Antoine DE SAINT GERMAIN

- DoB: 5 March 1996
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Employment

New Cornerstone Science Laboratory, University of Hong Kong **2024–current**
Postdoctoral Fellow — Advisor: Prof. Xuhua He

Education

University of Hong Kong **2018–2023**
PhD in Mathematics — Specialised in Lie theory and cluster algebras
Thesis: Friezes with coefficients for acyclic cluster algebras — Supervisor: Prof. Jiang-Hua Lu

University College London **2014–2018**
MSc in Mathematics with Mathematical Physics — First class honours
Thesis: Constructing non-trivial projective modules over integral group rings — Supervisor: Prof. F.E.A. Johnson

French International School of Hong Kong **2011–2014**
Diploma: French Baccalaureate — 19.57/20 overall average (highest in Asia)

Research interests

- Studying the interplay between cluster algebras, Lie theory, number theory and total positivity.
- Contributing to the rise of formal mathematics, and in particular Lie theory and representation theory, with Lean.

Papers

1. When frieze patterns meet Y-systems: Y-frieze patterns, **Math Intelligencer**, 2024.
2. On upper bounds of frieze patterns, **Fibonacci Quart.**, 2025 (with J. Cheah),
   Formalised in Lean 4: `https://antoine-dsg.github.io/frieze_patterns/`

Preprints

1. On the positive Mordell–Schinzel problem (with R. Zhang), *to appear.*
2. Fixed points of DT transformations, cluster-exponents and degrees of Weyl groups, **arXiv:2503.11391** (with J.-H. Lu)
3. Tropical friezes and cluster-additive functions via Fock-Goncharov duality and a conjecture of Ringel, **arXiv:2311.17712** (with P. Cao and J.-H. Lu)
4. Y-frieze patterns, **arXiv:2311.03073**
5. Friezes of cluster algebras of geometric type, **arXiv:2309.00906** (with M. Huang and J.-H. Lu)

Scholarships and Awards

2018-2022	Doris Chen Postgraduate Scholarship, University of Hong Kong
2019-2022	Excellent Teaching Award (x4), University of Hong Kong

Talks

2026	Mordell–Schinzel surfaces and cluster algebras, **Notre Dame University**
	On cluster exponents, **Richard P. Stanley Seminar, Harvard University**
	Mordell–Schinzel surfaces and cluster algebras, **Boston University**
	Mordell–Schinzel surfaces and cluster algebras, **Princeton / IAS number theory seminar**
2025	On the correspondence between root systems and cluster algebras, **Paris algebra seminar**
	Digitalising mathematics, **Shaw laureates forum**
	Mordell–Schinzel surfaces and generalised cluster algebras, **The University of Hong Kong**
	Fixed points of DT transformations and their applications, **Tohoku cluster seminar**
	Fixed points of DT transformations, cluster exponents and degrees of Weyl groups, **Nankai University**
2024	Fixed points of DT transformations and cluster exponents, **AIMS conference (Abu Dhabi)**
	Digitalising mathematics through Lean, **The Open University**
	Digitalising mathematics through Lean, Geometry seminar, **The University of Hong Kong**
	Y-frieze patterns, **Durham University**
2023	Frieze patterns and total positivity, **Université de Reims**
	Patterns from the duality pairing, **The University of Hong Kong**
	Cluster-additive functions and acyclic cluster algebras, **Paris algebra seminar**
	Cluster-additive functions and frieze patterns with coefficients, **Tokyo-Nagoya algebra seminar**
2022	Integral points, total positivity and frieze points, **Chengdu University**

Teaching Experience

Course instructor

2025	MATH1013 University mathematics II (HKU)
	MATH3002 Mathematical seminar (HKU)
2023	Introduction to total positivity in reductive groups (minicourse)

Teaching Assistant

2022	Algebra II
2021	Multivariable calculus and linear algebra, Linear algebra I
2020	University mathematics II, Multivariable calculus and linear algebra
2019	University mathematics II, Multivariable calculus and linear algebra

Miscellaneous

Maths En Jeans coordinator, Lycée Français International de Hong Kong
Formalising mathematics in Lean, workshops in HKU
Founder / maintainer of visualca.net (online website for cluster algebra computation applets)

Certificates

Coursera	Programming languages, **University of Washington**
	Machine learning, **Stanford University**
	Deep learning specialisation, **Stanford University**
Bloomberg	Bloomberg Market Concepts

Programming languages

Basic working knowledge in **SageMath**, **GAP**, **Javascript**, **Lean 4**
Elementary knowledge in **Python**

Languages

French	Native
English	Native
Spanish	CEFR level B1
Chinese	Elementary proficiency in reading/writing (traditional)
	Elementary proficiency in speaking/listening (Cantonese)

Personal activities

Long distance trail running.
Co-founder of namethatmineral.com (online tool for mineral identification).