

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

Funding

2022	£13,388	EPSRC Doctoral 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, <i>London Math Society</i>
2022	\$105,000	NSERC CGS-D (declined for PGS-D), <i>Government of Canada</i>
2020	£73,000	Hansel Scholarship, <i>University of St Andrews</i>
2020	\$1,000	Pure Math Undergraduate Research Prize, <i>University of Waterloo</i>
2016	\$20,000	W. T. Tutte National Scholarship, <i>University of Waterloo</i>
2016	\$5,000	President's Scholarship, <i>University of Waterloo</i>
2016	\$2,500	Rutherford Scholarship, <i>Government of Alberta</i>
2016	\$0	Governor General Bronze, <i>Tempo School</i>

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

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

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