

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

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. 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
<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
Advances in Mathematics, Volume 407, 108552

2022
1. The combinatorics of tensor products of higher Auslander algebras of type A
 With Jordan McMahon
Glasgow Mathematical Journal, 63(3), pp. 526–546

2021

PEER-REVIEWED CONFERENCE PROCEEDINGS

4. From higher Bruhat orders to Steenrod cup- i coproducts
 With Guillaume Laplante-Anfossi
Proceedings of the 36th International Conference on Formal Power Series and Algebraic Combinatorics

To appear
3. The higher Stasheff–Tamari orders in representation theory
Representations of Algebras and Related Structures

2023
2. Studying triangulations of even-dimensional cyclic polytopes via directed graphs
Proceedings of the 35th International Conference on Formal Power Series and Algebraic Combinatorics, Séminaire Lotharingien de Combinatoire 89B, Art. 4

2023
1. The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders
Proceedings of the 33rd International Conference on Formal Power Series and Algebraic Combinatorics, Séminaire Lotharingien de Combinatoire 85B, Art. 6

2021

OTHER CONFERENCE PROCEEDINGS

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

2024
1. Triangulations of cyclic polytopes and the higher Auslander algebras of type A
Various issues on representation theory and related topics RIMS Kōkyūroku, No. 2234

2022

OTHER PUBLICATIONS

2. Microthesis: Triangulations of cyclic polytopes in representation theory
London Mathematical Society Newsletter, No. 501, 33-34

2022
1. Higher-dimensional combinatorics in representation theory
 Doctoral thesis, University of Cologne

2022

PREPRINTS

4. Donaldson–Thomas invariants for the Bridgeland–Smith correspondence
 With Omar Kidwai
[arXiv:2401.10093](https://arxiv.org/abs/2401.10093)

2024
3. Steenrod operations via higher Bruhat orders
 With Guillaume Laplante-Anfossi
[arXiv:2309.16481](https://arxiv.org/abs/2309.16481)

2023
2. A geometric perspective on the τ -cluster morphism category
 With Sibylle Schroll, Aran Tattar, and Hipolito Treffinger
[arXiv:2302.12217](https://arxiv.org/abs/2302.12217)

2023
1. A structural view of maximal green sequences
 With Mikhail Gorsky
[arXiv:2301.08681](https://arxiv.org/abs/2301.08681)

2023

PRIZES AND SCHOLARSHIPS

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)

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence <i>Algebraic Geometry Days in Glasgow</i> University of Glasgow	May 2024
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	August 2023
A structural view of maximal green sequences <i>Cluster structures in the North</i> University of Central Lancashire	June 2023
A structural approach to maximal green sequences <i>Silting theory, algebras and representations</i> Charles University, Prague	September 2022

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	November 2020
---	---------------

CONTRIBUTED CONFERENCE TALKS (IN PERSON)

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence <i>International Conference on Representations of Algebras</i> Shanghai Jiao Tong University	August 2024
Donaldson–Thomas invariants for the Bridgeland–Smith correspondence <i>Clusters and their Applications in the North</i> University of Glasgow	February 2024
Donaldson–Thomas invariants for the Bridgeland–Smith correspondence <i>Cluster Algebras and Its Applications</i> Mathematisches Forschungsinstitut Oberwolfach	January 2024
Triangulations of prisms and preprojective algebras of type A <i>Combinatorial representation theory in Leeds</i> University of Leeds	July 2023

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
Virtual Heidelberg Laureate Forum
Online

September 2020

Representation theory and Grassmannians
STEM for Britain
Poster competition at UK Parliament

March 2019

GRANTS AND AWARDS

London Mathematical Society Scheme 1
Conference grants
Silting, simple-minded, and stability
Co-organised with Raquel Coelho Simões and David Pauksztello
GBP 4,000

October 2023

Japan Society for the Promotion of Science
Short Term Postdoctoral Research Fellowship
JPY 5,384,000
12 months awarded but 3 months taken

December 2021

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

July 2024

Köln Algebra and Representation Theory seminar
Co-organised with Daniel Schaefer
University of Cologne
Online

April 2021 – May 2022

Categorifications in Representation Theory
Co-organised with Aran Tattar
Online

September 2020

Mathematics PhD seminar
University of Leicester

September 2019 – August 2020

*Interactions between Representation Theory
and Homological Mirror Symmetry*
Local organising committee
University of Leicester

May 2019

RESEARCH STAYS

Simons Center for Geometry and Physics
Stony Brook University
*Geometric, Algebraic, and Physical structures around the moduli of Meromorphic
Quadratic Differentials*
Invited participant
2 weeks

June 2024

University of Copenhagen
Visiting: Guillaume Laplante-Anfossi
Host: Nathalie Wahl
1 week

January 2024

Okinawa Institute of Science and Technology
Exact Asymptotics: From Fluid Dynamics to Quantum Geometry
Theoretical Sciences Visiting Program
Invited participant
2 months

August – October 2023

Université du Québec à Montréal
Visiting: Hugh Thomas
2 weeks

November 2022

University of Aarhus
Visiting: Raphael Bennett-Tennenhaus and Amit Shah
1 week

October 2022

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

April 2021

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

December 2021

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

JSPS Short Term Pre/Postdoctoral Fellowships

REVIEWING

AMS MathSciNet
8 reviews written

October 2022 – present

zbMATH
14 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**

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^AT_EX**Languages**

(CEFR levels)

English Native

French B1

German B1

Japanese B1