

# NICHOLAS WILLIAMS

<https://nchlswillms.github.io>  $\diamond$  [github.com/nchlswillms](https://github.com/nchlswillms)  $\diamond$  [williams@math.uni-koeln.de](mailto:williams@math.uni-koeln.de)

## EDUCATION

---

### PhD in Mathematics

University of Cologne

University of Leicester

Supervisor: Sibylle Schroll

*April 2021 – June 2022 (expected)*

*September 2018 – September 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

---

### University of Tokyo

JSPS London Short Term Predoctoral Research Fellow

Host: Osamu Iyama

One year

*Currently unable to take up due to COVID-19 travel restrictions*

### King's College London

Graduate Teaching Assistant

*September 2021 – December 2021*

### London School of Economics

Guest Teacher

*September 2021 – December 2021*

### University of Leicester

Feedback session leader

*January 2019 – December 2020*

## PUBLICATIONS

---

The combinatorics of tensor products of higher Auslander algebras of type  $A$

(With Jordan McMahon.)

*Glasgow Mathematical Journal*, 63(3), pp. 526–546.

*2021*

## CONFERENCE PROCEEDINGS

---

The higher Stasheff–Tamari orders in representation theory

*Proceedings of the 2020 International Conference on Representations of Algebras*

*To appear*

The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders

*Proceedings of the 33rd International Conference on Formal Power Series and Algebraic Combinatorics,*

*Séminaire Lotharingien de Combinatoire* 85B, Art. 6, 12.

*2021*

## PREPRINTS

---

|  |                      |
|--|----------------------|
| Quiver combinatorics for higher-dimensional triangulations<br><code>arXiv:2112.09189</code>                        | <i>December 2021</i> |
| The two higher Stasheff–Tamari orders are equal<br><code>arXiv:2106.01050</code>                                   | <i>June 2021</i>     |
| The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders<br><code>arXiv:2012.10371</code> | <i>December 2020</i> |
| New interpretations of the higher Stasheff–Tamari orders<br><code>arXiv:2007.12664</code>                          | <i>July 2020</i>     |

## PRIZES AND SCHOLARSHIPS

---

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

---

|  |                      |
|--|----------------------|
| <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<br>Via BigBlueButton | <i>November 2020</i> |
|--|----------------------|

## CONTRIBUTED CONFERENCE TALKS

---

|   |                      |
|---|----------------------|
| <b>The first higher Stasheff–Tamari orders are quotients of the higher Bruhat orders</b><br><i>Formal Power Series and Algebraic Combinatorics</i><br>Bar-Ilan University<br>Via Zoom | <i>January 2022</i>  |
| <b>The higher Stasheff–Tamari orders on triangulations of cyclic polytopes</b><br><i>London Mathematical Society Graduate Student Meeting</i><br>Via Zoom                             | <i>June 2021</i>     |
| <b>Vertex figures of cubillages of cyclic zonotopes</b><br><i>London Mathematical Society Graduate Student Meeting</i><br>Via Zoom  | <i>November 2020</i> |
| <b>Nice triangulations of cyclic polytopes</b><br><i>London Mathematical Society Graduate Student Meeting</i>   | <i>June 2019</i>     |

|   |                   |
|---|-------------------|
| <b>Higher analogues of Grassmannian clusters</b><br><i>Maurice Auslander Distinguished Lectures and International Conference</i>          | <i>April 2019</i> |
| <b>Higher analogues of Grassmannian clusters</b><br><i>New Connections and Directions in Representation Theory</i><br>University of Leeds | <i>April 2019</i> |
| <b>Higher analogues of Grassmannian clusters</b><br><i>Tropical Geometry meets Representation Theory</i><br>University of Leicester       | <i>April 2019</i> |

## SEMINAR TALKS

---

|   |                      |
|---|----------------------|
| <b>Equivalence of maximal green sequences</b><br>Paris algebra seminar<br>Institut de Mathématiques de Jussieu-Paris Rive Gauche<br>In person   | <i>February 2022</i> |
| <b>An algebraic interpretation of the higher Stasheff–Tamari orders</b><br>Aachen–Bochum–Cologne Darstellungstheorie Seminar<br>RWTH Aachen University, Ruhr-University Bochum, and University of Cologne<br>Via Zoom | <i>January 2022</i>  |
| <b>Cyclic polytopes and higher Auslander–Reiten theory</b><br>Tokyo–Nagoya algebra seminar<br>University of Tokyo and Nagoya University<br>Via Zoom   | <i>December 2021</i> |
| <b>The two higher Stasheff–Tamari orders are equal</b><br>Working seminar in algebra and geometry<br>University of Cologne<br>Via Zoom  | <i>May 2021</i>      |
| <b>The higher Stasheff–Tamari orders in representation theory</b><br>Paris algebra seminar<br>Institut de Mathématiques de Jussieu-Paris Rive Gauche<br>Via Zoom  | <i>April 2021</i>    |
| <b>New interpretations of the higher Stasheff–Tamari orders</b><br>Diskrete Mathematik / Geometrie Forschungsseminar<br>TU Berlin<br>Via Zoom   | <i>March 2021</i>    |
| <b>The Tamari lattice in representation theory</b><br>Junior Algebra Colloquium<br>University of Bristol<br>Via Zoom  | <i>March 2021</i>    |
| <b>KP solitons</b><br>PhD seminar<br>University of Leicester<br>Via Microsoft Teams   | <i>October 2020</i>  |

**KP solitons and the higher Stasheff–Tamari orders II***October 2020*

Working seminar in algebra and geometry

University of Leicester

Via Zoom

**KP solitons and the higher Stasheff–Tamari orders I***September 2020*

Working seminar in algebra and geometry

University of Leicester

Via Zoom

**Triangulations of odd-dimensional cyclic polytopes***June 2020*

PhD seminar

University of Leicester

Via Blackboard Collaborate

**Fukaya categories and higher Auslander algebras of type  $A$** *April 2020*

Working seminar in algebra and geometry

University of Leicester

Via Zoom

**Cluster categories and crossing conditions***February 2020*

Working seminar in algebra and geometry

University of Leicester

**An algebraic interpretation of the higher Stasheff–Tamari orders***November 2019*

Pure mathematics seminar

University of East Anglia

**An algebraic interpretation of the higher Stasheff–Tamari orders***November 2019*

Working seminar in algebra and geometry

University of Leicester

**Nice triangulations of cyclic polytopes***October 2019*

PhD seminar

University of Leicester

**Higher analogues of Grassmannian clusters***April 2019*

Algebra and number theory seminar

University of Graz

**Alternating strand diagrams, plabic graphs, and Grassmannians***January 2019*

PhD seminar

University of Leicester

**Grassmannians***October 2018*

Working seminar in algebra and geometry

University of Leicester

**POSTERS**

---

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

## GRANTS

---

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

## ORGANISATION

---

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

## RESEARCH STAYS

---

|  |                      |
|--|----------------------|
| University of Cambridge<br>Isaac Newton Institute for Mathematical Sciences<br>Cluster algebras and representation theory programme<br>Invited participant<br>1 week | <i>December 2021</i> |
|--|----------------------|

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

*April 2019*

## REVIEWING

---

zbMATH  
2 reviews written

*September 2020 – present*

## REFEREEING

---

Journal of Algebraic Combinatorics

## TEACHING

---

### **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*

## OTHER

---

London Mathematical Society  
Associate member  
3 reports on conferences written for the LMS newsletter

*June 2019 – present*

**Programming**      Python, Sage, Maple, node.js, Haskell  
                              Git  
                               $\text{\LaTeX}$

### Languages

|          | (CEFR levels) |
|----------|---------------|
| English  | Native        |
| German   | B1            |
| French   | B1            |
| Spanish  | A1            |
| Japanese | A1            |

## OTHER EMPLOYMENT

---

**Enders Analysis**  
Research analyst, Telecoms

*November 2016 – August 2018*