaling over \$1,100,000 since 2017.

2018

1. AFIT/ENP Research in Support of Defense Threat Reduction Agency Nuclear Technologies, DTRA, \$100,000, Co-PI, 35% responsibility, PI - John McClory
2. Imaging Fast Neutron Sources Using Rotating Scatter Masks, FRC, \$31,000, PI, 100% responsibility
3. Endowed Term Chair for Nuclear Treaty Monitoring, AFTAC, \$40,000, PI, 100% responsibility
4. Endowed Term Chair for Nuclear Material, AFTAC, \$40,000, Co-PI, 25% responsibility, PI- James Petrosky
5. Targeted Modification of the NIF Neutron Energy Spectra for National Security Applications, NIF JNSAC, \$1,000,000 (in kind), Co-PI, PI - Lee Bernstein

2017

1. Endowed Term Chair for Nuclear Treaty Monitoring, AFTAC, \$42,000, Co-PI, 50% Responsibility, PI - Lt Col James Fee

PUBLICATIONS

Archived Journals in Print (* denotes student)

2018:

1. R. Olesen*, B. E. ODay, D. E. Holland, L. W. Burggraf, and **J. E. Bevins**, "Characterization of Novel Rotating Scatter Mask Designs for Gamma Direction Identification," *Nuclear Instrumentation and Methods in Physics Research Section A*. (Accepted September 2018)
2. **James E. Bevins**, Elie Katzenson, James Kendrick, Rebecca Krentz-Wee, Sarah Laderman, Yubin Tian, "A Framework for Assessing Alternate Proliferation Pathways in the Age of Non-State Actors," *Nuclear Posture Review*, vol. 25, pp. 87-110, 2018, DOI: 10.1080/10736700.2018.1493172.
3. M. K. Covo, R. A. Albright, et al., "The 88-Inch Cyclotron: A One-Stop Facility for Electronics Radiation and Detector Testing," *Measurement*, vol 127, pp. 580-587, 2018.
4. D. E. Holland, **J. E. Bevins**, L. W. Burggraf, and B. E. ODay, "Rotating scatter mask optimization for gamma source direction identification, *Nuclear Instruments and Methods Phys. Res. A*, vol. 901, pp. 104111, 2018.
5. K. P. Harrig, B. L. Goldblum, J. A. Brown, D. L. Bleuel, L. A. Bernstein, **J. Bevins**, M. Harasty, T. A. Laplace, E. F. Matthews, "Neutron Spectroscopy for Pulsed Beams with Frame Overlap using a Double Time-of-Flight Technique," *Nuclear Instrumentation and Methods in Physics Research Section A*, vol. 877, pp. 359366, 2018.
6. **J. E. Bevins** and R. S. Slaybaugh, "Gnowee: A Hybrid Metaheuristic Optimization Algorithm for Constrained, Black Box, Combinatorial Mixed-Integer Design, *Nuclear Technologies*, 2018, DOI: 10.1080/00295450.2018.1496692.

2017:

2016:

1. N. Benczer-Koller, G. J. Kumbartzki, et al., "Magnetic moment and lifetime measurements of Coulomb-excited states in ^{106}Cd ," *Physical Review C*, Vol. 94, 2016.
2. G. J. Kumbartzki, N. Benczer-Koller, et al., " $Z = 50$ core stability in ^{110}Sn from magnetic-moment and lifetime measurements," *Physical Review C*, Vol. 93, 2016.

Limited Distribution Journal Articles, in Print

2012:

1. **J. Bevins**, K. Dahl, J. McClory, J. Petrosky, A. Caruso, and S. Karki, "Bulk Radiation Damage Effects of a p-type B₅C:H_x Thin Film on n-Si Heterojunction Diode," *Journal of Radiation Effects, Research and Engineering*, Vol. 30, No1, 2012.

Refereed, In Process

1. Bethany L. Goldblum, Thomas C. Hickey, **James E. Bevins**, Elie Katzenson, Sarah Laderman, Nathaniel Mahowald, Yara Mubrak, Andrew W. Reddie, and Austin P. Wright, "Networks and Nukes: Multiplex Network Analysis for Interconnected Systems," *Proceedings of the National Academy of Sciences*. (Submitted May 2018)

Publications in Conference Proceedings (* denotes student)

1. **J. E. Bevins**, S. Bogetic*, L. A. Bernstein, R. Slaybaugh, and J. Vujic, "Metaheuristic Optimization Method for Neutron Spectra Shaping, *Transactions of the American Nuclear Society*, vol. 118, Philadelphia, PA, June 18th, 2018.
2. D. E. Holland, **J. E. Bevins**, L. W. Burggraf, and B. E. ODay, "Rotating scatter mask optimization for gamma source direction identification, presented at the *Symposium on Radiation Measurement and Applications*, Ann Arbor, MI, June 14th, 2018.
3. J. R. Stickney*, **J. E. Bevins**, E. Cazalas, and J. W. McClory, "Pulse Height Spectra Analysis of a Neutron Energy Tuning Assembly, presented at the *Symposium on Radiation Measurement and Applications*, Ann Arbor, MI, June 13th, 2018.
4. R. J. Olesen*, B. O. Day, D. Holland, L. Burggraf, and **J. Bevins**, "Characterization of Rotating Scatter Mask Designs for Novel Applications in Photon Detection, presented at the *Symposium on Radiation Measurement and Applications*, Ann Arbor, MI, June 13th, 2018.
5. Z. T. Condon*, L. W. Burggraf, J. V. Logan, B. E. ODay, R. J. Olesen, **J. E. Bevins**, and J. C. Petrosky, "Multisource Location Using a Rotating Scatter Mask to Predictably Attenuate Full Energy Gamma-Ray Emissions, presented at the *Hardened Electronics and Radiation Technology Technology Technical Interchange Meeting*, Tucson, AZ, April 19th, 2018.
6. **James E. Bevins**, Bethany L. Goldblum, Elie Katzenson, James Kendrick, Rebecca Krentz-Wee, Sarah Laderman, Yubing Tian, "Alternate Nuclear Proliferation Pathways in the Age of Non-State Actors," *Transactions of the American Nuclear Society*, vol. 117, pp. 10091012, Washington, D.C., October 30th, 2017 (invited).
7. M. K. Covo et al., "88-Inch Cyclotron: The one-stop facility for electronics radiation testing," presented at *IEEE International Workshop on Metrology for AeroSpace (MetroAeroSpace)*, pp. 484-488, Padua, Italy, July 2017.
8. **James E. Bevins**, Bethany L. Goldblum, Tom Hickey, Elie Katzenson, James Kendrick, Rebecca Krentz-Wee, Sarah Laderman, Yubing Tian, Collin Ting, Alexa J Wehsener, "Alternate Nuclear Proliferation Pathways in the Age of Non-State Actors," presented at *Advances in Nuclear Non-proliferation Technology and Policy Conference*, Santa Fe, NM, September 2016.
9. **J. Bevins**, R. Slaybaugh, L. Bernstein, E. Henry, W. Dunlop, "Targeted Modification of Neutron Energy Spectra for National Security Applications," presented at *Hardened Electronics And Radiation Technology Technical Interchange Meeting*, Monterey, CA, April 2016.
10. **J. Bevins**, R. Slaybaugh, L. Bernstein, W. Dunlop, E. Henry, "Application of Metaheuristic Optimization Methods for Neutron Spectral Shaping Applications," presented at *Conference on Data Analysis*, Santa Fe, NM, March 2016.
11. G. Kumbartzki, N. Benczer-Koller, et al., "Magnetic Moments of the 2_1^+ and 4_1^+ States in ^{110}Sn *, presented at *Fall Meeting of the APS Division of Nuclear Physics*, 2015, vol. 60, no. 13.
12. A. Stevenson and **J. Bevins**, "Project Nimble Elder: Investigation of Practical Solutions for Active Interrogation," presented at *Hardened Electronics And Radiation Technology Technical Interchange Meeting*, Albuquerque, NM, April, 2013.
13. A. Stevenson, J. St. Ledger, and **J. Bevins**, "The AFNWC Nuclear Dust Cloud Modeling Initiative," presented at *Hardened Electronics And Radiation Technology Technical Interchange Meeting*, Monterey, CA, March 2012.
14. S. Karki, **J. E. Bevins**, Joseph Sandstrom, C. Clayton, M. S. Driver, B. Nordell, J. W. McClory, J. C. Petrosky, K. I. Pokhodnya and A. N. Caruso, "Fabrication and transport properties of a-B₅C:Hx to n-type Si heterojunction diodes", *American Physical Society March Meeting*, Dallas, TX, March 2011.

15. Abigail A. Bickley, **James Bevins**, Anthony Caruso, James Petrosky, John McClory, Peter Doherty, and William Miller, "Design and testing of a boron carbide based neutron spectrometer for homeland security applications," *Abstracts Of Papers Of The American Chemical Society*, vol. 242. 1155, 2011.
16. **James Bevins**, John McClory, James Petrosky, and Anthony Caruso, "Theoretical Performance of a p-type B₅C:H_x Thin Film on n-Si Neutron Detector", *Transactions of the American Nuclear Society*, vol. 103, pp. 212-216, November 2010.
17. **J. Bevins**, J. P. Hayward, J. Mihalcz, "Monte Carlo simulations of passive time correlation measurements for monitoring HEU in large storage arrays," *Proceedings of 50th INMM Annual Meeting*, Tucson, AZ, July 2009.

Conference Presentations (not including publications listed above)

1. Z. Sweger*, **J. Bevins**, N. Munshi, B. Goldblum, D. Bleuel, and R. Slaybaugh, "Foil Activation Analysis for Neutron Spectrum Unfolding, presented at *National Nuclear Security Administration University Program Review*, Ann Arbor, MI, June 7th, 2018.
2. B. Egner*, R. Torzilli*, **J. E. Bevins**, and B. E. ODay, "Automated Parametric Optimization of a High-Purity Germanium Monte Carlo Neutral-Particle Model, presented at the *American Nuclear Society Student Conference*, Gainesville, FL, April 5th, 2018.
3. T. A. Laplace, J. A. Brown, B. L. Goldblum, D. L. Bleuel, K. P. Harrig, **J. Bevins**, M. Harasty, "Low Energy Light Yield of Organic Scintillators," *University Program Review*, 2017, Walnut Creek, CA.
4. **J. Bevins**, "Modification of the NIF Neutron Spectrum for Forensics Applications," *University and Industry Technical Interchange Review Meeting*, 2016, Raleigh, NC.
5. **James E. Bevins**, Bethany L. Goldblum, Tom Hickey, Elie Katzenson, James Kendrick, Rebecca Krentz-Wee, Sarah Laderman, Yubing Tian, Collin Ting, Alexa J Wehsener, "Alternate Nuclear Proliferation Pathways in the Age of Non-State Actors," *University and Industry Technical Interchange Review Meeting*, 2016, Raleigh, NC.
6. **James Bevins**, Elie Katzenson, Tom Hickey, Erika Suzuki, James Kendrick, Nils Haneklaus, Yubing Tian, Bethany L. Goldblum, "Rethinking the Proliferation Paradigm: Alternate Nuclear Weapon Paths in the Age of Non-State Actors and Technology Democratization," 2015 Winter Project on Nuclear Issues Conference, Washington DC, 2015.
7. **J. Bevins**, "NIF Fission-Enhanced Tailored-Spectrum Irradiator," *Sather Workshop*, 2014, Berkeley, CA.
8. **J. Bevins**, B. Kowash, and J. McClory, "Calibration of AFIT Graphite Pile to Account for ²⁴¹Am Ingrowth in the ²³⁹PuBe13 Source," *ANS National Student Conference*, 2010, Ann Arbor, MI.

Other Works

1. **J. E. Bevins**, R. S. Slaybaugh, "Energy Tuning Assembly for Post-Detonation Nuclear Forensics, Invention Disclosure, January, 2018.
2. **James Bevins**, Youdong Zhang, and Rachel Slaybaugh. "Coeus." Software. (released 2017) <https://github.com/SlaybaughLab/Coeus>
3. **James Bevins**, Youdong Zhang, and Rachel Slaybaugh. "Gnowee." Software. (released 2017) <https://github.com/SlaybaughLab/Gnowee>

TEACHING EXPERIENCE

Air Force Institute of Technology
Assistant Professor of Nuclear Engineering

Aug. 2017 - Present
Wright Patterson AFB, OH

Course	Title	Term (# Students)
NENG 685	Methods for Neutral Particle Transport	Fa17 (5)
NENG 650	Nuclear Instrumentation	Wi18 (co-taught) (6)
NENG 725	Monte Carlo Radiation Transport	Sp18 (5)
NENG 612	Nuclear Engineering Laboratory	Su18 (4)

COMPUTER SKILLS

Languages	Python, JAVA, Fortran 90/95/2003, C++, PERL
Versioning and Testing	git, nose
Tools	Doxygen, L ^A T _E X, Jupyter, MatLab, Mathematica, shell, vim
Nuclear Software	MCNP, ADVANTG, PyNE, SCALE

PROFESSIONAL SERVICE

Institute Activities

NENG Academic Advisor	2017-present
Assistant Radiation Safety Officer	2017-present
Cloud Services Strategy Tiger Team	Member 2018-present

Professional Activities

American Nuclear Society	Student Faculty Advisor, 2017-present
American Nuclear Society	Member, 2006-present