

# Andrew Warren

UBC Mathematics, 1984 Mathematics Road, Vancouver, BC, Canada, V6T 1Z2

✉ [awarren@math.ubc.ca](mailto:awarren@math.ubc.ca) | 🏠 [andrew-warren.github.io](https://andrew-warren.github.io)

## Employment

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- Spring 2023 - present    **Postdoctoral Fellow**, Department of Mathematics, University of British Columbia
- Fall 2022 - Spring 2023    **CARMIN Visitor (postdoc)**, Institut des Hautes Études Scientifiques, Université Paris-Saclay

## Education

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- Carnegie Mellon University** Pittsburgh, PA  
PHD LOGIC, COMPUTATION, AND METHODOLOGY August 2022  
• Advisor: Prof. Dejan Slepčev
- Carnegie Mellon University** Pittsburgh, PA  
MS MATHEMATICAL SCIENCES May 2019  
• Advisor: Prof. Jeremy Avigad
- Reed College** Portland, OR  
BA MATHEMATICS May 2014  
• Honors thesis advisor: Prof. Thomas Wieting

## Other Affiliations

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- Fall 2022    **Visitor**, Institut Henri Poincaré
- Fall 2021    **Visiting Graduate Student**, Simons Institute for the Theory of Computing, UC Berkeley
- 2012-2014    **Senior Reactor Operator**, Reed Research Reactor (license granted by US Nuclear Regulatory Commission)

## Publications

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A (\*) symbol indicates first authorship. For articles with no (\*), all authors contributed equally and are listed alphabetically.

### PUBLISHED AND REVISION REQUESTED

- Vincent Guan\*, Joseph Janssen\*, Hossein Rahmani, **Andrew Warren**, Stephen Zhang, Elina Robeva, and Geoffrey Schiebinger. Identifying drift, diffusion, and causal structure from temporal snapshots. Major revision at the *Journal of Machine Learning Research*. [arXiv:2410.22729](https://arxiv.org/abs/2410.22729)
- Jakwang Kim, Young-Heon Kim, Yuanlong Ruan, and **Andrew Warren**. Statistical inference of convex order by Wasserstein projection. Major revision at *Bernoulli*. [arXiv:2406.02840](https://arxiv.org/abs/2406.02840)
- Andrew Warren**. Ultralimits of Wasserstein spaces and metric measure spaces with Ricci curvature bounded from below. Major revision at the *Journal of Logic and Analysis*. [arXiv:2303.04294](https://arxiv.org/abs/2303.04294)
- Dejan Slepčev and **Andrew Warren**. Nonlocal Wasserstein distance: metric and asymptotic properties. *Calculus of Variations and Partial Differential Equations*, 2023. [arXiv:2209.08407](https://arxiv.org/abs/2209.08407)
- Andrew Warren**. Wasserstein conditional independence testing. Major revision at *Foundations of Data Science*. [arXiv:2107.14184](https://arxiv.org/abs/2107.14184)
- Andrew Warren**. Fluctuation bounds for ergodic averages of amenable groups. *Bulletin of the London Mathematical Society*, 2021. [arXiv:2107.02403](https://arxiv.org/abs/2107.02403)

### SUBMITTED

- Andrew Warren\***, Anton Afanassiev, Forest Kobayashi, Young-Heon Kim, and Geoffrey Schiebinger. Principal curves in metric spaces and the space of probability measures. Submitted. [arXiv:2505.04168](https://arxiv.org/abs/2505.04168)

**Andrew Warren.** Gradient flow structure for a class of nonlocal diffusion equations. Submitted. [arXiv:2412.20969](https://arxiv.org/abs/2412.20969)

## DRAFTS

**Andrew Warren\***, Anton Afanassiev, Forest Kobayashi, and Geoffrey Schiebinger. Estimation of one-dimensional branching structures in data. Preprint, available on request.

Naomi Graham\*, Sharvaj Kubal\*, **Andrew Warren**, Matthieu Heitz, Michael Friedlander, Yaniv Plan, and Geoffrey Schiebinger. Recovering spatial transcriptomics images with ultra-low sequencing depths via adaptive regularization. Preprint, available on request.

## Presentations

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### CONFERENCE PRESENTATIONS

September 2025. *Gradient flow structure for some nonlocal diffusion equations*. (Invited talk) “Gradient flows face-to-face”: Workshop at the Institute of Mathematics of the University of Granada (IMAG), Spain.

June 2025. *Sampling beyond the log-Sobolev class*. (Invited talk) Workshop on “Wasserstein Gradient Flows in Math and Machine Learning”, Banff International Research Station, Alberta.

June 2025. *Estimation of one-dimensional branching structures in data*. (Invited talk) Workshop on “Frontiers in Applied Analysis” at the Center for Nonlinear Analysis, Carnegie Mellon University, Pittsburgh.

January 2025. *Estimation of one-dimensional structures from noisy empirical observation*. (Invited talk) Joint Mathematics Meeting of the American Mathematical Society, Seattle.

November 2024. *Estimation of one-dimensional structures from noisy empirical observation*. (Invited talk) Canadian Mathematical Society winter meeting, Vancouver.

June 2024. *Wasserstein principal curves*. (Invited talk) Summer School on Optimal Transport, Stochastic Analysis and Applications to Machine Learning, Korea Advanced Institute of Science and Technology, Daejeon, South Korea.

January 2024. *Recent connections between Loeb measures and the analysis and geometry of metric measure spaces*. (Invited talk) Joint Mathematics Meeting of the American Mathematical Society, San Francisco.

July 2023. *Gradient flow structure for some nonlocal diffusion equations*. (Contributed talk) “Nonlinear PDEs: Recent Trends in the Analysis of Continuum Mechanics”: Workshop at the Hausdorff Center for Mathematics, Bonn.

November 2022. *Basic properties of some nonlocal Wasserstein-type distances*. (Invited talk) Discrete Systems and Calculus of Variations: Workshop at the TU Munich Institute for Advanced Study, Garching bei München.

April 2022. *Ultralimits of Wasserstein spaces and  $CD(K, \infty)$  spaces*. (Invited talk) Joint Mathematics Meeting of the American Mathematical Society, Seattle.

July 2021. *Wasserstein conditional independence testing*. (Contributed poster, Geometry and Topology meets Data Analysis and Machine Learning (GTDAML) 2021.

April 2019. *Fluctuations of amenable ergodic averages*. (Contributed talk) Workshop on Dynamical Systems and Related Topics, University of Maryland (College Park).

June 2018, *Uniform metastability for ergodic averages of amenable groups*. (Contributed poster) Canadian Mathematical Society Summer Meeting, Fredericton, New Brunswick.

### SEMINAR TALKS

March 2025. *Gradient flow structure for some nonlocal diffusion equations*. (Invited talk) University of California Santa Barbara Applied Mathematics/PDE/Data Science seminar, Santa Barbara.

September 2024. *Estimation of one-dimensional structures from noisy empirical observation*. Institute of Applied Mathematics seminar talk, University of British Columbia, Vancouver.

November 2023. *Gradient flow structure for some nonlocal diffusion equations*. (Invited talk) KAIST stochastic analysis seminar, Daejeon, South Korea.

April 2023. *Gradient flow structure for some nonlocal diffusion equations*. (Invited talk) University of Washington probability seminar, Seattle.

February 2023. *Gradient flow structure for some nonlocal diffusion equations*. (Invited talk) IST Austria stochastic analysis group seminar, Klosterneuburg, Lower Austria.

December 2022. *Properties of some nonlocal Wasserstein-type distances*. (Invited talk) Optimal transport-PDE-machine learning seminar, Laboratoire de Mathématiques d'Orsay, Université Paris-Saclay, Île-de-France.

March 2022. *Static mean field games*. CMU-SIAM working group seminar, Pittsburgh.

December 2021. *Schrödinger bridge generative models*. CMU statistics and machine learning seminar, Pittsburgh.

November 2021. *Early control theory: Wiener and Bellman*. CMU historical machine learning seminar, Pittsburgh.

April 2021. *Natural gradient descent*. CMU-SIAM working group seminar, Pittsburgh.

March 2021. *Parametrized measure models*. CMU-SIAM working group seminar, Pittsburgh.

December 2020. *Wasserstein gradient flows, Chi-squared divergence, and Stein variational gradient descent*. CMU Center for Nonlinear Analysis working group seminar, Pittsburgh.

November 2020. *An optimal control perspective on deep learning*. CMU-SIAM working group seminar, Pittsburgh.

November 2019. *Continuum approximations for wide neural networks and gradient descent*. CMU statistics and machine learning seminar, Pittsburgh.

## Teaching Experience

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Fall 2025	<b>Mathematical Foundations of Machine Learning</b> , Instructor	UBC
Fall 2024	<b>Mathematical Foundations of Machine Learning (pilot course)</b> , Instructor	UBC
Spring 2024	<b>Integral Calculus</b> , Instructor	UBC
Spring 2022	<b>The Nature of Reason</b> , Teaching Assistant	CMU
Spring 2021	<b>Game Theory</b> , Teaching Assistant	CMU
Fall 2020	<b>Revolutions in Science</b> , Teaching Assistant	CMU
Spring 2020	<b>Game Theory</b> , Teaching Assistant	CMU
Fall 2018	<b>Formal Logic</b> , Teaching Assistant	CMU
Spring 2018	<b>The Nature of Reason</b> , Teaching Assistant	CMU
Fall 2016	<b>Rationalism and Empiricism</b> , Teaching Assistant	CMU
Spring 2016	<b>The Nature of Reason</b> , Teaching Assistant	CMU
Summer 2015	<b>Astrophysics</b> , <i>The Summer Science Program</i> , Lead Teaching Assistant	Boulder, CO
Summer 2014	<b>Astrophysics</b> , <i>The Summer Science Program</i> , Teaching Assistant	Montecito, CA
2012-2014	<b>Reactor Training Program</b> , <i>Reed Research Reactor</i> , Instructor	Reed

## Service

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2022 - present **Referee**, Annals of Applied Probability; Information and Inference; Nonlinear Analysis; SIAM Journal on Applied Dynamical Systems; Stochastic Processes and Applications (1x each)

2021 - 2022 **Departmental Diversity, Equity, and Inclusion Committee**, Graduate student co-representative

2019 & 2021 **Admissions Committee of The Summer Science Program**, Application reader for Northern California and New York City Metropolitan Region

2017 - 2019 **Department Colloquium**, Co-organizer