Dr. Dan Rust

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Education

- **Ph.D. in Mathematics** *University of Leicester*
 - Supervisor: Prof. Alex Clark
- MMath
 - University of Manchester
 - Master of mathematics with first class honours

Positions

• **Postdoctoral Research Associate** *Faculty of Mathematics, Bielefeld University,* Group of Prof. Michael Baake

• Visiting Researcher School of Mathematics, University of Birmingham, Group of Prof. Chris Good **Bielefeld, Germany** Apr 2016 – present

Birmingham, UK Dec 2019 – Jul 2020

Publications

- Published
 - Shifts of finite type and random substitutions (with P. Gohlke and T. Spindeler) Discrete & Continuous Dynamical Systems 39(9), 5085–5103 (2019)
 - Dynamical systems arising from random substitutions (with T. Spindeler) Indagationes Mathematicae 29(4), 1131–1155 (2018)
 - Beyond primitivity for one-dimensional substitution subshifts and tiling spaces (with G. R. Maloney) *Ergodic Theory and Dynamical systems* **38**(3), 1086–1117 (2018)
 - Computations for symbolic substitutions (with S. Balchin) Journal of Integer Sequences 20, Article 17.4.1 (2017)
 - An uncountable set of tiling spaces with distinct cohomology Topology and its Applications 205, 58–81 (2016)
- Preprints
 - Zeckendorf representations and mixing properties of sequences (with N. Manibo, E. D. P. Miro and G. Tadeo). *arxiv:* 1912.01573
 - A modification of Wythoff's Nim (with R. Fokkink). arxiv: 1904.08339
 - Periodic points in random substitution subshifts. *arxiv:* 1808.05934
- In Preparation
 - Extended symmetries of algebraic subshifts (with R. Fokkink and R. Yassawi)
 - Topological mixing for random substitutions (with E. D. P. Miro, L. Sadun and G. Tadeo)
 - Automorphism groups of random substitution subshifts (with R. Fokkink and G. Tadeo)
 - Substitution subshifts over infinite alphabets (with N. Manibo and J. Walton)
 - Codimension-one cut-and-project tilings and ordered cohomology (with J. Walton)
- Thesis
 - Cohomology of tiling spaces: beyond primitive substitutions (2016) *Supervised by Prof. Alex Clark,* University of Leicester

Leicester, UK 2012 – 2016

Manchester, UK 2008 – 2012

Invited Talks

• Topology and Geometry Seminar (invited by Mark Powell)	Durham, UK
<i>Durham University</i>	<i>Feb, 2020</i>
 Topology of tiling spaces over infinite alphabets 	
• Topology and Dynamics Seminar (invited by Simon Baker)	Birmingham, UK
<i>Birmingham University</i>	Jan, 2020
 Topological mixing of random substitution subshifts 	
• Expansions and Substitutions	Utrecht, Netherlands
Utrecht University	<i>May,</i> 2019
 Beyond primitivity for substitutions 	
• Open University Mathematics Departmental Seminar (invited by Uwe Grimm)	Milton Keynes, UK
Open University	Nov, 2018
 Aperiodic tilings and ordered cohomology 	
• Swansea Topology and Geometry Seminar (invited by Jeff Giansiracua)	Swansea, UK
Swansea University	Nov, 2018
 Aperiodic tilings and ordered cohomology 	
• Workshop on the spectral analysis of subshifts	Amiens, France
Universities of Picardie Jules Verne	Jun, 2018
 Recent progress on the dynamics of random substitutions 	
• Spectral Structures and Topological Methods in Mathematical Quasicrystals	Dberwolfach, Germany
Mathematisches Forschungsinstitut Oberwolfach	<i>Oct,</i> 2017
 Recent progress and open problems in random substitution 	
• Aperiodic Patterns in Crystals, Numbers and Symbols	Leiden, Netherlands
Lorentz Center@Oort, Leiden University	Jun, 2017
– Random substitutions	
• Workshop on Aperiodic Order: Enumeration Problems, Dynamics, and Topology	Bielefeld, Germany
<i>Bielefeld University</i>	<i>May,</i> 2017
 Topological entropy of random substitution subshifts 	
• Birmingham Topology and Dynamics Seminar (invited by Chris Good)	Birmingham, UK
Birmingham University	Apr, 2017
 The Strange Topology of Aperiodic Tilings (and their cohomology) 	
• 51st Spring Topology and Dynamical Systems Conference	Jersey City, NJ, USA
New Jersey City University	Mar, 2017
– Declined	
• Jena Dynamical Systems & Mathematical Physics seminar (invited by Daniel Lenz)	Jena, Germany
Friedrich-Schiller-Universität	Nov, 2016
 Ordered cohomology and co-dimension one cut and project sets 	
• 30th Summer Conference on Topology and its Applications	Galway, Ireland
National University of Ireland	Jun, 2015
 Uncountable collections of cohomology groups for tiling spaces 	
• Workshop on Aperiodic Order	Leicester, UK
University of Leicester	Jan, 2015
 Barge–Diamond approximants for multi-substitution tiling spaces 	

Contributed Talks and Seminars

Open University Aperiodic Order Research Seminar Open University	Milton Keynes, UK Aug, 2019
- Dynamics of substitution subshifts and their random cousins	
Workshop on Topology in Dynamics University of Leicester	Leicester, UK <i>Apr, 2017</i>
 Dynamics of stochastic substitution subshifts 	
• 19th Galway Topology Colloquium University of Leicester	Leicester, UK Aug, 2016
- Elevator pitch session—an introduction to my research	
Dynamical Systems for Aperiodicity Université Claude Bernard Lyon 1	Lyon, France Jan, 2016
 Non-minimal Substitution Tiling Spaces and Cohomology 	
• Young Topologists' Meeting EPFL	Ecublens, Switzerland Jul, 2015
 The strange topology of aperiodic tilings and their cohomology 	
• The 18th Galway Colloquium National University of Ireland	Galway, Ireland Jun, 2015
– What do I study? What questions am I thinking about?	
• Internal Ph.D. Student Seminar University of Leicester	Leicester, UK 2013 – 2015
 The hairy business of braids and fiber bundles Braid groups on surfaces Topological quantum field theories and their applications in knot theory TQFTs and Frobenius algebras Knot theory and Khovanov homology The new world order(ed groups): symbolic dynamics and substitutions Grout: A program for calculating topological invariants of letter substitutions Seifert surfaces and the fundamental theorem of knot theory 	
Chaired Sessions	
• 19th Galway Topology Colloquium University of Leicester	Leicester, UK Aug, 2016
- Elevator Pitch Session	

• Arbeitsgemeinschaft: Mathematical Quasicrystals MFO, Oberwolfach Research Institute for Mathematics

- Diffraction I & Diffraction II

Teaching

- Lecturer
 - Mathematics for Natural Sciences II Summer semester 2019
 - Mathematics for Natural Sciences I Winter semester 2018
 - Ergodic Theory Summer semester 2018
 - Optimisation for Economics Winter semester 2017
- Tutor
 - Linear Algebra for Physicists Winter semester 2019
 - Elementary Number Theory Summer semester 2017

Oberwolfach, Germany *Oct, 2015*

- Optimisation for Economics — Winter semester 2016	
Teaching Assistant	2012 - 2016
 Linear Algebra Calculus and Analysis Abstract Algebra Coding Theory Set Theory Markov Chains 	
Certification	2012
 Higher Education Academy STEM (Maths, Stats & OR): Teaching Skills Worl Teach 	kshop for Postgraduates who
Students	
• Gwendolyn Tadeo (co-supervised with Dr. Eden Delight P. Miro) Ateneo de Manila University, the Philippines <i>Ph.D. Thesis title: Mixing properties of Random Substitutions</i>	Ph.D. 2017 – 2019
• Philipp Gohlke (co-supervised with Prof. Michael Baake) Bielefeld University, Bielefeld, Germany <i>MSc Thesis title: On a family of semi-compatible random substitution</i>	MSc 2017 – 2018

Grants and Funding Awarded

- Alexander von Humboldt Foundation Renewed Research Stay — Supervision of Grant for Dr. Eden Delight P. Miro Bielefeld University, Sep.–Dec. 2019, (ca. €20,470)
- The Netherlands Organisation for Scientific Research (NWO) Visitor's Travel Grant — Principal Investigator TU Delft, the Netherlands, Mar.–May 2019, (ca. €1850)
- London Mathematical Society Conference Grant - Scheme 1 — Joint with Jamie Walton Model Sets and Aperiodic Order, Durham, 2018, (ca. £4500)
- Bielefeld University Conference supplementary funding — Joint with Jamie Walton Model Sets and Aperiodic Order, Durham, 2018, (ca. €10,000)
- London Mathematical Society Postgraduate Research Conference Grant - Scheme 8 — Joint with Petra Staynova 19th Galway Topology Colloquium, Leicester, 2016, (ca. £4000)

Department and Community Involvement

- Member of SFB 1283 (Collaborative Research Center) Taming uncertainty and profiting from randomness and low regularity in analysis, stochastics and their applications, Bielefeld University (2016 – present)
- Member of SFB 701 (Collaborative Research Center) Spectral structures and topological methods in mathematics, Bielefeld University (2016 – 2017)
- Organiser and grant applicant for the Model Sets and Aperiodic Order conference in Durham, 2018
- Organiser for the Mini-Workshop on Diffraction Measures of Aperiodic Structures in Bielefeld, 2018
- Co-founder and Organiser of the SYMBoL seminar series at Bielefeld University (2018 present)
- Organiser of the weekly postgraduate seminar on tilings and aperiodic order at Bielefeld University (2016 2018)
- Local organiser and principal grant applicant for the 19th Galway Topology Colloquium (2016)

- Local assistant and website designer for the 31st Summer Conference on Topology and its Applications (2016)
- Founder and organiser of the University of Leicester mathematics Ph.D. student internal seminar (2013 -2015)
- President of the University of Leicester Postgraduate Maths Society (2014 2015)
- Associate member of the London Mathematical Society
 Regular attendee of the Transpennine Topology Triangle meetings (2012 2016)

Personal

Nationality: British citizen Year of birth: 1989

References

Prof. Michael Baake: <i>Line manager</i>	Faculty of Mathematics Bielefeld University 33619, Bielefeld Germany mbaake@math.uni-bielefeld.de, (+49) 521 106 4793
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Prof. John Hunton:	Department of Mathematical Sciences
	Durham University
	Science Laboratories
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	john.hunton@durham.ac.uk, (+44) 0191 334 3050