

# Yulia Alexandr

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**Email:** yulia@math.berkeley.edu

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**Research interests** algebraic statistics, nonlinear algebra, information geometry, convex geometry

**Future employment** **University of California, Los Angeles** Jan 2024–Jun 2026  
Hedrick Assistant Adjunct Professor  
Mentor: Guido Montúfar

**Harvard University** Jun–Sep 2024  
Postdoctoral Fellow in Applied Mathematics  
Mentor: Anna Seigal

**Education** **University of California, Berkeley** 2019–2023  
PhD in Mathematics  
Advisors: Bernd Sturmfels and Serkan Hoşten  
Thesis: *From Voronoi Cells to Algebraic Statistics*

**Wesleyan University** Class of 2019  
BA in Mathematics with High Honors, class rank: 1  
Advisor: Karen Collins  
Thesis: *Combinatorial Nullstellensatz: Various Proofs, Extensions & Applications*

**Awards and fellowships** NSF Graduate Research Fellowship 2020  
Chancellor's Graduate Fellowship (UC Berkeley) 2019  
Phi Beta Kappa (Connecticut Gamma Chapter) 2019  
Rice Prize (Wesleyan University) 2019  
*awarded to a senior for excellence in mathematics*  
Rae Shortt Prize (Wesleyan University) 2018  
*awarded to a junior for excellence in mathematics*  
Twin Cities REU at the University of Minnesota 2018  
DIMACS REU at Rutgers University and Charles University (Prague) 2017  
Treespace REU at Lehman College 2016

**Papers** **Maximum information divergence from linear and toric models**  
with Serkan Hoşten.  
Submitted. Available on [arXiv](#), 2023.

**Moment varieties for mixtures of products**  
with Joe Kileel and Bernd Sturmfels.  
Published in Proceedings of the *International Symposium on Symbolic and Algebraic Computation (ISSAC 2023)*, ACM, New York, 2023, 53–60.

### **Decomposable context-specific models**

with Eliana Duarte and Julian Vill.

Submitted. Available on [arXiv](#), 2022.

### **Logarithmic Voronoi cells for Gaussian models**

with Serkan Hoşten.

To appear in *Journal of Symbolic Computation* **122** (2024).

### **Logarithmic Voronoi polytopes for discrete linear models**

To appear in *Algebraic Statistics*.

### **Logarithmic Voronoi cells**

with Alexander Heaton.

Published in *Algebraic Statistics* **12** (2021), no. 1, 75-95.

### **Computing a logarithmic Voronoi cell**

with Alexander Heaton and Sascha Timme.

Published online at [HomotopyContinuation.jl](#), 2019.

### **Recovering conductances of resistor networks in a punctured disk**

with Brian Burks, Sunita Chepuri, and Patricia Commins.

*Preprint*. Available on [arXiv](#), 2019.

### **Deformations of the Weyl character formula for $SO(2n + 1, \mathbb{C})$ via ice models**

with P. Commins, A. Embry, S. Frank, Y. Li, and A. Vetter.

*Preprint*. Available on [arXiv](#), 2018.

### **Growth of meandric numbers**

with Kayla Cummings and Edgar Jaramillo Rodriguez.

Transcription in *DIMACS-DIMATIA REU booklet (pp. 33-36)*, 2017.

## Teaching

### **Graduate student instructor (UC Berkeley)**

MATH 10B: Methods of mathematics

Spring 2023

MATH 54: Linear algebra and differential equations

Fall 2022

### **Directed reading program mentor (UC Berkeley)**

Topics: algebraic combinatorics and graph theory

Spring 2020

### **Teaching assistant (Wesleyan University)**

MATH 231: Probability theory

Fall 2018

MATH 274: Graph theory

Spring 2018

MATH 231: Probability theory

Fall 2017

## Talks

key: ★=invited/colloquium; †=contributed; △=seminar/lecture.

### *Moment varieties for mixtures of products*

- † International Symposium on Symbolic and Algebraic Computation (ISSAC) in Tromsø July 2023
- ★ AMS special session on mathematics in data science at Spring Western sectional meeting May 2023
- ★ SFSU Algebra, Geometry, and Combinatorics day March 2023

### *Computing logarithmic Voronoi cells*

- ★ AMS special session on polynomial systems, homotopy continuation and applications at the JMM January 2023

### *Decomposable context-specific models*

- ★ CEG Workshop in Warwick (virtual) September 2022

### *Logarithmic Voronoi Cells*

- ★ Naval Postgraduate School in Monterey CA June 2023
- ★ Santa Clara University math and CS colloquium October 2022
- △ Discrete Math & Geometry seminar at TU-Berlin (virtual) October 2022
- △ SFSU Algebra, Geometry, and Combinatorics Seminar October 2021
- △ Berkeley Combinatorics Research Seminar (virtual) April 2021
- △ Nonlinear Algebra Seminar Online (virtual) April 2020

### *Logarithmic Voronoi polytopes*

- △ Mathematical Methods in Data Analysis in Tirana, Albania July 2022

### *Combinatorics of logarithmic Voronoi cells*

- △ Algebra and Geometry seminar at University of Magdeburg July 2022

### *Logarithmic Voronoi cells for Gaussian models*

- ★ SIAM Conference on Applied Algebraic Geometry in Eindhoven July 2023
- † Effective Methods in Algebraic Geometry in Kraków, Poland June 2022
- △ Applied CATS seminar at KTH (virtual) May 2022

### *Logarithmic Voronoi polytopes for discrete linear models*

- † Algebraic Statistics at the University of Hawai'i at Manoa May 2022
- ★ AMS Spring Central Sectional Meeting (virtual) March 2022

### *Introduction to SAGE*

- † Mathematical computing virtual workshop by UCB and UBC Apr 2022

### *Linear Spaces and Grassmannians*

	△ Nonlinear Algebra course at MPI MiS (Leipzig, Germany)	June 2019
	<i>Caratheodory, Radon, and Helly theorems in convex geometry</i>	
	△ Minicourse on Convex Geometry at MPI MiS (Leipzig, Germany)	July 2021
	<i>Ice Models for Types A and B</i> (two talks)	
	△ Berkeley Combinatorics Reading Seminar	October 2019
	<i>Combinatorial Nullstellensatz</i>	
	Wesleyan University Thesis Defense	January 2019
	<i>Visibility Graphs of Staircase Polygons</i>	
	† Berkeley Undergraduate Number Theory Conference	April 2018
Visiting positions	<b>Institute for Mathematical and Statistical Innovation</b>	Sep–Dec 2013
	Visiting student for <i>Algebraic Statistics and Our Changing World</i>	
	<b>Max Planck Institute for Mathematics in the Sciences</b>	2019, 2021, 2022
	Summer visitor	
Skills	<b>Programming</b>	
	Macaulay2, SAGE, Mathematica, Singular, C, C++, $\LaTeX$ , OCaml, SML, HTML, Python, Julia	
	<b>Languages</b>	
	English (native), Russian (native), Hebrew (intermediate)	
Service and outreach	<b>Berkeley nonlinear algebra seminar</b> , co-organizer	Fall 2022
	STEMinist club, invited speaker, <i>Berkeley High School</i>	Nov 2021
	Noetherian Ring, member, <i>UC Berkeley</i>	2019–present
	Math Club graduate school panel, panelist, <i>Wesleyan University</i>	2020
	Directed reading program (DRP), mentor, <i>UC Berkeley</i>	2020
	Unbounded Representation (URep), officer, <i>UC Berkeley</i>	2019–2020