

Curriculum Vitae

Alex Rutar

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Personal Information

Institution	University of St Andrews
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Citizenship	Canadian
Languages	English (native), French (reading)

Education

2020-	PhD in Mathematics, <i>University of St Andrews, St Andrews, Scotland</i> Advisors: Kenneth Falconer and Jonathan Fraser
2016-2020	Bachelor of Mathematics, <i>University of Waterloo, Waterloo, Canada</i> Major: Pure Mathematics, Minor: Combinatorics and Optimization GPA: 95.7/100
Fall 2016	Exchange, <i>Budapest Semesters in Mathematics, Budapest, Hungary</i> Magna Cum Laude GPA: 4.0/4.0
2012-2016	Secondary School, <i>Tempo School, Edmonton, Canada</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

Scholarships and Awards

2023	£6,000	Cecil King Travel Scholarship, <i>London Math Society</i>
2022	\$105,000	NSERC CGS-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>

2019	\$4,500	NSERC Undergraduate Research Award , <i>Government of Canada</i>
2018	\$4,500	NSERC Undergraduate Research Award , <i>Government of Canada</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's Bronze , <i>Government of Alberta</i>

Publications

1. (with Amlan Banaji, Jonathan Fraser, and István Kolossváry) *Assouad spectrum of Gatzouras–Lalley carpets*. Preprint. [arxiv:2401.07168](https://arxiv.org/abs/2401.07168)
2. (with Antti Käenmäki) *Tangents and pointwise Assouad dimension of invariant sets*. Preprint. [arxiv:2309.11971](https://arxiv.org/abs/2309.11971)
3. (with Amlan Banaji and Sascha Troscheit) *Interpolating with generalized Assouad dimensions*. Preprint. [arxiv:2308.12975](https://arxiv.org/abs/2308.12975)
4. (with Andrew Mitchell) *Multifractal analysis of measures arising from random substitutions*. *Comm. Math. Phys.* **405** (2024), Paper No. 63, 44 p.
5. (with Jonathan Fraser) *Assouad-type dimensions of overlapping self-affine sets*. *Ann. Fenn. Math.* **49** (2024), 3–21
6. *Attainable forms of Assouad spectra*. To appear in: *Indiana Univ. Math. J.*
7. (with Amlan Banaji) *Attainable forms of intermediate dimensions*. *Ann. Fenn. Math.* **47** (2022), 939–960
8. *A multifractal decomposition for self-similar measures with exact overlaps*. Preprint. [arxiv:2104.06997](https://arxiv.org/abs/2104.06997)
9. (with Kathryn Hare) *Local dimensions of self-similar measures satisfying the Finite Neighbour Condition*. *Nonlinearity* **35** (2022), 4876–4904
10. *Geometric and combinatorial properties of self-similar multifractal measures*. *Ergodic Theory Dyn. Syst.* **43** (2023), 2028–2072
11. (with Kathryn Hare and Kevin Hare) *When the Weak Separation Condition implies the Generalized Finite Type Condition*. *Proc. Amer. Math. Soc.* **149** (2021), 1555–1568

Conferences and Presentations

2024.03	University of Loughborough Dynamical Systems Seminar: <i>Dynamical covering arguments via large deviations and non-convex optimization</i>
2024.03	University of Warwick DAGGER Seminar: <i>Multifractal analysis via Lagrange duality</i>
2024.02	UW Madison Analysis Seminar: <i>Dynamical covering arguments via large deviations and non-convex optimization</i>
2024.02	Shenzhen Fractal Geometry Seminar: <i>Some exotic phenomena for Assouad spectra</i>

2024.02	UBC Harmonic Analysis and Fractal Geometry Seminar: <i>Pointwise Assouad dimension and tangents of invariant sets</i>
2023.12	University of St Andrews Research Day: <i>Multifractal analysis and the geometry of Lagrange multipliers</i>
2023.11	Bristol Ergodic Theory and Dynamical Systems Seminar: <i>Pointwise Assouad dimension and regularity of invariant sets</i>
2023.10	BudWiSer: Budapest–Wien Dynamical Systems Seminar: <i>Multifractal analysis of non-conformal measures</i>
2023.10	OARS: Online Analysis Research Seminar: <i>Assouad-type dimensions: finer information on scaling and homogeneity</i>
2023.10	University of Edinburgh Analysis Seminar: <i>Pointwise Assouad dimension and regularity of invariant sets</i>
2023.09	St Andrews Analysis Seminar: <i>Multifractal analysis of planar self-affine measures via convex optimization</i>
2023.07	ICMS: Fractal Geometry: <i>Pointwise Assouad dimension and regularity of invariant sets</i>
2023.06	Multifractal analysis and self-similarity: <i>Multifractal analysis on (some) self-affine carpets</i>
2023.05	Thermodynamic Formalism: Non-additive Aspects and Related Topics: <i>Multifractal analysis of random substitutions</i>
2023.04	St Andrews Analysis Seminar: <i>Assouad dimension and tangents of dynamically invariant sets</i>
2023.04	Oulu Analysis Seminar: <i>Interpolating between box and Assouad dimension</i>
2023.04	Jyväskylä Geometric Analysis Seminar: <i>Assouad dimension and tangents of dynamically invariant sets</i>
2023.01	Oulu Analysis Seminar: <i>Convex Optimization and Multifractal Analysis</i>
2022.11	St Andrews Analysis Seminar: <i>L^q-spectra and multifractal analysis of random substitutions</i>
2022.10	Manchester Dynamics Seminar: <i>Assouad dimension and slices of self-affine sets</i>
2022.09	Fractals and Related Fields IV: <i>Geometric and Combinatorial Properties of Self-similar Measures</i>
2022.08	BME Dynamical Systems Seminar: <i>Geometric and Combinatorial Properties of Self-similar Measures</i>
2022.07	BECMC 2022: <i>Attainable forms of intermediate dimensions</i>
2022.07	University of Vienna Ergodic Theory Seminar: <i>Dimension theory and classification of Assouad spectra through homogeneous Moran sets</i>
2022.06	Geometry of Deterministic and Random Fractals: <i>Classifying Dimension Spectra</i>
2022.05	Workshop on Self-affine and Overlapping IFS: <i>Geometric and Combinatorial Properties of Self-similar Measures</i>
2022.04	Postgraduate Interdisciplinary Symposium for Mathematics: <i>Pisot Numbers and Bernoulli Convolutions</i>
2022.04	Probability, Analysis, and Dynamics 2022: <i>Geometric and Combinatorial Properties of Self-similar Measures</i>
2022.02	St Andrews Analysis Seminar: <i>Attainable forms of intermediate dimensions</i>

2021.04	Junior Ergodic Theory Seminar: <i>Self-similar measures with non-concave spectra and multifractal analysis</i>
2021.01	Postgraduate Interdisciplinary Symposium for Mathematics: <i>Analysis Group Intro Talk</i>
2020.10	St Andrews Analysis Seminar: <i>Multifractal Analysis for Self-Similar Measures with Exact Overlaps</i>
2020.02	University of Waterloo Analysis Seminar: <i>Geometric and Combinatorial Separation Conditions for IFSs</i>
2019.07	CUMC 2019: <i>An Algebraic Proof of Quadratic Reciprocity</i>
2018.07	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, visualization
HTML / CSS	fundamentals of web development