Andrew Warren

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Employment

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

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

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

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

Published and Revision Requested

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

Dejan Slepčev and **Andrew Warren**. Nonlocal Wasserstein distance: metric and asymptotic properties. *Calculus of Variations and Partial Differential Equations*, 2023. arXiv:2209.08407

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

Andrew Warren. Wasserstein conditional independence testing. Major revision at *Foundations of Data Science*. arXiv:2107.14184

Andrew Warren. Fluctuation bounds for ergodic averages of amenable groups. *Bulletin of the London Mathematical Society*, 2021. arXiv: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 to the *Annals of Statistics*. arXiv:2505.04168

Andrew Warren. Gradient flow structure for a class of nonlocal diffusion equations. Submitted to the *Archive for Rational Mechanics and Analysis*. arXiv:2412.20969

Vincent Guan*, Joseph Janssen*, Hossein Rahmani, **Andrew Warren**, Stephen Zhang, Elina Robeva, and Geoffrey Schiebinger. Identifying drift, diffusion, and causal structure from temporal snapshots. Submitted to the *Journal of Machine Learning Research*. arXiv:2410.22729

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.

Johanathan Hayase, Forest Kobayashi, and **Andrew Warren**. Finite-sample estimation of principal manifolds with super-critical Sobolev regularity. In preparation.

Nathan Glatt-Holtz and **Andrew Warren**. Consistency for a Bayesian inversion approach to drift estimation in the Fokker-Planck equation. In preparation.

Clément Soubrier*, **Andrew Warren**, and Geoffrey Woollard. The chiral Gromov-Wasserstein problem and its solution in low dimension. In preparation.

Presentations

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,∞) 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

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

Service

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