

# Yulia Alexandr

Updated January 24, 2023

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

**Office:** Evans 1045

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

**Education** **University of California, Berkeley** 2019–present  
PhD in Mathematics  
Advisors: Bernd Sturmfels and Serkan Hoşten  
Tentative thesis title: *Logarithmic Voronoi cells*

**Wesleyan University** Class of 2019  
BA in Mathematics with High Honors  
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
<i>awarded to a senior for excellence in mathematics</i>	
Rae Shortt Prize (Wesleyan University)	2018
<i>awarded to a junior for excellence in mathematics</i>	
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**

**Moment varieties for mixtures of products**  
with Joe Kileel and Bernd Sturmfels.  
Submitted. Available on [arXiv](#), 2023.

**Decomposable context-specific models**  
with Eliana Duarte and Julian Vill.  
Submitted. Available on [arXiv](#), 2022.

**Logarithmic Voronoi cells for Gaussian models**  
with Serkan Hoşten.  
Presented at MEGA 2022 in Kraków, submitted. Available on [arXiv](#), 2022.

**Logarithmic Voronoi polytopes for discrete linear models**  
Submitted. Available on [arXiv](#), 2021.

### **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.

REU project. 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.

REU project. 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; Δ=seminar/lecture.

### *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*

★ 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
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#### *Combinatorics of logarithmic Voronoi cells*

△ Algebra and Geometry seminar at University of Magdeburg	July 2022
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#### *Logarithmic Voronoi cells for Gaussian models*

† 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
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#### *Linear Spaces and Grassmannians*

△ Nonlinear Algebra course at MPI MiS (Leipzig, Germany)	June 2019
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#### *Caratheodory, Radon, and Helly theorems in convex geometry*

△ Minicourse on Convex Geometry at MPI MiS (Leipzig, Germany)	July 2021
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#### *Ice Models for Types A and B (two talks)*

△ Berkeley Combinatorics Reading Seminar	October 2019
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#### *Combinatorial Nullstellensatz*

Wesleyan University Thesis Defense	January 2019
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#### *Visibility Graphs of Staircase Polygons*

† Berkeley Undergraduate Number Theory Conference	April 2018
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## Skills

### Programming

Macaulay2, SAGE, Mathematica, Singular, C, C++,  $\LaTeX$ , OCaml, SML, HTML, Python

### Languages

English (native), Russian (native), Hebrew (intermediate)

Service and outreach	Berkeley nonlinear algebra seminar, 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