Rileigh **Bandy**

✉ rileigh.bandy@colorado.edu | 🐙 rbandy | 🦋 rbandy | in rjbandy

Research Interests

UNCERTAINTY QUANTIFICATION AND VALIDATION

- Heliophysics, chemical, ecological, and epidemic systems
- Development of data-driven models that adhere to physical constraints
- Calibration and validation techniques

Education

The University of Colorado, Boulder   *August 2019 - August 2024*
                                                                           (Expected)

PH.D., COMPUTER SCIENCE   *3.971/4.0 GPA*

- Advisor: Rebecca Morrison, Ph.D.
- Represented and learned the uncertainties in complex, physics-based computational models. For system of equations, I learned discrepancies through embedded model corrections. For black-box observations, I explored *a posterior* representations of uncertainties.

The University of Colorado, Boulder   *May 2022*

M.S., COMPUTER SCIENCE   *3.970/4.0 GPA*

The University of Texas at Austin   *August 2015 - May 2019*

B.S., COMPUTER SCIENCE   *3.67/4.0 GPA*

Research and Industry Experience

Sandia National Laboratory   *Albuquerque, NM*

RESEARCH AND DEVELOPMENT INTERN - OPTIMIZATION & UNCERTAINTY QUANTIFICATION (ORG: 1463)   *May 2022 - Present*

- Employed grouped Sobol' indices to inform relevant reactions in a finite-rate gas-surface chemistry model.
- Calibrated and validated a neural-network-corrected compartmental disease model.
- Investigated how calibration data and the neural network architecture affected the validation time horizon.

University of Texas at Austin   *Austin, TX*

                                                                           June 2016 - August 2016, May 2018 - June
RESEARCH FELLOW - SECTION OF COMPUTATIONAL MATERIALS, UNDER GRAEME HENKELMAN, PH.D.   *2018, and June 2019 - August 2019*

- Contributed to the Transition State Atomic Simulation Environment (TSASE) software library global optimization methodology. (http://theory.cm.utexas.edu/tsase/)
- Helped create a database for sharing collaborative results. (http://fri.oden.utexas.edu/ fri/fridb_GO/server.py)

Institute of Pure and Applied Mathematics   *Los Angeles, CA*

REU PARTICIPANT - RESEARCH IN INDUSTRY PROJECTS FOR STUDENTS, INDUSTRY SPONSOR: HRL LABORATORIES, LLC   *June 2018 - August 2018*

- Employed a data science approach and machine learning to simulated additive manufacturing.

Electric Reliability Council of Texas   *Taylor, TX*

CYBERSECURITY INTERN   *May 2017 - December 2017*

- Improved the company's security posture through the creation of an automated Open-Source Intelligence program that alerts security analysts of threats to the company or its personnel on the Clearnet and dark web.
- Created educational phishing exercises.

Awards & Distinctions

2023	**Recipient**, Space Weather with Quantified Uncertainties Student Travel Fellowship	*Cambridge, MA*
2023	**Winner of the Best Paper in Model Validation and Uncertainty Quantification**, Conference Proceedings of the Society for Experimental Mechanics (SEM) Series	*Austin, TX*
2020	**Recipient**, Dean's Summer Research Fellowship	*Boulder, CO*
2018	**Winner of the Student E-Poster Competition in the Technology, Engineering, and Math category**, the American Association for the Advancement of Science (AAAS) annual meeting	*Austin, TX*
2018	**Recipient**, Chevron Scholarship	*Austin, TX*
2018	**Recipient**, Swedish Excellence Endowment to study abroad at KTH Royal Institute of Technology	*Stockholm, Sweden*

Journal and Conference Papers

1. **R. Bandy** and R. Morrison, Stochastic Model Corrections for Reduced Lotka-Volterra Models Exhibiting Mutual, Competitive, and Predatory Interactions, in Chaos: An Interdisciplinary Journal of Nonlinear Science, *In revision*.

2. **R. Bandy** and R. Morrison, Quantifying Model Form Uncertainty in Spring-Mass-Damper Systems, in Conference Proceedings of the Society for Experimental Mechanics Series, **Best Paper in Model Validation & Uncertainty Quantification**.

Technical Reports

1. **R. Bandy**, T. Portone, and M. Sands, Quantifying and Reducing Uncertainties in Ablation Models for Hypersonic Flight, in Computer Science Research Institute (CSRI) Summer Proceedings 2023, Sandia National Laboratories, *In review*.

2. **R. Bandy**, T. Portone, and E. Acquesta, Validating Neural-Network-Corrected Dynamical Systems, in CSRI Summer Proceedings 2022, S.K. Seritan and J.D. Smith, eds., Technical Report SAND2022-10280R, Sandia National Laboratories, 2022, pp. 14–30.

3. E. Acquesta, T. Portone, R. Dandekar, C. Rackauckas, **R. Bandy**, G. Huerta, and I. Dytzel, Model-form Epistemic Uncertainty Quantification for Modeling with Differential Equations: Application to Epidemiology, in Sandia Report, Technical Report SAND2022-12823, Sandia National Laboratories, 2022, pp. 1–44.

Presentation

- Complex Couplings and Simple Springs: Analysis of Model-Form Error for Highly Nonlinear Oscillatory Systems. MS 407.2 session presented at 17th U.S. National Congress on Computational Mechanics (USNCCM); July 26th, 2023; Albuquerque, NM.

- Skewed Uncertainty Estimates for Deterministic Predictions. Poster session for junior researchers presented at Space Weather with Quantified Uncertainties Spring Meeting 2023; March 10th, 2023; Cambridge, MA.

- Quantifying Model Form Uncertainty in Spring-Mass-Damper Systems. Session 23 presented at SEM IMAC-XLI; February 14th, 2023; Austin, TX.

- Model Correction and Validation of Reduced Lotka-Volterra Models. MS 104 session presented at SIAM Conference on Uncertainty Quantification; April 14th, 2022; Atlanta, GA.

- Model Correction and Validation of Reduced Lotka-Volterra Models. Poster session presented at SIAM Conference on Applications of Dynamical Systems; May 26th, 2021; Virtual.

- Investigating Methodology for Global Optimization. Poster session presented at the AAAS Annual Meeting; February 18th, 2018; Austin, TX.

- Investigating Methodology for Global Optimization. Poster session presented at: Institute of Pure and Applied Mathematics workshop on Optimization and Optimal Control for Complex Energy and Property Landscapes; October 2nd, 2017; Los Angeles, CA.

Service Activities

Boulder "I Have a Dream" Foundation   *Boulder, CO*

POST SECONDARY VOLUNTEER TUTOR   *March 2021 - Present*

- Tutored post-secondary students in STEM subjects.

Access and Inclusion Peer Mentoring Program   *Boulder, CO*

GRADUATE MENTOR   *October 2020 - May 2022*

- Served as a mentor for first-year undergraduate underrepresented minority students in Engineering.
- Met regularly with my mentees to answer questions and provide support as they transitioned to college.

Computational Materials Freshman Research Initiative (FRI) Lab   *Austin, TX*

PEER MENTOR   *August 2016 - May 2019*

- Facilitated high school students in the lab's summer program code for the first time.
- Held lab hours for undergraduate students in the FRI course.
- Helped create and grade assignments for the FRI course.

Technical Skills

Programming Languages	C++, HTML, Java, Julia, MATLAB, Python, R, SQL.
Technologies and Services	Amazon Web Services, Git.
High Performance Computing	MPI, OpenMPI, Slurm.