

# Aminur Rahman

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Research Interests Dynamical Systems, Nonlinear dynamics and Chaos, Bifurcation Theory, Partial Differential Equations, Physical Applied Math, Mathematical Biology, Data Science, Machine Learning.

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## EDUCATION

May 2017 **Ph.D. in Applied Mathematics**, *New Jersey Institute of Technology & Rutgers University, Department of Mathematical Sciences*, Newark, NJ.  
Advisor: Denis Blackmore.  
Dissertation: *Qualitative Modeling and Analysis of Chaotic Logical Circuits and Walking Droplets: A Dynamical Systems Approach*

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## PROFESSIONAL APPOINTMENTS

9/1/20 - **Acting Instructor**, *University of Washington*, Seattle, WA.  
Present Mentors: Nathan Kutz and Ivana Bozic  
9/1/22 - **Artificial Intelligence Institute in Dynamic Systems Postdoctoral Researcher**, *University of Washington*, Seattle, WA.  
Present Mentors: Nathan Kutz  
9/1/17 - **Postdoctoral Teaching and Research Scholar**, *Texas Tech University*, Lubbock, TX.  
8/31/20 Mentors: Souparno Ghosh and Ranadip Pal  
6/1/08 - **Lee Teng Particle Accelerator Physics Undergraduate Internship**, *Argonne National Laboratory, University of Chicago*, Argonne, IL.  
8/8/08 Mentor: Nicholas Sereno

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## HONORS AND AWARDS

2023 UW AMATH Boeing Excellence in Research and Teaching Award  
2022 Third-prize in the Northwestern QBio Great Math Challenges proposal competition  
2021 First-prize in the APS Forum for Early Career Scientists poster award  
2020 Runner-up in the APS Group on Statistical and Nonlinear Physics Postdoctoral speaker award  
2016 New Jersey Institute of Technology Excellence in Teaching  
2013 Runner-up in the SIAM dsweb pedagogy contest  
Early career travel awards SIAM-DS 2021 and 2015, APS Braslau Family Grant: APS-March 2021, Dynamic Days 2018 and 2019, AMS Sectional-Fall 2016, NJIT student travel award 2013-2015

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## COMPETITIVE FUNDING

2021-2024 American Mathematical Society - Simons Foundation Travel Grant

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## PUBLICATIONS

Key: Underline – corresponding author; g, ug, hs – mentoring (graduate student, undergraduate, high school);  
► – highlighted publication

### SUBMITTED

- 27) J. N. Kutz, A. Rahman, M. Ebers<sup>g</sup>, J. Koch, J. Bramburger. Universal Dynamics of Damped-Driven Systems: The Logistic Map as a Normal Form for Energy Balance. (Submitted, preliminary version on arxiv: <https://arxiv.org/abs/2211.11748>)
- 26) A. Rahman, A. Peace, R. Kesawan<sup>g</sup>, S. Ghosh. Spatio-temporal models of infectious disease with high rates of asymptomatic transmission (Submitted, preliminary version on arxiv: <https://arxiv.org/abs/2207.09671>)

### REFEREED JOURNALS

- ▶ 25) [A. Rahman](#). Damped-driven system of bouncing droplets leading to deterministic diffusive behavior. *Phys. Rev. E* **108** 035103 (2023); DOI: 10.1103/PhysRevE.108.035103
- ▶ 24) [A. Rahman](#), D. Blackmore. The One-dimensional Version of Peixoto's Structural Stability Theorem: A Calculus-based Proof. *SIAM Review* **65**(3) (2023); DOI: 10.1137/21M1426572. **Cover Article**
- 23) G. Ferrandez-Quinto<sup>ug</sup>, [A. Rahman](#). Stochastic discrete dynamical model for the hydrodynamic analog of a quantum mirage. *Mech. Res. Commun.* **134** 104219 (2023); DOI: 10.1016/j.mechrescom.2023.104219. *Invited Special Issue in honor of Denis Blackmore*
- ▶ 22) [E. Kara](#), G. Zhang<sup>ug</sup>, J. J. Williams<sup>g</sup>, G. Ferrandez-Quinto<sup>ug</sup>, L. J. Rhoden<sup>ug</sup>, M. Kim<sup>ug</sup>, J. N. Kutz, [A. Rahman](#). Deep Learning Based Object Tracking in Walking Droplet and Granular Intruder Experiments. *J. Real-Time Image Pr.* **20** 86 (2023); DOI: 10.1007/s11554-023-01341-4
- 21) G. Zhang<sup>ug</sup>, I. C. Christov, [A. Rahman](#). Multi-bounce resonances in the interaction of walking droplets. *Mech. Res. Commun.* **134** 104215 (2023); DOI: 10.1016/j.mechrescom.2023.104215. *Invited Special Issue in honor of Denis Blackmore*
- 20) [A. Rahman](#), J. N. Kutz. Walking Droplets as a Damped-driven System *SIAM J. Appl. Dyn. Syst.* **22**(2) (2023); DOI: 10.1137/22M1486042.
- 19) K. Murthy<sup>hs</sup>, I. Jordan<sup>ug</sup>, P. Sojitra<sup>ug</sup>, [A. Rahman](#), D. Blackmore. Generalized Attracting Horseshoe in the Rössler Attractor. *Symmetry* **13**(1), 30 (2021); DOI: 10.3390/sym13010030. *Invited special issue on Symmetry in Modeling and Analysis of Dynamic Systems.*
- ▶ 18) [A. Rahman](#), D. Blackmore. Walking Droplets Through the Lens of Dynamical Systems. *Modern Physics Letters B* **34**(34) 2030009 (2020); DOI: 10.1142/S0217984920300094. *Invited World Scientific review article.*
- ▶ 17) [E. Kara](#)<sup>g</sup>, [A. Rahman](#), E. Aulisa, S. Ghosh. Tumor ablation due to inhomogeneous – anisotropic diffusion in generic 3-dimensional topologies. *Physical Review E* **102** 062425 (2020); DOI: 10.1103/PhysRevE.102.062425
- 16) [A. Rahman](#), D. Blackmore. Interesting bifurcations inspired by walking droplet dynamics. *Communications in Nonlinear Science and Numerical Simulations* **90** 105348 (2020); DOI: 10.1016/j.cnsns.2020.105348.
- 15) [S.R. Dhruba](#), [A. Rahman](#), R. Rahman, S. Ghosh, R. Pal. Recursive model for dose-time responses in pharmacological studies. *BMC Bioinformatics* **20**(Suppl 12):317 (2019); DOI: 10.1186/s12859-019-2831-4. *Invited special issue on Computational Network Biology: Modeling, Analysis, and Control.*
- ▶ 14) [A. Rahman](#), S. Ghosh, R. Pal. Modeling of drug diffusion in a solid tumor leading to tumor cell death. *Physical Review E* **98** 062408 (2018); DOI: 10.1103/PhysRevE.98.062408.
- ▶ 13) [A. Rahman](#). Standard map-like models for single and multiple walkers in an annular cavity. *Chaos* **28**(9) 096102 (2018); DOI: 10.1063/1.5033949. *Invited special issue on Hydrodynamic Quantum Analogs.*
- ▶ 12) [A. Rahman](#), I. Jordan<sup>ug</sup>, D. Blackmore. Qualitative models and experimental investigation of chaotic NOR gates and set/reset flip-flops. *Proceedings of the Royal Society A* **474** 1-19 (2018); DOI: 10.1098/rspa.2017.0111
- ▶ 11) [A. Rahman](#), Y. Joshi, [D. Blackmore](#). Sigma map dynamics and bifurcations. *Regular and Chaotic Dynamics* **22**(6) 740-749 (2017); DOI: 10.1134/S1560354717060107. *Invited special issue dedicated to the memory of Vladimir Arnold (1937 - 2010).*
- 10) [A. Rahman](#), D. Blackmore. Threshold voltage dynamics of chaotic RS flip-flops. *Chaos, Solitons & Fractals* **103C** 555-566 (2017); DOI: 10.1016/j.chaos.2017.07.014
- 9) [A. Rahman](#), D. Blackmore. Neimark–Sacker bifurcation and evidence of chaos in a discrete dynamical model of walkers. *Chaos, Solitons & Fractals* **91** 339-349 (2016); DOI: 10.1016/j.chaos.2016.06.016
- 8) [R. Goodman](#), [A. Rahman](#), M.J. Bellanich, C.N. Morrison. A mechanical analog of the two-bounce resonance of solitary waves: modeling and experiment. *Chaos* **25**, 043109 (2015); DOI: 10.1063/1.4917047
- 7) [D. Blackmore](#), [A. Rahman](#), J. Shah. Discrete dynamical modeling and analysis of the R-S flip-flop circuit. *Chaos, Solitons & Fractals* **42** 951-963 (2009); DOI: 10.1016/j.chaos.2009.02.032

## REFEREED CONFERENCE PROCEEDINGS

- 6) A. Rahman, S.R. Dhruva S. Ghosh, R. Pal. Recursive model for dose-time responses in pharmacological studies. (2018); Proceedings of the Fifth International Workshop on Computational Network Biology: Modeling, Analysis, and Control.

## DISSERTATION

- 5) A. Rahman. Qualitative Modeling of Chaotic Logical Circuits and Walking Droplets: A Dynamical Systems Approach. (2017) (link: <http://archives.njit.edu/vhlib/etd/2010s/2017/njit-etd2017-049/njit-etd2017-049.php>)

## Tutorials, National Lab Reports, Other

- (4) A. Rahman, E. Kara, J. N. Kutz. From Sequences of Images to Trajectories: A Tracking Algorithm for Dynamical Systems. *SIAM News* (2023) <https://sinews.siam.org/Details-Page/from-sequences-of-images-to-trajectories-a-tracking-algorithm-for-dynamical-systems>.
- 3) Y. Joshi, D. Blackmore, A. Rahman. Generalized attracting horseshoes and chaotic strange Attractors. (Submission on hold due to the passing of D. Blackmore, preliminary version on arxiv: <https://arxiv.org/abs/1611.04133>).
- 2) A. Rahman. SIAM-dswebtutorials: Peixoto's Structural Stability Theorem (2013)
- 1) A. Rahman, N. Sereno, H. Shang. Benchmarking the Multipass Beam-Breakup Simulation Code BI. OAG-TN-2008-029. (2008)

## MEDIA COVERAGE

"Cancer mechanics: How physical cues influence cell migration, metastasis, and treatment". *EurekaAlert!* February, 28, 2020, *Global Health News Wire* March, 2, 2020. Sourced publications: [14, 15, 17]

## MENTORING

Key: **p** – publication

### Graduate students

- 2022 - Present Ike Wenceslao Griss (Department of Applied Mathematics, University of Washington): Mentoring with Nathan Kutz and Bamdad Hosseini (UW - Amath) on Kernel Regression and Sparse Identification techniques for quantum analogs.
- 2022 - Present Joseph Williams<sup>P</sup>(Department of Applied Mathematics, University of Washington): Mentoring with Nathan Kutz (UW - Amath, ECE, AI) on developing quantum analog experiments.
- 2022 - Present Trevor Crupi (Department of Applied Mathematics, University of Washington): Mentoring with Ivana Bozic (UW - Amath) on social and biological spatio-temporal models. Defended MS thesis: June 6, 2022.
- 2021 - Present Katherine Owens (Department of Applied Mathematics, University of Washington, PhD 2022; currently postdoc at Fred Hutch): Continuing mentorship with Ivana Bozic (UW - Amath) on the transport of CAR-T cells and the efficacy of immunotherapy.
- 2019 - 2021 Erdi Kara<sup>P</sup>(Department of Mathematics and Statistics, Texas Tech University): Mentoring with Eugenio Aulisa (TTU - Math) on inhomogeneous - anisotropic drug diffusion in a tumor.
- 2018 Muhammad Shah Alam (Department of Mathematics and Statistics, Texas Tech University). Advisor: Angela Peace (TTU - Math). Title: Parameter Sensitivity Analysis of Dynamics of Ovarian Tumor Growth Model. Defended MS project: Nov. 2, 2018.

### Highlighted Undergraduate students

- Spring 2022 - Present George Zhang<sup>P</sup>(Department of Applied Mathematics, University of Washington): Continuing mentorship of my AMATH 499 student on Machine Learning techniques applied to droplet tracking and modeling and Studying dynamical cancer models. Mentoring with Nathan Kutz (UW - Amath, ECE, AI)
- Spring 2022 - Present Max Kim<sup>P</sup>(Department of Environmental Engineering, University of Washington): Continuing mentorship of my AMATH 499 student on developing experiments for Hydrodynamic Quantum Analogs. Mentoring with Nathan Kutz (UW - Amath, ECE, AI)
- Spring 2021 - Present Levi Rhoden<sup>P</sup>(Department of Mechanical Engineering, University of Washington): Continuing mentorship of my AMATH 499 student on developing experiments for Hydrodynamic Quantum Analogs. Mentoring with Nathan Kutz (UW - Amath, ECE, AI)

- Spring 2021 - Present Gonzalo Quinto<sup>P</sup>(Department of Applied Mathematics and Department of Physics, University of Washington): Continuing mentorship of my AMATH 499 student on Experimental and Theoretical Investigation of Damped-driven systems. Mentoring with Nathan Kutz (UW - Amath, ECE, AI)
- Fall 2019 - Spring 2021 Joel Garza (Department of Mechanical Engineering, Texas Tech University): Serving as mentor for the **National Academy of Engineering Grand Challenges** Scholars Program.
- Summer 2017 Parth Sojitra<sup>P</sup>(Department of Electrical Engineering, New Jersey Institute of Technology): Mentoring, with Denis Blackmore (NJIT - Math), a summer provost scholar on developing “real-world” systems that replicate generalized attracting horseshoe dynamics.
- June 2015 - August 2017 Ian Jordan<sup>P</sup>(Department of Electrical Engineering, New Jersey Institute of Technology; Currently: received PhD in 2022 from Stony Brook University in Computational Neuroscience): Mentoring, with Denis Blackmore (NJIT - Math), a summer provost scholar (2015 and 2016) and recipient of the NJIT phase II seed grant (2016) on designing and building chaotic electronic circuits.
- Summer 2015 Leila Wooten (Department of Mathematics, Bloomfield College): Mentoring, with Denis Blackmore (NJIT - Math), a **McNair scholar** on simulating and analyzing a 1D model for walking droplets.
- High school students**
- Summer 2017 Karthik Murthy<sup>P</sup>(Bridgewater-Raritan High School): Mentoring, with Denis Blackmore (NJIT - Math), a summer provost high school intern on developing “real-world” systems that replicate generalized attracting horseshoe dynamics.

## TEACHING EXPERIENCE

### HIGHLIGHTED COURSES

Among the courses below I **highlight** a few of note.

- Spring 2021, Winter 2022, Autumn 2023 **Enrollment > 400**, *University of Washington*, AMATH 301, Beginning Scientific Computing. Taught a course on the theory and application of scientific computing in both MATLAB and Python with over 400 students each quarter from a variety of academic backgrounds. Supervised and mentored 6 TAs in grading, quiz development, and tutorial sessions.
- Summer 2019 **Study Abroad**, *Texas Tech University*, Math 3350 and 2360, Higher Mathematics for Engineers I (ODEs) and Linear Algebra. Lead Study Abroad Program for TTU Engineering students in Sevilla, España.
- Fall 2018 **Graduate course**, *Texas Tech University*, Math 5346, Advanced Topics In Applied Mathematics I: Dynamical Systems, Asymptotics, and Numerics. Developed and taught a graduate course on the techniques of traditional applied mathematics. Structured the course based on a final project in the form of a scientific article with double-blind peer review.
- Spring 2015 **Excellence in Teaching Award**, *New Jersey Institute of Technology*, Math 491, Chaos Theory. Developed a course, as a PhD student, on chaos theory with a theoretical/computational component and a lab component. Lectures gained popularity on YouTube: [https://www.youtube.com/playlist?list=PLTgVJQEL0JdiHgC7CA11XYo\\_3cJx\\_ANmz](https://www.youtube.com/playlist?list=PLTgVJQEL0JdiHgC7CA11XYo_3cJx_ANmz). Won the NJIT 2016 Excellence in Teaching Award.

### GRADUATE COURSES

#### University of Washington

- Amath 600 Independent Research or Study. Spring 2022, Autumn 2022
- Amath 582 Computational Methods For Data Analysis [Data Science, Machine Learning, etc.] Winter 2023

#### Texas Tech University

- Math 5360 Practical Training in the Teaching of Undergraduate Mathematics. Fall 2018
- Math 5346 Advanced Topics In Applied Mathematics I: Dynamical Systems, Asymptotics, and Numerics. Fall 2018

### UNDERGRADUATE COURSES

#### University of Washington

- Amath 499 Undergraduate Reading and Research. Spring 2021, Spring 2022, Autumn 2022, Spring 2023, Autumn 2023
- Amath 482 Computational Methods For Data Analysis [Data Science, Machine Learning, etc.] Winter 2023
- Amath 481 Scientific Computing. Autumn 2020
- Amath 352 Applied Linear Algebra and Numerical Analysis. Autumn 2020, Spring 2023
- Amath 301 Beginning Scientific Computing. Spring 2021, Winter 2022, Autumn 2023

## Texas Tech University

- Math 4350 Advanced Calculus I: Intro to Real Analysis. Spring 2018  
Math 3351 Higher Mathematics for Engineers II: Partial Differential Equations. Fall 2017, Spring 2020  
Math 3350 Higher Mathematics for Engineers I: Ordinary Differential Equations. Study Abroad 2019, Summer 2020  
Math 3310 Intro to Proofs. Summer 2018  
Math 2450 Calculus III. Fall 2019  
Math 2360 Linear Algebra. Study Abroad 2019

## New Jersey Institute of Technology

- Math 491 Chaos Theory. Spring 2015  
Math 222 Ordinary Differential Equations. Fall 2014, Fall 2016  
Math 112 Calculus II. Spring 2014, Fall 2015, Spring 2017

## Substitute/Recitation

- University of Washington: Amath 536 (Mathematical Modeling of Cancer)
- New Jersey Institute of Technology: Math 110 (Precalculus), Math 111 (Calculus I), Math 112 (Calculus II), Math 139 (Trigonometry and Calculus), Math 222 (ODE), Math 332 (Complex Variables), Math 337 (Linear Algebra), Math 340 Lab (Numerical Methods Lab), Math 473 (Dynamical Systems), and Math 481/565 (Real Analysis).
- University of Delaware: Math 241 (Calculus I).

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## TALKS

### INVITED

- May 15, 2023 **Society for Industrial and Applied Mathematics Dynamical Systems 2023**, *Hilton*, Portland, OR.  
Nonlinear Dynamics, Bifurcations, and Chaos: The Works of Denis Blackmore.
- December 5, 2022 **NJIT Fluid Mechanics and Waves seminar**, *New Jersey Institute of Technology*, Newark, NJ.  
Walking droplets as a damped-driven system
- November 15, 2022 **MIT Physical Applied Math seminar**, *Massachusetts Institute of Technology*, Cambridge, MA.  
Walking droplets as a damped-driven system
- November 14, 2022 **BU Dynamical Systems seminar**, *Boston University*, Boston, MA.  
Spatio-temporal models of cancer treatments
- November 2, 2022 **NJIT Albert Dorman Honors College Colloquium**, *New Jersey Institute of Technology*, Newark, NJ.  
Simple Models in a Complex World: From Physics to Sociology
- January, 25, 2022 **Department of Applied Mathematics**, *University of Washington*, Seattle, WA.  
Early Career Research Panel for Undergraduate Applied Math Majors
- May, 24, 2021 **Society for Industrial and Applied Mathematics Dynamical Systems 2021**, *Virtual Conference*.  
Diffusive behavior in hydrodynamic quantum analogs
- February 18, 2021 **University of Nebraska - Lincoln Mathbio Seminar**, *University of Nebraska*, Lincoln, NE.  
Physics-based models of cancer drug response in solid tumors: towards computer-aided treatment strategies
- March 2, 2020 **American Physical Society March Meeting**, *Virtual session held on March 4th due to cancelation of APS March*, GSNP, Postdoctoral speaker award finalist.  
Diffusive behavior in walking droplets
- January 24, 2020 **University of Kentucky Math Seminar**, *University of Kentucky*, Lexington, KY.  
Mathematically Tractable Models in a Complex World: From Physics to Biology.
- May 20, 2019 **Society for Industrial and Applied Mathematics Dynamical Systems 2019**, *Snowbird Resort*, Snowbird, UT.  
Simple Proofs of Chaos for Logical Circuit and Walking Droplet Models.



- April 16, 2019 **Rennes Physics Seminar**, *Université de Rennes*, Rennes, FR.  
Coupled transport-population models for drug distribution and tumor cell death.
- February 26, 2019 **TTU SIAM Chapter Early Career Colloquium**, *Texas Tech University*, Lubbock, TX.  
Mathematically tractable models in cancer biophysics and walking droplets
- January 9, 2019 **Purdue Mechanical Engineering Seminar**, *Purdue University*, West Lafayette, IN.  
Coupled transport-population models for drug distribution and tumor cell death.
- November 28, 2018 **TTU Applied Mathematics Seminar**, *Texas Tech University*, Lubbock, TX.  
Simple Transport - Population Models in Solid Tumors
- November 6, 2018 **TTU BioMathematics Seminar**, *Texas Tech University*, Lubbock, TX.  
Simple Transport - Population Models in Solid Tumors
- October 31, 2018 **TTU Applied Mathematics Seminar**, *Texas Tech University*, Lubbock, TX.  
Discrete Dynamical Models of Walking Droplets
- April 3, 2018 **NJIT MathBio Seminar**, *New Jersey Institute of Technology*, Newark, NJ.  
Tumor ablation through drug diffusion
- February 27, 2018 **TTU SIAM Chapter Young Scholar Symposium**, *Texas Tech University*, Lubbock, TX.  
Simple models in a complex world
- February 6, 2018 **TTU BioMathematics Seminar**, *Texas Tech University*, Lubbock, TX.  
Tumor Ablation Through Drug Diffusion
- May 21, 2017 **Society for Industrial and Applied Mathematics Dynamical Systems 2017**, *Snowbird Resort*, Snowbird, UT.  
Bifurcations in Walking Droplet Dynamics.
- February 22, 2017 **MIT Numerical Methods for PDEs seminar**, *Massachusetts Institute of Technology*, Cambridge, MA.  
Dynamical modeling and analysis of walking droplets and chaotic logical circuits
- February 8, 2017 **URI Dynamical Systems Seminar**, *University of Rhode Island*, South Kingstown, RI.  
Dynamical modeling and analysis of chaotic logical circuits and walking droplets
- November 14, 2015 **American Mathematical Society Sectional Conference Fall 2015**, *Rutgers University*, New Brunswick, NJ.  
Neimark-Sacker Bifurcation and Evidence of Chaos in a Discrete Dynamical Model of Walkers
- October 7, 2015 **NJIT Department of Mechanical and Industrial Engineering Colloquium**, *New Jersey Institute of Technology*, Newark, NJ.  
The Chaotic Ballet of Walking Droplets
- May 21, 2015 **LANL Center for Nonlinear Studies Seminar**, *Los Alamos National Laboratory*, Los Alamos, NM.  
A Scheme for Modeling and Analyzing the Dynamics of Logical Circuits
- May 18, 2015 **Society for Industrial and Applied Mathematics Dynamical Systems 2015**, *Snowbird Resort*, Snowbird, UT.  
A Scheme for Modeling and Analyzing the Dynamics of Logical Circuits
- March 7, 2015 **American Mathematical Society Sectional Conference Spring 2015**, *Georgetown University*, Washington DC.  
A Mechanical Analog and Discrete Modeling of the n-bounce Resonance of Solitary Waves
- November 8, 2014 **American Mathematical Society Sectional Conference Fall 2014**, *University of North Carolina*, Greensboro, NJ.  
Further Analysis of Discrete Dynamical Models of the RS Flip-Flop Circuit
- March 29, 2014 **American Mathematical Society Sectional Conference Spring 2014**, *University of Maryland Baltimore County*, Baltimore, MD.  
A Scheme for Modeling and Analyzing the Dynamics of Logical Circuits
- CONTRIBUTED**
- March 6, 2020 **American Physical Society March Meeting**, *Virtual session held on March 3rd due to cancelation of APS March*, GSOFT, **APS GSNP Postdoctoral speaker award finalist talks**.  
Diffusive behavior in walking droplets
- January 5, 2018 **Dynamic Days 2018**, *Denver Hilton City Center*, Denver, CO.  
The Chaotic Ballet of Walking Droplets.

- July 3, 2017 **Workshop on Wave-Particle Duality and Hydrodynamic Quantum Analogs**, *University of Liège*, Liège, BE.  
Dynamics of Discrete Dynamical Models of a Walker in an Annulus.
- January 4, 2017 **Joint Mathematics Meetings 2017**, *Hyatt Regency Atlanta and Marriott Atlanta Marquis*, Atlanta, GA.  
The Chaotic Ballet of Walking Droplets.
- September 24, 2016 **American Mathematical Society Sectional Conference Fall 2016**, *Bowdoin College*, Brunswick, ME.  
Neimark-Sacker bifurcations and evidence of chaos in a discrete dynamical model of walkers.
- June 21, 2016 **NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ.  
A Tempest in The Mathematics of Time: A brief history of chaos and its appearance in walking droplets and electronic circuits.
- November 24, 2015 **American Physical Society 68th Annual Division of Fluid Dynamics Meeting**, *Hynes Convention Center*, Boston, MA.  
Neimark-Sacker Bifurcation and Evidence of Chaos in a Discrete Dynamical Model of Walkers
- June 11, 2015 **NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ.  
Neimark-Sacker Bifurcation and Evidence of Chaos in a Discrete Dynamical Model of Walkers
- July 24, 2014 **NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ.  
A Mechanical Analog of the Chaotic Scattering in Solitary Waves
- January 17, 2014 **Joint Mathematics Meetings 2014**, *Baltimore Convention Center*, Baltimore, MD.  
Peixoto's structural stability theorem: The one-dimensional version
- January 15, 2014 **Joint Mathematics Meetings 2014**, *Baltimore Convention Center*, Baltimore, MD.  
A Scheme for Modeling and Analyzing the Dynamics of Logical Circuits
- June 21, 2013 **Mathematical Problems in Industry 2013**, *Worcester Polytechnic Institute*, Worcester, MA.  
Phase Field Formulation for Microstructure Evolution in Oxide Ceramics
- June 11, 2013 **NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ.  
Peixoto's structural stability theorem: The one-dimensional version
- July 10, 2012 **NJIT Graduate Student Seminar**, *New Jersey Institute of Technology*, Newark, NJ.  
Logical circuits: A scheme for discrete modeling and analysis.
- April 20, 2011 **Hallenbeck Graduate Student Seminar**, *University of Delaware*, Newark, DE.  
Mechanical Chaotic Scattering: The Adventures in the Valley of Chaos
- October 20, 2010 **Hallenbeck Graduate Student Seminar**, *University of Delaware*, Newark, DE.  
A scheme for modeling and analyzing the dynamics of logical circuits
- CO-AUTHORED**
- May 14, 2023 **Society for Industrial and Applied Mathematics Dynamical Systems 2023**, *Hilton*, Portland, OR.  
Presenter: Katherine Owens. *Modeling Local Administration of CAR T-cell Therapy for Solid Tumors.*
- May 15, 2023 **Society for Industrial and Applied Mathematics Dynamical Systems 2023**, *Hilton*, Portland, OR.  
Presenter: Gonzalo Ferrandez Quinto. *Discrete Dynamical Model for the Hydrodynamic Analog of a Quantum Mirage.*
- November 5, 2019 **TTU BioMathematics Seminar**, *Texas Tech University*, Lubbock, TX.  
Presenter: Erdi Kara. *Tumor ablation due to inhomogeneous - anisotropic diffusion in generic 3 dimensional topologies*
- May 22, 2017 **Society for Industrial and Applied Mathematics Dynamical Systems 2017**, *Snowbird Resort*, Snowbird, UT.  
Presenter: Denis Blackmore; *Analysis of New Walking Droplet Bifurcations*
- January 4, 2017 **Joint Mathematics Meetings 2017**, *Hyatt Regency Atlanta and Marriott Atlanta Marquis*, Atlanta, GA.  
Presenter: Ian Jordan; *Discrete dynamical modeling and experimental investigation of chaotic NOR gates and set/reset flip-flops.*
- May 20, 2013 **Society for Industrial and Applied Mathematics Dynamical Systems 2013**, *Snowbird Resort*, Snowbird, UT.  
Presenter: Hao Wu; *Analysis and Simulation of the BSR Model*

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## POSTER PRESENTATIONS

- March 16, **American Physical Society March meeting**, *Virtual*, USA.  
2021 Physics-based models and simulations of cancer drug response in solid tumors. (**First-place in of FECS poster award**)
- February 27, **MAA Golden Section**, *Virtual*, West Coast, USA.  
2021 Mathematical Art Exhibition
- January 4-6, **Dynamic Days 2019**, *Hilton Orrington Hotel*, Evanston, IL.  
2019 Standard map-like models for single and multiple walkers in an annular cavity.
- October 6-11, **Congress of Neurological Surgeons 2018**, *Marriott Marquis*, Houston, TX.  
2018 A prospective analysis tool to assess potential success for extra-femoral mechanical thrombectomy; Presenter: Mousa K. Hamad
- June 5-6, **Frontiers in Applied and Computational Mathematics 2015**, *New Jersey Institute of Technology*, Newark, NJ.  
2015 A Scheme for Analyzing the Dynamics of Logical Circuits
- May 22-23, **Frontiers in Applied and Computational Mathematics 2014**, *New Jersey Institute of Technology*, Newark, NJ.  
2014 A Scheme for Analyzing the Dynamics of Logical Circuits
- January 16, **Joint Mathematics Meetings 2014**, *Baltimore Convention Center*, Baltimore, MD.  
2014 A Scheme for Analyzing the Dynamics of Logical Circuits
- October 31, **Graduate Student Association Research Day 2013**, *New Jersey Institute of Technology*, Newark, NJ.  
2013 A Scheme for Analyzing the Dynamics of Logical Circuits
- May 31 - **Frontiers in Applied and Computational Mathematics 2013**, *New Jersey Institute of Technology*, Newark, NJ.  
June 2, 2013 A Scheme for Analyzing the Dynamics of Logical Circuits
- May 21 - 23, **Frontiers in Applied and Computational Mathematics 2010**, *New Jersey Institute of Technology*, Newark, NJ.  
2010 A Scheme for Analyzing the Dynamics of Logical Circuits
- April 19, 2009 **NJIT Experience Day**, *New Jersey Institute of Technology*, Newark, NJ.  
Discrete Dynamical Modeling and Analysis of the R-S flip-flop circuit
- April 8, 2009 **Dana Knox Student Research Showcase**, *New Jersey Institute of Technology*, Newark, NJ.  
Discrete Dynamical Modeling and Analysis of the R-S flip-flop circuit
- March 29, **Garden State Undergraduate Mathematics Conference**, *Monmouth University*, Monmouth, NJ.  
2009 Discrete Dynamical Modeling and Analysis of the R-S flip-flop circuit
- May 19 - 21, **Frontiers in Applied and Computational Mathematics 2008**, *New Jersey Institute of Technology*, Newark, NJ.  
2008 Chaos of the R-S flip-flop circuit
- April 5, 2008 **NJIT Experience Day**, *New Jersey Institute of Technology*, Newark, NJ.  
Chaos of the R-S flip-flop circuit

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## RESEARCH WORKSHOPS

- June 13-17, **Mathematical Problems in Industry 2016**, *Duke University*, Durham, NC.  
2016 Worked on Predicting Physician Triage; a problem from *Revon Systems*
- June 22 - 26, **Mathematical Problems in Industry 2015**, *University of Delaware*, Newark, DE.  
2015 Worked on “Desulfurization of Natural Gas for Fuel Cells”; a problem from *Bloom Energy*
- September 15 - 19, 2014 **Boston/Keio Universities Workshop 2014**, *Boston University*, Boston, MA.  
Workshop on current theoretical and industrial Dynamical Systems problems
- June 23 - 27, **Mathematical Problems in Industry 2014**, *New Jersey Institute of Technology*, Newark, NJ.  
2014 Worked on “Effects of Membrane Morphology on Separation Efficiency”; a problem from *Pall Corp.*
- June 17 - 21, **Mathematical Problems in Industry 2013**, *Worcester Polytechnic Institute*, Worcester, MA.  
2013 Worked and presented on “Phase Field Formulation for Microstructure Evolution in Oxide Ceramics”; a problem from *Corning*



- June 11 - 15, **Mathematical Problems in Industry 2012**, University of Delaware, Newark, DE.  
2012 Worked on “The Use of Viscous Shear in Air Bearing Gaps for Precise Web Tension and Temperature Control”; a problem from *New Way Air Bearings*
- June 5 - 8, **Graduate Student Math Modeling Camp 2012**, Rensselaer Polytechnic Institute, Troy, NY.  
2012 Worked on “Modeling a cylindrical plunger viscometer”; a problem presented by *Professor Kara Maki*
- June 12 - 17, **Mathematical Problems in Industry 2011**, New Jersey Institute of Technology, Newark, NJ.  
2011 Worked on “Dynamic tumor growth modelling”; a problem from *Novartis*
- June 11 - 12, **Graduate Student Math Modeling Camp 2011**, New Jersey Institute of Technology, Newark, NJ.  
2011 Worked on “Modeling Photon generation”; a problem from *Lucent*

## SERVICE

### Departmental Service

- Serving on the Diversity, Equity, and Inclusion Committee pre-application review for prospective historically underrepresented students
- Organizing and Managing speaker schedule for the Boeing Distinguished Colloquium
- Helping to maintain departmental autograder in collaboration with sysadmin

### External

- May 14-18, Co-organizer for minisymposium on *In memoriam of the work of Denis Louis Blackmore* at the 2023 SIAM Conference on Applications of Dynamical Systems (DS23).
- May 23-27, Co-organizer for minisymposium on *Nonlinear Dynamics of Fluid-Solid Interactions: from 2021 Physics to Biology* at the SIAM Conference on Applications of Dynamical Systems (DS21).
- May 19-23, Co-organizer for minisymposium on *Unusual Complexity in Applied Dynamical Models* at the 2019 SIAM Conference on Applications of Dynamical Systems (DS19).
- May 21-25, Co-organizer for minisymposium on *Exotic Bifurcations in Fluid and Granular Dynamics* at the 2017 SIAM Conference on Applications of Dynamical Systems (DS17).
- Reviewed for: Physical Review E, Chaos: An Interdisciplinary Journal of Nonlinear Science, Journal of Nonlinear Science, Communications in Nonlinear Science and Numerical Simulations, Mechanics Research Communications (on regular reviewer list), Journal of Difference Equations and Applications (on regular reviewer list), Journal of Applied Mathematics and Computing, CRC Press, Journal of Biological Dynamics, Differential Equations and Applications

## PROFESSIONAL AFFILIATIONS

- Society for Industrial and Applied Mathematics
- American Physical Society

## TECHNICAL SKILLS

- Programming (in order of experience): MATLAB, C++, Java, Python, MPI (novice)