Kiersten Ruisard

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Education

2018 PhD in Physics, University of Maryland, College Park, MD
Dissertation: "Design of a Nonlinear Quasi-Integrable Lattice for Resonance Suppression at the University of Maryland Electron Ring"

2012 BSc in Physics *summa cum laude*, Rutgers University, Piscataway, NJ
Honors thesis: "Design of an Electrostatic Extraction Section for the University of Maryland Electron Ring."

Research interests

Physics of accelerator beams with space charge
Beam loss and halo growth
Nonlinear optics and resonances in rings
Control and optimization for particle accelerators

Professional Experience

2021- present Accelerator Physicist, Oak Ridge National Laboratory
Accelerator Physics Group, Supervisor: Nicholas Evans
Research projects: Beam dynamics and halo development on a 2.5 MeV H- test stand, model benchmarking, automated tuning of beam losses

2018- 2021 Shull Fellow, Oak Ridge National Laboratory
Accelerator Physics Group, Supervisor: Andrei Shishlo

2012-2018 Graduate Research Assistant, Institute for Research in Electronics and Applied Optics, University of Maryland College Park
Nonlinear optics for the University of Maryland Electron Ring, Advisor: Timothy Koeth
Source design for high power ionospheric modification, Advisor: Thomas Antonsen

2011-2012 Research Assistant, Institute for Research in Electronics and Applied Optics, University of Maryland College Park
Extraction section for University of Maryland Electron Ring, Advisor: Timothy Koeth

2010 Research Assistant, International REU in Gravitational Wave Detection, Physics Department, University of Florida, Gainesville
Glitch rejection in automated detection pipeline, Advisor: B.S. Sathyaprakash (Cardiff University)

2011 Independent study, Department of Physics, Rutgers University, NJ
Azimuthally-varying magnetic field design for Rutgers Cyclotron, Advisor: Timothy Koeth

2009-2011 Research Assistant, Department of Physics, Rutgers University, NJ
Galaxy Morphology with Adaptive Optics Imaging, Advisor: Andrew Baker

Teaching and mentoring

2022-present Supervisor for UT-Knoxville physics graduate research assistant, topic: halo development in an accelerator test-stand

2019,2021-2022,2024 Co-instructor, Fundamentals of Accelerator Physics and Technology, US Particle Accelerator School

2018 Teaching assistant, Classical Mechanics and Electromagnetics, US Particle Accelerator School

2015,2017 Co-instructor, Cyclotrons and Their Design, US Particle Accelerator School

2016-2017 Teaching assistant and co-designer, Accelerator Physics - Building the Maryland 5 MeV Cyclotron, University of Maryland *(Senior capstone course in engineering department)*

2014 Teaching assistant, General Physics: Electrodynamics, Light, Relativity and Modern Physics, University of Maryland Physics Department

Grants, honors & awards

2021 DOE Early Career Research Program Awardee, “Advancing accelerator beam modeling via high-dimensional phase space diagnostics at a high intensity injector test stand”
2014-2017 National Science Foundation Graduate Research Fellow
2013,2017 "Most popular talk" in Departmental Graduate Student Seminar
2016 Student Poster Prize at North American Particle Accelerator Conference
2012-2013 University of Maryland Dean’s Fellowship
2012 Henry Rutgers Scholar Undergraduate Thesis Award *(university-wide competition)*
2011-2012 Barry M. Goldwater Scholarship *(nationally competed merit scholarship)*

Professional Memberships and Service

2024-25 Scientific Programming Committee, 2025 North American Particle Accelerator Conference

2023-present Chair, Americas Region Selection Committee for Student Grants for the International Particle Accelerator Conference. *Responsible for fundraising and selection process for student grants for annual conference.*

2023-24 Early Career Member-at-large, American Physical Society, Division of Physics of Beams. *In this role, I was editor for the annual newsletter and organized the DPB event at IPAC'24.*

2023-24 Local Organizing Committee, 2024 International Particle Accelerator Conference. *Organized student programs, including student poster competition, networking event, and student grants program.*

2022 Workshop Chair, 5th ICFA Mini-Workshop on Space Charge, Knoxville, TN, Oct. 2022

Publications & Presentations

Refereed Journal Articles

2023 Hoover A., **Ruisard K.**, Aleksandrov A., Zhukov A., Cousineau S. Analysis of a hadron beam in five-dimensional phase space *Phys Rev Accel Beams* 2023;26:064202.

2021 **Ruisard K**, Aleksandrov A. Rapid charge redistribution leading to core hollowing in a high-intensity ion beam. *Phys Rev Accel Beams* 2021;24:014201.

2020 Aleksandrov A, Cousineau S, **Ruisard K**, Zhukov A. First measurement of a 2.5 MeV RFQ output emittance with 1 part-per-million dynamic range. *Nucl Instruments Methods Phys Res Sect A* 2021;987:164829.

2020 **Ruisard K**, Aleksandrov A, Cousineau S, Shishlo A, Tzoganis V, Zhukov A. High dimensional characterization of the longitudinal phase space formed in a radio frequency quadrupole. *Phys Rev Accel Beams* 2020;23(12):124201.

2019 **Ruisard K**, Komkov H B, Beaudoin B, Haber I, Matthew D, Koeth T. Single-invariant nonlinear optics for a small electron recirculator. *Phys Rev Accel Beams* 2019;22(4):41601.

Datasets

2025 Ruisard, K., Hoover, A., Thompson, T. (2025). SNS-BTF simulation benchmark (0.0.2). Zenodo. DOI:10.5281/zenodo.14902814

2023

Hoover, A., Ruisard, K., Aleksandrov, A., Zhukov, A., Cousineau, S. (2023). Five-dimensional phase space measurement at the Spallation Neutron Source Beam Test Facility (0.1.5). Zenodo. DOI:10.5281/zenodo.10368144

Newsletter articles

2023 **Ruisard K**, Aleksandrov A, Hoover A, Six Dimensional Distributions at the SNS Beam Test Facility. *APS-DPB Newsletter 2022*.

2020 Aleksandrov A, Cousineau S, **Ruisard K.** Understanding beam distributions in hadron linacs in the presence of space charge. *J Instrum* 2020; 15(7).

Seminars

2021 "How measuring 6D beam distributions can help control losses in high power accelerators," Accelerator Science Seminar, University of Chicago, May 10, 2021

"More range and more dimensions: Understanding beam distributions at the SNS Beam Test Facility," Fermilab Accelerator Physics and Technology Seminar, March 2, 2021

2018 "Design of nonlinear quasi-integrable optics for resonance suppression at the University of Maryland Electron Ring," John Adams Institute for Accelerator Science Seminar, Oxford University, Feb. 22, 2018

Outreach activities

2023 "The Spallation Neutron Source: powering neutron science at Oak Ridge National Laboratory," SAGE Live, remote, May 13, 2023. recording available

2021 "Connecting into Accelerator Physics," ORISE *Lunch with a Researcher*, remote, Oct. 14, 2021.

Panelist, “What Do Early-Career Physicists Do? A view of the Post-Doc Experience" APS March Meeting, remote, March 15-19

Conference and Workshop Talks

Written proceedings available where indicated

2025 "The Spallation Neutron Source Beam Test Facility," APS Global Physics Summit, Anaheim, California, March 16-21, 2025.

2024

"Benchmark of Linac Model and Phase Space Measurements at the SNS Beam Test Facility," 14th International Computational Accelerator Physics Conference, Seeheim, Germany, October 2-5, 2024. **Invited Speaker**

2022 Ruisard, K., Cousineau, S., Hoover, A., Zhukov, A., "Observation of current-driven features of 2.5 MeV ion bunch with complete and efficient 5D measurements at the SNS Beam Test Facility," in *Proceedings of the 31st Linear Accelerator Conference*.

Ruisard, K., Hoover, A., Zhukov, A., "Model/measurement comparison of the transverse phase space distribution of an RFQ-generated bunch at the SNS BTF," in Proceedings of NAPAC2022.

“Exploring Initial Distributions at the Beam Test Facility,” 5th ICFA mini-workshop on Space Charge, Knoxville, TN

2021 "Beyond RMS: Understanding the Evolution of Beam Distributions in High Intensity Linacs," in *Proceedings of IPAC2021*, remote, May 24-28 2021. **Invited Speaker**

"The implications and challenges of representing the 6D distribution of high charge bunches," 2021 APS April Meeting, remote

"6D measurements at an RFQ test stand," ARIES Workshop on Experiences during Hadron LINAC commissioning, remote, January 2021

2019 Ruisard KJ, Aleksandrov A, Cousineau S, Zhang Z. "Characterization and modeling of high-intensity evolution in the SNS Beam Test Facility," in *Proceedings of NAPAC2019*, Lansing, MI.

"Application of SNS Beam Test Facility (BTF) to halo formation in high-intensity linacs," ICFA Space Charge Workshop, CERN, Geneva, Switzerland. **Invited Speaker**

2018 Ruisard K, Beaudoin B, Haber I, Matthew D, Koeth T. "Nonlinear Optics At Umer : Lessons Learned in Simulation," in *Proceedings of the 13th Int. Computational Accelerator Physics Conference*, Key West, FL. **Invited speaker**

2017 "The UMER nonlinear optics experiments/simulations, nonlinear insert and octupole magnet development", ICFA Space Charge Workshop, Darmstadt, Germany. **Invited Speaker**

"Non-linear optics in UMER: theory, simulations, experiments," FAST IOTA scientific program meeting, Fermilab, Batavia, IL, June 6

2016 “The University of Maryland Electron Ring distributed octupole lattice: marrying quasi-integrable optics with the FODO lattice,” Advanced Accelerator Concepts Workshop, Washington DC

Ruisard K, Baumgartner H, Beaudoin B, Haber I, Matthews D, Koeth T. "Early tests and simulation of quasi-integrable octupole lattices at the University of Maryland Electron Ring,"

in *Proceedings of HB2016*. Malmo, Sweden, 511-516. **Invited Speaker**

"Status update: nonlinear optics experiments at UMER," FAST IOTA scientific program meeting, Fermilab, Batavia, IL, June 14

2015 Focused Workshop on Scientific Opportunities in IOTA, Fermilab, Batavia, IL, April 28-29

2014 "Nonlinear optics at the University of Maryland Electron Ring," Advanced Accelerator Concepts Workshop, San Jose, CA.

2013 Ruisard K, Hine G, Koeth T, Rosenberg A. "The Rutgers cyclotron: Placing student's careers on Target," in *Proceedings of the 20th International Conference on Cyclotrons and Their Applications.* Vancouver, BC, Canada, 291-295. **Invited Speaker**

"Nonlinear Integrable Optics at the University of Maryland Electron Ring," 1st Advanced Superconducting Test Accelerator (ASTA) User's Meeting, Fermilab, Batavia, IL, July 23-24

Poster Presentations with Proceedings

2024 Ruisard, K., Aleksandrov, A., Hoover, A., Thompson, T.E., Zhukov, A., "Progress towards halo modeling at the SNS Beam Test Facility," in *Proceedings of the 32nd Linear Accelerator Conference*.

Ruisard, K., Aleksandrov, A., Cousineau, S., Dickson, R., Han, B., Hoover, A., Shishlo, A., Thompson, T.E., Tzoganis, V., Welton, R., Zhukov, A., "Status of the Spallation Neutron Source beam test facility and progress of beam dynamics studies," in *Proceedings of IPAC24*.

2023 Ruisard K, Hoover A., Aleksandrov A., Cousineau S., Thompson T., Zhukov A. "Measurements at peak operational beam current in the SNS Beam Test Facility," in *Proceedings of IPAC23*, Venice, Italy. May 7-12 2023.

2020 Ruisard K, Aleksandrov A, Shishlo A. "Virtual slit for improved resolution in longitudinal emittance measurement," in *Proceedings of IBIC2020*, remote, Sept. 14-18, 2020.

2018 Ruisard KJ, Baumgartner H, Beaudoin B, et al. "Tuning low-current beams for nonlinear quasi-integrable optics experiments at the University of Maryland Electron Ring." in *Proceedings of IPAC2018*, Vancouver, Canada, May 2018.

2016 K. J. Ruisard et al., "Experimental plans for single-channel strong octupole fields at the University of Maryland Electron Ring", in *Proceedings of the 2016 NAPAC*, Chicago, IL, October 2016. **Student Poster Prize**

2015 K. J. Ruisard, B. Beaudoin, I. Haber, T. Koeth, "Simulations and experiments in support of octupole lattice studies at the University of Maryland Electron Ring," in *Proceedings of the*

2015 IPAC, Richmond, VA, May 2015.

2013 K. J. Ruisard, S. Bernal, I. Haber, R.A. Kishek, T. Koeth, "Design and simulation of an extraction section for the University of Maryland Electron Ring", in *Proceedings of the 2013 IPAC*, Shanghai, China, May 2013.

2012 K. J. Ruisard, B. Beaudoin, I. Haber, R.A. Kishek, T. Koeth, "Design of an Electrostatic Extraction Section for the University of Maryland Electron Ring", in *Proceedings of the 2012 IPAC*, New Orleans, LA, May 2012.