Alexis Langlois-Rémillard

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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. 2023	**Ph. D. in Mathematics**, Universiteit Gent Thesis subject: *Algebraic realization of Dunkl operators* 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	**FRQNT**[1] Doctoral Research Scholarship
2019–2023	**FWO**[2] EOS PRIMA PhD scholarship
2017–2019	**FRQNT** Master's award
2017–2018	Alexander-Graham-Bell **NSERC**[3] Master's award
Summer 2016	Undergraduate Research Awards, **NSERC** and **FRQNT**, Yvan Saint-Aubin
Summer 2015	Undergraduate Research Award, **NSERC**, Matilde Lalín

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.

Publications and preprints List available at https://alexisl-r.github.io/publications/.

Articles

1. (accepted preprint) De Bie, H., Langlois-Rémillard, A., Oste, R., and Van der Jeugt, J. (2022) Generalised symmetries and bases for Dunkl monogenics. 18p. Accepted in Rocky Mountains Journal of Mathematics arXiv:2203.01204

2. De Bie, H., Langlois-Rémillard, A., Oste, R., and Van der Jeugt, J. (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, arXiv:2010.03381

3. Langlois-Rémillard, A. and Saint-Aubin, Y. (2020) The representation theory of seam algebras. SciPost Physics 8, 019. 34p. doi:10.21468/SciPostPhys.8.2.019, arXiv:1909.03499

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[1] Fonds de Recherche du Québec – Nature et Technologies (Québec Research Funds on Natural Sciences)
[2] Fonds Wetenschappelijk Onderzoek – Vlaanderen (The Research Foundations – Flanders)
[3] National Science and Engineering Research Council of Canada

Proceedings

1. (accepted preprint) Langlois-Rémillard, A. (2021) The dihedral Dunkl–Dirac symmetry algebra with negative Clifford signature. *Accepted as contribution for the proceedings of* Lie Theory and its Applications in Physics. LT-XIV 2021, 7p.

2. (accepted preprint) Langlois-Rémillard, A. (2020) Deforming algebras with anti-involution via twisted associativity. *Accepted as contribution for the proceedings of* SPAS II, Västerås 2019, 21p. arXiv: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 arXiv:2009.13904

Talks and Workshop Complete list available at https://alexisl-r.github.io/talks/.

Invited talks:

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

Workshop:

June 2018	**Canadian Mathematical Society Summer Meeting**, Fredericton *Atelier d'enseignement actif* (with Marie-Andrée B. Langlois)

Contributed seminar and conference talks:

July 2022	**Group34**, Strasbourg *Monogenic representations of the algebra of symmetries of the generalised Dirac operator*
May 2022	**Non-commutative algebras, representation theory and special functions**, CRM, Montréal *On the representation theory of a symmetry algebra associated to a generalised Dirac operator*
February 2022	**Clifford research seminar**, Universiteit Gent, Online *Bases for Dunkl monogenics by generalised symmetries*
June 2021	**Lie Theory and its applications to physics XIV**, Online *Representations of the 3D dihedral Dunkl-Dirac symmetry algebra*
April 2021	**Clifford research seminar**, Universiteit Gent, Online *Generalizing the Deligne category, Khovanov's and Sazdanovic's approach*
December 2020	**CMS Winter meeting**, Canada, online *The symmetry algebra of the Dunkl–Dirac operator: the dihedral cases*
March 2020	**Clifford research seminar**, Universiteit Gent *The symmetry algebra of the 3D dihedral Dunkl–Dirac equation.*
November 2019	**SPAS**, Västerås *Cellular structure of seam algebras and avenues for deformations*
June 2019	**Clifford research seminar**, Universiteit Gent *Representation theory and cellular structure of seam algebras*
September 2018	**XXXth Meeting on representation theory of algebras**, Sherbrooke *Cellular structure of boundary seam Temperley-Lieb algebras*
June 2018	**Canadian Mathematical Society Summer Meeting**, Fredericton *Bratteli and the morphisms of boundary seam algebras*

Poster:

May 2022   **PhD Day meeting of the BMS**, Liège
Weavings weights: double dihedral deformation (with Marcelo De Martino and Roy Oste)

Outreach <small>More available at https://alexisl-r.github.io/popularization/.</small>

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

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

Outreach activities

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.
2016-2018   **Institut des sciences mathématiques**. I created an activity on tatami tiling in 2016 for the *MathFest* and co-created the activity *Le carréousel du géomètre* for the festival *Eureka!* 2018 at the Science center of Montréal.
2018-2019   **L'Axiomatique**. *Corrector-in-chief and writer* for a mathematics student journal at Université de Montréal.
2015-2017   **JÉMUM**. *Co-created and co-edited* a student mathematical journal to showcase summer research by undergraduate students.

Leadership and implication

Conference organizer

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

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, Frederiction 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
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)
Deutsch:	Basic

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.