Richard Lanas Phillips

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Education

Cornell University, Ithaca NY *4th year*
Ph.D. student in Computer Science, advised by Kyra Gan
Dean's Fellow; Center for the Study of Inequality Affiliate

Relevant Graduate Coursework

Advanced ML Systems
Data-Driven Optimization
NLP and Social Interaction
Seminar on Information Networks
Analysis of Algorithms
Algorithmic Game Theory
Learning with Big Messy Data

Haverford College, Haverford PA *Awarded May 2018*
B.S. with High Honors in Computer Science
Thesis: *Explaining Neural Network Predictions with Image Certainty Translation*
Advised by Sorelle A. Friedler

Peer Reviewed Publications

"One for One, or All for All: Equilibria and Optimality of Collaboration in Federated Learning"
Blum, A. T., Haghtalab, N., **Phillips, R. L.**,* Shao, H.* **Equal contribution*
The 38th International Conference on Machine Learning (ICML 2021) (21.5% acceptance rate)

"WILDS: A Benchmark of in-the-Wild Distribution Shifts"
Koh, P. W., Sagawa, S., Marklund, H., Xie, S. M., Zhang, M., Balsubramani, A., Hu, W., Yasunaga, M., **Phillips, R. L.**, Beery, S., Leskovec, J., Kundaje, A., Pierson, E., Levine, S., Finn, C., Liang, P.
The 38th International Conference on Machine Learning (ICML 2021) (3% selected for long talk)

"Disentangling Influence: Using Disentangled Representations to Audit Model Predictions"
Marx, C. T., **Phillips, R. L.**, Friedler, S. A., Scheidegger, C., Venkatasubramanian, S.
Conference on Neural Information Processing Systems (NeurIPS 2019) (21% acceptance rate)
arXiv preprint

"Interpretable Active Learning"
Phillips, R. L., Hyun Chang, K., Friedler, S. A.
Conference on Fairness, Accountability, and Transparency (FAT 2018)* (24% acceptance rate)
PMLR link

"Bio-Inspired Electroactive Organic Molecules for Aqueous Redox Flow Batteries. 1. Thiophenoquinones"
Pineda, S., Martin-Noble, G., **Phillips, R. L.**, Schrier, J.
J. Phys. Chem. C, 2015, 119(38), pp. 21800–21809 ACS link

Workshop Papers

"One for One, or All for All: Equilibria and Optimality of Collaboration in Federated Learning"
Blum, A. T., Haghtalab, N., **Phillips, R. L.**,* Shao, H.* **Equal contribution*
Workshop on Learning in the Presence of Strategic Behavior at NeurIPS 2021

"Interpretable Active Learning"
Phillips, R. L., Hyun Chang, K., Friedler, S. A.
Workshop on Human Interpretability in Machine Learning (WHI) at ICML 2017
arXiv link

Invited Talks

"Active Learning Recommendations for Exploratory Synthesis" September 24, 2016
Undergraduate Science Symposium 2016, Haverford, PA

"Precise Organic Molecule Geometric Descriptors" July 25, 2016
Rutgers–Bryn Mawr Undergraduate Research Workshop on Computational Geometry, Camden, NJ

Contributed Talks

"Interpretable Active Learning" (oral presentation, single-track) February 23, 2018
Conference on Fairness, Accountability, and Transparency (FAT) 2018*, New York, USA

Poster Presentations

"Applying Interpretability Methods for Accountable Data Pipelines" 2018
Phillips, R. L.
CCC Early Career Researcher Symposium 2018 workshop link

"Locally Interpretable Models to Generate Annotated Active Learning Recommendations" 2017
Phillips, R. L., Hyun Chang, K., Friedler, S. A.
New England Machine Learning Day 2017 workshop link

"Computational Screening for High Performance Aqueous Redox Flow Battery Materials" 2015
Phillips, R. L., Schrier, J.
14th Annual MERCURY Conference for Undergraduate Computational Chemistry abstract

Research Experience

ICES — Principal Investigator: Cluster-Based Approaches for Population Segmentation March 2021 – May 2022
Cornell University and the University of Toronto (collaborators: M. Udell, L. Rosella)

- Developed novel ML and cluster-based approaches for population segmentation under equity constraints to inform health system planning and decision-making.
- Analyzed multi-scale longitudinal EHR, billing, prescription, demographic, lab, immigration, and survey data for a population of over 15 million Ontarians.
- Designed rigorous evaluation protocols for segmentation methods intended to support policy-facing stakeholders.

Algorithmic Fairness Group — Research Assistant & Graduate Consultant November 2015 – May 2019
Haverford College, advised by S. A. Friedler, C. Scheidegger, & S. Venkatasubramanian

- Developed a theoretical framework for understanding why individual active learning recommendations are made.
- Assisted in developing a measure for bias in model confidence grounded in the legal precedent of disparate impact.
- Developed an unsupervised strategy for characterizing trends in prediction uncertainty across any dataset.
- Developed an algorithm using adversarial modeling (GAN-style) to transform images to help domain experts understand classifier predictions.

Dark Reactions Project — Research Assistant April 2015 – May 2018
Haverford College, advised by J. Schrier, S. A. Friedler, & A. Norquist
Dark Reactions GitHub

- Built an initial recommendation pipeline that facilitated numerous exploratory syntheses by exploiting model predictions to recommend diverse, high-success-probability reactions.
- Researched and published a solution for estimating long-term organic battery material stability.
- Designed and implemented active learning strategies to select samples for computationally intensive density functional theory (DFT) and Hartree–Fock calculations.
- Implemented an active learning pipeline in Django and RDKit for recommending reaction syntheses to better understand organically templated crystal formation.

Honors and Awards

Dean's Excellence Fellowship, Cornell University
Competitive fellowship covering stipend, tuition, and fees for a handful of first-year Cornell Ph.D. students from backgrounds underrepresented in doctoral programs.

Computing Research Association (CRA) Outstanding Undergraduate Researcher Award
Recognizes North American undergraduates with outstanding potential in computing research; awarded to one student from a liberal arts college and four in total.

Arnold and Mabel Beckman Foundation Beckman Scholar
National award providing full financial support (stipend, scholarship, conference travel, research materials) for 15 months of intensive undergraduate research. 58 scholars nationally in 2016; 2 from Haverford College.

John P. Chesick Scholar, Haverford College
Fellowship awarded yearly to 15 exceptional students from underrepresented or under-resourced backgrounds.

President and Provost's Discretionary Funding for Investigative Research in Cuba
Proposed and received funding for a two-week research trip to Cuba: surveys, interviews, and meetings with local scholars, with the goal of peer-reviewed publication. Joint award with one other Haverford student.

Service

Organizer, Bias and Discrimination Working Group, MD4SG

Cornell CS Ph.D. Admissions Volunteer
Including additional early reading and feedback for applicants from underrepresented backgrounds in CS.

Multicultural Academic Council Mentoring Program, Cornell University

Beckman Journal Club Co-Founder and President, Haverford College
Monthly interdisciplinary meeting of Beckman Scholars and faculty PIs; students present and discuss notable recent publications.

KINSC Student Advisory Board, Haverford College
One of five students making recommendations directly to the natural sciences steering committee.

Selected Projects

Robust Ensemble Adaptation under Label Shift
Modular YAML-configured experimentation stack for training and evaluation under label shift; confusion-matrix auditing, predictive stacking, and epsilon-robust objectives to stabilize performance across shifted test distributions.

Simultaneous A/B Testing for Small Groups via Low-Rank Structure
Methodology for concurrent experiments with limited sample sizes; exploits low-rank structure to share statistical strength. Prototype estimator and offline power analysis; designed for production metric integration.

Proof Annotation for Randomized Linear Algebra
Built an LLM tool to segment and annotate proofs about structured matrices. Designed proof primitives and an ontology to track assumptions, random events, and probability bounds in high-probability arguments, motivated by gaps in Lean's high-dimensional probability libraries.

Sample Explorer for Microtonal Instruments (Python, librosa)
Built a tool to find, audition, and trim sounds from film audio for microtonal digital instruments. Exported over 3,000 candidate WAV clips with tempo estimates and pitch labels in 12- and 31-tone equal temperament.

Delta Bond Length Tool
Tracks changes in lengths of common bonds across reaction families as a quantitative measure of long-term stability; uses subgraph isomorphism over chemical graphs (NetworkX, NumPy). GitHub

Neural Network for Molecular Geometry Optimization
Developed a model to approximate DFT-quality molecular geometry optimization using neural networks trained on a structured low-data problem. Paper link

Technical Skills

Languages	Python, R, SQL, C++, Rust, Bash, HTML
Model serving	SGLang, vLLM, speculative decoding, constrained generation
Machine learning	PyTorch, JAX, Hugging Face Transformers, scikit-learn, TensorFlow, Keras
Data and analysis	NumPy, pandas, SciPy, SQLite, NetworkX, CVXPY, OpenCV, RDKit, librosa
Tools and platforms	Slurm, Docker, AWS, Databricks, Weights & Biases, Git, Django, LaTeX, Airtable, Pydantic