

Contact

Email: mzubkov@dgist.ac.kr

Website: maksymzubkov.info

Research Interests

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

Employment

- *Daegu Gyeongbuk Institute of Science and Technology (DGIST)*, 2026–present
Mathematics Postdoctoral Fellow, BRL-AGSTA
Mentor: Kangjin Han
- *University of British Columbia*, 2024–2026
Postdoctoral Fellow in Applied Mathematics
Mentor: Elina Robeva

Education

- *University of California, Berkeley*, 2018–2024
Ph.D. 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, and Maksym Zubkov
- *Detection of Blow-up Singularities in Data*, Vladimir Baranovsky, Maricela Best McKay, and Maksym Zubkov

Submitted

- *Algebraic Geometry of Rational Neural Networks*, Alexandros Grosdos, Elina Robeva, and Maksym Zubkov, submitted; [arXiv:2509.11088](https://arxiv.org/abs/2509.11088)
- *Expressivity of Shallow Neural Networks Over Finite Fields*, Maksym Zubkov, Carol Wu, Shiwei Yang, Param Mody, and Yifei Chen, submitted; [arXiv:2607.17090](https://arxiv.org/abs/2607.17090)
- *Sign Patterns of Principal Minors of Real Symmetric Matrices*, Tobias Boege, Jesse Selover, and Maksym Zubkov, submitted; [arXiv:2407.17826](https://arxiv.org/abs/2407.17826)

Publications

- *Likelihood Geometry of Determinantal Point Processes*, Hannah Friedman, Bernd Sturmfels, and Maksym Zubkov, *Algebraic Statistics* 15.1 (2024), 15–25; [arXiv:2307.13486](#)
- *Chromatic Graph Homology for Brace Algebras*, Vladimir Baranovsky and Maksym Zubkov, *New York Journal of Mathematics* 23 (2017), 1307–1319; [journal record](#)

Research Visits

- October 2023: 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 MathFest	Chicago

Presentations at Seminars

Date	Title	Location
April 2026	Mathematics for AI: What Algebraic Geometry Brings to the Table	Naval Postgraduate School
April 2026	Geometry and Expressivity of Neuromanifolds: Where Algebraic Geometry Meets Neural Networks	University of Wisconsin–Madison
April 2026	Mathematics for AI: What Algebraic Geometry Brings to the Table	University of British Columbia
February 2026	Geometry and Expressivity of Neuromanifolds: Where Algebraic Geometry Meets Machine Learning	Colorado State University
February 2026	Geometry and Expressivity of Neuromanifolds: Where Algebraic Geometry Meets Machine Learning	University of California, Riverside
Fall 2025	The Interplay of Tensors and Neural Networks	UBC Reading Group on Algebraic Geometry
Summer 2025	Detecting Cluster Patterns in Tensor Data	UBC Seminar on Tensors and Causal Inference
Spring 2025	Principal Curves: Generalizations of PCA	UBC Seminar on Tensors and Causal Inference
Fall 2024	Attention Is a Smoothed Cubic Spline	UBC Seminar on Tensors and Causal Inference
Fall 2024	The Geometry of Rational Neural Networks	UC Irvine Algebra Seminar
Winter 2024	Geometry of Deep Polynomial Neural Networks	UC Berkeley Math and ML Seminar

Winter 2024	Geometry of Principally Regular Matrices	UBC IAM Seminar
Fall 2023	Geometry of Principally Regular Matrices	SFSU AGC Seminar
Fall 2023	Polynomial Neural Networks	UC Berkeley Computational Math Seminar
Summer 2023	Topology of the Complement of a Determinantal Variety	Leipzig University
Fall 2021	Applications of the Riemann–Roch Theorem	UC Berkeley Student Algebraic Curves Seminar
Spring 2021	Hochschild Homology and Differential Forms	UC Irvine Graduate Algebra Seminar
Fall 2019	Colored Jones Polynomials	UC Berkeley Student Topology Seminar
Spring 2019	Hyperbolic Dehn Surgeries	UC Berkeley Student Topology Seminar
Spring 2017	Homotopy Algebras: A_∞ , E_2 , and Brace	UC Irvine Graduate Algebra Seminar
Spring 2017	Preliminaries on Knot Theory: Jones Polynomials and Vassiliev Invariants	UC Irvine Undergraduate Math Club

Presentations at Conferences and Workshops

Date	Title	Location
June 2026	Algebraic Geometry of Rational Neural Networks	Advances in Geometric Numerical Methods, online
June 2026	The Interplay of Tensors and Neural Networks	Workshop on the Geometry of Tensors and Neural Networks, Nancy
June 2026	The Interplay of Tensors and Neural Networks	Mini-workshop on Machine Learning and Algebraic Geometry, Aalborg
May 2026	The Interplay of Tensors and Neural Networks	Tensor Isomorphism: Algorithms, Geometry and Applications, Hayama
Fall 2025	Algebraic Geometry of Rational Neural Networks	2nd SIAM Northern and Central California Sectional Conference, Berkeley
Fall 2025	Algebraic Geometry of Rational Neural Networks	Pacific Northwest Section of SIAM Biennial Meeting, Seattle
Summer 2025	Algebraic Methods in Machine Learning: An Overview	SIAM Conference on Applied Algebraic Geometry, Madison
January 2024	Likelihood Geometry of Determinantal Point Processes	Joint Mathematics Meetings, San Francisco
Fall 2023	Polynomial Neural Networks	IMSI Algebraic Statistics and Our Changing World, Chicago
January 2018	Chromatic Graph Homology for Brace Algebras	Joint Mathematics Meetings, San Diego

Teaching Experience

Date	Role	Course	University
Fall 2025	Leading Instructor	Math 100: Calculus I	UBC
Spring 2025	Leading Instructor	Math 101: Calculus II	UBC

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

Skills

- Programming: Python, C/C++, Macaulay2, Julia
- Languages: fluent in Russian and Ukrainian

Service and Outreach

- **Minisymposia organized**
 - Fall 2025, *Algebraic Methods in Machine Learning*, Pacific Northwest Section of SIAM Biennial Meeting, Seattle
 - Summer 2025, *Algebraic Methods in Machine Learning*, SIAM Conference on Applied Algebraic Geometry, Madison
- **Conferences organized**
 - Fall 2025, UBC Applied Mathematics Meetings, UBC
- **Seminars and reading groups organized**
 - Fall 2025, Informal Reading Group on Classical Algebraic Geometry, UBC
 - Fall 2025, Learning Seminar on Tensors and Causal Inference, UBC
 - Summer 2025, Causal Inference Reading Group, UBC
 - Spring 2025, Causal Inference Reading Group, UBC

- Fall 2024, Causal Inference Reading Group, UBC
- Fall 2024, Mathematical Foundations of Machine Learning, UC Berkeley
- **Reviewing:** SIAGA, *Algebraic Statistics*, zbMATH
- **Community work and education**
 - Founder of the 501(c)(3) nonprofit *Support Ukraine With Us*; raised \$750,000 for direct humanitarian relief in Ukraine
 - Creator of the mathematics-education project *Math For Life* across YouTube, Instagram, and TikTok
- **Mentoring undergraduates**
 - Carol Wu, Shiwei Yang, Param Mody, and Yifei Chen, *Neural Networks over Finite Fields*, Summer 2025
 - Shiwei Yang, *Algebraic Geometry over Finite Fields*, Fall 2024 and Spring 2025
 - Param Mody, *Tensor Decompositions*, Fall 2024 and Spring 2025
- **Outreach**
 - Math Circle Instructor, UC Irvine, 2017–2018
 - Direct Reading Program, UC Berkeley, 2020–2021