

STANFORD UNIVERSITY

Ph.D. in Computational and Mathematical Engineering
Advised by Professor Daniel Tartakovsky

Palo Alto, CA
Current

UNIVERSITY of OXFORD

M.Sc. in Mathematical Modelling and Scientific Computing
Dissertation title: “Simulating 3D Orthotropic Cardiac Electromechanics Incorporating Stress-Assisted Diffusion,” supervised by Professor Ricardo Ruiz-Baier

Oxford, UK

HARVARD UNIVERSITY

B.A. in Applied Mathematics; Magna Cum Laude with High Honors
Honors thesis title: “MethaneSat: Detecting Methane Emissions in the Barnett Shale Region,” supervised by Professor Steven C. Wofsy and Dr. Joshua Benmergui

Cambridge, MA

ACADEMIC & RESEARCH EXPERIENCE

Stanford University

PhD Candidate

Current

- Focus on exploiting mathematical structure to design data- and compute-efficient AI algorithms that maintain accuracy, stability and generalization in scientific machine learning (SciML) surrogate models
- Developed a probabilistic AI framework for learning on graphs grounded in optimal recovery and kernel theory, enabling accurate learning from sparse observations with rigorously quantified uncertainty (with H. Owhadi)
- Developed novel domain decomposition and transfer learning strategies to improve scalability, training efficiency, and out-of-distribution generalization for GNN surrogate models (with P. Stinis)
- Developed a reinforcement learning model selection algorithm for contextual bandits with provable regret guarantees, leveraging the bias-variance tradeoff to reduce unnecessary computation while preserving performance (with S. Athey)

Sandia National Laboratories

Graduate Intern, Computer Science Research Institute (CSRI)

Summer 2025

- Developed training-efficient AI surrogate models using physics-encoded GNN architectures, where attention is parameterized as a learnable inner product derived from an underlying dynamical system, enabling scalable learning under severe data scarcity

Apple

ML Research & Mathematical Sciences Intern, XDG

Summer 2024

- Designed AI/ML training pipelines for high-impact scientific applications within Apple’s Exploratory Design Group (XDG), with emphasis on model efficiency, stability, and performance under constrained data and compute budgets

Harvard University

Research Assistant – Wofsy Lab, Dept. of Earth & Planetary Sciences

Jan 2016 – Sep 2017

- Developed inverse modeling approach to predict ability of MethaneSat to constrain methane emissions
- Work was cited by NASA, directly contributed to securing funding for MethaneSat project (launched 2024!)

SLAC National Accelerator Laboratory

Intern (SULI) – Glenzer Lab

Summer 2015

- Led development of cryogenic targets and spectrometry diagnostics for ion acceleration experiment

APPLIED RESEARCH & POLICY EXPERIENCE

RAND Corporation

Technical Analyst

Jan 2019 – Sep 2021

- Developed large-scale MCMC and agent-based models to quantify financial impacts of US healthcare reform proposals; results informed federal and state policy briefs
- Designed multi-modal modeling framework to advise Virginia Governor Northam’s response to COVID-19
- Developed a framework for policymakers to better understand risks posed by adversarial AI techniques
- Project manager for international OECD research study on identifying most effective global teaching practices

PUBLICATIONS

(*) indicates first author

Propp, A.*, Perego, M., Howard, A., Gruber, A., Stinis, P., Cyr, E., Tartakovsky, D. (2025) “Domain-Decomposed Graph Neural Network Surrogate Modeling for Ice Sheets.” (*submitted*). <https://arxiv.org/abs/2512.01888>.

Propp, A.*, Actor, J., Walker, E., Owhadi, H., Tartakovsky, D., Trask, N. (2025) “Learning Dirichlet-to-Neumann Maps on Graphs via Gaussian Processes.” (*accepted to SIAM Journal on Scientific Computing*). <https://arxiv.org/abs/2506.02337>.

Propp, A.*, Vardavas, R., Price, C., Kapinos, K. (2025) “LHIEM: the Longitudinal Health, Income, and Employment Model.” *Journal of Artificial Societies and Social Simulation*. <https://www.jasss.org/28/2/1.html>.

Propp, A.*, Tartakovsky, D. (2025). “Transfer learning on multi-dimensional data: A novel approach to neural network-based surrogate modeling.” *Journal of Machine Learning for Modeling and Computing*. <https://doi/10.1615/JMachLearnModelComput.2024057138>.

Krishnamurthy, S.K.* , **Propp, A.***, Athey, S. (2024). “Towards Costless Model Selection in Contextual Bandits: A Bias-Variance Perspective.” *Proceedings of the 27th International Conference on Artificial Intelligence and Statistics (AISTATS)*. <https://proceedings.mlr.press/v238/kumar-krishnamurthy24a/kumar-krishnamurthy24a.pdf>.

Propp, A.*, Gizzi, A., Levbrero-Florencio, F., Ruiz-Baier, R. (2019). “An orthotropic electro-viscoelastic model for the heart with stress-assisted diffusion.” *Biomechanics and Modeling in Mechanobiology*. <https://doi.org/10.1007/s10237-019-01237-y>.

Gauthier, M.* et al. [**including Propp, A**] (2016). “High intensity laser-accelerated ion beam produced from cryogenic micro-jet target”. *AIP Review of Scientific Instruments*. <https://doi.org/10.1063/1.4961270>.

Chen, S. N.* et al. [**including Propp, A**] (2016). “Absolute dosimetric characterization of Gafchromic EBT3 and HDv2 films using commercial flat-bed scanners and evaluation of the scanner response function variability”. *AIP Review of Scientific Instruments*. <https://doi.org/10.1063/1.4954921>.

SELECTED CONFERENCES

Propp, A., Actor, J., Walker, E., Owhadi, H., Tartakovsky, D., Trask, N. “Learning Dirichlet-to-Neumann maps on graphs with Gaussian processes”. *SIAM Mathematics of Data Science (Poster, 2024)*.

Propp, A., Howard, A., Perego, M., Heinlein, A., Tartakovsky, D., Stinis, P. “Graph neural operators for quantification of geometric uncertainty.” *WCCM / PANACM (Invited talk, 2024)*.

Propp, A., Actor, J., Walker, E., Owhadi, H., Tartakovsky, D., Trask, N. “Discovery of Dirichlet-to-Neumann maps on graphs via Gaussian processes”. *Scientific Machine Learning: Emerging Topics (Contributed talk, 2024)*.

Propp, A. and Tartakovsky, D. “Transfer learning for surrogate models of PDEs.” *Mathematical and Scientific Machine Learning, ICERM (Invited talk, 2023)*.

Propp, A., Price, C., Vardavas, R., Kapinos, K. “Dynamic microsimulation modeling for healthcare expenditures.” *Conference of the American Society of Health Economists (ASHEcon) (Contributed talk, 2021)*.

Gizzi, A., **Propp, A.**, Ruiz-Baier, R. “Mixed formulations for stress-assisted diffusion problems in cardiac biomechanics.” *ICNumACA (2018)*.

Propp, A. et al. “MethaneSat: Detecting methane emissions in the Barnett Shale region.” *American Geophysical Union (AGU) Fall Meeting (Contributed talk, 2017)*.

Propp, A. et al. “Development of and laser-driven proton acceleration from a cryogenic hydrogen microjet.” 3rd High-Power Laser Workshop at SLAC National Accelerator Laboratory (*Poster, 2015*).

TEACHING EXPERIENCE

Harvard University

Teaching Fellow – Dept. of Applied Mathematics

- AM105: Ordinary & Partial Differential Equations
- AM21a: Multivariable Calculus
- Twice awarded *Certificate of Distinction in Teaching* based on students’ end-year reviews

AWARDS & FELLOWSHIPS

ICME Student Leadership Award, Stanford University	May 2023
Stanford Graduate Fellowship	Sep 2021
Enhancing Diversity in Graduate Education (EDGE) Fellowship, Stanford University	Sep 2021
RAND Corporation Spotlight Award	April 2020
Distinction on M.Sc. dissertation, Oxford Mathematical Institute	
Magna Cum Laude, Harvard University	
Certificate of Distinction in Teaching, Harvard University	Dec 2016
Certificate of Distinction in Teaching, Harvard University	May 2016
Harvard College Scholar	
“Hanging Jig,” U.S. Patent D679,613 S	April 2013

SERVICE

Reviewer – JASSS; Neural Networks; IJUQ

Peer mentor – Stanford EDGE Program; Stanford ICME Buddy Program

Board member – Stanford Women in Mathematics, Statistics, and Computational Engineering (WiMSCE)

Member – ICME Student Action Group