

Aria Masoomi

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Boston, MA, USA

EDUCATION

- **Northeastern University** Sep 2017 - Dec 2024
Ph.D. in Electrical and Computer Engineering, GPA: 4.0/4.0 Boston, USA
 - **Advisor:** Professor Jennifer Dy
 - **Thesis Title:** Making Deep Neural Networks Transparent
- **Northeastern University** Sep 2022 - Aug 2025
Ph.D. in Mathematics, GPA: 4.0/4.0 Boston, USA
 - **Advisor:** Professor Milen Yakimov
 - **Thesis Title:** Poisson Geometry of Flag Varieties and Representation Theory of their Quantum Deformations
- **Sharif University of Technology** Sep 2012 - Aug 2017
B.Sc. in Electrical Engineering, GPA: 3.7/4.0 Tehran, Iran
 - With Minor in Mathematical science

EXPERIENCE

- **ECE Department, Northeastern University** Sep 2017 - Aug 2024
Graduate Research Assistant USA
 - Worked on a number of methods in machine learning interpretability such as Shapley values (**Spotlight ICLR 2022**), extending them to Shapley graphs and hypergraphs to detect redundancy, and feature interactions analysis using Stein's Lemma and Information Theory (**NeurIPS 2021, NeurIPS 2023**).
 - Recently working on activation steering for controlling LLMs (**NeurIPS 2025**).
 - Collaborated with doctors at Harvard medical school applying machine learning algorithms to aid in Chronic Obstructive Pulmonary Disease (COPD) subtype discovery.
- **Math Department, Northeastern University** Sep 2024 - Aug 2025
Graduate Research Assistant USA
 - Classifying irreducible representations of the Quantum function algebra at a root of unity for partial flag varieties G/P_I , where G is a simply connected, semisimple algebraic group over a field K of characteristic 0, and ε is a primitive ℓ^{th} root of unity for ℓ an odd positive integer, and $\ell \geq 3$. Our approach involves descending the action of $O_\varepsilon(G/P_I)$ to a specific Normal Quantum Solvable algebra.
- **Simons Laufer Mathematical Sciences Institute (MSRI)** Feb 2024 - March 2024
Associate Program member USA
 - Noncommutative Algebraic Geometry and Representation Theory.
- **Astar (Institute for Infocomm Research)** May 2016 - Aug 2016
Researcher Singapore
 - Built motion detection algorithms using accelerometer sensors to efficiently allocate WLAN connection.

HONORS AND AWARDS

- **Best Ph.D. Thesis Award in Mathematics** 2025
Poisson Geometry of Flag Varieties and Representation Theory of their Quantum Deformations Northeastern University
- **Ph.D. Spotlight** 2024
Computer Engineering and Mathematics Northeastern University
- **ICLR Spotlight Paper** 2022
Explanations of Black-Box Models based on Directional Feature Interactions (~ 5% of submissions)
- **NeurIPS Spotlight Paper** 2021
Reliable Estimation of KL Divergence using a Discriminator in Reproducing Kernel Hilbert Space (~ 5% of submissions)
- **Singapore International Pre-Graduate Award (SIPGA)** 2016
*A*STAR*
- **Among the best B.Sc. Thesis of Electrical Engineering Department** 2017
Sharif University of Technology
- **Ranked 58th (top 0.5%) in Iran University Entrance Exam for B.Sc. Degree** 2012

- [C.1] Max Torop, **Aria Masoomi**, Masih Eskandar, Jennifer Dy. [DISCO: Disentangled Communication Steering for Large Language Models](#). Conference on Neural Information Processing Systems (**NeurIPS**) 2025.
- [C.2] Davin Hill, Brian L. Hill, **Aria Masoomi**, Vijay S Nori, Robert E Tillman, Jennifer Dy. [OrdShap: Feature Position Importance for Sequential Black-Box Models](#). Conference on Neural Information Processing Systems (**NeurIPS**) 2025.
- [C.3] Davin Hill, Joshua Bone, **Aria Masoomi**, Max Torop, Jennifer Dy. [Axiomatic Explainer Globalness via Optimal Transport](#). Conference on Artificial Intelligence and Statistics (**AISTATS**) 2025.
- [C.4] Davin Hill, **Aria Masoomi**, Max Torop, Sandesh Ghimire, Jennifer Dy. [Boundary-Aware Uncertainty for Feature Attribution Explainers](#). Conference on Artificial Intelligence and Statistics (**AISTATS**) 2024.
- [C.5] Zulqarnain Q. Khan, Davin Hill, **Aria Masoomi**, Jennifer Dy. [Analyzing Explainer Robustness via Probabilistic Lipschitzness of Prediction Functions](#). Conference on Artificial Intelligence and Statistics (**AISTATS**) 2024.
- [C.6] Max Torop*, **Aria Masoomi***, Davin Hill, Kivanc Kose, Stratis Ioannidis, Jennifer Dy. [SmoothHess: ReLU Network Feature Interactions via Steins Lemma](#). Conference on Neural Information Processing Systems (**NeurIPS**) 2023.
- [C.7] Ashutosh Singh, Ashish Singh, **Aria Masoomi**, Tales Imbiriba, Erik Learned-Miller, Deniz Erdomu. [Inv-Senet: Invariant Self Expression Network for Clustering Under Biased Data](#). IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**) 2023.
- [C.8] **Aria Masoomi**, Davin Hill, Zhonghui Xu, Craig P Hersh, Edwin K Silverman, Peter J Castaldi, Stratis Ioannidis, Jennifer Dy. [Explanations of black-box models based on directional feature interactions](#). Conference on Learning Representations (**ICLR**) 2022. **[Spotlight Paper, top 5% submissions]**
- [C.9] Chieh Wu*, **Aria Masoomi***, Arthur Gretton, Jennifer Dy. [Deep Layer-wise Networks Have Closed-Form Weights](#). Conference on Artificial Intelligence and Statistics (**AISTATS**) 2022.
- [C.10] Sandesh Ghimire, **Aria Masoomi**, Jennifer Dy. [Reliable estimation of kl divergence using a discriminator in reproducing kernel hilbert space](#). Conference on Neural Information Processing Systems (**NeurIPS**) 2021. **[Spotlight Paper, top 5% submissions]**
- [C.11] Zifeng Wang*, Tong Jian*, **Aria Masoomi**, Stratis Ioannidis, Jennifer Dy. [Revisiting Hilbert-Schmidt Information Bottleneck for Adversarial Robustness](#). Conference on Neural Information Processing Systems (**NeurIPS**) 2021.
- [C.12] **Aria Masoomi***, Chieh Wu*, Tingting Zhao, Zifeng Wang, Peter Castaldi, Jennifer Dy. [Instance-wise Feature Grouping](#). Conference on Neural Information Processing Systems (**NeurIPS**) 2020.
- [J.1] Élie Casbi, **Aria Masoomi**, Milen Yakimov. [The Poisson degeneracy locus of a flag variety](#). In *Mathematische Zeitschrift* 2025.
- [J.2] Md Navid Akbar, Mathew Yarossi, Sumientra Rampersad, Kyle Lockwood, **Aria Masoomi**, et al. [M2M-InvNet: Human Motor Cortex Mapping From Multi-Muscle Response Using TMS and Generative 3D Convolutional Network](#). IEEE Transactions on Neural Systems and Rehabilitation Engineering 2024.
- [J.3] Rahul Suryadevara, Andrew Gregory, Robin Lu, Zhonghui Xu, **Aria Masoomi**, et al. [Blood-based transcriptomic and proteomic biomarkers of emphysema](#). In *American Journal of Respiratory and Critical Care Medicine* 2024.
- [J.4] Tingting Zhao, Zifeng Wang, **Aria Masoomi**, Jennifer Dy. [Deep Bayesian Unsupervised Lifelong Learning](#). In *Neural Networks* 2022.
- [J.5] Rahul Suryadevara, Andrew Gregory, **Aria Masoomi**, et al. [Blood transcriptomics-based machine learning prediction of emphysema in smokers](#). In *CHEST Journal* 2021.
- [J.6] Zifeng Wang, **Aria Masoomi**, et al. [Improved prediction of smoking status via isoform-aware RNA-seq deep learning models](#). In *PLOS Computational Biology* 2021.
- [J.7] AR El Boueiz, JG Dy, JC Ross, **Aria Masoomi**, et al. [Deep learning prediction of COPD progression using enriched densitometry phenotypes](#). In *B101. Advances in COPD Pathogenesis* 2019.
- [J.8] Qianfan Wu, Adel Boueiz, Aican Bozkurt, **Aria Masoomi**, et al. [Deep learning methods for predicting disease status using genomic data](#). In *Journal of biometrics & biostatistics* 2018.
- [T.1] **Aria Masoomi**. [Making Deep Neural Networks Transparent](#). *Northeastern University*. 2024.
- [T.2] **Aria Masoomi**. [Poisson Geometry of Flag Varieties and Representation Theory of Their Quantum Deformations](#). *Northeastern University*. 2025.

INVITED TALKS

- **Maurice Auslander Distinguished Lectures and International Conference** Apr 2025
Woods Hole Oceanographic Institution Woods Hole, MA
Topic: Irreducible representations of quantum flag varieties at roots of unit
- **Joint Mathematics Meetings (JMM)** Jan 2025
Seattle Convention Center Seattle, WA
Topic: Irreducible Representations of Quantum Flag Varieties at Roots of Unity
- **Data to Actionable Knowledge Lab** Oct 2024
Harvard University Cambridge, MA
Topic: ReLU Network Feature Interactions via Steins Lemma: SmoothHess
- **American Mathematical Society (AMS)** Apr 2024
Howard University Washington, DC
Topic: Schemes of point modules of quantum flag varieties
- **American Mathematical Society (AMS)** Oct 2023
University of South Alabama Mobile, AL
Topic: Schemes of point modules of quantum flag varieties
- **American Mathematical Society (AMS)** May 2023
California State University Fresno, CA
Topic: Schemes of point modules of quantum flag varieties
- **Maurice Auslander Distinguished Lectures and International Conference** Apr 2023
Woods Hole Oceanographic Institution Woods Hole, MA
Topic: Schemes of point modules of quantum flag varieties
- **COPDGene Disease Progression Workshop** Jan 2021
Topic: From Prediction to Subtypes Virtual
- **COPDGene Deep Learning Workshop and Investigators Meeting** Nov 2018
Topic: Classifying Smoking Status by Deep Neural Networks Denver, CO

LEADERSHIP & SERVICES

- **Summer School Organizer** 2025
Machine Learning for Mathematicians and Physicists Summer School, Northeastern University
- **Conference Reviewer** 2025
Advances in Neural Information Processing Systems (NeurIPS)
- **Conference Reviewer** 2024
Association for the Advancement of Artificial Intelligence (AAAI)
- **Conference Reviewer** 2021
Advances in Neural Information Processing Systems (NeurIPS)
- **Conference Reviewer** 2021
Society for Artificial Intelligence and Statistics (AISTATS)
- **Teaching Assistant** 2017
Lab assistance for Principles of Electronics Course, ECE Department of Sharif University

SKILLS

- **Programming Languages:** Python, MATLAB, C, C++, Maccaulay2, SageMath
- **Data Science & Machine Learning:** PyTorch, pandas, NumPy, scikit-learn, \LaTeX
- **Version Control:** Git