

George Kenison

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Research Experience

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

Postdoctoral Researcher in Automated Reasoning and Program Analysis, May 2021–
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 (Masters 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: *International Symposium on Symbolic and Algebraic Computation, ISSAC 2023 (to appear)*. arXiv: 2302.06323.

2023c (with K. Nosan, M. Shirmohammadi, and J. Worrell). “The Hypergeometric Membership Problem with Quadratic Parameters”. In: *International Symposium on Symbolic and Algebraic Computation, ISSAC 2023 (to appear)*. arXiv: 2303.09204.

2023d (with J. Nieuwveld, J. Ouaknine, and J. Worrell). “The Positivity Problem for Reversible Linear Recurrence Sequences”. In: *International Colloquium on Automata, Languages and Programming, ICALP 2023 (to appear)*. URL: <https://bit.ly/3YUW5pA>.

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.

2022c (with D. Amrollahi, E. Bartocci, L. Kovács, M. Moosbrugger, and M. Stankovič). “Solving Invariant Generation for Unsolvable Loops”. In: *Static Analysis Symposium 2022. Radhia Cousot Award winning paper*. Springer Nature Switzerland, pp. 19–43. doi: 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.

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*. ACM. doi: 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.

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.

Preprints

2023a (with D. Amrollahi, E. Bartocci, L. Kovács, M. Moosbrugger, and M. Stankovič). *(Un)Solvable Loop Analysis*. Submitted. arXiv: 2306.01597.

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.

Teaching Experience

Co-lecturer for MSc seminar course on *Formal Methods*, Summer 2022, Summer 2023
Institute of Logic and Computation, Technische Universität Wien.

Co-lecturer for MSc course *Probabilistic Model Checking*, Winter 2019/20
Department of Computer Science, University of Oxford.

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

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,* Oct 2022
International Conference on Reachability Problems.

On the Skolem Problem for Reversible Sequences, *Vienna,* Aug 2022
International Symposium on the Mathematical Foundations of Computer Science.

On the Skolem Problem for Reversible Sequences, *Paris,* June 2022
Highlights of Logic, Games, and Automata.

On Positivity and Minimality for Second-Order Holonomic Sequences, *Tallinn,* Aug 2021
International Symposium on the Mathematical Foundations of Computer Science.

On the Skolem Problem and Prime Powers, *Kalamata,* July 2020
International Symposium on Symbolic and Algebraic Computation.

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>CONCUR 2023, MFCS 2023, ICALP 2023, LICS 2023, TACAS 2023, POPL 2023, STACS 2023, CASC 2022, MFCS 2021, ICALP 2020, J. Math. Comput. Sci.</i>	
Organiser , <i>Workshop on Reachability, Recurrences, and Loops, ICALP 2023 Satellite Workshop</i> .	
Organiser , <i>Autobóz Workshop 2023</i> , in partnership with the <i>Highlights Collaborative Research Week 2023</i> .	

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