Annie Stephenson

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Education

2022	PhD in Applied Physics	Harvard University
2015	BS in Physics, *magna cum laude*	University of Notre Dame

Research

Human Collective Behavior

2022-present **Postdoctoral Researcher | Princeton University | Advisor: Prof. S. Levin**

Studying how interactions between individuals bring about large-scale emergent patterns.
Applying physics-based models to describe organizations and communities.
Identifying warning signals for social tipping.

2020 **Visiting Graduate Research Fellow | University of Oslo | Advisor: Prof. İ. 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: 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.

2012 **University of Notre Dame | Advisor: Prof. Arielle Phillips**

Simulated the flow of materials in a galactic filament.

Selected Honors

Fellowships

2025 AI Safety Fellowship, Cooperative AI Foundation and Principles of Intelligent Behavior in Biological and Social Systems (PIBBSS), expected | 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
2018 Outstanding Poster Award, BASF Research on Advanced Materials Conference
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

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

Scientific Contributions

Preprints

G Falmagne*, **AB Stephenson***, and S Levin, "Interpretable Early Warnings using Machine Learning in an Online Game-experiment," Submitted to *PNAS*. *These authors contributed equally

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," submitted to *npj Complexity*.

J Eissfeldt and **AB Stephenson**. "Advantages and challenges around community-led content moderation models from a historical perspective." Book Chapter in *Trust and Safety: Past, Present, and Future*. To be published by Taylor and Francis Group, LLC.

AB Stephenson, G Falmagne, C Kempes, and S Levin, "Understanding Organizational Scaling using a Reddit Social Experiment"

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."

Publications

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," *ACS Photonics* Article ASAP, (2022)

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," *Optics Express* 29 (14), 21212-21224 (2021)

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," *PNAS* 118 (4), e2015551118 (2021)

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," *Science* 371 (6531), eabd9338 (2021)

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

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, Minneapolos, 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)

M Sharma, S Mindermann, JM Brauner, G Leech, **AB Stephenson**, T Gavenčiak, J Kulveit, YW Teh, L Chindelevitch, Y Gal. "On the robustness of effectiveness estimation of nonpharmaceutical interventions against COVID-19 transmission," NeurIPS (2020)

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)

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

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 courses: Neural Networks and Deep Learning, Improving Deep Neural Networks, Structuring Machine Learning Projects, Convolutional Neural Networks

Science Writing & Communication

2021 *Physics Today* 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 *What should I do with my career?*

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 *Don't Kvetch, Organize*, 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