

Ross W. Barnowski, Ph.D

Postdoctoral Scholar, Applied Nuclear Physics
Lawrence Berkeley National Laboratory

CONTACT INFORMATION

Bldg. 70A Mailstop 3363-E
Lawrence Berkeley National Laboratory
1 Cyclotron Road Berkeley CA 94720

Phone: (847)224-5917
E-mail: RWBarnowski@lbl.gov
Website: <https://github.com/rossbar.io>

RESEARCH INTERESTS

Nuclear instrumentation, gamma-ray spectroscopy and imaging, nuclear medicine (diagnostic imaging, radiotherapy), robotics, sensor fusion, SLAM

EDUCATION

University of California, Berkeley, Berkeley California 09/2010 - 06/2016
Ph.D, Nuclear Engineering - August 2016 — GPA: 3.98/4.0

- **Dissertation:** “*Development and Evaluation of Real-Time Volumetric Compton Gamma-Ray Imaging*”
- **Advisor:** Kai M. Vetter
- **Coursework:** Advanced Radiation Instrumentation Laboratory, Radiation Transport Simulation and Modelling, Medical Imaging Signals and Systems, Computer Vision, Applications in Parallel Computing, Python for Scientific Computation

University of Michigan, Ann Arbor, Michigan 09/2006 - 04/2010
B.S.E. Nuclear Engineering and Radiological Science - April 2010 — GPA 3.98/4.0
Coursework: Nuclear Reactor Design, Radiation Detection and Measurement, Nuclear Reactor Kinetics, General Radiation Laboratory, Nuclear Physics, Quantum Mechanics, C++ for Sci/Eng

EXPERIENCE

Lawrence Berkeley National Laboratory, Berkeley, CA 09/2016 - Present
Postdoctoral Researcher — Applied Nuclear Physics
Project: Portable Radiation Imaging Spectroscopy and Mapping (PRISM)

- Development of software for multichannel data acquisition system. Firmware integration and testing; network communication for control and data I/O. Full system integration including front-end design for HW/FW developers (engineering interface) and users. Device applications in source search and gamma-ray mapping — enhanced imaging and localization capabilities.
- Development and implementation of gamma-ray imaging modalities including Compton and proximity-based localization algorithms. Direct application to nuclear contamination remediation in Fukushima, Japan.

Project: Small-Animal Molecular Imaging

- Near-field, high-resolution Compton tomography for molecular imaging with small-animal models. Development and assembly of tomographic system as well as data analysis and image reconstruction algorithms. Proposed applications for radionuclide uptake studies and theranostics for radiopharmaceutical development.

Graduate Student Researcher — Applied Nuclear Physics 06/2011 - 05/2016
Project: Volumetric Gamma-Ray Imaging

- Develop and evaluate real-time 3D gamma-ray imaging techniques based on sensor fusion and real-time SLAM algorithms.
- Approach successfully demonstrated with portable high-purity germanium imager as well as hand-portable imager based on room-temperature semiconductor gamma-ray detectors.
- Software contributions include multithreaded application framework written in Python/C for interfacing with commercial DAQ hardware and implementing real-time gamma-ray imaging analysis.

Lawrence Livermore National Laboratory, Livermore, CA

Undergraduate Researcher — Nuclear Data Group 06/2009 - 08/2009 & 06/2010 - 07/2010

Project: Benchmarking of Evaluated Nuclear Data Library (ENDL) with Monte Carlo & deterministic particle transport codes

- Generate simulations using Monte Carlo & deterministic code packages for benchmarking nuclear cross-section data in the (ENDL) libraries.
- Scripting for automation of simulation input and data analysis. Experience with SLURM for job submission on cluster systems.
- Listed as co-author on release of ENDL2011.

Argonne National Laboratory, Argonne, IL

SULI Summer Intern

05/2008 - 08/2008

Project: Millimeter-wave radar for remote detection of plumes of ionizing radiation from illicit nuclear reprocessing activities.

- Technical report selected for publication in Journal of Undergraduate Science (1 of 18 winners out of 600 applicants).
- Winner of national SULI poster competition at AAAS conference.

PUBLICATIONS

Vetter K. , **Barnowski R.** , Haefner A. , Joshi T. H. , Pavlovsky R. , and Quiter B. J. . Gamma-ray imaging for nuclear security and safety: Towards 3-d gamma-ray vision. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 878:159–168, 2018.

Haefner A. , **Barnowski R.** , Luke P. , Amman M. , and Vetter K. . Handheld real-time volumetric 3-d gamma-ray imaging. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 857:42–49, 2017.

Barnowski R. , Haefner A. , Mihailescu L. , and Vetter K. . Scene data fusion: Real-time standoff volumetric gamma-ray imaging. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 800:65–69, November 2015.

Haefner A. , Gunter D. , **Barnowski R.** , and Vetter K. . A filtered back-projection algorithm for 4π compton camera data. *IEEE Transactions on Nuclear Science*, 62(4):1911–1917, August 2015.

Brown D. , Beck B. , Descalles M. , Escher J. , Hoffman R. , Mattoon C. , Navratil P. , Nobre G. , Ormand W. , Summers N. , and **Barnowski R.** . 2011 release of the evaluated nuclear data library (endl2011. 0). Technical report, Lawrence Livermore National Laboratory (LLNL), Livermore, CA (United States), May 2015.

Barnowski R. . In-sourcing nuclear medicine. *Journal of Science Policy and Governance*, 1, 2011.

Barnowski R. , Gopalsami N. , and others . Remote detection of radioactive plumes using millimeter wave technology. *Journal of Undergraduate Research*, 9, 2009.

CONFERENCE PRESENTATIONS

Barnowski R. . Evaluation of volumetric imaging systems with scene data fusion. In *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, San Diego, CA, November 2015.

Barnowski R. . Scene data fusion: Enabling real-time volumetric gamma-ray imaging. In *University Industry Technical Interchange (UITI)*, Ann Arbor, MI, June 2015.

Barnowski R. and Haefner A. . A python framework for gamma-ray imaging. In *Scipy*, Austin, TX, July 2014.

Barnowski R. . Near real-time fusion of gamma-ray imaging with 3d scene data for volumetric imaging. In *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Seoul, Republic of South Korea, November 2013.

TEACHING ¹	Graduate Student Instructor — UC Berkeley STAT 159/259	Fall 2015
	Upper Division ² /Graduate: Reproducible and Collaborative Statistical Data Science	
	Graduate Student Instructor — UC Berkeley NE 92	Fall 2014
	Lower Division: Introduction to Nuclear Engineering	
	Graduate Student Instructor — UC Berkeley NE 120	Fall 2012
	Upper Division: Nuclear Materials	
HONORS AND AWARDS	Graduate Student Instructor — UC Berkeley NE 120	Fall 2011
	Upper Division: Nuclear Materials	
	Graduate Student Instructor — UC Berkeley NE 104	Spring 2011
	Upper Division: Nuclear Instrumentation Laboratory	
	Graduate Student Instructor — UC Berkeley NE 101	Fall 2010
	Upper Division: Introduction to Nuclear Physics	
ACTIVITIES	Nuclear Science and Security Consortium Fellow	2014 - 2016
	American Nuclear Society Graduate Scholarship	2014
	UC Berkeley Outstanding GSI Award	2012
	University of Michigan Joseph M. Geisinger Scholar	2006 - 2010
	University of Michigan Class of 1931E Honors Scholar	2007 - 2010
	Sustainable Energy Fellowship Program Awardee, Cornell University	2010
	NEUP Scholarship Recipient	2009 - 2010
	American Nuclear Society National Scholarship Recipient	2007 - 2010
	The Hacker Within, UC Berkeley Chapter	2014-2016
	<i>Participant/Contributor</i>	
<ul style="list-style-type: none"> Contributed presentations/breakout sessions on scientific computing with python, including machine learning (scikit-learn), data visualization, distributed computing, and extending python (cython & the Python C-API). www.thehackerwithin.org/berkeley/previous.html 		
	Nuclear Engineering Graduate Student Association — NEGSA	2012-2015
	<i>Co-founder & Officer</i>	
	• Officer position: Secretary/Treasurer	2012-2014
	• Organized graduate student visit weekends and intra-departmental educational and social events.	
	• Initiated computing seminars for discussion of advanced computing topics relevant for nuclear engineers (merged with The Hacker Within, 2014).	
	American Nuclear Society (ANS)	2007-2015
	<i>University of Michigan & UC Berkeley Student Chapters</i>	
	Officer Positions	
	• Social Chair (UCB)	2012-2013
	• Vice President (UM)	2009-2010
	• Student Conference Volunteer Coordinator (UM)	2010
	• Outreach Chair (UM)	2008-2009

¹All graduate student instructor (GSI) positions were full 20 hr/week appointments

²Upper Division = Juniors/Senior-level, Lower Division = Freshman/Sophomore-level