

# RACHEL N. SLAYBAUGH

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Department of Nuclear Engineering  $\diamond$  University of California, Berkeley

4173 Etcheverry Hall MC 1730  $\diamond$  Berkeley, CA 94720

## EDUCATION

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Ph.D.	<b>University of Wisconsin–Madison</b> Nuclear Engineering and Engineering Physics, with a certificate in Energy Analysis and Policy	2011
M.S.	<b>University of Wisconsin–Madison</b> Nuclear Engineering and Engineering Physics	2008
B.S.	<b>Pennsylvania State University</b> Nuclear Engineering	2006

## RESEARCH EXPERIENCE

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<b>University of California, Berkeley</b> <i>Assistant Professor of Nuclear Engineering</i>	Jan. 2014 - Present <i>Berkeley, CA</i>
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- Researching numerical methods for neutral particle transport with an emphasis on supercomputing and advanced architectures; specialization in deterministic, Monte Carlo, and Hybrid methods
- Applications in reactor design, shielding, and nuclear security and nonproliferation
- Design Emphasis in Computational Science and Engineering Affiliated Faculty member

<b>Advanced Research Projects Agency – Energy</b> <i>Incoming Program Director</i>	Jan. 2017 – present <i>Washington, DC</i>
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- Developing first nuclear energy program for arpa-e (pending approval for release)
- Conducted extensive research and interviewing for program development

<b>Bettis Laboratory</b> <i>Senior Engineer in the Shield Design and Development group</i>	Mar. 2012 - Aug. 2014 <i>West Mifflin, PA</i>
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- Implemented the Forward-Weighted Consistent Adjoint Driven Importance Sampling (FW-CADIS) method for variance reduction in Monte Carlo; accredited method for use in shield design
- Developed new Resonance Factor variance reduction method for streaming through materials with space and energy self-shielding

<b>University of Wisconsin–Madison</b> <i>Research Assistant / Rickover Fellow</i>	Sept. 2006 - Nov. 2011 <i>Madison, WI</i>
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- Researched Acceleration Methods for Massively Parallel Deterministic Transport: added parallelization in the energy domain, an advanced eigenvalue solver, and a new multigrid in energy preconditioner to Denovo, developed at Oak Ridge National Lab
- Developed two Monte Carlo source sampling methods for arbitrarily shaped plasma sources; the sources are generated directly from plasma physics data

<b>Penn State Breazeale Reactor</b> <i>Reactor Operator</i>	Aug. 2003 - Apr. 2006 <i>University Park, PA</i>
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- NRC licensed Reactor Operator for TRIGA Mark III reactor
- Analyzed core burn-up anomaly; calibrated gamma irradiation facilities

## SELECTED PUBLICATIONS

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- Jeffery B. Greenblatt, Nicholas R. Brown, Rachel Slaybaugh, et al. "The Future of Low-Carbon Electricity." *Annual Review of Environment and Resources*. **42** (Nov 2017).
- R.N. Slaybaugh, M. Ramirez-Zweiger, Tara Pandya, Steven Hamilton, T.M. Evans "Eigenvalue Solvers for Modeling Nuclear Reactors on Leadership Class Machines." *Nuclear Science and Engineering*. (Submitted 2017)
- Ryan M. Bergmann, Kelly L. Rowland, Nikola Radnović, Rachel N. Slaybaugh, Jasmina L. Vujić. "Performance and Accuracy of Criticality Calculations Performed Using WARP, A Framework for Continuous Energy Monte Carlo Neutron Transport in General 3D Geometries on GPUs." *Annals of Nuclear Energy*. (accepted 2017)
- R. Vasques and K. Krycki and R. N. Slaybaugh. "Nonclassical Particle Transport in 1-D Random Periodic Media," *Nuclear Science and Engineering*. **185** (2017) 16-35.
- M. Munk, R.N. Slaybaugh, Tara M. Pandya, Seth R. Johnson, T. M. Evans, "An Angle-Informed Hybrid Method for CADIS and FW-CADIS." Proceedings of the PHYSOR 2016 Meeting in Sun Valley, ID, May 2016.
- J. Bevins, R. Slaybaugh, L. Bernstein, E. Henry, W. Dunlop, "Targeted Modification of Neutron Energy Spectra for National Security Applications." Proceedings of the 2016 Hardened Electronics And Radiation Technology Technical Interchange Meeting in Monterey, CA, April 2016.
- L. Bernstein, D. Brown, et al. "Nuclear Data Needs and Capabilities for Applications." White Paper. Lawrence Berkeley National Laboratory, May 27-29 2015.
- R.N. Slaybaugh, T.M. Evans, G.G. Davidson, and P.P.H. Wilson, "Rayleigh Quotient Iteration with a Multigrid in Energy Preconditioner for Massively Parallel Neutron Transport," M&C-SNA-MC 2015 Meeting in Nashville, TN, April 2015.
- S.C. Wilson and R.N. Slaybaugh. "Improved Monte Carlo Variance Reduction for Space and Energy Self-Shielding," *Nuclear Science and Engineering*. **179** (2015) 22-41.
- R.N. Slaybaugh, T.M. Evans, G.G. Davidson, and P.P.H. Wilson. "Multigrid in energy preconditioner for Krylov solvers," *Journal of Computational Physics*. **242** (2013) 405-419.
- T.M. Evans, A.S. Stafford, R.N. Slaybaugh, and K.T. Clarno. "Denovo—A new three-dimensional parallel discrete ordinates code in SCALE." *Nuc. Tech.* **171** (2010) 171-200.

## SYNERGISTIC ACTIVITIES

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*Nuclear Energy Advisory Committee*, Appointed Member 2016-2017

*Senior Fellow* of the Breakthrough Institute 2017-present

*Software and Computing*

Berkeley Institute for Data Science Senior Fellow; Advisory Board Member

Berkeley Research Computing      User Advisory Group

The Hacker Within      UCB Faculty Advisor 2014-present; UW Founding member 2009

Software Carpentry      Instructor since 2013

*American Nuclear Society*, National Level

Math and Comp. Division      Chair rotation 2016-present, Exec. Comm. 2013-present

Rad. Protection and Shielding Div.      Exec. Comm. 2015-present

Young Members Group      Exec. Comm. 2014-present

Past Chair / Vice Chair      NEED Comm, Professional Divisions Comm, Student Sections  
Comm, Professional Women in ANS

Board of Directors      Student Member 2007-2009

Society of Industrial and Applied Mathematics (SIAM) member since 2009