

Alexis Langlois-Rémillard

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Krijgslaan 281, S9
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Research interests

Algebra, mathematical physics, representation theory of algebras, diagrammatic algebras, cellular algebras, Lie (super)algebras, Dunkl operators and Temperley-Lieb algebras.

Education

- 2019-
exp. **Ph. D. in Mathematics**, Universiteit Gent
2023 Thesis subject: *Algebraic realization of Dunkl operators*
2023 Advisors: Profs Joris Van der Jeugt and Hendrik De Bie
- 2017-
2019 **M. Sc. in Mathematics**, Université de Montréal
Thesis: *Sur la structure cellulaire et la théorie de la représentation des algèbres de Temperley-Lieb à couture*
Advisor: Prof. Yvan Saint-Aubin
- 2014-
2017 **B.Sc in Mathematics**, Université de Montréal
Excellence mention

Scholarships

- 2019-2023 **FRQNT¹** Doctoral Research Scholarship
2019-2022 **FWO²** EOS PRIMA PhD scholarship
2017-2019 **FRQNT** Master's award
2017-2018 Alexander-Graham-Bell **NSERC³** Master's award
Summer 2016 Undergraduate Research Award, **NSERC** and **FRQNT**
Summer 2015 Undergraduate Research Award, **NSERC**

Academic work experience

- 2021- **Teaching Assistant** at Ghent University (in Dutch)
Mathematics for economics IA
Helped animating exercises sessions for 60-80 students classrooms, invigilated exams.
- 2016-2018 **Teaching Assistant** at Université de Montréal (in French)
Discrete Mathematics, Analysis 1 and Fundamental Mathematics
Animation of exercises sessions for 20-60 students classrooms, office hours for students, invigilated and corrected exams.
- Summer 2016 **NSREC Research internship** with Prof. Yvan Saint-Aubin at UdeM
Summer 2015 **NSREC Research internship** with Prof. Matilde Lalín at UdeM

Publications and preprints

Articles

1. De Bie, H., Langlois-Rémillard, A., Oste, R., and Van der Jeugt, Joris (2022) Finite-dimensional representations of the symmetry algebra of the dihedral Dunkl-Dirac operator. *Journal of Algebra* 591, 170–216. [DOI:10.1016/j.jalgebra.2021.09.025](https://doi.org/10.1016/j.jalgebra.2021.09.025), [arXiv:2010.03381](https://arxiv.org/abs/2010.03381)
2. Langlois-Rémillard, A. and Saint-Aubin, Y. (2020) The representation theory of seam algebras. *SciPost Physics* 8, 019. 34p. <https://doi.org/10.21468/SciPostPhys.8.2.019>, [arXiv:1909.03499](https://arxiv.org/abs/1909.03499)

¹Fonds de Recherche du Québec – Nature et Technologies (Québec Research Funds on Natural Sciences)

²Fonds Wetenschappelijk Onderzoek – Vlaanderen (The Research Foundations – Flanders)

³National Science and Engineering Research Council of Canada

Proceedings

1. (preprint) Langlois-Rémillard, A. (2021) The dihedral Dunkl-Dirac symmetry algebra with negative Clifford signature. *Submitted as contribution for the proceedings of Lie Theory and its Applications in Physics. LT-XIV 2021*
2. (preprint) Langlois-Rémillard, A. (2020) Deforming algebras with anti-involution via twisted associativity. *Submitted as contribution for the proceedings of SPAS II, Västerås 2019*, 21p. [arXiv:2106.01855](https://arxiv.org/abs/2106.01855)
3. Langlois-Rémillard, A. and Oste, R. (2020) An Exceptional Symmetry Algebra for the 3D Dirac-Dunkl Operator. In: Dobrev V. (ed) *Lie Theory and its Applications in Physics. LT Varna 2019*. Springer Proceedings in Mathematics & Statistics, vol 335. Springer Singapore. pp 399–405 [doi:10.1007/978-981-15-7775-8_30](https://doi.org/10.1007/978-981-15-7775-8_30) [arXiv:2009.13904](https://arxiv.org/abs/2009.13904)

Talks and Workshop

Invited talks:

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| May 2021 | EOS meeting , online <i>Finite-dimensional representations of the 3D dihedral Dunkl-Dirac symmetry algebra</i> |
| November 2018 | Seminar: representation theory of algebras , Université de Sherbrooke
<i>Idempotence, cellularité et algèbres diagrammatiques</i> |
| October 2018 | Mathematical physics seminar , Université de Montréal
<i>Roots of unity and the representation theory of boundary seam algebras</i> |

Workshop:

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| June 2018 | Canadian Mathematical Society Summer Meeting , Fredericton
<i>Atelier d'enseignement actif</i> (with Marie-Andrée B. Langlois) |
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Contributed seminar and conference talks:

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| November 2021 | Kleine seminar , Online
<i>Hopf algebras and reconstruction theory for tensor categories</i> |
| April 2021 | Clifford research seminar , Universiteit Gent, Online
<i>Generalizing the Deligne category, Khovanov's and Sazdanovic's approach</i> |
| February 2021 | Kleine seminar , online
<i>Basics of category \mathcal{O}</i> |
| December 2020 | CMS Winter meeting , Canada, online
<i>The symmetry algebra of the Dunkl-Dirac operator: the dihedral cases</i> |
| November 2020 | Kleine seminar , Online
<i>The categorification of S_n</i> |
| March 2020 | Clifford research seminar , Universiteit Gent
<i>The symmetry algebra of the 3D dihedral Dunkl-Dirac equation.</i> |
| November 2019 | SPAS , Västerås
<i>Cellular structure of seam algebras and avenues for deformations</i> |
| October 2019 | Kleine seminar , Universiteit Gent
<i>Cellular algebras</i> |
| June 2019 | Clifford research seminar , Universiteit Gent
<i>Representation theory and cellular structure of seam algebras</i> |
| December 2018 | Séminaire étudiant en mathématique , Université de Montréal
<i>Colorier une carte, une approche par dessin</i> |
| September 2018 | XXXth Meeting on representation theory of algebras , Sherbrooke
<i>Cellular structure of boundary seam Temperley-Lieb algebras</i> |
| June 2018 | Canadian Mathematical Society Summer Meeting , Fredericton
<i>Bratteli and the morphisms of boundary seam algebras</i> |
| May 2018 | XXI^e Colloque ISM , Université Sherbrooke
<i>Bratteli et les morphismes (semi-)simples de Temperley-Lieb</i> |

Outreach

Popularization work for a broad audience

1. Langlois-Rémillard, A. (2022) Huit dames et un échiquier. *Accromath*, 17, pp. 8–13. <https://accromath.uqam.ca/2022/02/huit-dames-et-un-echiquier/>
2. Langlois-Rémillard, A. (2021) Geraldine A. Coon. *Femmes en maths*. <https://femmesenmaths.org/geraldine-coon/>
3. Boutet, V., Godin, J. and Langlois-Rémillard, A. (2017) Excursion typographique : La matrice des fontes. *Accromath*, 12, pp. 26–29. <https://accromath.uqam.ca/archives/>
4. Langlois-Rémillard, A. (2016) *Le Petit Prince et l'algèbre*, Notes from the Margin, Mathematical Society of Canada, Vol XII, p.4. <https://issuu.com/cms-studc/docs/margin-fall2016>

Popularization talks

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| November 2021 | PRIME problem-solving avond , UGent
<i>Koninginnen en (bijzondere) borden</i> |
| September 2020 | Club mathématique , Université de Montréal
<i>Des pentagones aux heptagones, une infinité de différences</i> |
| November 2018 | Club mathématique , Université de Montréal
<i>Huit dames pour un échiquier</i> |
| July 2018 | Camp mathématique de l'AMQ , Dawson College, Montréal
<i>Le carréoussel du géomètre</i> |
| November 2017 | Club mathématique , Université de Montréal
<i>Excursion typographique: la matrice des fontes</i> |

Outreach activities

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| 2021 | Chess and mathematics . I collected a set of chess-inspired mathematical problems and created activities around them, both for general audience and university mathematics students. A Dutch problem-solving evening was given out of it for the UGent mathematical student organization PRIME . |
| 2016-2018 | Institut des sciences mathématiques . I created an activity on tatami tiling in 2016 for the <i>MathFest</i> and co-created the activity <i>Le carréoussel du géomètre</i> for the festival <i>Eureka!</i> 2018 at the Science center of Montréal. |
| 2018-2019 | L'Axiomatique . <i>Corrector-in-chief and writer</i> for a mathematics student journal at Université de Montréal. |
| 2015-2017 | JÉMUM . <i>Co-created and co-edited</i> a student mathematical journal to showcase summer research by undergraduate students. |

Leadership and implication

Conference organizer

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| 2019 | SAMARI . One-day conference on possibilities after graduation in mathematics. <i>Co-initiator and co-organizer</i> |
| 2016-2018 | Seminars in Undergraduate Mathematics in Montréal . Annual provincial undergraduate weekend conference. <i>President for 2016-2017 and member of the organizing committee in 2018</i> |
| 2018 | SAPHARI . One-day conference on possibilities after graduation in physics. <i>Organizer of the mathematics session</i> |
| 2017 | Canadian Undergraduate Mathematics Conference Annual national undergraduate one-week conference. <i>President for the Montréal 2017 edition</i> |

Students advising

- 2021-2022 **Co-mentor** (with S. Lazendic and A. Guzmán Adán) for the master thesis project of Pieter-Jan Vandaele on *Classical coding approaches to quantum applications* (UGent under Prof. A. Pizurica)
- 2021-2022 **Co-mentor** (with S. Lazendic and A. Guzmán Adán) for the master thesis project of Régis Schulze on *Classical and quantum approaches to belief propagation algorithms* (UGent under Prof. A. Pizurica)
- Spring 2021 **Jury member** for the master thesis of Bert Christiaens (UGent under Prof. A. Pizurica)

Session and seminars organizer

- 2019-present **Kleine seminar.** Organizing a postgraduate mathematical seminar at UGent on various algebraic subjects related to representation theory, https://alexisl-r.github.io/kleine_seminar/
- 2017-2018 **AARMS-STUDC student poster session.** Co-organizer for 2018 CMS Summer Meeting, University of New-Brunswick, Fredericton and 2017 CMS Winter Meeting, University of Waterloo, Waterloo.
- 2017-2018 **Séminaire étudiant en mathématiques.** Co-organizer for the graduate students mathematics seminar at Université de Montréal
- 2015-2017 **Club mathématique.** Co-organizer for a weekly seminar of talks aimed at undergraduate students at Université de Montréal

Community service

- 2020-present **Reviewer** for zbMATH Open. [zbMATH:langlois-remillard.alexis](https://zbmath.org/authors/zbMATH:langlois-remillard.alexis)
- 2016-2019 **Student committee** of the Canadian Mathematical Society. *Committee member*: involved in the French translation of general activities and in the edition of French articles in the annual publication *Notes from the Margin*.
- 2017-2019 **AECSMS**: Graduate mathematics and statistic students association in Université de Montréal. *President* (2018-2019) and *Treasurer* (2017-2018).
- 2014-2019 Students representative on the **mathematics and statistic departmental assembly** at Université de Montréal: 2014-2016 for undergraduate and 2018-2019 for graduate students.

Languages

- Français :** Native language
- English:** Fluent
- Nederlands:** Proficient (B2 CEFRL 2021-05)

Other Interests and Activities

- Chess** I am a Canadian and Québécois expert and play with the KGSRL chess club.
- Lifeguard** I taught swimming lessons and was a lifeguard from 2011 to 2016 and a lifeguard instructor from 2013 to 2016. I received a Commonwealth service citation for my volunteer work in 2015 and 2014.
- Literature** I greatly enjoy reading, writing and discussing literary works.