

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	<i>September 2018 – April 2022</i>
University of Cologne	<i>April 2021 – April 2022</i>
Started at University of Leicester	<i>September 2018 – April 2021</i>
Supervisor: Sibylle Schroll	
<i>Summa cum laude</i>	

Graduate Diploma in Quantitative Economics	<i>October 2017 – June 2018</i>
Birkbeck, University of London	
Distinction	

MMathPhil in Mathematics & Philosophy	<i>October 2012 – June 2016</i>
Worcester College, Oxford	
Double First Class Honours	

EMPLOYMENT

Research Associate	<i>October 2024 – September 2026</i>
University of Cambridge	
With Ailsa Keating	

Postdoctoral Research Associate	<i>September 2022 – September 2024</i>
Lancaster University	
With David Pauksztello	

JSPS Short Term Postdoctoral Research Fellow	<i>May 2022 – August 2022</i>
University of Tokyo	
With Osamu Iyama	

Graduate Teaching Assistant	<i>September 2021 – December 2021</i>
King's College London	

Guest Teacher	<i>September 2021 – December 2021</i>
London School of Economics	

Feedback Session Leader	<i>January 2019 – December 2020</i>
University of Leicester	

JOURNAL PUBLICATIONS

- | | |
|---|------------------|
| 9. The two higher Stasheff–Tamari orders are equal
<i>Journal of the European Mathematical Society</i> | <i>To appear</i> |
| 8. Steenrod operations via higher Bruhat orders
With Guillaume Laplante-Anfossi
<i>Proceedings of the London Mathematical Society</i> , Volume 130, no. 2, e70024 | <i>2025</i> |

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

5. Oriented matroids and type \mathbb{A} cluster categories 2025
arXiv:2509.07883
4. Preorders on maximal chains: 2025
hyperplane arrangements, Cambrian lattices, and maximal green sequences
With Mikhail Gorsky
arXiv:2506.08858
3. Donaldson–Thomas invariants for the Bridgeland–Smith correspondence 2024
With Omar Kidwai
arXiv:2401.10093
2. A geometric perspective on the τ -cluster morphism category 2023
With Sibylle Schroll, Aran Tattar, and Hipolito Treffinger
arXiv: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)

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** *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)

**Oriented matroids and maximal green sequences
of type A cluster algebras***October 2025*

Combinatorics and Representation Theory seminar

Korea Institute for Advanced Study

Steenrod operations via higher Bruhat orders*May 2025*

Longitudinal Algebra & Geometry Open Online Seminar (LAGOON)

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

ORGANISATION

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

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	June 2024
University of Copenhagen Visiting: Guillaume Laplante-Anfossi Host: Nathalie Wahl 1 week	January 2024
Okinawa Institute of Science and Technology <i>Exact Asymptotics: From Fluid Dynamics to Quantum Geometry</i> Theoretical Sciences Visiting Program	August – October 2023

Invited participant
2 months

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, 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

October 2022 – present

zbMATH
15 reviews written

September 2020 – present

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

October 2025 – July 2026

Part IB Groups, Rings, and Modules
Lecture cover: 1 lecture
University of Cambridge

February 2025

Part II Algebraic Geometry
Supervisor
University of Cambridge

January 2025 – March 2025

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

Cambridge Summer Research in Mathematics
Project: *Combinatorics of KP solitons*
Students: Lilian Contius, Chris Yuzhen Yang

2025

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

MEMBERSHIPS

London Mathematical Society

June 2019 – present

Associate member

3 reports on conferences written for the LMS newsletter

Trinity College Postdoctoral Society

January 2025 – present

OTHER

Interviewer for undergraduate mathematics admissions

December 2025

Two full days of interviews

Emmanuel College, Cambridge

Programming

Python, Sage, Maple, node.js, Haskell

Git

L^AT_EX

Languages

(CEFR levels)

English	Native
French	B1
German	B1
Japanese	B1