

# Rémi Prébet | Curriculum Vitæ

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## Education

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**2024- : KU Leuven** Leuven, Belgium

- *Post-doctoral researcher* at Mathematics department
- Supervisor : Fatemeh Mohammadi

**2020-2023: Sorbonne Université** Paris

- *PhD candidate* in the PolSys team at LIP6
- Supervisor: Mohab Safey El Din
- Subject: *Connectivity problems in semi-algebraic sets: algorithms, implementations and applications*

**2015–2020: École Normale Supérieure Paris-Saclay**, Cachan, France

2019-2020: *Master 2 research degree: Applied Algebra for Cryptography and Formal Calculus - UVSQ*

2018-2019: *Gap year authorised by the school (see below)*

2017-2018: *Master 2 degree of teaching and preparation for agrégation in mathematics.*

Laureate of the *agrégation* of mathematics with the option : Algebra and symbolic computation. Rank : 75/381.

2016-2017: *Master 1 Hadamard : Mathematics and Applications.*

It is a high level master in partnership with *École Polytechnique* and *Paris-Sud University*.

2015-2016: *Bachelor degree of pure and applied Mathematics.*

**2012–2015: Lycée Dumont D'Urville/ Lycée Masséna** Toulon/Nice.

Three years in Higher School Preparatory Classes

## Research

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### Submitted to peer-reviewed journals and conferences.....

**2024:** Algebraic Tools for Computing Polynomial Loop Invariants

with E. Bayarmagnai, F. Mohammadi, submitted to ISSAC '24 on 06/02/2024

(8 pages)

**2024:** *Computing roadmaps in unbounded smooth real algebraic sets II: algorithm and complexity*

with M. Safey El Din et É. Schost, submitted to Journal of Symbolic Computation on 04/02/2024

[arXiv:2402.03111] (60 pages)

### Publications in peer reviewed journals.....

**2022:** *Computing roadmaps in unbounded smooth real algebraic sets I: connectivity results*

with M. Safey El Din and É. Schost, *Journal of Symbolic Computation (in revision)*

[ 10.1145/3597066.3597081] - [arXiv:2203.03961]

**2019:** *A Data-Adaptive EOF-Based Method for Displacement Signal Retrieval From InSAR Displacement Measurement Time Series for Decorrelating Targets*

with Y. Yan, M. Jauvin and É. Trouvé, *IEEE Transactions on Geoscience and Remote Sensing*

[ 10.1109/TGRS.2019.2902719]

### Publications in peer reviewed proceedings of conferences.....

**2023:** *Algorithm for connectivity queries on real algebraic curves*

with Md N. Islam and A. Poteaux, *ISSAC '23*

[ 10.1145/3597066.3597081] - [arXiv:2302.11347]

**2022:** *Deciding cuspidality of manipulators through computer algebra and algorithms in real algebraic geometry* with D. Chablat, M. Safey El Din, D. Salunkhe and P. Wenger, *ISSAC '22*  
[ 10.1145/3476446.3535477 ] - [arXiv:2203.04578]

**2018:** *A Data-Adaptive Eof Based Method for Displacement Signal Extraction from Interferogram Time Series* with Y. Yan, M. Jauvin and É. Trouvé, *IGARSS 2018*  
[ 10.1109/IGARSS.2018.8518382 ]

### Presentations in conferences.....

**Jul. 2023:** *Algorithm for connectivity queries on real algebraic curves*

48<sup>th</sup> International Symposium on Symbolic and Algebraic Computation, Tromsø, Norway

**Jul. 2023 (invited):** *Efficiently answering connectivity queries on real algebraic space curves*

SIAM AG 2023, Eindhoven, Netherlands

**Mar. 2023:** *Efficiently solving connectivity queries on real algebraic curves*

Journées Nationales de Calcul Formel 2023, CIRM, Luminy, France

**Jul. 2023:** *Deciding Cuspidality of Manipulators through Computer Algebra and Algorithms in Real Algebraic Geometry*

47<sup>th</sup> International Symposium on Symbolic and Algebraic Computation, Lille, France

**Mar. 2022:** *On the algebra and geometry of cuspidality: algorithms and complexity*

Journées Nationales de Calcul Formel 2022, CIRM, Luminy, France

**Mar. 2021:** *Towards faster roadmap algorithms for smooth and unbounded real algebraic sets*

Journées Nationales de Calcul Formel 2021, CIRM, Luminy, France (online)

### Presentation in seminars and working groups.....

**Jun. 2023:** *Computational Semi-Algebraic Geometry for Differential Equations and Robotics*

NUMA Seminar, KU Leuven, Leuven, Belgium

**Jun. 2023:** *Computing with real algebraic curves: topology and connectivity properties*

Number Theory and Algebraic Geometry Seminar, KU Leuven, Leuven, Belgium

**Sep. 2022:** *Connectivity issues in semi-algebraic geometry: algorithms, complexity and robotics applications through computer algebra*

ORCCA Joint Lab Meeting, University of Waterloo, Waterloo, Ontario, Canada

**Feb. 2021:** *On the computation of roadmap of smooth unbounded semi-algebraic sets.*

Meeting of ANR ECARP project members (online)

**Nov. 2020:** *Towards faster roadmap algorithms for smooth and unbounded real algebraic sets*

Internal joint working group of PolSys-Specfun teams

### Presentation of posters.....

**Apr. 2023:** *Answering connectivity queries in semi-algebraic sets through roadmaps: an application to robotics*

Journées Nationales de l'Informatique Mathématique 2023, IRIF, Université Paris Cité, France

**Oct. 2022:** *Answering connectivity queries in semi-algebraic sets through roadmaps: an application to robotics*

Workshop on Solving Polynomial Equations and Applications, CWI, Amsterdam, Netherlands

**Mar. 2022:** *Symbolic and geometric computation applied to the resolution of an effective problem in robotic*

Journées Nationales de l'Informatique Mathématique 2022, CRISTAL, Univ. Lille, France

## Research Internships

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02-08/2020: LIP6, Sorbonne Université

Paris

- Subject: *Algorithms in computer algebra for connectivity queries in semi-algebraic sets*
- Generalizing theoretical proofs and results from the state-of-the-art
- Led to a submission in Journal of Symbolic Computation

Supervisor: Mohab Safey El Din

#### 04-07/2017: LISTIC, Université Savoie Mont Blanc

Annecy

- Subject: *Extraction of the displacement signal from a time series of Sentinel-1 interferograms in mountainous environments*
- Designing, implementing and analyzing new methods for signal processing
- Results published in IEEE Transactions on Geoscience and Remote Sensing and the proceedings of IGARSS '18

Supervisors: Yajing Yan and Emmanuel Trouvé

#### 02-06/2016: CMLA/LMO, ENS Cachan/Orsay

Cachan/Orsay

- Subject: *Traffic congestion and Mean Field Games*
- Proof of theoretical results and implementation of efficient numerical methods

Supervisors: Filippo Santambrogio and Anthony Preux

## Research visits

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#### 09-11/2022: Visiting Researcher at University of Waterloo

Waterloo ON, Canada

Research visit with Éric Schost

## Teaching activities

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#### 2024: Teaching Assignments - 12h

Leuven, Belgium

- Department of Mathematics - KU Leuven

#### 2020-2023: PhD student with teaching duties - 192h

- Department of Computer Sciences - Sorbonne Université
- Tutorials, Practical Classes, Corrections and courses

#### 2016-2017: Contractual faculty in Computer Sciences - 42h

- Preparatory Classe PC\*, Blaise Pascal, Orsay
- Design of Courses, Tutorials, Practicals and (two) Exams, all from scratch
- Lectures, Tutorials, Practical Classes, Corrections and Pedagogic Support
- Preparation of 34 students to national entrance exams for Engineering Schools

Reference: Emmanuel Roblet - emmanuel.roblet@wanadoo.fr

Year	Teaching unit	Level	CM	TD	TP
2024	Linear Algebra & Analysis	Bachelor	-	12h	-
2022-2023	Introduction to Cryptography	M1	-	20h	20h
	Introduction to Algebraic Algorithms	M1	2h	-	-
2021-2022	Data Structures	L2	-	19.5h	19.5h
	Numerical Representation and Methods	L2	-	13.5h	13.5h
2020-2021	Introduction to Programming II (with C language)	L1	-	38.5h	-
	Numerical Representation and Methods	L2	-	13.5h	13.5h
2016-2017	Introduction to Programming (with Python)	PC*	6h	12h	24h

## Supervision

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#### 2023-2025: PhD supervision committee - PhD student - KU Leuven

Member of the annual committee and PhD defense committee - Erdenebayar Bayarmagnai

**07/2021: Co-supervision - first year Master internship - Orsay**

*Connectivity computations on real algebraic curves*, Anis Zidani

## Other scientific activities

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**2023:** Reviewer for an article submitted to *Journal of Algebra* and one to ISSAC

**2024:** Co-organizer of a reading seminar on algorithms in algebraic geometry

[Webpage]

**2021-2023:** Co-organizer of the MATHEXP-PolSys Seminar

Webpages : [MATHEXP]- [PolSys]

## Involvement in the institutions

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**2021-2023:** **Elected representative** at the Faculty Council and the Training Commission of Sorbonne Université

**2020-2021:** **Representative** at the PhD students council of LIP6

**2016-17:** **Elected representative** at the Student Life Commission of École Normale Supérieure Paris-Saclay

## Skills & Languages

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**Languages:** Français (maternelle), Anglais (Avancé), Espagnol (intermédiaire, 5 mois en Amérique Latine)

**Programming:** C, PYTHON, JAVASCRIPT, SQL, HTML/CSS

**Softwares:** L<sup>A</sup>T<sub>E</sub>X, SAGEMATH, MAPLE, UNIX SHELL, GIT

## Personal Experiences

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**2018–2019:** **Gap year - World tour hitchhiking**

Pedagogic project with three classes of first year in middle school and volunteering.

See more: [lemondeapetitpas.wordpress.com](http://lemondeapetitpas.wordpress.com)