NICHOLAS WILLIAMS

https://nchlswllms.github.io ⋄ nw480@cam.ac.uk

PERSONAL INFORMATION

Full name: Nicholas James Williams
Date of birth: 11$^{\text{th}}$ July 1994
Place of birth: London, UK
Citizenship: UK

EDUCATION

Doctorate in Mathematics   *September 2018 – April 2022*
University of Cologne   *April 2021 – April 2022*
Started at University of Leicester   *September 2018 – April 2021*
Supervisor: Sibylle Schroll
Summa cum laude

Graduate Diploma in Quantitative Economics   *October 2017 – June 2018*
Birkbeck, University of London
Distinction

MMathPhil in Mathematics & Philosophy   *October 2012 – June 2016*
Worcester College, Oxford
Double First Class Honours

EMPLOYMENT

Research Associate   *October 2024 – September 2026*
University of Cambridge
With Ailsa Keating

Postdoctoral Research Associate   *September 2022 – September 2024*
Lancaster University
With David Pauksztello

JSPS Short Term Postdoctoral Research Fellow   *May 2022 – August 2022*
University of Tokyo
With Osamu Iyama

Graduate Teaching Assistant   *September 2021 – December 2021*
King's College London

Guest Teacher   *September 2021 – December 2021*
London School of Economics

Feedback Session Leader   *January 2019 – December 2020*
University of Leicester

JOURNAL PUBLICATIONS

9. The two higher Stasheff–Tamari orders are equal   *To appear*
   Journal of the European Mathematical Society

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

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 *January 2022*
the higher Bruhat orders
Formal Power Series and Algebraic Combinatorics
Bar-Ilan University

SEMINAR TALKS (IN PERSON)

Mutation des carquois et groupes de tresses *December 2025*
Séminaire de géometrie, 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   *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   *October 2025*
 of type A cluster algebras
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   *October 2023 – February 2024*
for quivers with potential
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   *July 2023*
via directed graphs
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 1$^{\text{st}}$ 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 *June 2024*
Stony Brook University
Geometric, Algebraic, and Physical structures around the moduli of Meromorphic Quadratic Differentials
Invited participant
2 weeks

University of Copenhagen *January 2024*
Visiting: Guillaume Laplante-Anfossi
Host: Nathalie Wahl
1 week

Okinawa Institute of Science and Technology *August – October 2023*
Exact Asymptotics: From Fluid Dynamics to Quantum Geometry
Theoretical Sciences Visiting Program

Invited participant
2 months

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

Isaac Newton Institute for Mathematical Sciences   *December 2021*
University of Cambridge
Cluster algebras and representation theory
Invited participant
1 week

University of Graz   *April 2019*
Visiting: Jordan McMahon
Host: Karin Baur
1 week

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   *October 2022 – present*
13 reviews written

zbMATH   *September 2020 – present*
15 reviews written

TEACHING

Part III Commutative Algebra   *October 2025 – July 2026*
Lecturer for 24-lecture course taken by ∼50 students
Other duties: teaching problem sheet classes and setting examination
University of Cambridge

Part IB Groups, Rings, and Modules   *February 2025*
Lecture cover: 1 lecture
University of Cambridge

Part II Algebraic Geometry   *January 2025 – March 2025*
Supervisor
University of Cambridge

Real analysis   *September 2021 – December 2021*
Class teacher (online)
King's College London

MA107: Quantitative methods   *September 2021 – December 2021*
Class teacher
London School of Economics

Calculus & analysis   *October 2020 – December 2020*
Class teacher (online)
University of Leicester

Second-year algebra   *January 2020 – April 2020*
Class teacher
University of Leicester

Calculus & analysis   *October 2019 – April 2020*
Class teacher
University of Leicester

Elements of number theory   *October 2019 – December 2019*
Class teacher
University of Leicester

Calculus & analysis   *January 2019 – March 2019*
Class teacher
University of Leicester

STUDENT SUPERVISION

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   *November 2018, 2019, 2020*
Research in the UK afternoon
University of Cambridge

Student Helper   *March 2013, 2014, 2015*
Oxford and Cambridge Student Conferences

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
                    LaTeX

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