

George Kenison

School of Computer Science and Mathematics – Liverpool John Moores University

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Research Experience

Research Interests: Decision Problems, Formal Methods, Automated Verification, Linear Dynamical Systems.

Research Fellow in Computer Science and Informatics.,

September 2023–

School of Computer Science and Mathematics, Liverpool John Moores University.

Postdoctoral Researcher in Automated Reasoning and Program Analysis.,

April 2021–August 2023

Institute of Logic and Computation, Technische Universität Wien.

Postdoctoral Researcher in Infinite-State Systems and Dynamical Systems.,

June 2018–March 2021

Department of Computer Science, University of Oxford.

Education

PhD in Mathematics, University of Warwick.

2017

Thesis: Asymptotics in conjugacy classes for free groups. EPSRC doctoral award funding.

MMath (Master of Mathematics), University of Warwick, First Class Hons.

2013

Dissertation: Periodic orbits of hyperbolic and quasi-hyperbolic toral automorphisms

Publications

2023b (with L. Kovács and A. Varonka). “From Polynomial Invariants to Linear Loops”. In: *Proceedings of the 2023 International Symposium on Symbolic and Algebraic Computation, ISSAC 2023*, pp. 398–406. doi: [10.1145/3597066.3597109](https://doi.org/10.1145/3597066.3597109).

2023d (with J. Nieuwveld, J. Ouaknine, and J. Worrell). “Positivity Problems for Reversible Linear Recurrence Sequences”. In: *50th International Colloquium on Automata, Languages, and Programming, ICALP 2023*. Vol. 261, 130:1–130:17. doi: [10.4230/LIPIcs.ICALP.2023.130](https://doi.org/10.4230/LIPIcs.ICALP.2023.130).

2023e (with K. Nosan, M. Shirmohammadi, and J. Worrell). “The Membership Problem for Hypergeometric Sequences with Quadratic Parameters”. In: *Proceedings of the 2023 International Symposium on Symbolic and Algebraic Computation, ISSAC 2023*, pp. 407–416. doi: [10.1145/3597066.3597121](https://doi.org/10.1145/3597066.3597121).

2022b. “On the Skolem Problem for Reversible Sequences”. In: *International Symposium on Mathematical Foundations of Computer Science, MFCS 2022*, 61:1–61:15. doi: [10.4230/LIPIcs.MFCS.2022.61](https://doi.org/10.4230/LIPIcs.MFCS.2022.61).

2022c (with D. Amrollahi, E. Bartocci, L. Kovács, M. Moosbrugger, and M. Stanković). “Solving Invariant Generation for Unsolvable Loops”. In: *Static Analysis Symposium 2022*. **Radhia Cousot Award winning paper**, pp. 19–43. doi: [10.1007/978-3-031-22308-2_3](https://doi.org/10.1007/978-3-031-22308-2_3).

2021 (with O. Klurman, E. Lefauchaux, F. Luca, P. Moree, J. Ouaknine, M. A. Whiteland, and J. Worrell). “On Positivity and Minimality for Second-Order Holonomic Sequences”. In: *International Symposium on Mathematical Foundations of Computer Science, MFCS 2021*, 67:1–67:15. doi: [10.4230/LIPIcs.MFCS.2021.67](https://doi.org/10.4230/LIPIcs.MFCS.2021.67).

2020 (with R. Lipton, J. Ouaknine, and J. Worrell). “On the Skolem Problem and Prime Powers”. In: *International Symposium on Symbolic and Algebraic Computation, ISSAC 2021*. doi: [10.1145/3373207.3404036](https://doi.org/10.1145/3373207.3404036).

2019 (with R. Sharp). “Statistics in conjugacy classes in free groups”. In: *Geom. Dedicata* 198.1, pp. 57–70. doi: [10.1007/s10711-018-0329-2](https://doi.org/10.1007/s10711-018-0329-2).

2017 (with R. Sharp). “Orbit counting in conjugacy classes for free groups acting on trees”. In: *J. Topol. Anal.* 9.4, pp. 631–647. doi: [10.1142/S1793525317500261](https://doi.org/10.1142/S1793525317500261).

Preprints

2023a (with D. Amrollahi, E. Bartocci, L. Kovács, M. Moosbrugger, and M. Stanković). *(Un)Solvable Loop Analysis*. Submitted. arXiv: [2306.01597](https://arxiv.org/abs/2306.01597).

2023c (with S. Hitarth, L. Kovács, and A. Varonka). *Linear Loop Synthesis for Quadratic Invariants*. Submitted.

2022a (with O. Klurman, E. Lefauchaux, F. Luca, P. Moree, J. Ouaknine, M. A. Whiteland, and J. Worrell). *On Inequality Decision Problems for Low-Order Holonomic Sequences*. Submitted.

2022d. *The Membership and Threshold Problems for Hypergeometric Sequences with Quadratic Parameters*. Submitted. arXiv: [2211.02447](https://arxiv.org/abs/2211.02447).

Teaching Experience

Co-lecturer for MSc seminar course on *Formal Methods*,
Institute of Logic and Computation, Technische Universität Wien.

Summer 2022, Summer 2023

Co-lecturer for MSc course *Probabilistic Model Checking*,
Department of Computer Science, University of Oxford.

Winter 2019/20

Stipendiary Lecturer in Pure Mathematics, *St Peter's College, Oxford.*

October 2018–September 2020

- **Academic tutor** for second year undergraduates. Tutorials in *Linear Algebra*, *Lebesgue Integration*, *Group Theory*, and *Graph Theory*. Duties included feedback, assessment, and writing progression reports.
- **Admissions interviewer** for mathematics and joint schools.

Teaching Associate, *School of Mathematics, University of Bristol.*

August 2017–May 2018

- **Academic tutor** for *Linear Algebra*, *Calculus*, *Metric Spaces*, and *Geometry*.

Teaching Assistant, *Mathematics Institute, University of Warwick.*

October 2013–June 2017

- **Undergraduate supervisor.** Small group teaching across the first year mathematics curriculum.
- **Support classes** in *Analysis*, *Metric Spaces*, *Experimental Maths*, and *Dynamical Systems*.

Fellow of the Higher Education Academy, *Professional Qualification.*

Departmental Award for Outstanding Teaching, *Mathematics Institute, University of Warwick.*

Student Feedback.

- “Always prepared, always cheerful and always willing to go that extra mile in helping students to understand—a true inspiration!”
- “He was engaging, whilst provoking the students to find their own way to the answers.”
- “I was involved in an incident in term one and if it wasn't for his support, both [academic and pastoral], I wouldn't have made it through the term and hence the year.”
- “George made me feel comfortable asking questions and... his analysis classes were a highlight of my week.”

Seminar Talks

(Un)Solvable Loop Analysis, *Liverpool.*

Oct 2023

Decision Problems for Hypergeometric Sequences, *TU Wien and ISTA.*

Feb 2023

On the Skolem Problem and Reversible Sequences, *Chalmers and Gothenburg.*

July 2022

On the Skolem Problem and Reversible Sequences, *TU Wien and ISTA.*

May 2022

On Positivity and Minimality for Second-Order Holonomic Sequences, *Open University.*

Sept 2021

On Positivity and Minimality for Second-Order Holonomic Sequences, *TU Wien and ISTA.*

Sept 2021

Skolem's Problem and prime powers, *Oxford.*

Feb 2019

Skolem's Problem and prime powers, *Bristol.*

Dec 2018

Statistics in conjugacy classes in free groups, *Warwick.*

Jan 2018

Statistics in conjugacy classes in free groups, *Bristol.*

Nov 2017

Comparing length functions on free groups, *Warwick.*

May 2017

Asymptotics in conjugacy classes for free groups, *Manchester.*

Nov 2017

Orbit counting in conjugacy classes for free groups acting on trees, *Warwick.*

Nov 2015

Conference and Workshop Talks

The Membership Problem for Hypergeometric Sequences with Quadratic Parameters, *Tromsø,* **July 2023**
International Symposium on Symbolic and Algebraic Computation.

On the Skolem Problem for Reversible Sequences, *Kaiserslautern,*
International Conference on Reachability Problems.

Oct 2022

On the Skolem Problem for Reversible Sequences, *Vienna,*
International Symposium on the Mathematical Foundations of Computer Science.

Aug 2022

On the Skolem Problem for Reversible Sequences, *Paris,*
Highlights of Logic, Games, and Automata.

June 2022

On Positivity and Minimality for Second-Order Holonomic Sequences, *Tallinn,*
International Symposium on the Mathematical Foundations of Computer Science.

Aug 2021

On the Skolem Problem and Prime Powers , <i>Kalamata</i> , International Symposium on Symbolic and Algebraic Computation.	July 2020
Skolem meets Euclid , <i>Moorea</i> , Workshop on Dynamical Systems and Computation.	June 2019
Asymptotics in conjugacy classes for group actions , <i>St Andrews</i> , Young Researchers In Mathematics.	Aug 2016
Asymptotics for free group actions , <i>Manchester</i> , Workshop on Dynamical Systems, Ergodic Theory and Applications.	June 2016
Orbit counting in conjugacy classes for free groups acting on trees , <i>Goettingen</i> , Summer School on Dynamical Approaches in Spectral Geometry.	Sept 2015

Widening Participation and Outreach

Mathematics in Education and Industry , <i>Problem Solving Matters: tutor and mentor</i> .	Summer 2017
Further Maths Support Programme , <i>STEP/AEA workshops, enrichment days, Royal Institution masterclasses, and problem solving classes</i> .	2012–2019

Academic Service

External Reviewer/Sub-Reviewer , <i>SODA 2024, CONCUR 2023, MFCS 2023, ICALP 2023, LICS 2023, TACAS 2023, POPL 2023, STACS 2023, CASC 2022, MFCS 2021, ICALP 2020, J. Math. Comput. Sci. (JMCS), ACM Trans. Program. Lang. Syst. (TOPLAS)</i> .	
Organiser , <i>Workshop on Reachability, Recurrences, and Loops</i> , ICALP 2023 Satellite Workshop.	10 July 2023
Autobóz , <i>Annual Research Workshop on Automata, Logic, and Games</i> .	
<ul style="list-style-type: none"> ○ Steering Committee, 2023– ○ Organiser, Autobóz 2023 (16–22 July) in partnership with the <i>Highlights Collaborative Research Week</i>. ○ Speaker Autobóz 2023: Tutorials on Decision Problems for Linear Recurrence Sequences. 	

Departmental & University Service

Pay and remuneration committee for sessional teachers , <i>Warwick</i> .	2015–2017
Staff & Graduate Student Liaison Committee (Mathematics) , <i>Warwick</i> .	2014–2017