

NICHOLAS WILLIAMS

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EDUCATION

| | |
|---|--|
| Doctorate in Mathematics University of Cologne Started at University of Leicester Supervisor: Sibylle Schroll <i>Summa cum laude</i> | <i>September 2018 – April 2022</i> <i>April 2021 – April 2022</i> <i>September 2018 – April 2021</i> |
| Graduate Diploma in Quantitative Economics Birkbeck, University of London Distinction | <i>October 2017 – June 2018</i> |
| MMathPhil in Mathematics & Philosophy Worcester College, Oxford Double First Class Honours | <i>October 2012 – June 2016</i> |

EMPLOYMENT

| | |
|--|--|
| Research Associate University of Cambridge With Ailsa Keating | <i>October 2024 – September 2026</i> |
| Postdoctoral Research Associate Lancaster University With David Pauksztello | <i>September 2022 – September 2024</i> |
| JSPS Short Term Postdoctoral Research Fellow University of Tokyo With Osamu Iyama | <i>May 2022 – August 2022</i> |
| Graduate Teaching Assistant King's College London | <i>September 2021 – December 2021</i> |
| Guest Teacher London School of Economics | <i>September 2021 – December 2021</i> |
| Feedback Session Leader University of Leicester | <i>January 2019 – December 2020</i> |

JOURNAL PUBLICATIONS

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|---|------------------|
| 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 <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 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

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)

- 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

RESEARCH STAYS

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|---|-----------------------|
| 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 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 <i>Cluster algebras and representation theory</i> 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, Discrete Mathematics (x2), Electronic Research Archive, Journal of Algebra, Journal of Algebraic Combinatorics

JSPS Short Term Pre/Postdoctoral Fellowships

REVIEWING

AMS MathSciNet
10 reviews written

October 2022 – present

zbMATH
14 reviews written

September 2020 – present

TEACHING

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

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
Associate member
3 reports on conferences written for the LMS newsletter

June 2019 – present

Trinity College Postdoctoral Society

January 2025 – present

OTHER

Programming Python, Sage, Maple, node.js, Haskell
 Git
 L^AT_EX

Languages

(CEFR levels)

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| English | Native |
| French | B1 |
| German | B1 |
| Japanese | B1 |