

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

6. Stability spaces of string and band modules *To appear*
With Sibylle Schroll, Aran Tattar, Hipolito Treffinger, and Yadira Valdivieso
Journal of Pure and Applied Algebra.
5. The two higher Stasheff–Tamari orders are equal *To appear*
Journal of the European Mathematical Society.
4. Quiver combinatorics and triangulations of cyclic polytopes *2023*
Algebraic Combinatorics, Volume 6, no. 3, pp. 639–60.
3. The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders *2023*
Electronic Journal of Combinatorics, Volume 30, no. 1, P1.29.
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

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

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. A survey of congruences and quotients of partially ordered sets *2023*
[arXiv:2303.03765](https://arxiv.org/abs/2303.03765)
3. 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)
2. A structural view of maximal green sequences *2023*
With Mikhail Gorsky
[arXiv:2301.08681](https://arxiv.org/abs/2301.08681)
1. Triangulations of prisms and preprojective algebras of type A *2022*
With Osamu Iyama
[arXiv:2208.12957](https://arxiv.org/abs/2208.12957)

PRIZES AND SCHOLARSHIPS

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|--------------------------------------------------------------------------------------------------------------------------|-------------|
| 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)

A structural view of maximal green sequences

June 2023

Cluster structures in the North

University of Central Lancashire

A structural approach to maximal green sequences

September 2022

Silting theory, algebras and representations

Charles University, Prague

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)

Triangulations of prisms and preprojective algebras of type A

July 2023

Combinatorial representation theory in Leeds

University of Leeds

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 *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 *May 2021*

Working seminar in algebra and geometry

University of Cologne

The higher Stasheff–Tamari orders in representation theory*April 2021*

Paris algebra seminar

Institut de Mathématiques de Jussieu-Paris Rive Gauche

New interpretations of the higher Stasheff–Tamari orders*March 2021*

Diskrete Mathematik / Geometrie Forschungsseminar

TU Berlin

POSTERS

**Studying triangulations of even-dimensional cyclic polytopes
via directed graphs***July 2023**Formal Power Series and Algebraic Combinatorics***An algebraic interpretation of the higher Stasheff–Tamari orders***June 2021**Young Researchers in Mathematics*

Online

Winner of 1st prize in poster competition**An algebraic interpretation of the higher Stasheff–Tamari orders***May 2021**Advances in Representation Theory of Algebras*

Online

New interpretations of the higher Stasheff–Tamari orders*January 2021**Combinatorial algebra meets algebraic combinatorics*

Université du Québec à Montréal

Online

An algebraic interpretation of the higher Stasheff–Tamari orders*November 2020**International Conference on Representations of Algebras*

“Research snapshot”

Online

New interpretations of the higher Stasheff–Tamari orders*September 2020**Virtual Heidelberg Laureate Forum*

Online

Representation theory and Grassmannians*March 2019**STEM for Britain*

Poster competition at UK Parliament

GRANTS AND AWARDS

Japan Society for the Promotion of Science

December 2021

Short Term Postdoctoral Research Fellowship

JPY 5,384,000

12 months awarded but 3 months taken

London Mathematical Society Scheme 8

April 2020

Postgraduate research conference grants

Categorifications in Representation Theory conference organised with Aran Tattar

GBP 2,500

ORGANISATION

Köln Algebra and Representation Theory seminar

April 2021 – May 2022

Co-organised with Daniel Schaefer

University of Cologne

Online

Categorifications in Representation Theory conference

September 2020

Co-organised with Aran Tattar

Online

Mathematics PhD seminar

September 2019 – August 2020

University of Leicester

Representation theory and mirror symmetry conference

May 2019

Local organising committee

University of Leicester

RESEARCH STAYS

Max Planck Institute for Mathematics, Bonn

February 2023

Visiting: Guillaume Laplante-Anfossi

1 week

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

April 2019

Visiting: Jordan McMahon

Host: Karin Baur

1 week

REFEREEING

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

REVIEWING

AMS MathSciNet

October 2022 – present

3 reviews written

zbMATH

September 2020 – present

9 reviews written

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

Mathematics & Philosophy Representative
Joint Consultative Committee with Undergraduates
University of Oxford

2015 – 2016

Undergraduate Representative
Joint Committee for Mathematics and Philosophy
University of Oxford

2015 – 2016

Undergraduate Representative
Mathematics Department Art Committee
University of Oxford

2015 – 2016

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 L ^A T _E X
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Languages

	(CEFR levels)
English	Native
German	B1
French	B1
Japanese	A2