

# Antoine Béreau

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## SUMMARY

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Former PhD Student at École polytechnique and Inria in the TROPICAL team working on the topic of tropical polynomial system solving using game theoretical tools, now teaching mathematics in highschool.

**Research interests:** Tropical geometry, polynomial system solving, polyhedra, mean payoff games, resultant theory, symbolic computation, combinatorics

## EDUCATION

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Present	Highschool math teacher at <b>Lycée de Cachan</b>
2021–2024	PhD student at <b>CMAP (École polytechnique)</b> and <b>Inria Saclay</b> in the TROPICAL team supervised by <a href="#">Marianne Akian</a> and <a href="#">Stéphane Gaubert</a> on the topic of tropical polynomial system solving using game theoretical tools
2021	Master's degree at <b>ENS Rennes</b> and <b>Sorbonne Université</b> <i>mention très bien</i> (16.275/20)
2020	<i>Agrégation de mathématiques</i> (ranked 47)
2018	Bachelor's degree at <b>ENS Rennes</b> and <b>Université Rennes 1</b> <i>mention très bien</i> (16.000/20)
2017	Admission at <b>École Normale Supérieure de Rennes (ENS Rennes)</b>
2014	<i>Baccalauréat Scientifique mention très bien</i> (18.000/20)

## PUBLICATIONS & PREPRINTS

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**Eigenvalue Methods for Sparse Tropical Polynomial Systems** 2024

Marianne Akian, Antoine Béreau, Stéphane Gaubert

*Lecture Notes in Computer Science* in the proceedings of ICMS 2024

[https://doi.org/10.1007/978-3-031-64529-7\\_31](https://doi.org/10.1007/978-3-031-64529-7_31)

**The Nullstellensatz and Positivstellensatz for Sparse Tropical Polynomial Systems** 2024

(Extended version of the ISSAC' 23 article)

Marianne Akian, Antoine Béreau, Stéphane Gaubert

Submitted to the *Journal of Foundations of Computational Mathematics* in February 2024

<https://arxiv.org/abs/2312.05859>

**The Tropical Nullstellensatz and Positivstellensatz for Sparse Polynomial Systems** 2023

Marianne Akian, Antoine Béreau, Stéphane Gaubert

ISSAC '23: *Proceedings of the 2023 International Symposium on Symbolic and Algebraic Computation*

<https://doi.org/10.1145/3597066.3597089>

## SOFTWARES

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**Tropical Polynomial System Solving** (see the project on Gitlab: [🔗](#))

This project consists in a Python implementation of tropical polynomial and matrices, full and sparse, as classes, and provides some base tools to work with these objects, in particular to examine the solvability of a sparse tropical polynomial system.

## GRANTS & AWARDS

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2023 ISSAC 2023 Distinguished Student Author Award  
2021 PhD Fellowship: *Contrat doctoral spécifique normalien (CDSN)*

## TALKS

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**A Tropical Day** in CMAP, Palaiseau Oct 21, 2024  
*Eigenvalue Methods for Sparse Tropical Polynomial Systems*

**Conference ICMS 2024** in Durham Jul 22 – Jul 25, 2024  
*Eigenvalue Methods for Sparse Tropical Polynomial Systems*

**Conference ISSAC 2023** in Tromsø Jul 24 – Jul 27, 2023  
*The Nullstellensatz and Positivstellensatz for Sparse Tropical Polynomial Systems*

**SIAM Conference on Applied Geometry** in Eindhoven Jul 10 – Jul 14, 2023  
*The Nullstellensatz and Positivstellensatz for Sparse Tropical Polynomial Systems*

**Rencontres Doctorales Lebesgue 2023** in Nantes Apr 19 – Apr 21, 2023  
*Un tour d'horizon des mathématiques tropicales*

**Journées nationales de calcul formel** in CIRM, Marseille Mar 6 – Mar 10, 2023  
*The Nullstellensatz and Positivstellensatz for Sparse Tropical Polynomial Systems*

**Workshop ARGO 2022** in Santiago Aug 30 – Sept 2, 2022  
*The Nullstellensatz for Sparse Tropical Polynomial Systems*

## TEACHING

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**Mathematics teacher** Present  
in *seconde*, *première* and *terminale* at Lycée de Cachan

**Mathematics examiner** Present  
in second year of *classe préparatoire TSI* (technology and industrial science) at Lycée de Cachan

**Teaching assistant** 2021–2024  
in first year of Bachelor of Science at École polytechnique for the fall semester course MAA101 Linear Algebra for three years

**Mathematics and computer science examiner** 2020–2021  
in first and second year of *classe préparatoire BCPST* (biology, chemistry, physics and geology) at lycée Chaptal, Paris

**Mathematics examiner** 2019–2020  
in first year of *classe préparatoire PCSI* (physics, chemistry and engineering) at ECAM Rennes

## MISCELLANEOUS

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2022–2023	Referent researcher for the <i>MATh.en.JEANS</i> project (a school year long workshop to introduce high school students to mathematical research on open problems) in lycée Gustave Eiffel, Gagny
2018, 2021	Juror and team leader for the 10th and 13th editions of the <a href="#">International Tournament of Young Mathematicians</a>
2018, 2019, 2020	Organiser, juror and team leader for several occurrences of the <i>Tournoi Français des Jeunes Mathématiciennes et Mathématiciens</i> ( <i>TFJM<sup>2</sup></i> )
2018	Local organiser for the <i>Rendez-vous des Jeunes Mathématiciennes</i> (a weekend of conferences and research on problems to encourage young girls in high schools to engage in mathematical activities)

## SKILLS

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Languages	French (mother tongue), English (fluent C1-C2), German (good level B2-C1)
Computer Skills	Python, Scilab/Matlab, Lean, OCaml, Html/css, L <sup>A</sup> T <sub>E</sub> X and Office suite