

Annie Stephenson

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Education

2022	PhD in Applied Physics	Harvard University
2015	BS in Physics, <i>magna cum laude</i>	University of Notre Dame

Research

Collective Behavior

2022-present	Postdoctoral Researcher Princeton University Advisor: Prof. S. Levin Investigating how individual interactions lead to emergent patterns in human and/or AI social systems. Applying physics-based models to describe organizations and communities. Identifying warning signals for social tipping.
2025	AI Safety Fellow PIBBSS and CAIF Advisor: Dr. J. Kulveit Developing emergent behavior metrics to compare behavior in groups of AI and humans Building LLM simulations of the game Dungeons and Dragons for comparison with human games. Supported by Cooperative AI Foundation (CAIF) and Principles of Behavior in Biological and Social Systems (PIBBSS)
2020	Visiting Graduate Research Fellow University of Oslo Advisor: Prof. i Gözen Contributed to Bayesian hierarchical models estimating the effectiveness of COVID-19 social interventions. Funded by the NSF GROW fellowship during my graduate studies.

Physics

2015-2022	Graduate Researcher, Harvard University Advisor: Prof. V. Manoharan Developed a Monte Carlo model to simulate light transport in structurally colored materials. Predicted reflectance, polarization, and phase, and validated through optical measurements. Designed techniques to fabricate these materials.
	Undergraduate Researcher
2014-2015	Harvard University Rowland Institute Advisor: Prof. C. Hur Imaged microparticle flow through microfluidic channels and developed code to track particle motion. Funded by Harvard REU program; Later funded on PI grant.
2013-2015	Stanford University Advisors: Prof. H. Manoharan and Prof. K. Gomes Measured and modeled the electronic band structure of 2D materials using scanning tunneling micrographs. Funded through SR-EIP program; resulted in senior thesis.
2012-2013	University of Notre Dame Advisor: Prof. J. Furdyna Imaged gallium arsenide nanowires and analyzed images to optimize growth.

Selected Honors

Fellowships

2025	AI Safety Fellowship, Cooperative AI Foundation and Principles of Intelligent Behavior in Biological and Social Systems (PIBBSS) 3-month summer fellowship, 8% acceptance rate
2020	NSF Graduate Research Opportunities Worldwide Awarded to fund international research proposal
2015-2020	NSF Graduate Research Fellowship Program 3 years of funding, 12% acceptance rate

Awards

2023	2nd place, Poster Competition at Collective Intelligence Symposium, Santa Fe Institute
2021	1st place, Datathon at the International Conference on Computational Social Science Competed with 17 teams
2015	Outstanding Physics Major Award, University of Notre Dame Awarded to 2 students in major
2015	Dean's Research Award, University of Notre Dame Awarded to 2 students in the College of Science

Competitive Programs

2025	Cooperative AI Summer School, Marlow, UK 4-day course
2023	Complex Systems Summer School, Santa Fe Institute 4-week course
2022	Spring School on Evolution of Social Complexity, Complexity Science Hub Vienna 1-week course

Computational Skills

Languages	Python, MATLAB, SQL, some experience with C++, Java, and Fortran 90
Certificates	Deep Learning Specialization, Coursera (offered by DeepLearning.AI), Instructor: Andrew Ng Completed full 5-course series

Scientific Contributions

Preprints	<p>AB Stephenson, A Zhu, C Callison-Burch, J Kulveit, "Comparing Collective Behavior of LLM and Human Groups," accepted to NeurIPS workshop on algorithmic collective action.</p> <p>G Falmagne*, AB Stephenson*, and S Levin, "Interpretable Early Warnings using Machine Learning in an Online Game-experiment," Under review at <i>PNAS</i>. *These authors contributed equally</p> <p>J Garland, J Bak-Coleman, S Benesch, S DeDeo, R DiResta, J Eissfeldt, S Ha, J Irons, C Kempes, J Lovato, K Roschke, PE Smaldino, AB Stephenson, T Wheatley, and V Semenova. "The Case Against Efficiency: Friction in Social Media," Under review at <i>npj Complexity</i>.</p> <p>J Eissfeldt and AB Stephenson. "Advantages and challenges around community-led content moderation models from a historical perspective." Book Chapter in <i>Trust and Safety: Past, Present, and Future</i>. To be published by Taylor and Francis Group, LLC.</p> <p>W Barfuss, V Galaz, AB Stephenson, E Zhivkopoulos, J Heitzig. "Collective Decisions for a Planet under Pressure," Chapter in report: AI for Sustainability Sciences.</p> <p>AB Stephenson, G Falmagne, C Kempes, and S Levin, "Understanding Organizational Scaling using a Reddit Social Experiment."</p> <p>AB Stephenson, A von Raesfeld, JA McGuire, V Hwang, S Barkley, and VN Manoharan, "How weak multiple scattering affects structural color in disordered nanoparticle assemblies and bird feathers."</p>
Publications	<p>AB Stephenson, M Xiao, V Hwang, L Qu, PA Odorisio, M Burke, K Task, T Deisenroth, S Barkley, RH Darji, VN Manoharan, "Predicting the structural colors of films of disordered photonic balls," <i>ACS Photonics</i> Article ASAP, (2022)</p> <p>M Xiao, AB Stephenson, A Neophytou, V Hwang, D Chakrabarti, VN Manoharan, "Investigating the trade-off between color saturation and angle-independence in photonic glasses," <i>Optics Express</i> 29 (14), 21212-21224 (2021)</p> <p>V Hwang, AB Stephenson, S Barkley, S Brandt, M Xiao, J Aizenberg, VN Manoharan, "Designing angle-independent structural colors using Monte Carlo simulations of multiple scattering," <i>PNAS</i> 118 (4), e2015551118 (2021)</p> <p>JM Brauner, S Mindermann, M Sharma, D Johnston, J Salvatier, T Gavenčiak, AB Stephenson, G Leech, G Altman, V Mikulik, AJ Norman, JT Monrad, T Besiroglu, H Ge, MA Hartwick, YW Teh, L Chindelevitch, Y Gal, J Kulveit. "Inferring the effectiveness of government interventions against COVID-19," <i>Science</i> 371 (6531), eabd9338 (2021)</p>

M Sharma, S Mindermann, JM Brauner, G Leech, **AB Stephenson**, T Gavenčiak, J Kulveit, YW Teh, L Chindelevitch, Y Gal. "[How Robust are the Estimated Effects of Nonpharmaceutical Interventions against COVID-19?](#)" NeurIPS (2020)

V Hwang*, **AB Stephenson***, S Magkiriadou, JG Park, VN Manoharan. "[Effects of multiple scattering on angle-independent structural color in disordered colloidal materials](#)," *Physical Review E* 101 (1), 012614 (2020)

*These authors contributed equally

Patents

VN Manoharan, V Hwang, J McGuire, **AB Stephenson**, and M Xiao "Ultraviolet Filtering Photonic Materials," US20240369739A1, published 2024, status: pending.

VN Manoharan, **AB Stephenson**, V Hwang, and M Xiao. "Structural Colors with Short-Wavelength Response for Packaging Applications," US20240192416A1, published 2024, status: pending

VN Manoharan, **AB Stephenson**, V Hwang, and M Xiao. "Methods and Systems for Selecting Parameters to Approximate Desired Properties of Structural Color," US20230095058A1, published 2023, status: pending.

RH Darji, J Newhouse, VN Manoharan, V Hwang, **AB Stephenson**, "Porous Metal Oxide Microspheres with Varying Pore Sizes." US11471849B2, published 2021, status: granted

RH Darji, J Newhouse, VN Manoharan, V Hwang, **AB Stephenson**, "Porous Metal Oxide Microspheres," US11517871B2, published 2021, status: granted

Presentations

AB Stephenson, G Falmagne, C Kempes, S Levin. "Understanding the scaling of social organizations using Reddit" International Conference for Computational Social Science, Philadelphia, PA (2024)

AB Stephenson, G Falmagne, S Levin. "Understanding the scaling of social organizations using Reddit" American Physical Society March Meeting, Minneapolis, MN (2024)

Invited: **AB Stephenson**, G Falmagne, S Levin. "Understanding the emergence of organizations using Reddit" Condensed Matter Physics Seminar, University of Notre Dame, Notre Dame, IN (2023)

Invited: **AB Stephenson**, G Falmagne, S Levin. "Reddit's r/place social experiment: a testbed for understanding collective behavior of communities," Collective Adaptation in a Turbulent World Workshop, Santa Fe Institute, Santa Fe, NM (2023)

Invited: **AB Stephenson**, V Hwang, M. Xiao, S Barkley, VN Manoharan. "Measuring and modeling light scattering in disordered systems for applications in structural color," Physics Department Seminar, University of Fribourg, Fribourg, Switzerland (2022)

AB Stephenson, V Hwang, S Barkley, VN Manoharan, "The physical origin of the reflectance features of structurally colored colloidal glasses," American Physical Society March Meeting, Boston, MA (2019)

AB Stephenson, V Hwang, S Barkley, VN Manoharan, "Predicting Scattering in Structurally Colored Colloidal Glasses," Workshop on Correlated Disorder and Hyperuniformity in Photonics and Soft Matter, Paris, France (2018)

AB Stephenson, V Hwang, S Barkley, VN Manoharan, "Determining Degree of Scattering in Structurally-colored Colloidal Glasses," American Physical Society March Meeting, Los Angeles, CA (2018)

AB Stephenson, V Hwang, JG Park, VN Manoharan, "Coupling between absorption and scattering in disordered colloids," American Physical Society March Meeting, New Orleans, LA (2017)

AB Stephenson, KK Gomes, W Ko, W Mar, HC Manoharan, "Momentum-Space Imaging of the Dirac Band Structure in Molecular Graphene via Quasiparticle Interference," American Physical Society March Meeting, Denver, CO (2014)

Science Writing & Communication

2021	<i>Physics Today</i> Quick Study invited piece: " A field guide to angle-independent structural color "
2017-2020	Softbites Blog Co-founded soft matter physics blog served as Managing Editor, Writer, and Reviewer Piece I wrote: " What is Soft Matter? "
2019	Communicating Science Convention (ComSciCon), UCSD 7% acceptance rate
2018-2019	Science Writing Workshop, Harvard University Led and designed workshop for 10 students in 2019 and co-led workshop in 2018

Teaching & Mentorship

2023	Junior Seminar, University of Notre Dame Dept. of Physics Invited talk on <i>What should I do with my career?</i>
2019	Undergraduate Mentoring Workshop, Harvard University 11 hours of training
2016	Teaching Fellow, Applied Science 50a, Harvard University
2014	Teaching Assistant, Computational Methods in Physics, University of Notre Dame
2012	Teaching Assistant, Astronomy Lab, University of Notre Dame

Leadership & Service

2020-2022	Applied Physics Steward, Harvard Graduate Student Union Elected to help students navigate union benefits
2020	<i>Don't Kvetch, Organize</i> , JOIN for Justice 8-week course on social justice and community organizing
2017-2019	Photonics Club, Harvard University President in 2018 and outreach coordinator in 2017
2013-2015	Society of Physics Students, University of Notre Dame President, vice president, and board member