Contact

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Research Interests

Computational algebraic geometry, tensor algebra / tensor decomposition, mathematical machine learning

Employment

- *University of British Columbia*, 2024 - 2026
  Postdoctoral Fellow in Applied Mathematics
  Mentor: Elina Robeva

Education

- *University of California, Berkeley*, 2018 - 2024
  PhD in Mathematics
  Thesis: Topology of Principally Regular Matrices
  Advisor: David Nadler
- *University of California, Irvine*, 2016 - 2018
  Bachelor of Science Honors in Mathematics
  Advisor: Vladimir Baranovsky

Work in progress

- *Simultaneous diagonalization of tensors*, Elina Robeva, Matija Tomic, Carol Wu, Maksym Zubkov
- *Detection of Blow-up Singularities in Data*, Vladimir Baranovsky, Maricela Best Mckay, Maksym Zubkov

Submitted

- *Algebraic geometry of rational neural networks*, Alexandros Grosdos, Elina Robeva, Maksym Zubkov, submitted, available on arXiv https://arxiv.org/abs/2509.11088
- *Expressivity of Shallow Neural Networks Over Finite Fields*, Maksym Zubkov, Carol Wu, Shiwei Yang, Param Mody, Yifei Chen, submitted, available on arXiv https://openreview.net/forum?id=tfGuvCp50e
- *Sign patterns of principal minors of real symmetric matrices*, Tobias Boege, Jesse Selover, and Maksym Zubkov, submitted, available on arXiv https://arxiv.org/abs/2407.17826

Publications

- *Likelihood Geometry of Determinantal Point Processes*, Hannah Friedman, Bernd Sturmfels, and Maksym Zubkov, Published in Algebraic Statistics 15.1 (2024): 15-25, available on arXiv https://arxiv.org/abs/2307.13486
- *Chromatic Graph Homology for Brace Algebras*, Vladimir Baranovsky and Maksym Zubkov, Published in New York J. Math. 23 (2017): 1307–1319, available on https://nyjm.albany.edu/j/2017/23-58p.pdf

Research visits

- 2023 October: IMSI *Algebraic Statistics and Our Changing World*, Apprenticeship Week: Varieties from Statistics - "Geometry of polynomial neural networks"

Honors and Awards

Year	Award	Institution
2025	Award for Outstanding Teaching by a postdoctoral fellow	University of British Columbia
2024	Coleman Fellowship	UC Berkeley
2020	Outstanding Graduate Student Instructor Award	UC Berkeley
2018	UROP Fellowship	UC Irvine
2017	SURP Fellowship	UC Irvine
2017	Honorary Presenter MAA at MathFest	Chicago

Presentations at Seminars

Date	Title	Location
2025 Fall	The interplay of tensors and neural networks	UBC Reading Group on Algebraic Geometry
2025 Summer	Detecting Cluster Patterns in Tensor Data	UBC Seminar on Tensors and Casual Inference
2025 Spring	Principal Curves: generalizations of PCA	UBC Seminar on Tensors and Casual Inference
2024 Fall	Attention is a smoothed cubic spline	UBC Seminar on Tensors and Casual Inference
2024 Fall	The geometry of rational neural networks	UCI Algebra Seminar
2024 Winter	Geometry of Deep Polynomial Neural Networks	UC Berkeley, Math and ML Seminar
2024 Winter	Geometry of Principally Regular Matrices	UBC, IAM Seminar
2023 Fall	Geometry of Principally Regular Matrices	SFSU, AGC Seminar
2023 Fall	Polynomial Neural Networks	UC Berkeley, Computational Math Seminar
2023 Summer	Topology of Complement of Determinantal Variety	Leipzig University
2021 Fall	Applications of Riemann-Roch theorem	UC Berkeley, Student Algebraic Curve Seminar
2021 Spring	Hochschild Homology and differential forms	UC Irvine, Graduate Algebra Seminar
2019 Fall	Colored Jones Polynomials	UC Berkeley, Student Topology Seminar
2019 Spring	Hyperbolic Dehn Surgeries	UC Berkeley, Student Topology Seminar
2017 Spring	Homotopy Algebras: A-infinity, E2, and Brace	UC Irvine, Graduate Algebra Seminar
2017 Spring	Preliminaries on Knot Theory: Jones Polynomials and Vassiliev Invariant	UC Irvine, Undergraduate Math Club

Presentations at Conferences and Workshops

Date	Title	Location
2025 Fall	Algebraic geometry of rational neural networks	2nd SIAM Northern and Central California Sectional Conference, Berkeley
2025 Fall	Algebraic geometry of rational neural networks	Pacific Northwest Section of SIAM Biennial Meeting 2025, Seattle
2025 Summer	Algebraic Methods in Machine Learning: An Overview	SIAM Conference on Applied Algebraic Geometry, Madison
2024 January	Likelihood Geometry of Determinantal Point Processes	Joint Mathematics Meetings, San Francisco
2023 Fall	Polynomial Neural Networks	IMSI Algebraic Statistics and Our Changing World, Chicago
2018 January	Chromatic Graph Homology for Brace Algebras	Joint Mathematics Meetings, San Diego

Teaching Experience

Date	Role	Course	University
2025 Fall	Leading Instructor	Math 100: Calculus I	UBC
2025 Spring	Leading Instructor	Math 101: Calculus II	UBC
2024 Fall	Leading Instructor	Math 100: Calculus I	UBC
2021 Summer	Lecturer	Math 53: Multivariable Calculus	UC Berkeley
2019 Summer	Lecturer	Math 53: Multivariable Calculus	UC Berkeley
2023 Fall	Graduate Student Instructor	Math 16A: Calculus	UC Berkeley
2023 Spring	Graduate Student Instructor	Math 16A: Calculus	UC Berkeley
2021 Fall	Graduate Student Instructor	Math 16B: Calculus	UC Berkeley
2021 Spring	Graduate Student Instructor	Math 16B: Calculus	UC Berkeley
2020 Fall	Graduate Student Instructor	Math 32: Precalculus	UC Berkeley
2020 Spring	Graduate Student Instructor	Math 32: Precalculus	UC Berkeley
2019 Fall	Graduate Student Instructor	Math 53: Multivariable Calculus	UC Berkeley
2018 Spring	Graduate Student Instructor	Math 53: Multivariable Calculus	UC Berkeley
2018 Fall	Graduate Student Instructor	Math 53: Multivariable Calculus	UC Berkeley
2018 Spring	Supplemental Math Instructor	Math 2D: Multivariable Calculus	UC Irvine
2018 Winter	Supplemental Math Instructor	Math 2D: Multivariable Calculus	UC Irvine
2017 Fall	Supplemental Math Instructor	Math 2D: Multivariable Calculus	UC Irvine
2017 Summer	Supplemental Math Instructor	Math 2B: Integral Calculus	UC Irvine
2017 Summer	Supplemental Math Instructor	Math 2A: Differential Calculus	UC Irvine
2017 Spring	Supplemental Math Instructor	Math 2D: Multivariable Calculus	UC Irvine
2016 Spring	Supplemental CS Instructor	Introduction to C/C++	Los Angeles Pierce College

Skills

- Programing skills: Python, C/C++, Macaulay2, Julia

- Languages: Fluent in Russian and Ukrainian

Service and Outreach

- **Minisymposium Organized**
  - 2025 Fall, *Algebraic Methods in Machine Learning*, Pacific Northwest Section of SIAM Biennial Meeting 2025, Seattle
  - 2025 Summer, *Algebraic Methods in Machine Learning*, SIAM Conference on Applied Algebraic Geometry (AG25), Madison
- **Conferences Organized**
  - 2025 Fall, UBC Applied Mathematics Meetings, UBC
- **Seminars and Reading Groups Organized**
  - 2025 Fall, Informal Reading Group on Classical Algebraic Geometry, UBC
  - 2025 Fall, Learning Seminar on Tensors and Causal Inference, UBC
  - 2025 Summer, Causal Inference Reading Group, UBC
  - 2025 Spring, Causal Inference Reading Group, UBC
  - 2024 Fall, Causal Inference Reading Group, UBC
  - 2024 Fall, Mathematical Foundations of Machine Learning, UCB
- **Reviewing**
  - SIAGA, Algebraic Statistics, zbMATH (MathSci)
- **Community Work / Education**
  - Founder of Ukrainian 501(c)(3) non-profit *Support Ukraine With US*; fundraised more than $1,000,000 for direct humanitarian relief in Ukraine
  - Leading a math educational channel *Math For Life* on YouTube with more than 16,000 subscribers
- **Mentoring Undergraduates**
  - Carol Wu, Shiwei Yang, Param Mody, Yifei Chen, *Neural Networks over Finite Fields*, 2025 Summer,
  - Shiwei Yang, *Algebraic Geometry over Finite Fields*, 2024 Fall, 2025 Spring,
  - Param Mody, *Tensor Decompositions*, 2024 Fall, 2025 Spring
- **Outreach**
  - Math Circle Instructor, UC Irvine, 2017–2018
  - Direct Reading Program, UC Berkeley, 2020–2021