

# Aram-Alexandre Pooladian

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🐙 github.com/APooladian

## Education

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### PhD (Data Science: Theory track)

*Focus:* High-dimensional statistics, machine learning, and optimal transport

*Advisor:* Jonathan Niles-Weed

*Funding:* Meta AI Mentorship, Google Research Collab, Data Science Fellowship, and NSERC PGS-D

**New York University**

*September 2020 – Present*

### MSc (Applied Mathematics)

*Focus:* Optimization and Deep Learning

*Advisors:* Tim Hoheisel and Adam Oberman

*Funding:* Lorne Trottier Fellowship, NSERC CGS-M, FRQNT Scholarship, Mitacs Scholarship

**McGill University**

*May 2018 – May 2020*

### BA (Honours Applied Mathematics)

*Honours thesis advisor:* Tim Hoheisel

**McGill University**

*September 2014 – May 2018*

## Work experience

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### Visiting researcher

*Mentors:* Brandon Amos and Ricky Chen

*Focus:* Computational aspects of optimal transport, generative modelling

**Meta AI Research**

*October 2022 – Present*

## Research articles

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### Preprints

- Klein, M., Pooladian, A-A., Ndiaye, E., Ablin, P., Niles-Weed, J., and Cuturi, M. “Learning Costs for Structured Monge Displacements”, 2023 [PDF]
- Pooladian, A-A., Domingo-Enrich, C., Chen, R., and Amos, B. “Neural Optimal Transport with Lagrangian Costs”, 2023 [PDF]
- Divol, V., Niles-Weed, J., and Pooladian, A-A. (alphabetical) “Optimal transport map estimation in general function spaces”, 2022 [PDF]
- Pooladian, A-A., and Niles-Weed, J. “Entropic estimation of optimal transport maps”, 2021. [PDF]
  - **Best paper award** at NeurIPS Workshop: Optimal Transport in Machine Learning (OTML), 2021

### Journal publications

- Chewi, S., and Pooladian, A-A. (alphabetical) “An entropic generalization of Caffarelli’s contraction theorem via covariance inequalities”, 2023+. *Compte Rendues Mathématique* [PDF]
- Domingo-Enrich, C., and Pooladian, A-A. (alphabetical) “An Explicit Expansion of the Kullback-Leibler Divergence along Fisher-Rao gradient flows”, *Transactions on Machine Learning Research (TMLR)* 2023 [PDF]
- Hoheisel, T., Pablos, B., Pooladian A-A., Schwartz, A., and Steverango, L. (alphabetical) “A survey of one-parameter regularization methods for mathematical programs with vanishing constraints”, *Optimization Methods and Software*.

## Conference and workshop publications

- **Pooladian, A-A.\***, Divol, V.\*, and Niles-Weed, J. "Minimax estimation of discontinuous optimal transport maps: The semi-discrete case", *Fortieth International Conference on Machine Learning (ICML) 2023*. [PDF]
- **Pooladian, A-A.\***, Ben-Hamu, H.\*, Domingo-Enrich, C.\*, Amos, B., Lipman, Y., and Chen, R. "Multisample Flow Matching: Straightening Flows with Minibatch Couplings", *Fortieth International Conference on Machine Learning (ICML) 2023*. [PDF]
- **Pooladian, A-A.**, Cuturi M., and Niles-Weed, J. "Debiasser Beware: Pitfalls of Centering Regularized Transport Maps", *Thirty-ninth International Conference on Machine Learning (ICML) 2022*. [PDF]
- Finlay, C., Gerolin, A., Oberman, A., **Pooladian, A-A.** (alphabetical) "Learning normalizing flows from Entropy-Kantorovich potentials", *Invertible Neural Networks, Normalizing Flows, and Explicit Likelihood Models (INNF+) ICML Workshop, 2020*. [PDF] (Spotlight presentation)
- **Pooladian, A-A.**, Finlay, C., Hoheisel, T., and Oberman, A. "A principled approach for generating adversarial images under non-smooth dissimilarity metrics", *Proceedings of the 23rd International Conference on Artificial Intelligence and Statistics (AISTATS), 2020*. [PDF]
- Finlay, C.\*, **Pooladian, A-A.\***, and Oberman, A. "The LogBarrier attack: making effective use of decision boundary information", *IEEE International Conference on Computer Vision (ICCV), 2019*. [PDF]

## Select awards and scholarships

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<b>Meta AI Mentorship fellowship</b> (Mentored by Brandon Amos and Ricky Chen) Competitive industry scholarship: full tuition and stipend covered for two academic years	Oct 2022 — Oct 2024
<b>Best Paper Award at NeurIPS OTML Workshop</b>	Dec 2021
<b>Google Research Collab Award</b> (With Marco Cuturi) Competitive scholarship in collaboration with industry	Fall 2021
<b>NSERC CGS-D Scholarship</b> (Declined; accepted PGS-D Scholarship) Competitive Canadian scholarship; awarded to roughly 17% of applicants	May 2020 — May 2023
<b>IPAM Research Fellow at UCLA</b>	March 2020 — June 2020
<b>Mitacs Scholarship with Desjardins</b> Competitive scholarship in collaboration with industry	September 2019 — December 2019
<b>FRQNT Master's Scholarship</b> Competitive provincial master's scholarship; ranked 2 <sup>nd</sup> in my category	May 2019 — May 2020
<b>Lorne Trottier Fellowship</b> Nominated by faculty	May 2018 — May 2019
<b>NSERC CGS-M Scholarship</b> Competitive Canadian scholarship; awarded to 3 students in the department	May 2018 — May 2019

## Invited talks and presentations

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<b>16th International Conference on Computational and Methodological Statistics</b> <i>Invited talk:</i> Workshop on optimal transport and statistics	December 2023 Berlin, Germany
<b>Foundations of Computational Mathematics</b> <i>Invited talk:</i> Workshop on computational optimal transport	June 2023 Paris, France

<b>University of Ottawa</b>	March 2023
<i>Invited talk:</i> Applied Mathematics Seminar	Ottawa, Canada
<b>University of Toronto – Vector Institute</b>	March 2023
<i>Invited talk:</i> Seminar speaker	Toronto, Canada
<b>Simons Institute for the Theory of Computing</b>	January 2023
<i>Invited talk:</i> Geometric Methods in Optimization and Sampling Reunion Workshop	Berkeley, CA, USA
<b>Yale University</b>	April 2022
<i>Invited talk:</i> Computer Science Seminar Series	New Haven, CT, USA
<b>MIT-IBM-Cornell joint meeting</b>	March 2022
<i>Invited speaker:</i> Group meeting	(Online)
<b>Optimal Transport and Machine Learning Workshop at NeurIPS (Best Paper Award)</b>	December 2021
<i>Contributing talk:</i> Oral presentation	(Online)
<b>Simons Institute for the Theory of Computing</b>	December 2021
<i>Invited talk:</i> Geometric Methods in Optimization and Sampling	Berkeley, CA, USA
<b>Invertible Neural Nets and Normalizing Flows Workshop at ICML</b>	July 2020
<i>Contributing talk:</i> Oral presentation	(Online)

## Academic service and other activities

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- **Co-organizer** of Optimal Transport and Machine Learning (OTML) Workshop at NeurIPS 2023
- Journal reviewing: Journal of Machine Learning Research, Annals of Statistics, Research in Mathematical Sciences
- Conference reviewing: International Conference on Machine Learning (ICML 2022, 2023), NeurIPS 2023, NeurIPS OTML workshop (2021, 2023), Conference on Learning Theory (COLT 2021, 2022, 2023), International Conference on Artificial Intelligence and Statistics (AISTATS 2021)
- Organizer and founder of the CDS Graduate Student Seminar Series (Spring 2022, Fall 2022, Spring 2023)
- PhD Student Representative at NYU CDS (2020 — 2021)

## Teaching experience

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<b>Head Teaching Assistant</b> for “DSGA 1020: Mathematical Statistics” (Grad course)	New York University
Prepared weekly tutorials, marked assignments and exams	<i>Fall 2022</i>
<b>Course Instructor</b> for “Girls in STEM: Data Science”	New York University
Prepared and delivered over 20h of material to ~40 high school girls across 5 weeks	<i>Summer 2021, 2022</i>
<b>Head Teaching Assistant</b> for “MATH 151: Calculus A” (Undergrad course)	McGill University
Prepared weekly tutorials and held office hours	<i>Fall 2018</i>