

# NICHOLAS WILLIAMS

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## EDUCATION

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### Doctorate in Mathematics

University of Cologne  
Started at University of Leicester  
Supervisor: Sibylle Schroll  
*Summa cum laude*

*September 2018 – May 2022*

*April 2021 – May 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

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### Postdoctoral Research Associate

Lancaster University  
With David Paukztello

*September 2022 – March 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

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4. Quiver combinatorics and triangulations of cyclic polytopes *To appear*  
*Algebraic Combinatorics*
3. The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders *2023*  
*Electronic Journal of Combinatorics*
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.

## CONFERENCE PROCEEDINGS

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3. Triangulations of cyclic polytopes and the higher Auslander algebras of type  $A$  *To appear*  
*Various issues on representation theory and related topics, RIMS Kōkyūroku*

2. The higher Stasheff–Tamari orders in representation theory *To appear*  
*Proceedings of the 2020 International Conference on Representations of Algebras*
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, 12.*

## OTHER PUBLICATIONS

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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

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5. A geometric perspective on the  $\tau$ -cluster morphism category *2023*  
 (With Sibylle Schroll, Aran Tattar, and Hipolito Treffinger)  
[arXiv:2302.12217](#)
4. A structural view of maximal green sequences *2023*  
 (With Mikhail Gorsky)  
[arXiv:2301.08681](#)
3. Stability spaces of string and band modules *2022*  
 (With Sibylle Schroll, Aran Tattar, Hipolito Treffinger, and Yadira Valdivieso)  
[arXiv:2208.15000](#)
2. Triangulations of prisms and preprojective algebras of type  $A$  *2022*  
 (With Osamu Iyama)  
[arXiv:2208.12957](#)
1. The two higher Stasheff–Tamari orders are equal *2021*  
[arXiv:2106.01050](#)

## PRIZES AND SCHOLARSHIPS

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| <b>Gibbs prize for Mathematics &amp; Philosophy</b><br>University of Oxford<br>For top performance in Mathematics papers | <i>2016</i> |
| <b>Gibbs prize for Mathematics &amp; Philosophy</b><br>University of Oxford<br>For top performance in Mathematics papers | <i>2015</i> |
| <b>Academic scholarship</b><br>Worcester College, Oxford   | <i>2013</i> |
| <b>Honorary scholarship</b><br>Westminster School  | <i>2007</i> |

## INVITED CONFERENCE TALKS (IN PERSON)

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| <b>A structural approach to maximal green sequences</b><br><i>Silting theory, algebras and representations</i><br>Charles University, Prague | <i>September 2022</i> |
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## INVITED CONFERENCE TALKS (VIRTUAL)

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**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)

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**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*

*Representation theory and various issues on related topics*

Research Institute for Mathematical Sciences, Kyoto University

**Higher analogues of Grassmannian clusters**

*April 2019*

*Maurice Auslander Distinguished Lectures and International Conference*

**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)

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**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)

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**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)**

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**Cyclic polytopes and higher Auslander–Reiten theory III***July 2022*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

**Cyclic polytopes and higher Auslander–Reiten theory II***June 2022*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

**Mutating cluster-tilting objects in  $(d + 2)$ -angulated cluster categories***June 2022*

FD seminar

**Cyclic polytopes and higher Auslander–Reiten theory I***June 2022*

Tokyo–Nagoya algebra seminar

University of Tokyo and Nagoya University

**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

**The Tamari lattice in representation theory***March 2021*

Junior Algebra Colloquium

University of Bristol

**POSTERS**

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**An algebraic interpretation of the higher Stasheff–Tamari orders***June 2021**Young Researchers in Mathematics*

Online

Winner of 1<sup>st</sup> prize in poster competition

<b>An algebraic interpretation of the higher Stasheff–Tamari orders</b> <i>Advances in Representation Theory of Algebras</i> Online	<i>May 2021</i>
<b>New interpretations of the higher Stasheff–Tamari orders</b> <i>Combinatorial algebra meets algebraic combinatorics</i> Université du Québec à Montréal Online	<i>January 2021</i>
<b>An algebraic interpretation of the higher Stasheff–Tamari orders</b> <i>International Conference on Representations of Algebras</i> “Research snapshot” Online	<i>November 2020</i>
<b>New interpretations of the higher Stasheff–Tamari orders</b> <i>Virtual Heidelberg Laureate Forum</i> Online	<i>September 2020</i>
<b>Representation theory and Grassmannians</b> <i>STEM for Britain</i> Poster competition at UK Parliament	<i>March 2019</i>

## GRANTS

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London Mathematical Society Scheme 8 Postgraduate research conference grants <i>Categorifications in Representation Theory</i> conference organised with Aran Tattar GBP 2,500	<i>April 2020</i>
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## ORGANISATION

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<b>Köln Algebra and Representation Theory seminar</b> Co-organiser University of Cologne Online	<i>April 2021 – May 2022</i>
<b>Categorifications in Representation Theory conference</b> Co-organised with Aran Tattar Online	<i>September 2020</i>
<b>Mathematics PhD seminar</b> University of Leicester	<i>September 2019 – August 2020</i>
<b>Representation theory and mirror symmetry conference</b> Local organising committee University of Leicester	<i>May 2019</i>

## RESEARCH STAYS

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Max Planck Institute for Mathematics, Bonn Visiting: Guillaume Laplante-Anfossi 1 week	<i>February 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

*April 2021*

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

*December 2021*

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

*April 2019*

## REVIEWING

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AMS MathSciNet  
2 reviews written

*October 2022 – present*

zbMATH  
7 reviews written

*September 2020 – present*

## REFEREEING

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Journal of Algebraic Combinatorics, Electronic Research Archive

## TEACHING

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**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

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Small Grants Committee The Leathersellers' Company	<i>September 2022 – present</i>
Mathematics & Philosophy Representative Joint Consultative Committee with Undergraduates University of Oxford	<i>2015 – 2016</i>
Undergraduate Representative Joint Committee for Mathematics and Philosophy University of Oxford	<i>2015 – 2016</i>
Undergraduate Representative Mathematics Department Art Committee University of Oxford	<i>2015 – 2016</i>

## OUTREACH

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University of Leicester Representative <i>Research in the UK afternoon</i> University of Cambridge	<i>November 2018, 2019, 2020</i>
Student Helper <i>Oxford and Cambridge Student Conferences</i>	<i>March 2013, 2014, 2015</i>

## OTHER

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London Mathematical Society Associate member 3 reports on conferences written for the LMS newsletter	<i>June 2019 – present</i>
<b>Programming</b>	Python, Sage, Maple, node.js, Haskell Git L <sup>A</sup> T <sub>E</sub> X
<b>Languages</b>	(CEFR levels) English Native German B1 French B1 Japanese A2 Spanish A1