

NICHOLAS WILLIAMS

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PERSONAL INFORMATION

Full name: Nicholas James Williams
Date of birth: 11th July 1994
Place of birth: London, UK
Citizenship: 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

10. A geometric perspective on the τ -cluster morphism category
With Sibylle Schroll, Aran Tattar, and Hipolito Treffinger
Mathematische Zeitschrift
To appear
9. The two higher Stasheff–Tamari orders are equal
Journal of the European Mathematical Society
To appear

8. Steenrod operations via higher Bruhat orders 2025
With Guillaume Laplante-Anfossi
Proceedings of the London Mathematical Society, Volume 130, no. 2, e70024
7. A survey of congruences and quotients of partially ordered sets 2024
EMS Surveys in Mathematical Sciences, Volume 11, no. 1, pp. 153–203
6. Triangulations of prisms and preprojective algebras of type A 2024
With Osamu Iyama
International Mathematics Research Notices, rnae059
5. Stability spaces of string and band modules 2024
With Sibylle Schroll, Aran Tattar, Hipolito Treffinger, and Yadira Valdivieso
Journal of Pure and Applied Algebra, Volume 228, no. 4, 107503
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 2024
With Guillaume Laplante-Anfossi
Proceedings of the 36th International Conference on Formal Power Series and Algebraic Combinatorics, Séminaire Lotharingien de Combinatoire 91B, Art. 10
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. Oriented matroids and type \mathbb{A} cluster categories 2025
[arXiv:2509.07883](#)
3. Preorders on maximal chains:
hyperplane arrangements, Cambrian lattices, and maximal green sequences 2025
With Mikhail Gorsky
[arXiv:2506.08858](#)
2. Donaldson–Thomas invariants for the Bridgeland–Smith correspondence 2024
With Omar Kidwai
[arXiv:2401.10093](#)
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)

Mutation des carquois et groupes de tresses December 2025
Séminaire de géométrie, représentations, algèbre, analyse, logique
Université de Caen Normandie

Steenrod operations via higher Bruhat orders December 2024
Algebra, Number Theory, Logic and Representation theory seminar
University of East Anglia

Donaldson–Thomas invariants for the Bridgeland–Smith correspondence *October 2024*
Algebraic Geometry Seminar
University of Cambridge

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

Seminar@Aarhus

Aarhus University

*October 2022***Equivalence of maximal green sequences**

Working Seminar in Algebra and Geometry

University of Cologne

*April 2022***Equivalence of maximal green sequences**

Paris Algebra Seminar

Institut de Mathématiques de Jussieu-Paris Rive Gauche

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

Pure Mathematics Seminar

University of East Anglia

*November 2019***Higher analogues of Grassmannian clusters**

Algebra and Number Theory Seminar

University of Graz

*April 2019***SEMINAR TALKS (VIRTUAL)****Oriented matroids and maximal green sequences
of type A cluster algebras**Combinatorics and Representation Theory seminar
Korea Institute for Advanced Study*October 2025***Steenrod operations via higher Bruhat orders**

Longitudinal Algebra & Geometry Open Online Seminar (LAGOON)

*May 2025***Oriented matroids from cluster-tilting objects in type A cluster categories** *March 2025*

New Directions in Group Theory & Triangulated Categories

Donaldson–Thomas invariants for the barbell quiver with potential

Cologne algebra seminar

University of Cologne

*June 2024***Mutating cluster-tilting objects in $(d+2)$ -angulated cluster categories**

FD seminar

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

Aachen–Bochum–Cologne Darstellungstheorie Seminar

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

*January 2022***Cyclic polytopes and higher Auslander–Reiten theory**

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

*December 2021***The two higher Stasheff–Tamari orders are equal**

Working seminar in algebra and geometry

University of Cologne

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

Paris algebra seminar

Institut de Mathématiques de Jussieu-Paris Rive Gauche

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

Diskrete Mathematik / Geometrie Forschungsseminar

TU Berlin

March 2021

LECTURE SERIES (IN PERSON)

**Introduction to Donaldson–Thomas theory
for quivers with potential**
Lancaster University
12 lectures

October 2023 – February 2024

LECTURE SERIES (VIRTUAL)

Cyclic polytopes and higher Auslander–Reiten theory
Tokyo–Nagoya algebra seminar
University of Tokyo and Nagoya University
3 lectures

June – July 2022

POSTERS

From higher Bruhat orders to Steenrod cup-*i* coproducts
Formal Power Series and Algebraic Combinatorics
Ruhr-Universität Bochum

July 2024

**Studying triangulations of even-dimensional cyclic polytopes
via directed graphs**
Formal Power Series and Algebraic Combinatorics
University of California, Davis

July 2023

An algebraic interpretation of the higher Stasheff–Tamari orders
Young Researchers in Mathematics
Online
Winner of 1st prize in poster competition

June 2021

An algebraic interpretation of the higher Stasheff–Tamari orders
Advances in Representation Theory of Algebras
Online

May 2021

New interpretations of the higher Stasheff–Tamari orders
Combinatorial algebra meets algebraic combinatorics
Université du Québec à Montréal
Online

January 2021

An algebraic interpretation of the higher Stasheff–Tamari orders
International Conference on Representations of Algebras
“Research snapshot”
Online

November 2020

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 <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 <i>Categorifications in Representation Theory</i> Co-organised with Aran Tattar GBP 2,500	<i>April 2020</i>

ORGANISATION

<i>Simple-mindedness, silting, and stability</i> Co-organising with Raquel Coelho Simões and David Pauksztello Ambleside Campus, University of Cumbria	<i>July 2024</i>
<i>Köln Algebra and Representation Theory seminar</i> Co-organised with Daniel Schaefer University of Cologne Online	<i>April 2021 – May 2022</i>
<i>Categorifications in Representation Theory</i> Co-organised with Aran Tattar Online	<i>September 2020</i>
<i>Mathematics PhD seminar</i> University of Leicester	<i>September 2019 – August 2020</i>
<i>Interactions between Representation Theory and Homological Mirror Symmetry</i> Local organising committee University of Leicester	<i>May 2019</i>

RESEARCH STAYS

Université de Caen Normandie Visiting: Matthew Pressland 1 week	<i>December 2025</i>
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, Annals of Representation Theory, Communications in Algebra, Compositio Mathematica, Discrete Mathematics (x2), Electronic Journal of Combinatorics, Electronic Research Archive, Indagationes Mathematicae, Journal of Algebra, Journal of Algebraic Combinatorics, Selecta Mathematica
- JSPS Short Term Pre/Postdoctoral Fellowships (x7)
- Quick opinions: Inventiones Mathematicae, Proceedings of the Edinburgh Mathematical Society

REVIEWING

AMS MathSciNet 13 reviews written	<i>October 2022 – present</i>
zbMATH 15 reviews written	<i>September 2020 – present</i>

TEACHING

Part III Commutative Algebra Lecturer for 24-lecture course taken by ~50 students Other duties: teaching problem sheet classes and setting examination University of Cambridge	<i>October 2025 – July 2026</i>
Part IB Groups, Rings, and Modules Lecture cover: 1 lecture University of Cambridge	<i>February 2025</i>

Part II Algebraic Geometry

January 2025 – March 2025

Supervisor

University of Cambridge

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

STUDENT SUPERVISION

Part III essay (Master's project)

2025 – 2026

University of Cambridge

Two students

Cambridge Summer Research in Mathematics

2025

Project: *Combinatorics of KP solitons*

Students: Lilian Contius, Chris Yuzhen Yang

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

MEMBERSHIPS

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

June 2019 – present

Trinity College Postdoctoral Society

January 2025 – present

OTHER

Interviewer for undergraduate mathematics admissions
Two full days of interviews
Emmanuel College, Cambridge

December 2025

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

Languages

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