

NICHOLAS WILLIAMS

<https://nchlswllms.github.io> ♦ nicholas.williams@lancaster.ac.uk

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

Research Associate

University of Cambridge
With Ailsa Keating

October 2024 – September 2026

Postdoctoral Research Associate

Lancaster University
With David Pauksztello

September 2022 – September 2024

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. The two higher Stasheff–Tamari orders are equal
<i>Journal of the European Mathematical Society</i> | <i>To appear</i> |
| 7. A survey of congruences and quotients of partially ordered sets
<i>EMS Surveys in Mathematical Sciences</i> , Volume 11, no. 1, pp. 153–203 | <i>2024</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 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

PEER-REVIEWED CONFERENCE PROCEEDINGS

4. From higher Bruhat orders to Steenrod cup- i coproducts To appear
With Guillaume Laplante-Anfossi
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

PRIZES AND SCHOLARSHIPS

- Gibbs prize for Mathematics & Philosophy** 2016
 University of Oxford
 For top performance in Mathematics papers
- Gibbs prize for Mathematics & Philosophy** 2015
 University of Oxford
 For top performance in Mathematics papers
- Academic scholarship** 2013
 Worcester College, Oxford

INVITED CONFERENCE TALKS (IN PERSON)

- Donaldson–Thomas invariants for the Bridgeland–Smith correspondence** May 2024
Algebraic Geometry Days in Glasgow
 University of Glasgow
- Triangulations of cyclic polytopes through the lens of reconfiguration** August 2023
Minisymposium on Combinatorial Reconfiguration
International Congress on Industrial and Applied Mathematics
 Waseda University, Tokyo
- 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)

- Donaldson–Thomas invariants for the Bridgeland–Smith correspondence** August 2024
International Conference on Representations of Algebras
 Shanghai Jiao Tong University
- Donaldson–Thomas invariants for the Bridgeland–Smith correspondence** February 2024
Clusters and their Applications in the North
 University of Glasgow
- Donaldson–Thomas invariants for the Bridgeland–Smith correspondence** January 2024
Cluster Algebras and Its Applications
 Mathematisches Forschungsinstitut Oberwolfach
- 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
 Woods Hole, Massachusetts

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
 Woods Hole, Massachusetts

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)

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence *June 2024*
 Geometric, Algebraic, and Physical structures around the moduli of Meromorphic Quadratic Differentials
 Simons Center for Geometry and Physics
 Stony Brook University

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence *April 2024*
 Leeds Algebra Seminar
 University of Leeds

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence *April 2024*
 Algebra and Number Theory Seminar
 University of Vienna

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence *March 2024*
 Paris Algebra Seminar
 Institut de Mathématiques de Jussieu-Paris Rive Gauche

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence *October 2023*
 Sheffield Geometry and Physics seminar
 University of Sheffield

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence *October 2023*
 EGRET seminar
 University of Edinburgh

Donaldson–Thomas theory of quivers with potential *September 2023*
 Exact Asymptotics Theoretical Sciences Visiting Program
 Okinawa Institute of Science and Technology

Higher-dimensional cluster combinatorics and representation theory *August 2023*
 OIST Representation Theory Seminar
 Okinawa Institute of Science and Technology

Combinatorics of KP solitons *August 2023*
 Exact Asymptotics Theoretical Sciences Visiting Program
 Okinawa Institute of Science and Technology

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)

Donaldson–Thomas invariants for the barbell quiver with potential *June 2024*
 Cologne algebra seminar
 University of Cologne

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

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

LECTURE SERIES (IN PERSON)

**Introduction to Donaldson–Thomas theory
for quivers with potential***October 2023 – February 2024*

Lancaster University

12 lectures

LECTURE SERIES (VIRTUAL)

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

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

3 lectures

POSTERS

From higher Bruhat orders to Steenrod cup- i coproducts*July 2024**Formal Power Series and Algebraic Combinatorics*

Ruhr-Universität Bochum

**Studying triangulations of even-dimensional cyclic polytopes
via directed graphs***July 2023**Formal Power Series and Algebraic Combinatorics*

University of California, Davis

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

London Mathematical Society Scheme 1

October 2023

Conference grants

Silting, simple-minded, and stability

Co-organised with Raquel Coelho Simões and David Pauksztello

GBP 4,000

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

Co-organised with Aran Tattar

GBP 2,500

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**May 2019**and Homological Mirror Symmetry*

Local organising committee

University of Leicester

RESEARCH STAYS

Simons Center for Geometry and Physics Stony Brook University <i>Geometric, Algebraic, and Physical structures around the moduli of Meromorphic Quadratic Differentials</i> Invited participant 2 weeks	<i>June 2024</i>
University of Copenhagen Visiting: Guillaume Laplante-Anfossi Host: Nathalie Wahl 1 week	<i>January 2024</i>
Okinawa Institute of Science and Technology <i>Exact Asymptotics: From Fluid Dynamics to Quantum Geometry</i> Theoretical Sciences Visiting Program Invited participant 2 months	<i>August – October 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	<i>April 2021</i>
Isaac Newton Institute for Mathematical Sciences University of Cambridge <i>Cluster algebras and representation theory</i> Invited participant 1 week	<i>December 2021</i>
University of Graz Visiting: Jordan McMahon Host: Karin Baur 1 week	<i>April 2019</i>

REFEREEING

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

JSPS Short Term Pre/Postdoctoral Fellowships

REVIEWING

AMS MathSciNet 8 reviews written	<i>October 2022 – present</i>
zbMATH 14 reviews written	<i>September 2020 – present</i>

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
--------------------	---

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