RACHEL N. SLAYBAUGH

slaybaugh@berkeley.edu ⋄ (570) · 850 · 3385

Department of Nuclear Engineering ⋄ University of California, Berkeley

4173 Etcheverry Hall MC 1730 ⋄ Berkeley, CA 94720

EDUCATION

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

RESEARCH EXPERIENCE

Lawrence Berkeley National Laboratory   Berkeley, CA
Division Director   *Jan. 2021 – present*

- Managing the Cyclotron Road division to translate hard science into positive societal impact
- Expanding the divisions mission to support even more deployment of innovative technologies

University of California, Berkeley   Berkeley, CA
Assistant Professor of Nuclear Engineering   *Jan. 2014 – July 2017*
Associate Professor   *July 2017 – present*

- Developing numerical methods for neutral particle transport with an emphasis on supercomputing and advanced architectures as well as data science
- Applications in reactor design, shielding, and nuclear security and nonproliferation
- Berkeley Institute for Data Science Faculty Affiliate
- Designated Emphasis in Energy Science and Technology (DEEST) Executive Committe member
- Design Emphasis in Computational Science and Engineering Affiliated Faculty member
- Applied Science & Technology Faculty member

Advanced Research Projects Agency – Energy   Washington, DC
Special Gov Employee / Program Director / Senior Technical Advisor   *Jan. 2017 – Nov. 2020*

- Program creation and management
- Director for MEITNER, the Nuclear OPEN+ cohort, LISE, and GEMINA Programs, supporting research for enabling technologies for advanced nuclear fission reactors
- Co-Director for TERRA and ROOTS Programs, supporting research for sensing and data analytics for above- and below-ground plant outcomes
- Director for FOCUS Program, supporting research for solar technologies that combine photovoltaic and concentrated solar power technologies

Bettis Laboratory   West Mifflin, PA
Senior Engineer in the Shield Design and Development group   *Mar. 2012 – Aug. 2014*

- 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

- Built two software tools in support of using FW-CADIS for shield design
- Scientific Software Development Committee: leader in developing internal website for sharing software carpentry tools and resources

University of Wisconsin–Madison Madison, WI
Research Assistant / Rickover Fellow *Sept. 2006 – Nov. 2011*

- Dissertation "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

Forschungszentrum Karlsruhe (KIT) Karlsruhe, Germany
Visiting Researcher *May 2008 – Dec. 2008*

- Learned about the Rigorous 2 Step method for Monte Carlo geometry conversion while working in the Reactor Safety group
- Helped group incorporate the Direct Accelerated Geometry Monte Carlo (DAGMC) library into MCNP workflow

Penn State Breazeale Reactor University Park, PA
Reactor Operator *Aug. 2003 – Apr. 2006*

- NRC licensed Reactor Operator for TRIGA Mark III reactor
- Analyzed core burn-up anomaly; calibrated gamma irradiation facilities

TEACHING EXPERIENCE

University of California, Berkeley Jan. 2014 - Present
Assistant Professor of Nuclear Engineering *Berkeley, CA*

- Founder Nuclear Innovation Bootcamp, Su. 2016 - 2020
- NE 250, Nuclear Reactor Theory (graduate-level): Fa. 2015, 2017
- NE 255, Numerical Simulations for Radiation Transport (graduate-level): Fa. 2016
- NE 155, Introduction to Numerical Simulations for Radiation Transport (senior-level elective): Sp. 2014, 2015, 2016, 2017, 2021
- NE 100, Introduction to Nuclear Energy and Techn (junior-level required): Fa. 2020
- NE 198, Faculty sponsor for class in which Berkeley students do hands-on science experiments with students in under-served elementary schools in Oakland: Fa. 2015 - present
- NE 24, Putting the Science in Computational Science (Freshman seminar), Sp. 2015, 2016, 2017

Software Carpentry Scientific Computing Workshops
Instructor

- Jan. 14-15, 2016: git; Berkeley Institute for Data Science
- July 16, 2015: shell; École Polytechnique Fédérale Lausanne
- July 1-2, 2015: shell and Python; for underrepresented minority students; UC, Berkeley
- June 11, 2015: Python; Oak Ridge National Laboratory
- Jan. 5-6, 2015: version control; for women only; University of Colorado, Boulder
- Apr. 14-15, 2014: introductory material, version control, object oriented concepts in Python; for women only; Lawrence Berkeley National Laboratory

Bettis Laboratory   Mar. 2012 - Aug. 2014
Instructor   *West Mifflin, PA*

- Qualified instructor for Bettis Reactor Engineering School (BRES), an internal school for new DOE-Naval Reactors employees
- Co-taught BRES Shielding course Fa. 2012, 2013, and Sp. 2013

University of Pittsburgh   Fa. 2012, Sp. 2013
Adjunct Professor   *Pittsburgh, PA*

- Co-taught Introduction to Nuclear Engineering (ENGR 1700), Fa. 2012
- Co-taught *new* course Nuclear Chemistry and Radiochemistry (ENGR 2112), Sp. 2013

SELECTED PRESENTATIONS

"Optimal Operations of Advanced Reactors: How Do We Get There?" Current Issues in Computational Methods – Roundtable, American Nuclear Society Annual Meeting. Online. 14 June 2021. (invited)

Panelist for "Serving the Nation: Engineering as Leaders in Government." Spring Dean's Society Event. Online 24 Mar. 2021. (invited)

"How Can Nuclear Support a Clean Energy Future?" American Physical Society Meeting. Online. 17 Mar. 2021. (invited)

"Nuclear in the 2020s: considerations for the decade ahead." **Keynote Speaker**, ARPA-E Annual Fission Meeting. Online. 23 Feb. 2021. (invited)

Guest Lecture "Nuclear Energy (where we are, where we are going, and why)" for STIA 402: Clean Energy Innovation, Georgetown University School of Foreign Service. Online. 20 Oct. 2020. (invited)

Panelist for "Flexible Nuclear for Future Energy Systems Webinar." Lucid Catalyst and ClearPath. 5 Aug. 2020. (invited)

Panelist for " Beyond Now: Microreactors and Near Term Demonstrations - Perspectives from the Department of Defense and Department of Energy." Panelist. U. S. WIN Virtual Conference. 28 July 2020. (invited)

Panelist for "Advanced Nuclear Tech in a Decarbonized Energy Future: Feasible or Fantastical?" Duke Energy Initiative lecture series. Online. 14 July 2020. (invited)

Panelist for "Challenges and Opportunities in Thermal Hydraulics of High Temperature Gas Cooled Reactors." American Nuclear Society Annual Meeting. Online. 8 June 2020. (invited)

Panelist for "Building Your Leadership Competency." American Nuclear Society Annual Meeting. Online. 8 June 2020. (invited)

"How Can Nuclear Be Part of a Clean Energy Future?" G20 Workshop on Circular Carbon Economy. Riyadh, KSA. 5 March 2020. (invited)

"Special Update: ARPA-E Nuclear Program Update." Advanced Reactors Summit VII. Knoxville, TN. 11 Feb 2020. (invited)

"The Opportunity of Next-Gen Nuclear Energy." Citizen's Climate Lobby, Fairfax Meeting. Annandale, VA. 11 Feb 2020. (invited)

"How Can Nuclear Energy Be Part of a Clean Energy Future?" Climate Tech Convening 2020. San Francisco, CA. 30 Jan 2020. (invited)

Panelist for "Time to be Inclusive and Pragmatic Before Its Too Late: Advanced nuclear technologies must be a significant part of the solution set." Cleantech Forum. San Francisco, CA. 28 Jan 2020. (invited)

"What is ARPA-E Doing in Nuclear Energy?" Argonne National Laboratory Colloquium. Lemont, IL. 20 November 2019. (invited)

Guest Lecture "Nuclear Energy" for STIA 402: Clean Energy Innovation, Georgetown University School of Foreign Service. 23 Oct. 2019. (invited)

Panelist for "The role of innovation in the civilian and military nuclear energy sectors." The civilian-military nexus and the role of innovation in nuclear energy, Atlantic Council. Washington, DC. 15 Oct 2019. (invited)

"Nuclear and ARPA-E: Activities and Opportunities." NUC Workshop: Innovations in Advanced Reactor Design, Analysis, and Licensing. Raleigh, NC (given remotely). 18 September 2019. (invited)

"Nuclear Energy Programs and Research at Advanced Research Projects Agency-Energy (ARPA-E)." GABI nuclear energy roundtable. Washington, DC. 12 September 2019. (invited)

Panelist for "Future Scientists and Engineers for Nuclear Energy." Third Symposium on US-Japan Nuclear Energy Research Cooperation. Washington, DC. 26 June 2019. (invited)

Panelist for "Lessons from Solar PV." Breakthrough Dialogue 2019 Whole Earth Discipline. Sausalito, CA. 21 June 2019. (invited)

"Computing in Nuclear Engineering: Moving Beyond Today's Limitations." MIT Nuclear Science & Engineering Colloquium. Cambridge, MA. 29 April 2019.

"Creating the Future of Nuclear Energy." CITRIS Research Exchange Seminar Series. Berkeley, CA. 28 Nov. 2018. (invited)

"U.S. Nuclear Innovation System." Commercialisation of Small Nuclear in the UK. Coventry, UK. 6 Nov. 2018. (invited)

"MEITNER: The Newest ARPA-E Program." NASA iTech. New York, NY. 14 June 2018. (invited)

"Deep decarbonization: financing the rapid deployment of innovations after R&D." 2050 Today Panel. San Fancisco, CA. 15 June 2018. (invited)

"Advanced Solvers for Radiation Transport." University of Illinois Urbana Champaign NPRE Dept. Graduate Colloquium. Champaign, IL. 5 Dec. 2017. (invited)

"Nuclear Energy: What Can Analytics Do for Economics and Safety?" **Keynote Speaker**, Industrial Machine Learning Workshop 17. San Francisco, CA. 24 Oct. 2017. (invited)

Panelist for "Alternative energy, nuclear and CCS: What are the prospects?" Low-Emissions Solution Conference at the 5th International Conference on Sustainable Development. New York, NY. 21 Sept. 2017. (invited)

Panelist for "The Case for Nuclear: Communications and Analyzing Risks and Benefits" Aspen Institute Future of Nuclear Energy Roundtable. Aspen, CO. 12 Sept. 2017. (invited)

"Advanced Solvers and Innovation for Penetrating Radiation" **Keynote Speaker**, SPIE Penetrating Radiation Technical Event. San Diego, CA. 8 Aug. 2017. (invited)

"Challenges & Opportunities in Developing an Innovation Culture in Nuclear." Second Annual Third Way Advanced Nuclear Summit Panel. Washington, DC. 21 Feb. 2017. (invited)

"Advancing Reactors with Advanced Solvers and Innovative Programs." Electric Power Research Institute. Research Meeting. Palo Alto, CA. 13 Feb. 2017. (invited)

"Exploring the Advanced Nuclear Ecosystem." SxSW Eco Panel. Austin, TX. 12 Oct. 2016. (invited)

"The Opportunity of Global Nuclear Innovation." 49th Japan Atomic Industrial Forum (JAIF) Annual Conference. Tokyo, Japan. 12 April 2016. (invited)

"Exascaling Nuclear Innovation." **Keynote speaker**, Conference on Data Analysis 2016. Santa Fe, NM. 4 Mar. 2016. (invited)

"Lets Get Real: When can we expect commercial advanced reactors?." The Advanced Nuclear Summit and Showcase Panel. Washington, DC. 27 Jan. 2016. (invited)

"Hybrid Transport Methods for Shielding Challenges." Idaho National Laboratory seminar. Idaho Falls, ID. 20 Nov. 2015. (invited)

K.L. Rowland, R.N. Slaybaugh. "Developments in the GPU-accelerated WARP Monte Carlo Neutron Transport Code." Workshop sur l'utilisation des accélérateurs (GPUs, MICs) pour les simulations Monte-Carlo. École Polytechnique, Saclay, France. 10 July 2015.

"The PyNE Software Library: A Framework for ENSDF?" Nuclear Data Week Meeting. Brookhaven National Laboratory. 6 Nov. 2014.

"The Resonance Factor Method: Accelerating Monte Carlo in the Presence of Space and Energy Self-Shielding." CEA-Saclay Colloquium. Saclay, France. 26 June 2014.

R.N. Slaybaugh, T.M. Evans, P.P.H. Wilson, S.C. Wilson. "Radiation Transport: Computational Methods and Real-World Use." NC State Univ. NE Dept. Graduate Colloquium. Raleigh, NC. 8 Nov. 2012. (invited)

R. Slaybaugh, M. Arbidze, S. Lamichhane, D. O'Connor. "An Evaluation of European Union Energy Policies." UW–Madison Center for World Affairs and the Global Economy Seminar. Madison, WI. 11 May 2011.

R.N. Slaybaugh, T.M. Evans, G.G. Davidson. "Parallel Algorithms for Fixed-Source and Eigenvalue Problems." 2010 SIAM Annual Meeting. Pittsburgh, PA. 12-16 July 2010.

AWARDED FUNDING

Current

- Machine Learning Informed Domain Decomposition for Monte Carlo Coupled Electron-Photon Transport
  PI: *Rachel Slaybaugh* (University of California, Berkeley)
  Agency: Sandia National Laboratory
  Amount awarded: $258,639
  Period of performance: Apr 1 2021 – Sept 30, 2023

- Anomaly Detection in Proprietary Data using Multi-Party Computation
  PI: *Rachel Slaybaugh* (University of California, Berkeley)
  Agency: Sandia National Laboratory
  Amount awarded: $332,600
  Period of performance: Oct 1 2018 – Sept 30, 2021

- Training the Next Generation of Nuclear Engineers: Graduate Fellowships at the University of California, Berkeley
  PI: Massimiliano Fratoni (University of California, Berkeley)
      co-PI: Peter Hosemann, *Rachel Slaybaugh* (University of California, Berkeley)

Agency: Nuclear Regulatory Commission
Amount awarded: $400,000
Period of performance: June 30, 2018 – June 29, 2022

- Methods for Process Monitoring to Accurately Detect and Quantify Material Holdup in Advanced Recycle Facilities
  PI: Kai Vetter (University of California, Berkeley)   co-PI: *Rachel Slaybaugh*, Per Peterson, Karl van Bibber (University of California, Berkeley)
  Agency: Department of Energy, Office of Nuclear Energy
  Amount awarded: $800,000
  Period of performance: Oct 1 2017 – Sept 30, 2021 Role: *awarded with Rachel Slaybaugh as PI*; transitioned to co-PI due to leave of absence

- Department of Energy, Nuclear Science and Security Consortium (NSSC)
  Lead PI: Jasmina Vujic (University of California, Berkeley)
     co-PIs: Karl van Bibber, Kai Vetter, Barbara Jacak, Max Fratoni, Lee Bernstein, *Rachel Slaybaugh*, Michael Nacht, Bethany Goldblum (University of California, Berkeley), Ken Czervinski (University of Nevada, Las Vegas), Michael Thoennessen (Michigan State University), Jason Hayward (University of Tennessee, Knoxville), Allison Macfarlane (George Washington University), Mani Tripathi (University of California, Davis), Mikael Nilsson (University of California, Irvine), Ralf Sudowe (University of Nevada, Las Vegas), Cody Folden (Texas A&M University)
  Agency: Department of Energy, National Nuclear Security Administration
  Amount awarded: $25,000,000
  Period of performance: 2016 – 2021 Role: *awarded with Rachel Slaybaugh as Modeling and Simulation co-PI*; I stepped down due to leave of absence

Completed

- Training the Next Generation of Nuclear Engineers: Graduate Fellowships at the University of California, Berkeley
  PI: Peter Hosemann (University of California, Berkeley)
     co-PI: Massimiliano Fratoni , *Rachel Slaybaugh* (University of California, Berkeley)
  Agency: Nuclear Regulatory Commission
  Amount awarded: $400,000
  Period of performance: June 30, 2016 – June 29, 2020

- Nuclear Engineer Scholarships at the University of California, Berkeley to Support the Expansion and Diversity of the Undergraduate Program
  PI: Massimiliano Fratoni (University of California, Berkeley)
     co-PI: Peter Hosemann, *Rachel Slaybaugh* (University of California, Berkeley)
  Agency: Nuclear Regulatory Commission
  Amount awarded: $400,000
  Period of performance: June 30, 2016 – June 29, 2019

- Nuclear Engineering and Computational Methods
  PI: Rachel Slaybaugh (University of California, Berkeley)
  Agency: Lawrence Livermore National Laboratory
  Amount awarded: $8,728
  Period of performance: Sept 8, 2016 – Sept 30, 2018

- Improved Hybrid Modeling of Used Fuel Storage Facilities
  PI: Rachel Slaybaugh (University of California, Berkeley)
     Collaborators: T. M. Evans, S. W. Mosher, and D. E. Peplow (Oak Ridge National Laboratory)
  Agency: Department of Energy, Office of Nuclear Energy

Amount awarded: $645,393
Period of performance: Jan 1 2015 – Dec 31, 2017

- MOOSE Application Collaboration Specifically Pronghorn and RELAP-7
  PI: Rachel Slaybaugh (University of California, Berkeley)
  Agency: Idaho National Laboratory
  Amount awarded: $12,000
  Period of performance: Feb 1 2016 – Jan 31, 2017

- University of California, Berkeley Department of Nuclear Engineering Graduate Fellowship Program
  PI: Rachel Slaybaugh (University of California, Berkeley)
      co-PIs: Massimilliano Fratoni, Jasmina Vujic (University of California, Berkeley)
  Agency: Nuclear Regulatory Commission
  Amount awarded: $400,000
  Period of performance: Aug 1 2014 – July 31, 2018

- Ex-core Dosimetry Calculations for a Pressurized Water Reactor and Comparison to Operational Data
  PI: Rachel Slaybaugh (University of California, Berkeley)
  Agency: National Center for Computational Sciences (NCCS)
  Amount awarded: 5 million hours on Titan Supercomputer
  Period of performance: Feb 23 2017 – Aug 23, 2017

- Transport/Fluence Analysis Methods (purchase order)
  PI: Rachel Slaybaugh (University of California, Berkeley)
  Agency: Westinghouse Electric Company
  Amount awarded: $50,000
  Period of performance: Jan 1 2016 – Oct 28, 2016

- Department of Energy, Nuclear Science and Security Consortium (NSSC)
  Lead PI: Jasmina Vujic (University of California, Berkeley)
      co-PIs: Micheal Nacht, Heino Nitsche, Rick Norman, *Rachel Slaybaugh*, and Kai Vetter (University of California, Berkeley), B. Sherrill (Michigan State University), M. Tripathi (University of California, Davis), G. Miller (University of California, Irvine), S. Shirk (UC/IGCC), K. Czerwinski (University of Nevada, Las Vegas), S. Lapi (Washington University of St. Louis)
  Agency: Department of Energy, National Nuclear Security Administration
  Amount awarded: $26,500,000
  Period of performance: 2011 – 2016
  Role: Per Peterson was the original Nuclear Engineering co-PI; I replaced him when I started in 2014

COMPUTER SKILLS

Languages	C++, Python, Fortran 90/95/2003
Versioning and Testing	git, svn, cvs, CTest, GoogleTest, nose, TravisCI
Tools	EC2, Doxygen, LaTeX, MathCAD, Mathematica, shell, vim, bash, Emacs, Jupyter, Trilinos, LAPACK, MPI, Valgrind, cmake
Nuclear Software	Exnihilo, ADVANTG, MCNP, Serpent, SCALE, PyNE, MOOSE

HONORS AND AWARDS

American Nuclear Society (ANS) Young Member Excellence Award	2014
ANS Presidential Citation	2014
Rickover Fellowship	2008-2011
Second Place, 2011 ANS Winter Meeting Poster Session	2011
Selected participant, Modeling Experimentation and Validation Reactor Physics School	Jul. 2011
Selected participant, Energy Hub conference Poster Session	2011
Everitt P. Blizard Memorial Scholarship, ANS	2010-2011
ANS Mathematics and Computation Division Best Summary + Presentation Award	Nov. 2010
Graduate Scholarship, ANS	2009-2010
Selected participant, Lindau Meeting of Nobel Laureates in Physics	2008
Second Place, 2007 ANS Winter Meeting Poster Session	Nov. 2007
Best Paper, Health Physics Track, 2007 ANS Student Conference	2007
Tau Beta Pi Honor Society	2006
Alpha Nu Sigma Honor Society	2005

PROFESSIONAL SERVICE

National Academies of Science member of the Committee on Laying the Foundations for New and Advanced Nuclear Reactors in the United States, 2020-2022

Biden-Harris Transition Team, 2020

Good Energy Collective, Founding Board Chair, 2020-present

Activate, Leadership Council, 2021-present

UC Berkeley, Innovation & Entrepreneurship Council, 2021-present

Pennsylvania State University, Nuclear Alumni Advisory Council, 2020-2021

University of Michigan, NERS Department Advisory Board, 2019-2021

Nuclear Energy Advisory Committee, Appointed Member, 2016-2017

Senior Fellow of the Breakthrough Institute, 2017-present

Journals, reviews, conference organizing

Nuclear Science and Engineering	Editorial Advisory Board, 2020-present
	reviewer
Annals of Nuclear Energy	reviewer
Journal of Computational Physics	reviewer
Journal of Nuclear Science and Technology	reviewer
Nuclear Engineering and Design	reviewer
Canadian Innovation Fund	proposal reviewer
Lawrence Livermore National Laboratory	LDRD reviewer
US DOE Consolidated Innovative Nuclear Research	proposal reviewer
US DOE Technology Commercialization Fund	proposal reviewer
Platform for Advanced Scientific Computing (PASC) Conference 21	Papers Domain Co-Chair for Engineering
ANS: Math & Comp, PHYSOR, national meetings	reviewer

American Nuclear Society, National Level

Math and Comp. Division	Chair Rotation 2016-2019; Exec. Comm. 2013-2016
Rad. Protection and Shielding Div.	Exec. Comm. 2015-2018

Young Members Group	Exec. Comm. 2014-2017
NEED Comm.	Chair 2013-2015, Vice Chair 2010-2013
Professional Divisions Comm.	Vice Chair 2012-2016
Student Sections Comm.	Chair 2010-2013, Vice Chair 2009-2010
Professional Women in ANS	Chair 2008-2010, Vice Chair 2006-2008
Board of Directors	Student Member 2007-2009
Other committee service	Membership, Bylaws and Rules, Public Info., 2013 Nominating Comm., 2014 Special Selection Comm. for Nominating Comm. Candidates

Software and Computing

The Hacker Within, UCB and UW (http://thehackerwithin.github.io/berkeley/)	Faculty Advisor 2014-2018; Co-founder 2009
Berkeley Research Computing (http://research-it.berkeley.edu/programs/berkeley-research-computing)	User Advisory Group 2016-present
Software and Data Carpentry (http://software-carpentry.org/)	Instructor since 2013
Berkeley Computing and Computer Science Education Committee	2014-present

Energy and Science

Society of Industrial and Applied Mathematics	Member 2009-2020
Berkeley Energy and Resources Collaborative (BERC)	Advisory Board Member 2017-2021
UCB–ANS	Faculty Advisor 2014-2019
Nuclear Engineering Student Delegation	Co-Vice Chair 2010, Selected 2009
UW–Energy Hub	Conference Speaker Chair 2009, Founding Member 2007, Collegiate Energy Association 2008-2010

Education

UC Berkeley Admissions Reader	2021
Berkeley College of Engineering Graduate Education Committee	2014-2017
Berkeley College of Engineering Undergraduate Education Committee	2020-present
Search and promotion committees	member

PUBLICATIONS

Italicized names indicate my students or researchers

A. J. Novak, Sebastian Schunert, Robert Carlsen, Paolo Balestra, Rachel Slaybaugh, Richard Martineau. "Multiscale Thermal-Hydraulic Modeling of the Pebble Bed Fluoride-Salt-Cooled High-Temperature Reactor." *Annals of Nuclear Energy.* **154** (2021) 107968.
https://www.sciencedirect.com/science/article/pii/S0306454920306642

A. J. Novak, R. W. Carlsen, S. Schunert, P. Balestra, R. N. Slaybaugh, and R. C. Martineau. "Pronghorn: A Multidimensional Coarse Mesh Application for Advanced Reactor Thermal-Hydraulics." *Nuclear Technology.* DOI: 10.1080/00295450.2020.1825307
https://www.tandfonline.com/doi/full/10.1080/00295450.2020.1825307

R. Martineau, D. Andrs, R. Carlsen, D. Gaston, J. Hansel, F. Kong, A. Lindsay, C. Permann, A. Slaughter, E. Merzari, R. Hu, *A. Novak*, R. Slaybaugh. "Multiphysics for Nuclear Energy

Applications Using a Cohesive Computational Framework." *Nuclear Engineering and Design.* **367** (2020) 1107512.
https://doi.org/10.1016/j.nucengdes.2020.110751
Best research award from ScienceDirect

A. J. Novak, J. W. Peterson, L. Zou, D. Andrš, R. N. Slaybaugh, R. C. Martineau, "Validation of Pronghorn Friction-Dominated Porous Media Thermal-Hydraulics Model with the SANA Experiments." *Nuclear Engineering and Design.* **350** (2019) 182-194.
https://www.sciencedirect.com/science/article/pii/S0029549319301037

Nicholas J. Quartemont, *James E. Bevins*, Lee Bernstein, Rachel Slaybaugh. "Analysis of an Energy Tuning Assembly for Simulating Nuclear Weapon Environments at the National Ignition Facility." *Journal of Radiation Effects.* **38**:1 (2020) 13-26.
https://apps.dtic.mil/sti/pdfs/AD1093191.pdf

Marissa Ramirez de Chanlette, *Weixiong Zheng*, R. N. Slaybaugh. "A Two-Grid and Nonlinear Diffusion Acceleration Method for the SN Equations with Neutron Upscattering." *Journal of Computational Transport Theory.* **49**:1 (2020) 1-14.
https://doi.org/10.1080/23324309.2019.1695631

Mario Ortega, Rachel N Slaybaugh, Peter N Brown, Teresa S Bailey, Britton Chang. "A Rayleigh Quotient Method for Criticality Eigenvalue Problems in Neutron Transport." *Annals of Nuclear Energy.* **138** (2020) 107120.
https://doi.org/10.1016/j.anucene.2019.107120

A. J. Novak, J. W. Peterson, L. Zou, D. Andrš, R. N. Slaybaugh, R. C. Martineau, "Validation of Pronghorn Friction-Dominated Porous Media Thermal-Hydraulics Model with the SANA Experiments." *Nuclear Engineering and Design.* **350** (2019) 182-194.
https://www.sciencedirect.com/science/article/pii/S0029549319301037

Richard Vasques, Leonardo R. C Moraes, Ricardo C Barros, Rachel N Slaybaugh, "A Spectral Approach for Solving the Nonclassical Transport Equation." *Journal Of Computational Physics.* **402** (2020) 109078.
http://arxiv.org/abs/1812.04811
https://www.sciencedirect.com/science/article/pii/S0021999119307831

Madicken Munk, Rachel Slaybaugh, "Review of Hybrid Methods for Deep-Penetration Neutron Transport." *Nuclear Science and Engineering.* **193**:10 (2019) 1055-1089.
https://www.tandfonline.com/doi/full/10.1080/00295639.2019.1586273

J. S. Rehak, L. M. Kerby, M. D. DeHart, R. N. Slaybaugh. "Weighted Delta-Tracking with Scattering," *Nuclear Engineering and Design.* **342** (2019) 231-239.
https://arxiv.org/abs/1802.02237

James Bevins, Zachary Sweger, Ninad Munshi, Bethany Goldblum, Josh Brown, Darren Bleuel, Lee Bernstein, Rachel Slaybaugh. "Performance Evaluation of an Energy Tuning Assembly for Neutron Spectral Shaping." *Nuclear Inst. and Methods in Physics Research, A.* **923** (2019) 79-87.
https://www.sciencedirect.com/science/article/pii/S0168900219300968

Kelly L. Rowland, Cory D. Ahrens, Steven Hamilton, and R.N. Slaybaugh. "Assessment of the Lagrange Discrete Ordinates Equations for Three-Dimensional Neutron Transport" *Nuclear Science and Engineering.* **193**:3 (2019) 233-252.
https://github.com/kellyrowland/ldo-deterministic

James E. Bevins, R.N. Slaybaugh. "Gnowee: A Metaheuristic Optimization Algorithm for Solving Engineering Problems Containing Continuous and Discrete Design Parameters." *Nuclear Technology.* **205**:4 (2019) 542-562.

`http://arxiv.org/abs/1804.05429`

I. Makine, *R. Vasques*, R.N. Slaybaugh. "Exact Transport Representation of the Classical and Nonclassical Simplified P$_N$ Equations." *Journal of Computational and Theoretical Transport.* **47**:4-6 (2018) 326-349.
`https://www.tandfonline.com/doi/abs/10.1080/23324309.2018.1496938`

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.* **190** (2017) 31-44.
`https://arxiv.org/abs/1708.04928`

Jeffery B. Greenblatt, Nicholas R. Brown, Rachel Slaybaugh, Theresa Wilks, Emma Stewart, and Sean T. McCoy. "The Future of Low-Carbon Electricity," *Annual Review of Environment and Resources.* **42** (2017) 289-316.
`http://www.annualreviews.org/doi/10.1146/annurev-environ-102016-061138`

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.* **103** (2017) 334-349.
`https://www.sciencedirect.com/science/article/pii/S0306454916309902`

Leah E. Morgan, *Madicken Munk*, Brett Davidheiser-Kroll, Nicholas H. Warner, Sanjeev Gupta, Rachel Slaybaugh, Patrick Harkness, Darren F. Mark. "Instrumentation development for planetary in situ ^{40}Ar/^{39}Ar geochronology," *Geostandards and Geoanalytical Research.* **41**:3 (2017) 381-396.
`https://onlinelibrary.wiley.com/doi/full/10.1111/ggr.12170`

R. Vasques, K. Krycki, R. N. Slaybaugh. "Nonclassical Particle Transport in One-Dimensional Random Periodic Media," *Nuclear Science and Engineering.* **185**:1 (2017) 78-106.
`https://arxiv.org/abs/1602.00825`

S.C. Wilson and R.N. Slaybaugh. "Improved Monte Carlo Variance Reduction for Space and Energy Self-Shielding," *Nuclear Science and Engineering.* **179**:1 (2015) 22-41.
`https://arxiv.org/abs/1502.04749`

G.G. Davidson, T.M. Evans, J.J. Jarrell, S.P. Hamilton, T.M. Pandya, and R.N. Slaybaugh, "Massively Parallel, Three-Dimensional Transport Solutions for the k-Eigenvalue Problem," *Nuclear Science and Engineering.* **177**:2 (2014) 111-125.
`https://www.tandfonline.com/doi/abs/10.13182/NSE12-101`

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.
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David R. Farley, *Mitch G. Negus*, Rachel N. Slaybaugh. "Industrial Internet-of-Things & Data Analytics for Nuclear Power & Safeguards." Sandia National Laboratories, SAND2018-12807, November 2018.

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Slaybaugh, Rachel; Lovering, Jessica; Baker, Suzanne. "How Innovative New Reactors Could Improve Public Acceptance" in *Encyclopedia of Nuclear Energy* (Vol. 4 pg. 682-691), edited by Andrew Kadak and Ehud Greenspan, Elsevier, 2021.
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Other Works : Software

Josh Rehak, Weixiong Zheng, Alexander Blank, Ramirez de Chanlette, R. N. Slaybaugh. BART. Software (released 2019)
https://github.com/SlaybaughLab/BART

James Bevins, Youdong Zhang, and Rachel Slaybaugh. "Coeus." Software. (released 2017) https://github.com/SlaybaughLab/Coeus

James Bevins, Youdong Zhang, and Rachel Slaybaugh. "Gnowee." Software. (released 2017) https://github.com/SlaybaughLab/Gnowee

Ryan M. Bergmann, Kelly L. Rowland, Nikola Radnović, Rachel N. Slaybaugh, Jasmina L. Vujić. "WARP." Software (released 2017) `https://github.com/SlaybaughLab/warp`

PyNE: The Nuclear Engineering Toolkit. Software. (periodic contributions 2014-2017) `https://github.com/pyne/pyne`

Other Works : Funding Opportunity Announcements

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Other Works : Other Writings

Suzanne Baker, Jessica Lovering, and Rachel Slaybaugh. "Our Progressive Policy Agenda for Advanced Nuclear Energy." Policy Report for Good Energy Collective. August 2, 2020. `https://www.goodenergycollective.org/policy/progressive-policy-agenda-for-advanced-nuclear-energy`

Suzanne Baker, Jessica Lovering, Rachel Slaybaugh, and Denia Djokic. "A Policy Pathway for Nuclear Justice." Policy Report for Good Energy Collective. April 27, 2021. `https://www.goodenergycollective.org/policy/a-policy-pathway-for-nuclear-justice`

MENTORING

Doctoral Advisement

- Chair, Dissertation Committee: Josh Rehak (NE), "A Novel Tool for the Assessment and Validation of Acceleration Methods for Solving the Neutron Transport Equation." UC Berkeley 2020.

- Chair, Dissertation Committee: April Novak (NE), "Multiscale Thermal-Hydraulic Methods for Pebble Bed Reactors." UC Berkeley 2020.

- Chair, Dissertation Committee: Mario Ortega (NE), "A Rayleigh Quotient Fixed Point Method for Criticality Eigenvalue Problems in Neutron Transport." UC Berkeley 2019.

- Chair, Dissertation Committee: Kelly Rowland (NE), "Advanced Quadrature Selection for Monte Carlo Variance Reduction." UC Berkeley 2018.

- Chair, Dissertation Committee: James Bevins (NE), "Targeted Modification of Neutron Energy Spectra for National Security Applications." UC Berkeley 2017.

- Chair, Dissertation Committee: Madicken Munk (NE), "FW/CADIS-Ω: An Angle-Informed Hybrid Method for Neutron Transport." UC Berkeley 2017.

- Chair, Dissertation Committee: Nathan Bailey (NE), "Atom probe tomographic analysis of high dose oxide-dispersion strengthened steel (alloy MA957) at selected irradiation conditions." UC Berkeley 2016.

- co-Chair, Dissertation Committee: Sebastian Schunert (NE), "Comparing various Spatial Discretization Schemes based on a Method of Manufactured Solution Benchmark Suite." North Carolina State University 2013.

- Member, Dissertation Committee: Daniel Wooten (NE), "Predicting Fuel Salt Composition via Linear Optimization in Molten Salt Reactors." UC Berkeley 2019.

- Member, Dissertation Committee: Stephen Parker (NE), "Synthesis, Characterization, and Neutronic Modeling of (ThxU1-x)N Fuels for Application in Compact Nuclear Reactors." UC Berkeley 2018.

- Member, Dissertation Committee: Nicholas Thompson (Nuclear Engineering and Science), "Measuring and Validating Neutron Capture Cross Sections Using a Lead Slowing-Down Spectrometer." Rensselaer Polytechnic Institute 2017.

- Member, Dissertation Committee: Ryan Bergmann (NE), "The Development of WARP - A Framework for Continuous Energy Monte Carlo Neutron Transport in General 3D Geometries on GPUs." UC Berkeley 2014.

Master's Advisement

- Chair, Thesis Committee: Marissa Ramirez Zweiger (NE), "A Two-Grid, Nonlinear Diffusion Acceleration Method for the SN Equations with Neutron Upscattering." UC Berkeley 2018.

- Chair, Thesis Committee: Mitch Negus (NE), "Ex-Core fluence analysis of an operating rector using VERAShift." UC Berkeley 2018.

- Chair, Thesis Committee: Joshua Rehak (NE), "Weighted Delta-Tracking with Scattering implemented in the Serpent 2 Monte Carlo Code." UC Berkeley 2017.

- Chair, Thesis Committee: Kelly Rowland (NE), "Delta-tracking in the GPU-accelerated WARP Monte Carlo Neutron Transport Code." UC Berkeley 2015.

- Member, Thesis Committee: Daniel Wooten (NE), "Future needs of circulating fuel reactor kinetics modeling." UC Berkeley 2017.

- Member, Thesis Committee: Ilker Makine (NE), "Exact Transport Representations of the Classical and Nonclassical Simplified PN Equations with Isotropic Scattering." I'lnstitut National des Sciences et Techniques 2017.

- Member, Thesis Committee: Milos Atz (NE), "Effect of initial enrichment and discharge burnup on the minimum critical mass of far-field depositions of fissile material from LWR spent fuel." UC Berkeley 2016.

- Member, Thesis Committee: Dan Shen (NE), "Preliminary feasibility assessment of molten salt cooled reactor with pin-type fuel." UC Berkeley 2016.

Directed Undergraduate Independent Study at UC Berkeley

- Spring and Summer 2018: Alexander Blank

- Fall 2017: Emily Vu and Jaqueline Garcia

- Fall 2016 and Spring 2017: Eliav Maas

Directed Undergraduate Research at UC Berkeley

Laura Shi: Jan 2019 – Aug 2019; Emily Vu: April 2016 – May 2019; Jemin Desai: Sept 2016 – Sept 2017; David Smith: June 2016 – Aug 2017; Mingjian Lu: June 2016 – Aug 2017; Will Kable: Aug 2016 – May 2017; Youdoung Zhang: Aug 2016 – May 2017; Garrett Baltz: Feb 2015 – July 2016; Josh Howland: Jan 2014 – May 2016; Clay Sheih: Dec 2015 – May 2016; Soham Shah: May 2015 – Aug 2015; Joseph Labrum: May 2015 – Aug 2015; Marissa Ramirez-Zweiger: Nov 2014 – Aug 2015; Nikola Radnovic Jan 2014 – May2014

Other Scholars

- Mentored Weixiong Zheng as a Postdoctoral Scholar March 2017–Dec 2018; Dr. Zheng is now employed at a Bay Area software startup

- Mentored Richard Vasques as an Assistant Project Scientist June 2015– June 2017; Dr. Zheng is now a professor at The Ohio State University

- Mentored Ilker Makine as a Visiting Scholar Summer 2017