

# 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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4. A structural view of maximal green sequences *2023*  
 (With Mikhail Gorsky)  
[arXiv:2301.08681](https://arxiv.org/abs/2301.08681)
3. Stability spaces of string and band modules *2022*  
 (With Sibylle Schroll, Aran Tattar, Hipolito Treffinger, and Yadira Valdivieso)  
[arXiv:2208.15000](https://arxiv.org/abs/2208.15000)
2. Triangulations of prisms and preprojective algebras of type  $A$  *2022*  
 (With Osamu Iyama)  
[arXiv:2208.12957](https://arxiv.org/abs/2208.12957)
1. The two higher Stasheff–Tamari orders are equal *2021*  
[arXiv:2106.01050](https://arxiv.org/abs/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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| <b>An algebraic interpretation of the higher Stasheff–Tamari orders</b><br><i>International Conference on Representations of Algebras</i><br>Selected to give talk by scientific committee based on research snapshot | <i>November 2020</i> |
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## 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

**SEMINAR TALKS (VIRTUAL)**


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<b>Cyclic polytopes and higher Auslander–Reiten theory III</b>	<i>July 2022</i>
Tokyo–Nagoya algebra seminar University of Tokyo and Nagoya University	
<b>Cyclic polytopes and higher Auslander–Reiten theory II</b>	<i>June 2022</i>
Tokyo–Nagoya algebra seminar University of Tokyo and Nagoya University	
<b>Mutating cluster-tilting objects in <math>(d + 2)</math>-angulated cluster categories</b>	<i>June 2022</i>
FD seminar	
<b>Cyclic polytopes and higher Auslander–Reiten theory I</b>	<i>June 2022</i>
Tokyo–Nagoya algebra seminar University of Tokyo and Nagoya University	
<b>An algebraic interpretation of the higher Stasheff–Tamari orders</b>	<i>January 2022</i>
Aachen–Bochum–Cologne Darstellungstheorie Seminar RWTH Aachen University, Ruhr-University Bochum, and University of Cologne	
<b>Cyclic polytopes and higher Auslander–Reiten theory</b>	<i>December 2021</i>
Tokyo–Nagoya algebra seminar University of Tokyo and Nagoya University	
<b>The two higher Stasheff–Tamari orders are equal</b>	<i>May 2021</i>
Working seminar in algebra and geometry University of Cologne	
<b>The higher Stasheff–Tamari orders in representation theory</b>	<i>April 2021</i>
Paris algebra seminar Institut de Mathématiques de Jussieu-Paris Rive Gauche	
<b>New interpretations of the higher Stasheff–Tamari orders</b>	<i>March 2021</i>
Diskrete Mathematik / Geometrie Forschungsseminar TU Berlin	
<b>The Tamari lattice in representation theory</b>	<i>March 2021</i>
Junior Algebra Colloquium University of Bristol	

**POSTERS**


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<b>An algebraic interpretation of the higher Stasheff–Tamari orders</b>	<i>June 2021</i>
<i>Young Researchers in Mathematics</i> Online Winner of 1 <sup>st</sup> prize in poster competition	
<b>An algebraic interpretation of the higher Stasheff–Tamari orders</b>	<i>May 2021</i>
<i>Advances in Representation Theory of Algebras</i> Online	
<b>New interpretations of the higher Stasheff–Tamari orders</b>	<i>January 2021</i>
<i>Combinatorial algebra meets algebraic combinatorics</i>	

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

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London Mathematical Society Scheme 8 *April 2020*  
Postgraduate research conference grants  
*Categorifications in Representation Theory* conference organised with Aran Tattar  
GBP 2,500

## ORGANISATION

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**Köln Algebra and Representation Theory seminar** *April 2021 – May 2022*  
Co-organiser  
University of Cologne  
Online

**Categorifications in Representation Theory conference** *September 2020*  
Co-organised with Aran Tattar  
Online

**Mathematics PhD seminar** *September 2019 – August 2020*  
University of Leicester

**Representation theory and mirror symmetry conference** *May 2019*  
Local organising committee  
University of Leicester

## RESEARCH STAYS

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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

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