

Mathematics Department
California Institute of Technology
1200 E. California Blvd. Pasadena, CA 91125, USA

maazouz@caltech.edu
www.yelmaazouz.org
Citizenship: France and Morocco

Academic Positions

- | | |
|-------------|--|
| 2025 – | California Institute of Technology
<i>Harry Bateman</i> Postdoctoral Scholar |
| 2024 – 2025 | Max Planck Institute for Mathematics in the Sciences
Postdoctoral Researcher |
| 2023 – 2024 | RWTH Aachen University
Postdoctoral Researcher |

Education

- | | |
|-----------|--|
| 2019–2022 | University of California, Berkeley
Ph.D., Statistics, December 16, 2022
Advisor: Bernd Sturmfels
Thesis: <i>Non-archimedean Excursions in Probability,
Number Theory, Combinatorics and Geometry</i> |
| 2016–2019 | École Polytechnique
B.Sc. in Mathematics |

Research Interests

Applied Algebraic Geometry, Commutative Algebra, Algebraic Combinatorics and Mathematical Physics.

Publications and Preprints

Preprints

- | | |
|-----|---|
| [4] | C-networks and the planar Ising inverse problem
With Terrence George. Submitted. arXiv:2606.15082 . |
| [3] | Angular pair-of-pants decompositions of complex varieties
With Paul Alexander Helminck. Submitted. arXiv:2601.14116 . |
| [2] | How to tropicalize a non-archimedean lattice
Submitted. arXiv:2512.12127 . |
| [1] | Totally positive skew-symmetric matrices
With Jonathan Boretsky and Veronica Calvo Cortes. Submitted. arXiv:2412.17233 . |

Journal Publications

- [14] **Gram Matrices for Isotropic Vectors**
With Bernd Sturmfels and Svala Sverrisdóttir. To appear in *Communications in Mathematical Physics*.
- [13] **Symplectic Grassmannian description of the Coulomb branch three and four point amplitudes**
With Veronica Calvo Cortes, S. Hegde, and A. Suthar. *Journal of High Energy Physics*. Vol. 12, No. 73, 2025.
- [12] **Spinor-Helicity Varieties**
With Anaëlle Pfister and Bernd Sturmfels. *SIAM Journal on Applied Algebra and Geometry*. Vol. 9, No. 4, 2025.
- [11] **The positive orthogonal Grassmannian**
With Yelena Mandelshtam. *Le Matematiche*, Special Issue on Positive Geometry, Vol. 80, No. 1, 2025.
- [10] **$GL(n, \mathbb{Z}_p)$ -invariant Gaussian measures on the space of p -adic polynomials**
With Antonio Lerario. *Electronic Journal of Probability*, Vol. 30, No. 64, 2025.
- [9] **On the topology of the moduli of tropical unramified p -covers**
With Paul Helminck, Felix Röhrle, Pedro Souza, and Claudia Yun. *Selecta Mathematica*, Vol. 31, No. 14, 2025.
- [8] **Sampling from p -adic algebraic manifolds**
With Enis Kaya. *SIAM Journal on Applied Algebra and Geometry*, Vol. 9, No. 2, 2025.
- [7] **Valued rank metric codes**
With Marvin A. Hahn, Mima Stanojkovski, and Alessandro Neri. *Journal of Algebra and Its Applications*, Vol. 24, No. 4, 2025.
- [6] **The Bernoulli clock: probabilistic and combinatorial interpretations of the Bernoulli polynomials by circular convolution**
With Jim Pitman. *Combinatorics, Probability and Computing*, Vol. 33, No. 2, 2024.
- [5] **Tropical invariants for binary quintics and reduction types of Picard curves**
With Paul A. Helminck and Enis Kaya. *Glasgow Mathematical Journal*, Vol. 66, No.1, 2024.
- [4] **Lines on p -adic and real cubic surfaces**
With Rida Ait El Manssour, Enis Kaya, and Kemal Rose. *Abhandlungen aus dem Mathematischen Seminar der Universität Hamburg*, Vol. 93, No. 2, 2023.
- [3] **Bolytrope orders**
With Gabriele Nebe and Mima Stanojkovski. *International Journal of Number Theory*, Vol. 19, No. 5, 2023.
- [2] **The Gaussian entropy map in valued fields**
Algebraic Statistics, Vol. 13, No. 1, 2022.
- [1] **Orders and Polytropes: Matrix Algebras from Valuations**
With Marvin A. Hahn, Gabriele Nebe, Mima Stanojkovski, and Bernd Sturmfels. *Beiträge zur Algebra und Geometrie*, Vol. 63, No. 3, 2022.

Conference Proceedings

- [2] **Totally positive skew-symmetric matrices**
With Jonathan Boretsky and Veronica Calvo Cortes. *Proceedings of the 38th International Conference on Formal Power Series and Algebraic Combinatorics*.
- [1] **The positive orthogonal Grassmannian**
With Yelena Mandelshtam. *Proceedings of the 37th International Conference on Formal Power Series and Algebraic Combinatorics*.

Awards and Honors

2021	Outstanding Graduate Student Instructor Award
2020	U.C. Berkeley EWJ Gateway Fellowship
2020	SEEDS OCP Foundation Scholarship
2019	École Polytechnique Prix du stage de recherche
2016	French Major Excellence Scholarship
2014	King Mohammed VI Foundation Istihqaq Scholarship

Teaching

California Institute of Technology

Spring 2026	Ma 125: Algebraic Curves
Winter 2026	Ma 190B: Tropical Geometry
Winter 2026	Ma 140B: Introduction to Random Matrix Theory
Spring 2025	Ma 132C: Toric Geometry
Winter 2025	Ma 140B: Probability: Stochastic Processes

RWTH Aachen University

Fall 2023	Local Fields
Spring 2023	Algebraic Groups

University of California, Berkeley (Graduate Student Instructor)

Fall 2022	STAT 134: Concepts of Probability
Spring 2022	STAT 150: Stochastic Processes
Spring 2021	STAT 134: Concepts of Probability
Fall 2020	STAT 201A: Introduction to Probability at an Advanced Level
Spring 2020	STAT 134: Concepts of Probability
Summer 2020	Statistics MA Bridge Program

Advising and Mentoring

- Mentoring Summer Undergraduate Research Fellows at Caltech
 - Phoebe Richter: *Random Poisson partitions of the hyperbolic plane*
 - Ezra Caspary: *Gröbner theory of the symplectic Stiefel manifold*
 - Henry Gustafson: *The positive symplectic Grassmannian $\mathrm{SpGr}(2, 2n)$*
 - Enes Banushi: *Cluster structures in scattering amplitudes*
- Co-mentored graduate students at MPI MiS
 - Svala Sverrisdóttir: *Gram matrices for isotropic vectors*
 - Veronica Calvo Cortes: *Totally positive skew-symmetric matrices, Symplectic Grassmannian description of the Coulomb branch three- and four-point amplitudes.*
 - Anaëlle Pfister: *Spinor-Helicity varieties*

Service

Committee work

- Ph.D. algebra qualifying exam jury for Jinzhou Huang (Caltech)
- Ph.D. candidacy exam jury for Zhaoxing Gu (Caltech)
- Ph.D. candidacy exam jury for Shaowu Zhang (Caltech)
- B.A. thesis jury for Ikeda Jun (Caltech)

Refereeing

- Archiv der Mathematik
- ANTS XV
- Le Matematiche
- Annals of Probability
- Mathematische Annalen
- International Mathematics Research Notices.

Organizing: Conferences and Seminars

2025	<i>Information, Geometry & Physics Seminar</i> at Caltech
2024	<i>Non-Linear Algebra Seminar</i> at MPI-MiS
2023	<i>Mathematics and Decision Conference</i> at UM6P
2023	<i>Joint Algebra Seminar</i> at RWTH Aachen
2022	<i>Non-Linear Algebra Seminar</i> at UC Berkeley

Invited Talks

	Sampling from p-adic algebraic manifolds
Mar. 2027	Integral Geometry of Algebraic Varieties, ICERM, Brown University
Sep. 2023	SFB TRR-195 Annual Meeting 2023, Saarland University
Mar. 2023	Arithmétique en Plat Pays, KU Leuven
	Totally positive skew-symmetric matrices
Jul. 2025	SIAM Conference on Applied Algebraic Geometry 2025

Oct. 2025	Spinor-Helicity varieties Michigan Interdisciplinary Meeting on Amplitudes: Bridges between Physics & Mathematics University of Michigan
Oct. 2024	How to tropicalize a non-archimedean lattice? Tropical Geometry: Moduli Spaces and Matroids, Goethe University Frankfurt am Main
May. 2025	Spring Western Sectional Meeting, California Polytechnic State University, San Luis Obispo
Feb. 2024	The Bernoulli clock: probabilistic and combinatorial interpretations of the Bernoulli polynomials by circular convolution Symposium on Sparsity and Singular Structures 2024
Aug. 2021 Nov. 2019	The Gaussian entropy map in valued fields Branching from Number Theory: p -adics in the Sciences, MPI-MiS Buildings, Varieties and Applications, MPI-MiS
Sep. 2023	Tropical invariants for binary quintics and reduction types of Picard curves Tropical Geometry and its Applications, Durham University

Seminar Talks

Sep 2026	C-networks and inverse problem for the planar Ising model Combinatorics Seminar, University of Michigan
May 2024	Sampling from p-adic algebraic manifolds Oberseminar, Osnabrück University
Jul. 2022	Joint Algebra Seminar, RWTH Aachen
Jun. 2022	Algebraic Geometry Seminar, UC San Diego
Apr. 2025	How to tropicalize a non-archimedean lattice? Algebra and Discrete Math Seminar, University of California, Davis
Nov. 2021 Nov. 2019	The Gaussian entropy map in valued fields Geometric Structures Research Seminar, SISSA Buildings, Varieties and Applications, MPI-MiS
Sep. 2022	The Bernoulli clock: probabilistic and combinatorial interpretations of the Bernoulli polynomials by circular convolution Probability Seminar, UC Berkeley
Jan. 2025	The positive orthogonal Grassmannian Combinatorics Forum, University of California, Los Angeles
Apr. 2023 Jul. 2022	$GL(n, \mathbb{Z}_p)$-invariant Gaussian measures on the space of p-adic polynomials Algebra and Representation Theory Seminar, University of Cologne Joint Algebra Seminar, RWTH Aachen University

Jan. 2023	Bolytrope orders Quadratic Forms, Modular Forms, and Applications, Joint Mathematics Meetings
Oct. 2023	On the topology of the moduli space of prime cyclic covers of genus g curves Algebraic Geometry Seminar, University of Tübingen
Jul. 2022	Non-Linear Algebra Seminar, MPI-MiS

Languages and Programming

Languages:

Tamazight (Native), Arabic (Native), French (Fluent), English (Fluent), German (Beginner)

Programming:

Python, Julia, Macaulay2, Singular, Polymake, SageMath, Magma

References

Prof. Bernd Sturmfels

Director, Max Planck Institute for Mathematics
in the Sciences
Professor Emeritus, UC Berkeley
bernd@mis.mpg.de

Prof. Paolo Aluffi

Distinguished Research Professor
Department of Mathematics
Florida State University
aluffi@math.fsu.edu

Prof. Matilde Marcolli

Robert F. Christy Professor of Mathematics
and Computing and Mathematical Sciences
California Institute of Technology
matilde@caltech.edu

Prof. Yue Ren

UKRI Future Leaders Fellow
Associate Professor in Algebra
Durham University
yue.ren2@durham.ac.uk

Prof. Thomas Lam

Professor of Mathematics
Associate Chair for Term Faculty
University of Michigan
tfylam@umich.edu