Curriculum Vitae

Alex Rutar

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Personal Information

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

Education

2020-	**PhD in Mathematics**, ***University of St Andrews***, *St Andrews, Scotland* Advisors: Kenneth Falconer and Jonathan Fraser
2016-2020	**Bachelor of Mathematics**, ***University of Waterloo***, *Waterloo, Canada* Major: Pure Mathematics, Minor: Combinatorics and Optimization GPA: 95.7/100
Fall 2016	**Exchange**, ***Budapest Semesters in Mathematics***, *Budapest, Hungary* Magna Cum Laude GPA: 4.0/4.0
2012-2016	**Secondary School**, ***Tempo School***, *Edmonton, Canada* 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**, *London Math Society*
2022	$105,000	**NSERC CGS-D**, *Government of Canada*
2020	£73,000	**Hansel Scholarship**, *University of St Andrews*
2020	$1,000	**Pure Math Undergraduate Research Prize**, *University of Waterloo*

2019	$4,500	**NSERC Undergraduate Research Award**, *Government of Canada*
2018	$4,500	**NSERC Undergraduate Research Award**, *Government of Canada*
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's Bronze**, *Government of Alberta*

Publications

1. (with Amlan Banaji, Jonathan Fraser, and István Kolossváry) *Assouad spectrum of Gatzouras–Lalley carpets*. Preprint. arxiv:2401.07168
2. (with Antti Käenmäki) *Tangents and pointwise Assouad dimension of invariant sets*. Preprint. arxiv:2309.11971
3. (with Amlan Banaji and Sascha Troscheit) *Interpolating with generalized Assouad dimensions*. Preprint. arxiv:2308.12975
4. (with Andrew Mitchell) *Multifractal analysis of measures arising from random substitutions*. To appear in: *Comm. Math. Phys.*
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
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**: *Dynamical covering arguments via large deviations and non-convex optimization*
2024.03	**University of Warwick DAGGER Seminar**: *Multifractal analysis via Lagrange duality*
2024.02	**UW Madison Analysis Seminar**: *Dynamical covering arguments via large deviations and non-convex optimization*
2024.02	**Shenzhen Fractal Geometry Seminar**: *Some exotic phenomena for Assouad spectra*

2024.02 **UBC Harmonic Analysis and Fractal Geometry Seminar**: *Pointwise Assouad dimension and tangents of invariant sets*

2023.12 **University of St Andrews Research Day**: *Multifractal analysis and the geometry of Lagrange multipliers*

2023.11 **Bristol Ergodic Theory and Dynamical Systems Seminar**: *Pointwise Assouad dimension and regularity of invariant sets*

2023.10 **BudWiSer: Budapest–Wien Dynamical Systems Seminar**: *Multifractal analysis of non-conformal measures*

2023.10 **OARS: Online Analysis Research Seminar**: *Assouad-type dimensions: finer information on scaling and homogeneity*

2023.10 **University of Edinburgh Analysis Seminar**: *Pointwise Assouad dimension and regularity of invariant sets*

2023.09 **St Andrews Analysis Seminar**: *Multifractal analysis of planar self-affine measures via convex optimization*

2023.07 **ICMS: Fractal Geometry**: *Pointwise Assouad dimension and regularity of invariant sets*

2023.06 **Multifractal analysis and self-similarity**: *Multifractal analysis on (some) self-affine carpets*

2023.05 **Thermodynamic Formalism: Non-additive Aspects and Related Topics**: *Multifractal analysis of random substitutions*

2023.04 **St Andrews Analysis Seminar**: *Assouad dimension and tangents of dynamically invariant sets*

2023.04 **Oulu Analysis Seminar**: *Interpolating between box and Assouad dimension*

2023.04 **Jyväskylä Geometric Analysis Seminar**: *Assouad dimension and tangents of dynamically invariant sets*

2023.01 **Oulu Analysis Seminar**: *Convex Optimization and Multifractal Analysis*

2022.11 **St Andrews Analysis Seminar**: *L^q-spectra and multifractal analysis of random substitutions*

2022.10 **Manchester Dynamics Seminar**: *Assouad dimension and slices of self-affine sets*

2022.09 **Fractals and Related Fields IV**: *Geometric and Combinatorial Properties of Self-similar Measures*

2022.08 **BME Dynamical Systems Seminar**: *Geometric and Combinatorial Properties of Self-similar Measures*

2022.07 **BECMC 2022**: *Attainable forms of intermediate dimensions*

2022.07 **University of Vienna Ergodic Theory Seminar**: *Dimension theory and classification of Assouad spectra through homogeneous Moran sets*

2022.06 **Geometry of Deterministic and Random Fractals**: *Classifying Dimension Spectra*

2022.05 **Workshop on Self-affine and Overlapping IFS**: *Geometric and Combinatorial Properties of Self-similar Measures*

2022.04 **Postgraduate Interdisciplinary Symposium for Mathematics**: *Pisot Numbers and Bernoulli Convolutions*

2022.04 **Probability, Analysis, and Dynamics 2022**: *Geometric and Combinatorial Properties of Self-similar Measures*

2022.02 **St Andrews Analysis Seminar**: *Attainable forms of intermediate dimensions*

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