Antoine DE SAINT GERMAIN

Personal Details

- DoB: 5 March 1996
- Address: New Cornerstone Science Laboratory, Run Run Shaw Building, The University of Hong Kong, Pokfulam, Hong Kong
- Phone: +852 5933 2145
- Email: adsg96@hku.hk

Research interests

- Cluster algebras
- Lie theory
- Total positivity
- Formal mathematics (Lean 4)

Education

2018-2023 - University of Hong Kong, Hong Kong

- PhD in Mathematics Supervisor: Prof. Jiang-Hua Lu
- Thesis: Friezes with coefficients for acyclic cluster algebras

2014-2018 — University College London, London

 $\bullet\,$ MSc in Mathematics with Mathematical Physics — Supervisor: Prof. F.E.A. Johnson

Employment

2024-current — **University of Hong Kong**, Hong Kong,

• Postdoctoral Fellow — Advisor: Prof. Xuhua He

Papers

Published

- 1. When frieze patterns meet Y-systems: Y-frieze patterns, Math Intelligencer, 2024.
- 2. (with J. Cheah, formalised in Lean4) On upper bounds of frieze patterns, Fibonacci Quart., 2025.

Preprints

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

In preparation

1. (with J.-H. Lu) *Cluster tori for finite type and Bott-Samelson varieties.* Scholarships and Certificates

2018-2022	Doris Chen Postgraduate Scholarship, University of Hong Kong
2018-2022	Excellent Teaching Award (x4), University of Hong Kong
2018	Certificate in Teaching and Learning, University of Hong Kong

Talks

- **2025** Fixed points of DT transformations, cluster exponents and degrees of Weyl groups, Conference on Poisson geometry and cluster algebras, Nankai University.
- **2024** Fixed points of DT transformations and cluster exponents, AIMS conference, Abu Dhabi. Digitalising mathematics through Lean, The Open University, UK. Digitalising mathematics through Lean, Geometry seminar, HKU. Y-frieze patterns, Continued fractions and SL₂-tilings, Durham University.
- 2023 Frieze patterns and total positivity, LMR Seminar, Université de Reims. Patterns from the duality pairing, Cluster algebras, Representation theory and Algebraic Geometry (HKU). 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.

Conferences attended

- 2025 Poisson geometry and cluster algebras, Nankai University.
- \bullet 2024 AIMS conference, NYU in Abu Dhabi. Continued fractions and SL₂-tilings, Durham University.
- 2023 Cluster algebras Arbeitsgemeinschaft, MFO, Oberwolfach. Cluster algebras, Representation theory and Algebraic Geometry, HKU. Higher Structures in Geometry and Mathematical Physics, IHP Paris.
- 2022 New Trends in Representation theory, AMSI-MSRI Winter School, The University of Hawaii.
- 2021 Global Young Scientist Summit, Singapore (virtual).
- 2019 Toric Varieties, MSRI Summer Graduate School, NCTS Taipei. International Congress of Chinese Mathematicians, Tsinghua University.

Teaching Experience

The University of Hong Kong

- University Mathematics II (2019, 2020).
- Multivariable Calculus and Linear Algebra (2019, 2020, 2021).
- Linear algebra I (2021).
- Algebra II (2022).
- Introduction to total positivity in reductive groups, Geometry seminar (2023).
- Mathematical seminar (2025).

Outreach

- Maths En Jeans coordinator, Lycée Français International de Hong Kong (2024-)
- Formalising mathematics in Lean, workshops in HKU (2024-)
- Founder / maintainer of visualca.net (online website for cluster algebra computation applets, 2023-)

Miscellaneous

Languages

- French: native speaker
- English: native speaker
- Spanish: level B1
- Cantonese: elementary proficiency (reading/writing and speaking/listening)

Online certificates

- 2025 Programming languages, University of Washington (via Coursera)
- **2019** Deep learning specialisation, Stanford University (via Coursera), Bloomberg Market Concepts, Bloomberg
- 2018 Machine learning, Stanford University (via Coursera)

Personal activities

- 2023 current Long distance trail running.
- 2020 current Co-founder of namethatmineral.com (online tool for mineral identification).