

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 – April 2022

April 2021 – April 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 – June 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

- | | |
|---|------------------|
| 8. A survey of congruences and quotients of partially ordered sets
<i>EMS Surveys in Mathematical Sciences</i> | <i>To appear</i> |
| 7. The two higher Stasheff–Tamari orders are equal
<i>Journal of the European Mathematical Society</i> | <i>To appear</i> |
| 6. Triangulations of prisms and preprojective algebras of type A
With Osamu Iyama
<i>International Mathematics Research Notices</i> , rnae059 | <i>2024</i> |
| 5. Stability spaces of string and band modules
With Sibylle Schroll, Aran Tattar, Hipolito Treffinger, and Yadira Valdivieso
<i>Journal of Pure and Applied Algebra</i> , Volume 228, no. 4, 107503 | <i>2024</i> |
| 4. Quiver combinatorics and triangulations of cyclic polytopes
<i>Algebraic Combinatorics</i> , Volume 6, no. 3, pp. 639–60 | <i>2023</i> |
| 3. The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders
<i>Electronic Journal of Combinatorics</i> , Volume 30, no. 1, P1.29 | <i>2023</i> |

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

PEER-REVIEWED CONFERENCE PROCEEDINGS

4. From higher Bruhat orders to Steenrod cup- i coproducts To appear
Proceedings of the 36th International Conference on Formal Power Series and Algebraic Combinatorics
3. The higher Stasheff–Tamari orders in representation theory 2023
Representations of Algebras and Related Structures
2. Studying triangulations of even-dimensional cyclic polytopes via directed graphs 2023
Proceedings of the 35th International Conference on Formal Power Series and Algebraic Combinatorics, Séminaire Lotharingien de Combinatoire 89B, Art. 4
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

OTHER CONFERENCE PROCEEDINGS

2. Donaldson–Thomas invariants for the Bridgeland–Smith correspondence 2024
Cluster Algebras and Its Applications
Oberwolfach Reports, No. 2/2024
1. 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

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

4. Donaldson–Thomas invariants for the Bridgeland–Smith correspondence 2024
 With Omar Kidwai
[arXiv:2401.10093](https://arxiv.org/abs/2401.10093)
3. Steenrod operations via higher Bruhat orders 2023
 With Guillaume Laplante-Anfossi
[arXiv:2309.16481](https://arxiv.org/abs/2309.16481)
2. A geometric perspective on the τ -cluster morphism category 2023
 With Sibylle Schroll, Aran Tattar, and Hipolito Treffinger
[arXiv:2302.12217](https://arxiv.org/abs/2302.12217)
1. A structural view of maximal green sequences 2023
 With Mikhail Gorsky
[arXiv:2301.08681](https://arxiv.org/abs/2301.08681)

PRIZES AND SCHOLARSHIPS

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

INVITED CONFERENCE TALKS (IN PERSON)

Triangulations of cyclic polytopes through the lens of reconfiguration <i>Minisymposium on Combinatorial Reconfiguration</i> <i>International Congress on Industrial and Applied Mathematics</i> Waseda University, Tokyo	<i>August 2023</i>
A structural view of maximal green sequences <i>Cluster structures in the North</i> University of Central Lancashire	<i>June 2023</i>
A structural approach to maximal green sequences <i>Silting theory, algebras and representations</i> Charles University, Prague	<i>September 2022</i>

INVITED CONFERENCE TALKS (VIRTUAL)

An algebraic interpretation of the higher Stasheff–Tamari orders <i>International Conference on Representations of Algebras</i> Selected to give talk by scientific committee based on research snapshot	<i>November 2020</i>
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CONTRIBUTED CONFERENCE TALKS (IN PERSON)

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence <i>Clusters and their Applications in the North</i> University of Glasgow	<i>February 2024</i>
Donaldson–Thomas invariants for the Bridgeland–Smith correspondence <i>Cluster Algebras and Its Applications</i> Mathematisches Forschungsinstitut Oberwolfach	<i>January 2024</i>
Triangulations of prisms and preprojective algebras of type A <i>Combinatorial representation theory in Leeds</i> University of Leeds	<i>July 2023</i>
A structural view of maximal green sequences <i>Maurice Auslander Distinguished Lectures and International Conference</i> Woods Hole, Massachusetts	<i>April 2023</i>
Cyclic polytopes and representation theory <i>Representation theory of algebras session</i> Canadian Mathematical Society Winter Meeting, Toronto	<i>December 2022</i>

Algebraic interpretation of the higher Stasheff–Tamari orders <i>Various issues on representation theory and related topics</i> Research Institute for Mathematical Sciences, Kyoto University	<i>July 2022</i>
Higher analogues of Grassmannian clusters <i>Maurice Auslander Distinguished Lectures and International Conference</i> Woods Hole, Massachusetts	<i>April 2019</i>
Higher analogues of Grassmannian clusters <i>New Connections and Directions in Representation Theory</i> University of Leeds	<i>April 2019</i>
Higher analogues of Grassmannian clusters <i>Tropical Geometry meets Representation Theory</i> University of Leicester	<i>April 2019</i>

CONTRIBUTED CONFERENCE TALKS (VIRTUAL)

The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders <i>Formal Power Series and Algebraic Combinatorics</i> Bar-Ilan University	<i>January 2022</i>
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SEMINAR TALKS (IN PERSON)

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence Leeds Algebra Seminar University of Leeds	<i>April 2024</i>
Donaldson–Thomas invariants for the Bridgeland–Smith correspondence Algebra and Number Theory Seminar University of Vienna	<i>April 2024</i>
Donaldson–Thomas invariants for the Bridgeland–Smith correspondence Paris Algebra Seminar Institut de Mathématiques de Jussieu-Paris Rive Gauche	<i>March 2024</i>
Donaldson–Thomas invariants for the Bridgeland–Smith correspondence Sheffield Geometry and Physics seminar University of Sheffield	<i>October 2023</i>
Donaldson–Thomas invariants for the Bridgeland–Smith correspondence EGRET seminar University of Edinburgh	<i>October 2023</i>
Donaldson–Thomas theory of quivers with potential Exact Asymptotics Theoretical Sciences Visiting Program Okinawa Institute of Science and Technology	<i>September 2023</i>
Higher-dimensional cluster combinatorics and representation theory OIST Representation Theory Seminar Okinawa Institute of Science and Technology	<i>August 2023</i>
Combinatorics of KP solitons Exact Asymptotics Theoretical Sciences Visiting Program Okinawa Institute of Science and Technology	<i>August 2023</i>

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*April 2022*

Working Seminar in Algebra and Geometry

University of Cologne

Equivalence of maximal green sequences*February 2022*

Paris Algebra Seminar

Institut de Mathématiques de Jussieu-Paris Rive Gauche

An algebraic interpretation of the higher Stasheff–Tamari orders*November 2019*

Pure Mathematics Seminar

University of East Anglia

Higher analogues of Grassmannian clusters*April 2019*

Algebra and Number Theory Seminar

University of Graz

SEMINAR TALKS (VIRTUAL)**Cyclic polytopes and higher Auslander–Reiten theory III***July 2022*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

Cyclic polytopes and higher Auslander–Reiten theory II*June 2022*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

Mutating cluster-tilting objects in $(d + 2)$ -angulated cluster categories*June 2022*

FD seminar

Cyclic polytopes and higher Auslander–Reiten theory I*June 2022*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

An algebraic interpretation of the higher Stasheff–Tamari orders*January 2022*

Aachen–Bochum–Cologne Darstellungstheorie Seminar

RWTH Aachen University, Ruhr-University Bochum, and University of Cologne

Cyclic polytopes and higher Auslander–Reiten theory*December 2021*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

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

Studying triangulations of even-dimensional cyclic polytopes via directed graphs <i>Formal Power Series and Algebraic Combinatorics</i> University of California, Davis	<i>July 2023</i>
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>
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 AND AWARDS

London Mathematical Society Scheme 1 Conference grants <i>Silting, simple-minded, and stability</i> Co-organised with Raquel Coelho Simões and David Pauksztello GBP 4,000	<i>October 2023</i>
Japan Society for the Promotion of Science Short Term Postdoctoral Research Fellowship JPY 5,384,000 12 months awarded but 3 months taken	<i>December 2021</i>

London Mathematical Society Scheme 8
Postgraduate research conference grants
Categorifications in Representation Theory
Co-organised with Aran Tattar
GBP 2,500

April 2020

ORGANISATION

Simple-mindedness, silting, and stability

July 2024

Co-organising with Raquel Coelho Simões and David Pauksztello
Ambleside Campus, University of Cumbria

Köln Algebra and Representation Theory seminar

April 2021 – May 2022

Co-organised with Daniel Schaefer
University of Cologne
Online

Categorifications in Representation Theory

September 2020

Co-organised with Aran Tattar
Online

Mathematics PhD seminar

September 2019 – August 2020

University of Leicester

Interactions between Representation Theory and Homological Mirror Symmetry

May 2019

Local organising committee
University of Leicester

RESEARCH STAYS

University of Copenhagen

January 2024

Visiting: Guillaume Laplante-Anfossi

Host: Nathalie Wahl

1 week

Okinawa Institute of Science and Technology

August – October 2023

Exact Asymptotics: From Fluid Dynamics to Quantum Geometry

Theoretical Sciences Visiting Program

Invited participant

2 months

Université du Québec à Montréal

November 2022

Visiting: Hugh Thomas

2 weeks

University of Aarhus

October 2022

Visiting: Raphael Bennett-Tennenhaus and Amit Shah

1 week

University of Cologne

April 2021

Visiting: Sibylle Schroll and Aran Tattar

1 week

University of Cambridge

December 2021

Isaac Newton Institute for Mathematical Sciences

Cluster algebras and representation theory programme

Invited participant

1 week

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

April 2019

REFEREEING

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

REVIEWING

AMS MathSciNet *October 2022 – present*
6 reviews written

zbMATH *September 2020 – present*
12 reviews written

TEACHING

Real analysis *September 2021 – December 2021*
Class teacher (online)
King's College London

MA107: Quantitative methods *September 2021 – December 2021*
Class teacher
London School of Economics

Calculus & analysis *October 2020 – December 2020*
Class teacher (online)
University of Leicester

Second-year algebra *January 2020 – April 2020*
Class teacher
University of Leicester

Calculus & analysis *October 2019 – April 2020*
Class teacher
University of Leicester

Elements of number theory *October 2019 – December 2019*
Class teacher
University of Leicester

Calculus & analysis *January 2019 – March 2019*
Class teacher
University of Leicester

COMMITTEE ROLES

Mathematics & Philosophy Representative *2015 – 2016*
Joint Consultative Committee with Undergraduates
University of Oxford

Undergraduate Representative *2015 – 2016*
Joint Committee for Mathematics and Philosophy
University of Oxford

Undergraduate Representative *2015 – 2016*
Mathematics Department Art Committee
University of Oxford

OUTREACH

University of Leicester Representative
Research in the UK afternoon
University of Cambridge

November 2018, 2019, 2020

Student Helper
Oxford and Cambridge Student Conferences

March 2013, 2014, 2015

OTHER

London Mathematical Society
Associate member
3 reports on conferences written for the LMS newsletter

June 2019 – present

Programming Python, Sage, Maple, node.js, Haskell
 Git
 \LaTeX

Languages

	(CEFR levels)
English	Native
French	B1
German	B1
Japanese	B1