Amlan Banaji

Curriculum Vitae

Research Associate in Fractal Geometry at Loughborough University's mathematics department since March 2023.

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Nationality: UK

RESEARCH INTERESTS

My main research interests relate to the geometry and dimension theory of fractal sets and measures. I have worked with fractals generated by conformal and non-conformal iterated function systems. I am currently interested in Fourier decay of fractal measures, and interpolating between different notions of dimension. I am interested in finding connections between fractal geometry and other areas of mathematics.

PUBLICATIONS AND PREPRINTS

1. A. Banaji and J. M. Fraser. *Intermediate dimensions of infinitely generated attractors*
   Transactions of the American Mathematical Society 376 (2023), 2449–2479. arXiv

2. A. Banaji and A. Rutar. *Attainable forms of intermediate dimensions*
   Annales Fennici Mathematici 47 (2022), 939–960. arXiv

3. A. Banaji. *Metric spaces where geodesics are never unique*
   To appear in the **American Mathematical Monthly.** arXiv

4. A. Banaji and H. Chen. *Dimensions of popcorn-like pyramid sets*
   To appear in the **Journal of Fractal Geometry**. arXiv

5. A. Banaji and I. Kolossváry. *Intermediate dimensions of Bedford–McMullen carpets with applications to Lipschitz equivalence*
   Submitted. arXiv

6. A. Banaji. *Generalised intermediate dimensions*
   Submitted. arXiv

7. A. Banaji and J. M. Fraser. *Assouad type dimensions of infinitely generated self-conformal sets*
   Submitted. arXiv

EDUCATION

University of St Andrews
2019–present

PhD Mathematics

Topic: Fractal geometry and dimension theory
With the Analysis Research Group
Supervisors: Prof. Jonathan Fraser (primary), Prof. Kenneth Falconer
Fully funded by the Leverhulme Trust

University of St Andrews
2018–2019

MSc Mathematics, Distinction

GPA: 19.5/20. Ranked 1st in the Faculty of Science and Medicine
Dissertation:
Solvability of Partial Differential Equations on Fractal Domains
(Score: 19.1/20, supervised by Professor Kenneth Falconer)

University of Cambridge,
King's College
2015–2018

BA (Hons) Mathematics

Selected Part II courses: Linear Analysis, Analysis of Functions, Topics in Analysis, Differential Geometry, Riemann Surfaces, Logic and Set Theory

Thomas Tallis Sixth Form
2013–2015

A-Levels:
Mathematics(A), Further Mathematics(A*), Physics(A*), Chemistry(A*), History(A), Extended Project Qualification(A*, equivalent to half an A level)*

SELECTED PRIZES

2019: **Postgraduate Gray Prize** for the best MSc student in the Faculty of Science and Medicine at the University of St Andrews.

TALKS

I have given 23 talks (listed at amlan-banaji.github.io/talks) at conferences and seminar series including:

- One World Fractals (online, 18/1/23)
- Mathematics Research Day (St Andrews, 1/12/22)
- Szenzhen Technology University Mathematics Colloquium, (China (online), inaugural talk, 22/10/22)
- Fractals and Related Fields IV (Porquerolles, France, 5/9/22)
- Geometry of Deterministic and Random Fractals (Budapest University of Technology and Economics, 30/6/22)
- Junior Ergodic Theory Meeting (ICMS, Edinburgh (30/3/22) and online (19/3/21))
- Workshop on affine and overlapping iterated function systems (Bristol, 11/5/22)
- Dynamics and Group Geometry Early Researchers Seminar (DAGGER) (Warwick, 30/5/22 and 1/3/21)
- Analysis Seminar (St Andrews, 3/5/22, 12/10/21, 20/4/21, 30/6/20)

EXPERIENCE

- **Teaching undergraduate tutorials at the University of St Andrews:**
  Most recent student feedback score: 1.5 on a scale from 1 to 5 (where 1 is highest).
  2019–2022: MT2502 Analysis (10 groups total)
  2021: MT2505 Abstract Algebra (2 groups)
  2020: MT1003 Pure and Applied Mathematics (2 groups)

- *2018–present:* **Tutoring** mathematics (undergraduate, A level and STEP) with G5 Education, Oxford Exclusif Tutorial Agency, PhD Tutors, Sishu Chinese School, and privately.

- *2018*: LMS-funded **Cambridge Summer Research in Mathematics (SRIM) project** on Leray-Schauder Topological Degree Theory and its applications to Partial Differential Equations.

- *2017*: internship at market research company Kantar TNS, working as a **data scientist** for the social media team, using Python.

SERVICE

- *2022*: **Referee** for *Proc. Roy. Soc. Edinburgh Sect. A* and *J. Math. Anal. Appl.*
- *2022:* **Organiser** of St Andrews Analysis Reading Group
- *2021*: **Co-organiser** of the Postgraduate Interdisciplinary Mathematics Symposium (PIMS), St Andrews.
- *2019–2021*: **Treasurer** of St Andrews Mindfulness Society.

MEMBERSHIP OF PROFESSIONAL BODIES

- *2022–present:* London Mathematical Society
- *2020–present:* Edinburgh Mathematical Society
- *2019–present*: Institute of Mathematics and its Applications

INTERESTS AND SKILLS

- **Languages:** English (native), German (conversational, A* at GCSE), Hindi (conversational)
- **Music**: Piano (grade 8), Clarinet (toured Canada and Venice)
- **Sport:** running, badminton, chess