# LEVIN LAB MEMBERS 2025-2026

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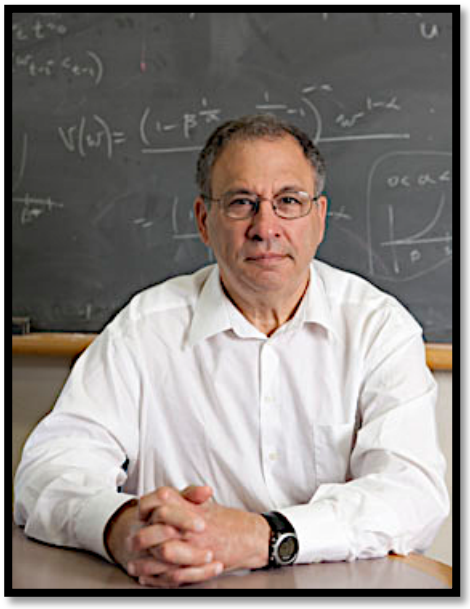
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*Updated: 4/10/2026*

# DIRECTOR & ADMINISTRATOR

*Simon A. Levin*
*Kara Rock*



## Simon A. Levin

*Director, Levin Lab*
*James S. McDonnell Distinguished University Professor in Ecology & Evolutionary Biology*
*Director, Center for BioComplexity in the High Meadows Environmental Institute*

**Simon A. Levin** is the James S. McDonnell Distinguished University Professor in Ecology and Evolutionary Biology at Princeton University. He received his B.A. from Johns Hopkins University and his Ph.D. in Mathematics from the University of Maryland. Levin is a Fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science, a Member of the National Academy of Sciences and the American Philosophical Society, and a Foreign Member of the Istituto Veneto and the Istituto Lombardo. He is a University Fellow of Resources for the Future, a Fellow of the Beijer Institute of Ecological Economics, a Fellow of the Society for Industrial and Applied Mathematics, a Fellow of the Society for Mathematical Biology, a Fellow of the American Mathematical Association, a Distinguished Fellow of the Luohan Academy, and a Fellow of the Academia Europaea. He is a former President of the Ecological Society of America and the Society for Mathematical Biology, Chair of the Council of IIASA, Chair of the Board of the Beijer Institute, and Chair of the Science Board of the Santa Fe Institute. He has received numerous awards including the Kyoto Prize in Basic Sciences, Heineken Prize for Environmental Sciences, Margalef Prize for Ecology, Tyler Prize for Environmental Achievement, the U.S. National Medal of Science, BBVA Foundation Frontiers of Knowledge Award in Ecology and Conservation Biology, and the 2025 Gold Key award. He has mentored more than 150 Ph.D. students and Postdoctoral Research Associates and Fellows.



## Kara Rock

*Levin Lab Administrator*

**Kara Rock** is the Levin Lab Administrator at the Department of Ecology and Evolutionary Biology. With a foundation in physics and education, Kara brings a unique perspective to the role. She previously completed her undergraduate degree in Education: Physics at the University of South Florida, where she designed strategies to deepen scientific learning across diverse communities. Through her involvement with the L'Space program at Arizona State University, Kara gained invaluable experience in NASA mission design, proposals, and public outreach. Her passion for space exploration led her to pursue a master's degree in space policy, international relations, business, and leadership within the Thunderbird school at Arizona State University, solidifying her leadership and management skills.

Kara is driven by a desire to apply research on biological systems and their environments to practical solutions for Earth and future space habitats. She is dedicated to advancing our understanding of these interactions to promote sustainable practices and ensure the well-being of our planet and potential future homes beyond.

Beyond her professional pursuits, Kara enjoys exploring new places, listening to music, and dancing.

# VISITING RESEARCH SCHOLARS

*Stefani Crabtree*
*George Hagstrom*
*Denis Patterson*



## Stefani Crabtree

*Assistant Professor, Utah State University, Visiting Research Scholar, Levin Lab*

**Stefani Crabtree** is a Visiting Research Scholar to the Levin Lab, having joined in spring of 2020. She is currently Assistant Professor of Social-Environmental Modeling at Utah State University and External Faculty at the Santa Fe Institute. She completed a Ph.D. in Anthropology from Washington State University (2016) and a Ph.D. in Archéologie, Territoires et Environnements from the Université de Franche-Comté (2017). Her work uses complex adaptive systems modeling, such as agent-based models and network models, to understand the archaeological past and to leverage the archaeological record as a calibration dataset for sustainability challenges in the present and future.

Crabtree's recent work weaves together disparate strands of science to found a new field of 'archaeoecology' that acts as a bridge between paleoecology and modern ecology and explicitly includes humans as described in detail by her recent paper "Towards a Science of Archaeoecology" in the journal *Trends in Ecology and Evolution*. While studies of the abiotic environment are well established in archaeology (e.g., climate reconstruction from tree rings) examining full ecosystems from the archaeological past in a comprehensive and quantitative way—and assessing the human place within those ecosystems— is novel. She leads research projects in Western Australia, Northern Mongolia, and the American Southwest that combine fieldwork and computational modeling to query the past to be able to advance questions on sustainability into the future. Her work has impacted governmental policy on environmental management in arid ecosystems. She holds additional positions at the Australian Research Council Centre of Excellence for Australian Biodiversity and Heritage and at Crow Canyon Archaeological Center.



## George Hagstrom

*Doctoral Lecturer, CUNY*
*Visiting Research Scholar, Levin Lab*

**George Hagstrom** studies emergent properties in complex adaptive systems, with particular focus on marine ecosystem function, biogeochemical cycles, and collective behavior in biological, social, and economic systems. One of Hagstrom's primary goals is to develop marine ecosystem models that capture biodiversity and adaptation, and to use these models to improve our understanding of key macroscale features of marine ecosystems and to predict how these ecosystem functions will respond to climate change and other anthropogenic perturbations. He uses a trait-space based description, rather than one based on species, to find a reduced-dimensionality representation of highly diverse marine ecosystems. He developed the trait-based ATOM model of marine phytoplankton and used it to show how dynamics in the elemental stoichiometry of phytoplankton induce novel couplings and feedbacks in marine biogeochemical cycles. He has implemented ATOM within an IPCC, CMIP6 grade Earth System Model, and is actively studying dynamic stoichiometry impacts nutrient limitation, primary productivity and carbon export, and nitrogen fixation. Hagstrom is working to extend the ATOM framework to incorporate genetic data, using quantitative systems biology, with the aim of better understanding the trade-offs between heterotrophic metabolic strategies and the relevance of genetic differences in *Prochlorococcus* and *Synechococcus* genetic differences across oligotroiphic ecosystems. Hagstrom is also actively working on a project to better understand how the microscopic dynamics of complex systems can be used to better anticipate or to manage critical transitions, using an approach directly inspired by statistical physics.



## Denis Patterson

*Assistant Professor, Durham University, UK*
*Visiting Research Scholar, Levin Lab*

**Denis Patterson** joined the Levin Lab in November 2020 as a Postdoctoral Researcher and is now an Assistant Professor in Applied Mathematics at Durham University. He previously received a Ph.D. in Applied Mathematics from Dublin City University under the supervision of Prof. John Appleby. His thesis employed techniques from nonlinear and stochastic analysis to study functional differential equations subject to random forcing. He then joined Professor Jonathan Touboul's group at Brandeis University where he began applying his mathematical training to problems in biology, ecology, and neuroscience.

Denis has worked extensively on spatially explicit models of forest-savanna ecosystems, including rigorously deriving such models from microscale interaction rules and studying their dynamics in detail. The goal of this work is a better understanding of the implications of empirically observed forest-savanna bistability and of the resilience of these ecosystems more generally. He is also interested in mathematical models of malaria, both at the population and within-host scales, as well as problems in biological development. Dynamical systems, stochastic analysis and (nonlocal) PDEs, are common tools across his various projects.

# POSTDOCTORAL RESEARCH ASSOCIATES & FELLOWS

*Talia Borofsky*
*Abigail Croker*
*Michael Faran*
*Giuseppe Ferro*
*Mallory Gaspard*
*Xander Huggins*
*Harman Jaggi*
*Aanjaneya Kumar*
*John McAlister*
*Nusrat Molla*
*Alison Robey*
*Annie Stephenson*
*Ray Tung*
*Adam Wiechman*
*Emma Zajdela*



## Talia Borofsky

*Postdoctoral Research Fellow, High Meadows Environmental Institute*

**Talia Borofsky** joined the High Meadows Environmental Institute as a postdoctoral research fellow in August 2023. She was formerly associated with the Hebrew University of Jerusalem Alexander Silberman Institute of Life Sciences as a Zuckerman Postdoctoral Fellow (August 2023 – May 2023) and is now a USDA NIFA AFRI postdoctoral fellow. She received her Ph.D. in Biology from Stanford University, where she researched the evolution of social learning and cooperative hunting by predators with advisor Professor Marcus Feldman.

She continues to be fascinated by social predators and is now researching the feedback between predator group formation and prey populations to understand how group sizes respond to changes in prey availability, and in turn, how the grouping of predators influences prey populations and their ability to coexist. In particular, she is applying the models she formulates to (1) mitigating livestock-carnivore conflict and (2) investigating the movement ecology of wolves in Northern Quebec. Her research is conducted in the labs of Princeton Professors Simon Levin and Daniel Rubenstein, as well as in the lab of Professor Erol Akçay (University of Pennsylvania), with whom she has a visiting appointment. Besides researching predators, she enjoys painting, as well as learning about and advocating for public transportation systems.



## Abigail Croker

*Postdoctoral Research Associate, High Meadows Environmental Institute***Abigail Croker** joined the High Meadows Environmental Institute and the Levin Lab in the Fall of 2024 within the Earth Resilience and Sustainability Initiative, developing collaborations with the Stockholm Resilience Center and the Potsdam Institute for Climate Impact Research. She is completing her Ph.D. at the Centre for Environmental Policy, Imperial College London, funded by Grantham Institute's Science and Solutions for Changing Planet Doctoral Training Partnership (SSCP DTP). She is also affiliated with the Leverhulme Centre for Wildfires, Environment and Society. Abigail's research applies a social-ecological systems framework to explore the opportunities for and challenges of decentralizing fire management across East and Southern African savanna-protected areas under future climate-socioeconomic change. Her research takes a historical institutionalist and ecological approach to understand how multiple systems variables interact to affect resilience in complex adaptive savanna ecosystems, integrating fieldwork, empirical research approaches, and systems modelling.

Her research will explore the relationships between the introduction of carbon market mechanisms aiming to mitigate wildfires and increase natural carbon sequestration, and the expansion of agricultural frontiers across highly biodiverse tropical mesic savanna-forest transition zones. Three interrelated challenges occurring in these ecosystems are central to this investigation: (i) the emergence of a 'wildfire paradox' across conservation landscapes where delineated land use boundaries separate human and livestock populations and fire suppression operations have been implemented; (ii) an increase in carbon-oriented results-based payment schemes in wildfire and conservation management interventions which often prioritize carbon revenue generation at the national level; (iii) the rapid expansion of agri-business frontiers where annual rainfall supports crop production. Abigail will be working with Professor Simon Levin, Professor Daniel Rubenstein, Professor Jonathan Levine, and others, to investigate how these challenges play out in local agrarian contexts and their long-term impacts on savanna health and biodiversity, natural carbon capture, and social-ecological resilience.



## Michael Faran

*Postdoctoral Research Associate, High Meadows Environmental Institute*

**Michael Faran** is an incoming postdoctoral researcher in the Levin Lab whose training spans nonequilibrium statistical mechanics, acoustics, biophysics, and quantum mechanics. He is completing a Ph.D. in Biomedical Engineering (biophysics) at Tel Aviv University's Bisker Lab, following an M.Sc. and B.Sc. in Physics, and a B.Sc. in Electrical Engineering. His Ph.D. research develops theory and simulation for prediction, inference, and control of nonequilibrium self-assembly, aiming for a deeper mechanistic understanding of complex assembly processes.

Prior to Princeton, he co-founded and led Deep Voice, an NGO developing AI-based acoustic tools for marine-mammal conservation in collaboration with researchers worldwide, including NOAA Fisheries. At Princeton, his work will center on simulation-based, physics-informed models that couple predator–prey patchiness with ocean dynamics to forecast North Atlantic right whale movements and to evaluate conservation interventions. He is a recipient of Tel Aviv University's Weinstein Prize for Excellent Signal Processing Research.

Beyond his academic work, he enjoys progressive rock and metal, strategy games, and spending time in the ocean, especially snorkeling and scuba diving.



## Giuseppe M. Ferro

*Postdoctoral Research Fellow, Center for Statistics and Machine Learning, Co-Advised by Sarah-Jane Leslie*

**Giuseppe Ferro** joined the High Meadows Environmental Institute in October 2022. Before that, he worked at ETH Zürich where he received a Ph.D. in Economics. He analyzed how real human beings make decisions under uncertainty, as opposed to what they should do. Specifically, he focused on developing operational models of individual decision-making in risky and ambiguous setups, representing the decision activity as a stochastic process, and working at different levels of abstraction (axiomatic models, low-dimensional stochastic processes, and computational models).

He is now interested in understanding misinformation spreading. One of his projects aims to understand how recommendation algorithms on social media affect opinion dynamics on controversial issues such as climate change, analyzing the unintended consequences of an unregulated "attention" market. Another project involves studying the linguistic microstructure of climate change misinformation propaganda, to uncover whether certain narratives are more successful than others.



## Mallory Gaspard

*Postdoctoral Research Associate, High Meadows Environmental Institute, Mechanical and Aerospace Engineering*

**Mallory Gaspard joined** the Levin Lab in December of 2025. She is mentored by Professors Naomi Leonard (Mechanical and Aerospace Engineering) and Simon Levin (Ecology and Evolutionary Biology). She is broadly inspired by developing mathematical approaches to decision making and optimal control under uncertainty, particularly to solve problems arising in technological, ecological, and sociological contexts. As an applied mathematician, she aims to use these approaches to reveal insights into the "why" behind physical phenomena and provide recommendations for the design or improvement of such systems.

Mallory completed her B.S. in Mathematics and Applied Physics at Rensselaer Polytechnic Institute (RPI) in December 2018, followed by her Ph.D. in Applied Mathematics at Cornell University in summer 2025. At Cornell, Mallory's doctoral research focused on developing dynamic programming based frameworks for optimal control under uncertainty to determine driving strategies in the face of limited traffic signal timing information, to compute enhanced driving directions that also provide lane change timing and effort information, and to better understand when predators in the animal kingdom might decide to utilize motion camouflage tactics while pursuing prey. At Princeton, Mallory is both extending and broadening these mathematical approaches to enhance our understanding of collective behavior in large scale systems of interconnected individuals (e.g., living organisms, technological devices) to investigate the roles that social connections play in shaping outcomes and to deepen our intuition about life-event timing in ecological contexts**.**



## Xander Huggins

*Postdoctoral Research Fellow, University of British Columbia Postdoctoral Research Associate, High Meadows Environmental Institute*

**Xander Huggins** joined the Levin Lab in Fall of 2024. His Ph.D. research, conducted under the supervision of Tom Gleeson (University of Victoria) and James S. Famiglietti (Arizona State University) advanced theory and methods to understand global groundwater systems as social-ecological systems. During his Ph.D., he participated in the Young Scientist Summer Program at the International Institute for Applied Systems Analysis and there received the Mikhalevich Award.

His postdoctoral work will be conducted primarily at the Institute for Resources, Environment and Sustainability at the University of British Columbia (UBC), and supported through an NSERC Postdoctoral Fellowship, a UBC Killam Postdoctoral Research Fellowship, and a Canadian Space Agency Postdoctoral award. He also co-leads an international working group on large-scale freshwater resilience, which convenes semi-annually for the Global Freshwater Systems Science Workshop.

His postdoctoral interests involve understanding groundwater's role in mediating or driving regime shifts across social, ecological, and Earth systems. Building on his previous work to globally map groundwater-dependent ecosystems, he will investigate the resilience of these ecosystems worldwide to groundwater storage changes across land use and socioeconomic contexts. More broadly, his work applies complexity science to groundwater as a social-ecological system, drawing on resilience theory and system dynamics to understand critical transitions. He is also interested in characterizing system archetypes, across social, economic, and biophysical systems, to develop bounded theories on social-ecological transitions and how these insights can inform Earth system modeling and sustainability transformations.



## Harman Jaggi

*Postdoctoral Research Associate, High Meadows Environmental Institute*

**Harman Jaggi** joined the High Meadows Environmental Institute and the Levin Lab in August 2024, after completing her Ph.D. in biology at Stanford University, working on life-history dynamics and socio-ecological systems advised by Professor Shripad Tuljapurkar. During her graduate studies, she has worked on the evolution of migration in heterogenous environments, the role of density-dependence in food-limited ungulate populations, and the biocultural vulnerability of indigenous crops in the Indian Trans Himalaya (with the Nature Conservation Foundation, India). At Princeton, she will be mentored by Professors Simon Levin and Johnathan Levine and will work in collaboration with the Stockholm Resilience Centre. She is broadly interested in working on problems in population dynamics, agroecology, and wildlife conservation. Outside of work, she loves going to concerts and discovering new music.



## Aanjaneya Kumar

*Complexity Postdoctoral Fellow, Sante Fe Institute*
*Visiting Research Scholar, Levin Lab*

**Aanjaneya (Aanj) Kumar** joined Princeton and the Levin Lab in Fall 2024 as a Visting Research Scholar and member of the Earth Resilience and Sustainability Initiative. He will also hold a joint position at the Santa Fe Institute as a Complexity Postdoctoral Fellow. His research interests lie in the study of stochastic models of complex systems. Over the last few years, his primary aim has been to obtain insight into practically relevant problems by first formulating suitable mathematical models and then analyzing them using tools from statistical physics, network science, and evolutionary game theory. His research projects thus far can be broadly classified into the following themes: (i) extremal statistics and rare events, (ii) social dynamics and cultural evolution, and lastly, (iii) partially observed stochastic processes, which is also the theme of his Ph.D. research being carried out at the Indian Institute of Science Education and Research (IISER) Pune, India.

Going forward, he is excited by the prospect of exploring the theme of *Designing Resilient Institutions.* The society we live in is structured by several formal and informal rules. These rules are shaped by cultural influences and social processes with the objective of producing desirable socio-economic outcomes. We refer to these rules as "institutions." In addition to being efficient in promoting collective action on important societal issues, we require our institutions to be able to deal with and adapt to change. Aanj aims to understand the characteristics that make an institution resilient by exploring the coevolutionary dynamics of institutions and socio-ecological systems.

Outside of academic research, he is passionate about writing, social justice, and horror movies.



## John McAlister

*Postdoctoral Researcher, The Program in Applied and Computational Mathematics*

**John McAlister** is an incoming postdoctoral research associate in the Program in Applied and Computational Mathematics whose research focuses on game theoretic modeling with explicit spatial or relational structure. He earned a BS in Zoology and a BS in Mathematics at The Ohio State University then went on to the University of Tennessee - Knoxville to pursue a PhD in Mathematics focusing on mathematical ecology. There, under the direction of Dr. Nina Fefferman and Dr. Tadele Mengesha, his dissertation focused on understanding how the structure of a population can suppress or promote non-consensus equilibria in coordination games. As he continues his research, he uses tools from differential and nonlocal equations to develop new models of collective behavior that account for the relational structure of the population. Outside of his research, John enjoys running and powerlifting and he is a big fan of Ohio State Football.



## Nusrat Molla

*Distinguished Postdoctoral Research Fellow, The Andlinger Center*

**Nusrat Molla** joined Simon A. Levin and Elke U. Weber's Labs in July 2023 as a Distinguished Postdoctoral Research Fellow at the Andlinger Center. She completed her Ph.D. in Land, Air, and Water Resources at University of California, Davis, where she focused on combining dynamical systems modeling and qualitative data to understand the socio-political dynamics of transitions in how natural resources are extracted and governed. In addition to general models of how resource governance systems respond to change, this work involved a case study in California's San Joaquin Valley to understand the implications of different strategies and narratives about water and agriculture for the power and vulnerability of different water users.

Her current work centers on sustainability transitions, particularly in extractive industry-dependent communities. She is interested in how different forms of extraction and production shape development trajectories in the communities in which they are based through their influence on institutions, infrastructures, landscapes, and culture. She is exploring these questions through a general stylized model of the resource curse, and a case study in the coal mining region of Central Appalachia, where she conducted interviews and participatory modeling to explore post-coal futures. She also plans to conduct surveys in the region to explore belief networks around what constitutes a just transition. In the future, she hopes to develop theory about how the material – such as natural resources, infrastructures, and institutional structures – interact with the discursive – narratives, discourses, and belief systems – in enabling or constraining transformations.



## Alison Robey

*Postdoctoral Research Associate, High Meadows Environmental Institute*

**Alison Robey** will join the High Meadows Environmental Institute and the Levin Lab in the fall of 2026. She is a theoretical ecologist whose research broadly explores the responses of populations and communities to novel environmental stressors, with a particular focus on population dynamics under fluctuating conditions.
Alison completed her B.A. in Environmental Studies and Mathematics at Williams College in 2020, where she began her research career modeling invasive species spread with Prof. Julie Blackwood. She then spent a year working on models of airborne virus spread as a post-baccalaureate researcher with Dr. Laura Fierce at Brookhaven National Laboratory. She conducted her doctoral research in Ecology & Evolutionary Biology from 2021 to 2026 with Prof. David Vasseur at Yale University. Alison's Ph.D. work focused on how interactions between physiology and population dynamics affect temperature-driven risk under shifting thermal regimes. At Princeton, she plans to expand her research to incorporate key factors ranging from eco-evolutionary dynamics to interspecific interactions and applications to empirical systems. Her work is conducted in the labs of Prof. Simon Levin and Prof. Jonathan Levine.

Outside of research, Alison is an avid naturalist and can be found hiking, birding, and writing about the natural world.

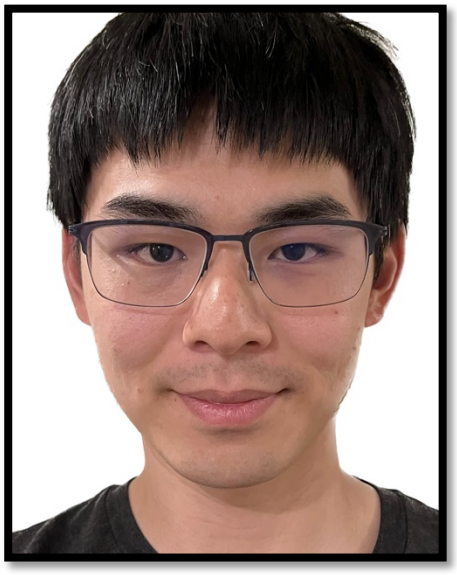


## Annie Stephenson

*Postdoctoral Research Associate, High Meadows Environmental Institute*

**Annie Stephenson** joined the High Meadows Environmental Institute in September 2022 and is also affiliated with the Stockholm Resilience Center and the Potsdam Institute for Climate Impact Research. She completed her Ph.D. at Harvard University in Applied Physics. Her Ph.D. work combined experimental measurements and theoretical models to understand and tune light scattering in correlated, disordered systems for applications in structural color. Through her work with agent-based models for light scattering and data-informed model-building, she developed an interest in understanding other complex systems with large numbers of interacting components.

As a postdoctoral researcher at Princeton, Annie is studying human collective behavior. In particular, she is interested in the dynamics of cooperation and conflict and collective action. In one project, in collaboration with postdoc Guillaume Falmagne, she is working to characterize patterns, including critical transitions and early warning signals of those transitions, using data from a collaborative game on the discussion website Reddit. In this same Reddit dataset, she is also investigating scaling laws in organizations using techniques borrowed from urban scaling theory, aiming to develop an understanding of why some communities can successfully mobilize individuals to reach a common goal, while others cannot. Annie and Guillaume have begun collaborating with a group of researchers at the Santa Fe Institute to further study the Reddit community structure. In another project, Annie is using social media data to understand the dynamics of fashion trends—why some spread quickly but are soon forgotten and why others can remain popular for much longer. In a project in collaboration with Professors Naomi Leonard (Princeton, Mechanical and Aerospace Engineering) and Scott Althaus (University of Illinois, Urbana-Champaign), she plans to examine data collected as part of the Social, Political, and Economic Event Database Project (SPEED) to understand the growth dynamics of social movements. Additionally, Annie attended the Complex Systems Summer School at the Santa Fe Institute, where she formed several group projects that are still active, and she has since been back to the Santa Fe Institute for two other workshops.



## Ray Tung

*Postdoctoral Researcher, The Program in Applied and Computational Mathematics*

Hwai-Ray (Ray) Tung is an incoming postdoctoral research associate joining the Program in Applied & Computational Mathematics and the Levin Lab in March 2026. He completed his PhD in mathematics at Duke University in 2023 under the guidance of Rick Durrett and is finishing a postdoc position in the University of Utah math department. His work generally uses simple stochastic models to understand phenomena in a variety of biological areas. Previous topics include what to do after missing a dose of antibiotic, cancer evolution, and extreme first passage times, among others. In addition to stochastic models, he has also worked on deterministic models as well as topological data analysis. He is looking forward to working on forest-grassland models during his time at Princeton. Outside of research, Ray enjoys playing games of all kinds, exploring local eateries, and taking short hikes.



## Adam Wiechman

*Postdoctoral Research Associate, High Meadows Environmental Institute*

Adam joined High Meadows Environmental Institute and the Levin Lab in August 2025. He earned his Ph.D. in Sustainability with a concentration in Complex Adaptive Systems Science at Arizona State University where he was also an NSF Graduate Research Fellow. His work focuses on the politics of infrastructure investment and its relationship to sustainability goals, including resilience and equity. He maintains an interdisciplinary approach that draws on perspectives from public policy and administration, political economy, social-ecological systems, and complexity science to advance scholarly and practical understanding. His doctoral work examined how the design of institutions responsible for infrastructure affects the robustness of infrastructure systems to social and environmental variation, using the example of urban water systems in the Phoenix Metropolitan Area.

While at Princeton, Adam will work with Simon Levin and Elke Weber to understand the interaction between multiple forms of uncertainty (environmental, social, and funding), institutional design, regional collaboration, and local decision making in the implementation of sustainable infrastructure transitions. He intends to empirically ground the work in the implementation of the Inflation Reduction Act and Bipartisan Infrastructure Law through a survey conducted with colleagues at Indiana University Bloomington while also developing an agent-based model of institutionally constrained collective inference and infrastructure investment. In line with his commitment to translating complex insights into policy understanding, he plans to facilitate participatory workshops with public managers and officials on the relationship between uncertainty, institutions, collaboration, and infrastructure decision making.



## Emma Zajdela

*Postdoctoral Research Associate, High Meadows Environmental Institute, C-PREE; ORISE IC Postdoctoral Research Fellowship at Princeton University for Modeling the Dynamics of Complex Socio-Ecological Systems at the Nexus of Environmental Challenges, Scientific Collaboration, and Conflict Siegel Research Fellow, Santa Fe Institute*

**Emma Zajdela** joined the Levin Lab in October 2023. Previously, she completed her Ph.D. in the Department of Engineering Sciences and Applied Mathematics at Northwestern University, where she was a recipient of the National Science Foundation Graduate Research Fellowship, Buffett Institute Global Impacts Fellowship, and NICO Intersection Science Fellowship. She has worked on topics ranging from the mathematics of poker, autonomous vehicles, scientific collaboration at conferences, and fashion trends using a variety of approaches including game theory and agent-based modeling. Her current work employs a dynamical systems framework, which is then empirically validated with data. Since 2015, she has worked with the Malta Conferences Foundation, a non-profit organization that uses science diplomacy in the Middle East and currently serves as Treasurer and Member of the Board of Directors. At Princeton, Emma is focusing on modeling the dynamics of complex socio-ecological systems at the nexus of environmental challenges, scientific collaboration, and conflict. Recently, she has been studying how to foster international cooperation for global environmental issues, focusing on institutions bridging science, policy, and diplomacy. In collaboration with Professor Michael Oppenheimer (Princeton, School of Public and International Affairs, Department of Geosciences and HMEI), she investigates the role of scientists in creating change in the public sphere, particularly on shared environmental challenges including climate change. Emma is also interested in understanding the role of technology in optimizing scientific ecosystems to foster cross-border collaborations and innovation. As part of this project, she is collaborating with the Santa Fe Institute to study and design the ARCH platform, a new digital ecosystem for online communities. This work is supported by the Sloan Foundation, and in 2024, she was named a Siegel Research Fellow at the Santa Fe Institute to “recognize the contributions you have made to bring network and other forms of nonlinear analysis into the applied domain.”

# GRADUATE STUDENTS

*Matthew Cheung*
*Jacob Chisausky*
*Shloka Janapaty*
*Jiayu Li*
*Yimei Li*
*Victor V. Odouard*
*Marcela Ordorica Arango*

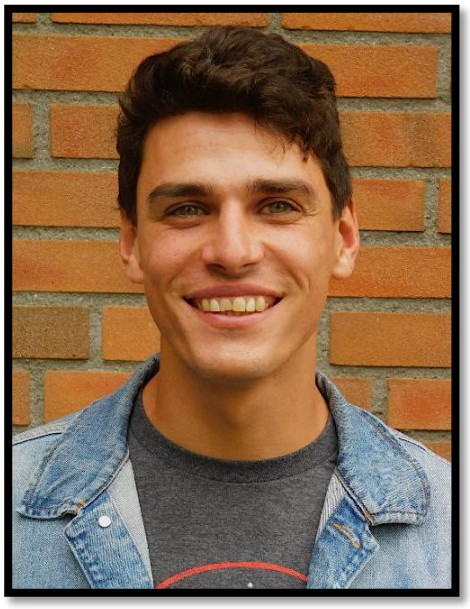


## Matthew Cheung

*Ph.D. Student, Program in Applied and Computational Mathematics (PACM)*

**Matthew Cheung** is a fifth-year Ph.D. student in the Levin Lab and the Program for Applied and Computational Mathematics at Princeton University. Before starting graduate school, he graduated from the University of California, Los Angeles with a B.S. in Applied Mathematics and a Specialization in Computing.

Matthew is interested in the interplay between human behavior/opinions and the dynamics of wealth in socioeconomic systems. This involves incorporating heterogeneity and aspects of human behavior, such as pro-social preferences and discounting, into models in ecological economics. His current research explores a dynastic model for intergenerational resource transfers under uncertain conditions, and the implications for inequality. Future work will look to integrate the dynamics of information and opinions regarding redistribution and pro-sociality, and the feedback from the dynamics of wealth.



## Jacob Chisausky

*Ph.D. Student, Department of Ecology & Evolutionary Biology*

**Jacob Chisausky** started the Ecology and Evolutionary Biology Ph.D. program in the summer of 2024. He is advised by Professors Simon A. Levin and Corina Tarnita.

He is interested broadly in social behavior, life history, and adaptation from an evolutionary perspective, utilizing both mathematical modelling and computational approaches. Before joining Princeton EEB, he earned an M.S. in the MEME (Erasmus Mundus Master's Program in Evolutionary Biology) program, during which he developed models to address the diversification of mating type loci in mushrooms, the evolution of individual and social learning, and costly signaling theory. Before this, he completed a B.S. in Plant Biology at Southern Illinois University, Carbondale, where he investigated plant-pollinator interaction networks in the region.



## Shloka Janapaty

*Ph.D. Student,*

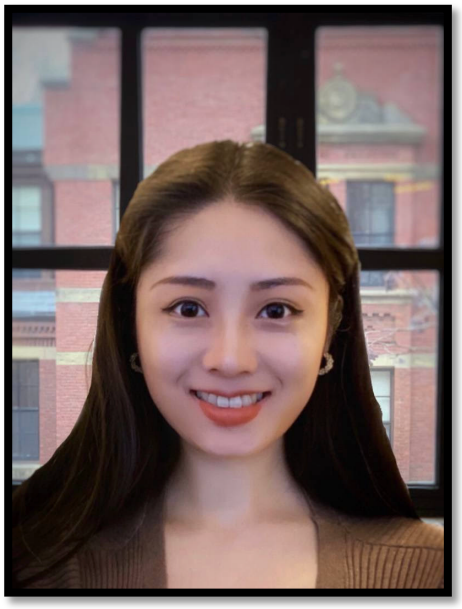
**Shloka Janapaty** is a second-year PhD student in Ecology and Evolutionary Biology co-advised by Simon Levin and Lars Hedin. She is interested in using tools from mathematics to examine (1) resource acquisition strategies in plant community assembly and (2) resource allocation strategies in wild animals, particularly phenotypic plasticity in life-history strategies and the emergent properties of trophic interactions. Previously, she earned her B.S. in Applied Mathematics at Columbia University.



## Jiayu Li

*Ph.D. Student, Program in Applied and Computational Mathematics (PACM)*

**Jiayu Li** is a third-year graduate in Applied Math (PACM) at Princeton. She joined Levin lab Fall 2023. Before that, she graduated from UCLA with a B.S. in Applied Math and Computational and Systems Biology. She's interested in collective behavior and spatial pattern formation. Her current research includes exploring how the awareness of infectious disease affects the disease transmission, investigating the evolution of cooperation in complex population structure, and understanding how the competition among neighboring plants shapes the spatial pattern of the plant community.



## Yimei Li

*Ph.D. Student, Program in Quantitative and Computational Biology (QCB)*

**Yimei Li** is a fourth-year Ph.D. student in Quantitative and Computational Biology at Princeton University. She joined the Levin Lab in May 2022, where she began studying mathematical models for the ecology and evolution of infectious diseases, especially their cross-scale dynamics. Before that, she worked on dynamical models of dengue incidence.
She is interested in human–virus interactions and uses mathematical, statistical, and computational approaches to study pathogens across scales—from genomes and cells to within-host processes and population-level dynamics. Currently, she is developing statistical and machine learning methods for forecasting infectious disease outbreaks, applying AI to study virus dynamics across scales, and investigating the role of defective interfering particles (DIPs) in influenza evolution, immune responses, and therapeutic potential.



## Victor Vikram Odouard

*Ph.D. Student, Program in Applied and Computational Mathematics (PACM)*

**Victor V. Odouard** is a first-year student in PACM and the Levin Lab.

Two main thrusts animate Victor's research. The first is an impulse to integrate knowledge, to see how observations that seem different might be instances of the same process. The second is an aspiration to understand how human society changes, not just so we can predict what might happen, but so we can actively change it.

It is in light of these stimuli that Victor's eclectic set of interests (in math, evolution, ethics, et al.) makes sense. Regarding the first motive, Victor studied math in his bachelor's at Cornell because he thinks of it as a sort of formalized creativity; in specifying a mathematical definition of a process, we often see how it shares many qualities with other processes we might not have known were related. And Victor has researched the evolution of cooperation because he believes that evolution by natural selection is a powerful abstract framework for understanding change in many systems, including in economies and political systems. This begins to show why the first motive is not so divorced from the second: Victor believes that a set of mathematical lenses, including evolutionary theory, will prove very helpful in understanding societal change. But even detailed, descriptive account of societal evolution will not tell us how to make society better. For that, we need ethics — what does it even mean to be "better"?

Right now, Victor is working on (the long project of) bringing together these three components — mathematics, evolutionary theory, and ethics — to understand societal evolution. What parallels might it have in the evolution of other systems? And what interventions might make us better off?



## Marcela Ordorica Arango

*Ph.D. Student, Mechanical and Aerospace Engineering Department*

**Marcela Ordorica Arango** is a fourth-year Ph.D. candidate in the Princeton Mechanical and Aerospace Engineering Department, co-advised by Professors Naomi Leonard, Simon Levin, and Bryan Grenfell.

Her research focuses on how human behavior shapes the spread of epidemics and other contagion processes in networks of interacting populations. By developing and analyzing mathematical models, she studies how belief evolution and individual decision-making, such as masking and self-isolation, affect contagion dynamics. She is also interested in how factors such as vaccine distribution, misinformation, and other social determinants influence a population's health outcomes.

She was awarded the HMEI-STEP Graduate Fellowship in 2025, which supports Ph.D. students in incorporating policy perspectives into their research.
Before arriving at Princeton, Marcela earned a B.S. and an M.S. in Mathematics from the National Autonomous University of Mexico (UNAM).

# Visiting Researchers and Rotators

*Orlando Da Costa*
*Yizhe Sun*



## Thomas ‘Orlando’ Da Costa

*Visiting Exchange Student*

**Thomas 'Orlando' Da Costa** is a visiting exchange student under the Jane Eliza Procter Fellowship program and joined the Levin Lab in Fall 2025.

He received two B.Sc. in Physics and in Mechanics from Sorbonne University in 2020 before entering l'École Normale Supérieure de la rue d'Ulm (ENS Ulm), where he earned his masters in cognitive sciences and participated in a dual-degree with AgroParisTech (Université Paris-Saclay) to complete another masters in environmental economics. Alongside these topics, he followed a public policy-oriented cursus with a minor in environmental sciences, his past research focusing on behavioral factors that could influence pesticides use among farmers or on the consideration of inequality in climate economics.

His research interests lie nowadays in modeling complex socio-ecological systems, at the intersection of biodiversity, climate change, land use, and well-being. He notably wants to explore the bioeconomic relationship of the five main drivers of biodiversity loss: land-use change, invasive alien species, pollution, climate change and resource exploitation.

At Princeton, he will be mentored by Pr. Simon Levin and aims to prepare his PhD thesis plan. He's interested in stochastic models, statistical physics, heterogeneity and the roles of institutions in economics models: don't hesitate to reach out if you want to chat about it!

Outside of academia, he loves jazz and never says no to a jam or a game night.



## Yizhe Sun

*Graduate Student in Physics on Levin Lab Rotation*

**Yizhe Sun** is a first-year graduate student in Physics. He graduated from Harvard with a B.A. in Physics and Music. Yizhe previously worked on many different physics systems, from topological materials and quantum dynamics to colloids at curved interfaces. Through these experiences, he developed an interest in understanding many-body complex systems through mathematical tools. He is now excited to join the Levin Lab for a rotation to explore how such frameworks can illustrate ecological and social phenomena. Outside of research, Yizhe is also an avid musician and opera-lover.