Curriculum Vitae

Alex Rutar

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Personal Information

Institution	University of St Andrews
Email	alex@rutar.org
Website	https://rutar.org
Citizenship	Canadian
Languages	English (native), French (reading)

Research Interests

I am generally interested in fractal geometry, dynamical systems, and the fine geometry of sets and measures in Euclidean space. Here are some areas that I am actively working in:

- geometry of overlapping self-similar sets, associated invariant measures, and their multifractal analysis
- general dimension theory, dimension interpolation, and classification
- symbolic dynamics, matrix products, and random substitutions
- thermodynamic formalism and multifractal analysis of self-affine measures
- fine scaling of self-affine sets and Assouad-type dimensions

Education

2020-	**PhD in Mathematics**, ***University of St Andrews***, *St Andrews, UK* Advisors: Jonathan Fraser and Kenneth Falconer
2016-2020	**Bachelor of Mathematics**, ***University of Waterloo***, *Waterloo, ON* Major: Pure Mathematics, Minor: Combinatorics and Optimization GPA: 95.7/100
Fall 2018	**Exchange**, ***Budapest Semesters in Mathematics***, *Budapest* Magna Cum Laude GPA: 4.0/4.0
2012-2016	**Secondary School**, ***Tempo School***, *Edmonton, AB* Advanced Placement National Scholar GPA: 99/100

Funding

2021	£15,609	**EPSRC Doctoral Funding**
2020	£15,285	**EPSRC Doctoral Funding**
2019	$4,500	**NSERC Undergraduate Research Award**
2018	$4,500	**NSERC Undergraduate Research Award**

Scholarships and Awards

2023	£6,000	**Cecil King Travel Scholarship**, *London Math Society*
2022	$105,000	**NSERC CGS-D** (declined for PGS-D), *Government of Canada*
2020	£73,000	**Hansel Scholarship**, *University of St Andrews*
2020	$1,000	**Pure Math Undergraduate Research Prize**, *University of Waterloo*
2016	$20,000	**W. T. Tutte National Scholarship**, *University of Waterloo*
2016	$5,000	**President's Scholarship**, *University of Waterloo*
2016	$2,500	**Rutherford Scholarship**, *Government of Alberta*
2016	$0	**Governor General Bronze**, *Tempo School*

Publications

1. A. Mitchell, A. Rutar. Multifractal analysis of measures arising from random substitutions. *arXiv:2301.04958* (submitted).

2. J. M. Fraser, A. Rutar. Assouad-type dimensions of overlapping self-affine sets. *arXiv:2209.13952* (submitted).

3. A. Rutar. Attainable forms of Assouad spectra. *Indiana Univ. Math. J.* (accepted).

4. A. Banaji, A. Rutar. Attainable forms of intermediate dimensions. *Ann. Fenn. Math.* 47 (2022), 939-960.

5. A. Rutar. A Multifractal Decomposition for Self-similar Measures with Exact Overlaps. *arXiv:2104.06997* (submitted).

6. K. E. Hare, A. Rutar. Local Dimensions of Self-similar Measures Satisfying the Finite Neighbour Condition. *Nonlinearity* 35 (2022), 4876-4904

7. A. Rutar. Geometric and Combinatorial Properties of Self-similar Multifractal Measures. *Ergodic Theory Dynam. Systems* (accepted).

8. K. E. Hare, K. G. Hare, A. Rutar. When the Weak Separation Condition implies the Generalized Finite Type Condition. *Proc. Amer. Math. Soc.* 149 (2021), 1555-1568.

Conferences and Presentations

Jan. 2023	**Convex Optimization and Multifractal Analysis**: *Oulu Analysis Seminar*
Oct. 2022	**Assouad dimension and slices of self-affine sets**: *Manchester Dynamics Seminar*
Sep. 2022	**Fractals and Related Fields IV**: *Geometric and Combinatorial Properties of Self-similar Measures*
Aug. 2022	**BME Dynamical Systems Seminar**: *Geometric and Combinatorial Properties of Self-similar Measures*
Jul. 2022	**BECMC 2022**: *Attainable forms of intermediate dimensions*
Jul. 2022	**University of Vienna Ergodic Theory Seminar**: *Dimension theory and classification of Assouad spectra through homogeneous Moran sets*
Jun. 2022	**Geometry of Deterministic and Random Fractals**: *Classifying Dimension Spectra*
May. 2022	**Workshop on Self-affine and Overlapping IFS (Bristol)**: *Geometric and Combinatorial Properties of Self-similar measures*
Apr. 2022	**Probability, Analysis, and Dynamics (Bristol)**: *Geometric and Combinatorial Properties of Self-similar measures*
Apr. 2022	**St Andrews Burn Meet**: *Pisot Numbers and Bernoulli Convolutions*
Feb. 2022	**St Andrews Analysis Seminar**: *Attainable forms of intermediate dimensions*
Apr. 2021	**Junior Ergodic Theory Seminar**: *Self-similar measures with non-concave spectra and multifractal analysis*
Jan. 2021	**St Andrews Online Burn Meet**: *Analysis Group Intro Talk*
Oct. 2020	**St Andrews Analysis Seminar**: *Multifractal Analysis for Self-Similar Measures with Exact Overlaps*
Feb. 2020	**Waterloo Analysis Seminar**: *Geometric and Combinatorial Separation Conditions for Iterated Function Systems*
Jul. 2019	**CUMC 2019**: *An Algebraic Proof of Quadratic Reciprocity*
Jul. 2018	**CUMC 2018**: *Pisot–Vijayaraghavan numbers*

Other Skills

LaTeX	typesetting and package development
git	version control software
Python	software development, numerical computation, symbolic computation, graphical tools
Mathematica	functional programming, algorithm implementation for research papers
HTML and CSS	fundamentals of web development