

NICHOLAS WILLIAMS

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EDUCATION

Doctorate in Mathematics

University of Cologne

Started at University of Leicester

Supervisor: Sibylle Schroll

Summa cum laude

September 2018 – May 2022

April 2021 – May 2022

September 2018 – April 2021

Graduate Diploma in Quantitative Economics

Birkbeck, University of London

Distinction

October 2017 – June 2018

MMathPhil in Mathematics & Philosophy

Worcester College, Oxford

Double First Class Honours

October 2012 – June 2016

EMPLOYMENT

Postdoctoral Research Associate

Lancaster University

With David Pauksztello

September 2022 – March 2025

JSPS Short Term Postdoctoral Research Fellow

University of Tokyo

With Osamu Iyama

May 2022 – August 2022

Graduate Teaching Assistant

King's College London

September 2021 – December 2021

Guest Teacher

London School of Economics

September 2021 – December 2021

Feedback Session Leader

University of Leicester

January 2019 – December 2020

JOURNAL PUBLICATIONS

4. Quiver combinatorics and triangulations of cyclic polytopes *To appear*
Algebraic Combinatorics
3. The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders *2023*
Electronic Journal of Combinatorics
2. New interpretations of the higher Stasheff–Tamari orders *2022*
Advances in Mathematics, Volume 407, 108552
1. The combinatorics of tensor products of higher Auslander algebras of type A *2021*
(With Jordan McMahon)
Glasgow Mathematical Journal, 63(3), pp. 526–546.

CONFERENCE PROCEEDINGS

3. The higher Stasheff–Tamari orders in representation theory *To appear*
Proceedings of the 2020 International Conference on Representations of Algebras

2. Triangulations of cyclic polytopes and the higher Auslander algebras of type A 2022
Various issues on representation theory and related topics
RIMS Kōkyūroku No.2234
1. The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders 2021
Proceedings of the 33rd International Conference on Formal Power Series and Algebraic Combinatorics, Séminaire Lotharingien de Combinatoire 85B, Art. 6, 12.

OTHER PUBLICATIONS

2. Microthesis: Triangulations of cyclic polytopes in representation theory 2022
London Mathematical Society Newsletter, No. 501, 33-34.
1. Higher-dimensional combinatorics in representation theory 2022
 Doctoral thesis, University of Cologne

PREPRINTS

6. A survey of congruences and quotients of partially ordered sets 2023
[arXiv:2303.03765](#)
5. A geometric perspective on the τ -cluster morphism category 2023
 (With Sibylle Schroll, Aran Tattar, and Hipolito Treffinger)
[arXiv:2302.12217](#)
4. A structural view of maximal green sequences 2023
 (With Mikhail Gorsky)
[arXiv:2301.08681](#)
3. Stability spaces of string and band modules 2022
 (With Sibylle Schroll, Aran Tattar, Hipolito Treffinger, and Yadira Valdivieso)
[arXiv:2208.15000](#)
2. Triangulations of prisms and preprojective algebras of type A 2022
 (With Osamu Iyama)
[arXiv:2208.12957](#)
1. The two higher Stasheff–Tamari orders are equal 2021
[arXiv:2106.01050](#)

PRIZES AND SCHOLARSHIPS

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| Gibbs prize for Mathematics & Philosophy
University of Oxford
For top performance in Mathematics papers | 2016 |
| Gibbs prize for Mathematics & Philosophy
University of Oxford
For top performance in Mathematics papers | 2015 |
| Academic scholarship
Worcester College, Oxford | 2013 |
| Honorary scholarship
Westminster School | 2007 |

INVITED CONFERENCE TALKS (IN PERSON)

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| A structural approach to maximal green sequences
<i>Silting theory, algebras and representations</i>
Charles University, Prague | September 2022 |
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INVITED CONFERENCE TALKS (VIRTUAL)

An algebraic interpretation of the higher Stasheff–Tamari orders *November 2020*
International Conference on Representations of Algebras
Selected to give talk by scientific committee based on research snapshot

CONTRIBUTED CONFERENCE TALKS (IN PERSON)

A structural view of maximal green sequences *April 2023*
Maurice Auslander Distinguished Lectures and International Conference

Cyclic polytopes and representation theory *December 2022*
Representation theory of algebras session
Canadian Mathematical Society Winter Meeting, Toronto

Algebraic interpretation of the higher Stasheff–Tamari orders *July 2022*
Various issues on representation theory and related topics
Research Institute for Mathematical Sciences, Kyoto University

Higher analogues of Grassmannian clusters *April 2019*
Maurice Auslander Distinguished Lectures and International Conference

Higher analogues of Grassmannian clusters *April 2019*
New Connections and Directions in Representation Theory
University of Leeds

Higher analogues of Grassmannian clusters *April 2019*
Tropical Geometry meets Representation Theory
University of Leicester

CONTRIBUTED CONFERENCE TALKS (VIRTUAL)

The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders *January 2022*
Formal Power Series and Algebraic Combinatorics
Bar-Ilan University

SEMINAR TALKS (IN PERSON)

A structural view of maximal green sequences *February 2023*
Algebra group seminar
University of Cologne

The higher Stasheff–Tamari orders on triangulations of cyclic polytopes *November 2022*
Séminaire du LaCIM
Université du Québec à Montréal

Cyclic polytopes and representation theory *November 2022*
Geometry and mathematical physics seminar
University of Birmingham

Cyclic polytopes and representation theory *October 2022*
Pure mathematics seminar
Lancaster University

Mutation in higher cluster categories *October 2022*
Seminar@Aarhus
Aarhus University

Equivalence of maximal green sequences Working seminar in algebra and geometry University of Cologne	<i>April 2022</i>
Equivalence of maximal green sequences Paris algebra seminar Institut de Mathématiques de Jussieu-Paris Rive Gauche	<i>February 2022</i>
An algebraic interpretation of the higher Stasheff–Tamari orders Pure mathematics seminar University of East Anglia	<i>November 2019</i>
Higher analogues of Grassmannian clusters Algebra and number theory seminar University of Graz	<i>April 2019</i>

SEMINAR TALKS (VIRTUAL)

Cyclic polytopes and higher Auslander–Reiten theory III Tokyo–Nagoya algebra seminar University of Tokyo and Nagoya University	<i>July 2022</i>
Cyclic polytopes and higher Auslander–Reiten theory II Tokyo–Nagoya algebra seminar University of Tokyo and Nagoya University	<i>June 2022</i>
Mutating cluster-tilting objects in $(d + 2)$-angulated cluster categories FD seminar	<i>June 2022</i>
Cyclic polytopes and higher Auslander–Reiten theory I Tokyo–Nagoya algebra seminar University of Tokyo and Nagoya University	<i>June 2022</i>
An algebraic interpretation of the higher Stasheff–Tamari orders Aachen–Bochum–Cologne Darstellungstheorie Seminar RWTH Aachen University, Ruhr-University Bochum, and University of Cologne	<i>January 2022</i>
Cyclic polytopes and higher Auslander–Reiten theory Tokyo–Nagoya algebra seminar University of Tokyo and Nagoya University	<i>December 2021</i>
The two higher Stasheff–Tamari orders are equal Working seminar in algebra and geometry University of Cologne	<i>May 2021</i>
The higher Stasheff–Tamari orders in representation theory Paris algebra seminar Institut de Mathématiques de Jussieu-Paris Rive Gauche	<i>April 2021</i>
New interpretations of the higher Stasheff–Tamari orders Diskrete Mathematik / Geometrie Forschungsseminar TU Berlin	<i>March 2021</i>

POSTERS

An algebraic interpretation of the higher Stasheff–Tamari orders <i>Young Researchers in Mathematics</i> Online Winner of 1 st prize in poster competition	<i>June 2021</i>
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An algebraic interpretation of the higher Stasheff–Tamari orders <i>Advances in Representation Theory of Algebras</i> Online	<i>May 2021</i>
New interpretations of the higher Stasheff–Tamari orders <i>Combinatorial algebra meets algebraic combinatorics</i> Université du Québec à Montréal Online	<i>January 2021</i>
An algebraic interpretation of the higher Stasheff–Tamari orders <i>International Conference on Representations of Algebras</i> “Research snapshot” Online	<i>November 2020</i>
New interpretations of the higher Stasheff–Tamari orders <i>Virtual Heidelberg Laureate Forum</i> Online	<i>September 2020</i>
Representation theory and Grassmannians <i>STEM for Britain</i> Poster competition at UK Parliament	<i>March 2019</i>

GRANTS

London Mathematical Society Scheme 8 Postgraduate research conference grants <i>Categorifications in Representation Theory</i> conference organised with Aran Tattar GBP 2,500	<i>April 2020</i>
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ORGANISATION

Köln Algebra and Representation Theory seminar Co-organiser University of Cologne Online	<i>April 2021 – May 2022</i>
Categorifications in Representation Theory conference Co-organised with Aran Tattar Online	<i>September 2020</i>
Mathematics PhD seminar University of Leicester	<i>September 2019 – August 2020</i>
Representation theory and mirror symmetry conference Local organising committee University of Leicester	<i>May 2019</i>

RESEARCH STAYS

Max Planck Institute for Mathematics, Bonn Visiting: Guillaume Laplante-Anfossi 1 week	<i>February 2023</i>
Université du Québec à Montréal Visiting: Hugh Thomas 2 weeks	<i>November 2022</i>
University of Aarhus Visiting: Raphael Bennett-Tennenhaus and Amit Shah 1 week	<i>October 2022</i>

University of Cologne
Visiting: Sibylle Schroll and Aran Tattar
1 week

April 2021

University of Cambridge
Isaac Newton Institute for Mathematical Sciences
Cluster algebras and representation theory programme
Invited participant
1 week

December 2021

University of Graz
Visiting: Jordan McMahon
Host: Karin Baur
1 week

April 2019

REFEREEING

Communications in Algebra, Discrete Mathematics, Electronic Research Archive, Journal of Algebraic Combinatorics

REVIEWING

AMS MathSciNet
3 reviews written

October 2022 – present

zbMATH
8 reviews written

September 2020 – present

TEACHING

Real analysis
Class teacher (online)
King's College London

September 2021 – December 2021

MA107: Quantitative methods
Class teacher
London School of Economics

September 2021 – December 2021

Calculus & analysis
Class teacher (online)
University of Leicester

October 2020 – December 2020

Second-year algebra
Class teacher
University of Leicester

January 2020 – April 2020

Calculus & analysis
Class teacher
University of Leicester

October 2019 – April 2020

Elements of number theory
Class teacher
University of Leicester

October 2019 – December 2019

Calculus & analysis
Class teacher
University of Leicester

January 2019 – March 2019

COMMITTEE ROLES

Small Grants Committee The Leathersellers' Company	<i>September 2022 – present</i>
Mathematics & Philosophy Representative Joint Consultative Committee with Undergraduates University of Oxford	<i>2015 – 2016</i>
Undergraduate Representative Joint Committee for Mathematics and Philosophy University of Oxford	<i>2015 – 2016</i>
Undergraduate Representative Mathematics Department Art Committee University of Oxford	<i>2015 – 2016</i>

OUTREACH

University of Leicester Representative <i>Research in the UK afternoon</i> University of Cambridge	<i>November 2018, 2019, 2020</i>
Student Helper <i>Oxford and Cambridge Student Conferences</i>	<i>March 2013, 2014, 2015</i>

OTHER

London Mathematical Society Associate member 3 reports on conferences written for the LMS newsletter	<i>June 2019 – present</i>
Programming	Python, Sage, Maple, node.js, Haskell Git L ^A T _E X
Languages	(CEFR levels) English Native German B1 French B1 Japanese A2 Spanish A1