

# Amlan Banaji

Curriculum Vitae

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Marie Skłodowska-Curie Actions (MSCA) postdoctoral fellow in mathematics at the University of Jyväskylä, Finland

Nationality: UK

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## RESEARCH INTERESTS

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My main research interests are in geometry and analysis related to fractal sets and measures. These ‘fractals’ exhibit complexity over a wide range of scales, and often arise in a natural dynamical way, such as via (conformal or non-conformal) iterated function systems. Currently, I am especially interested in the rate of decay of the Fourier transform of stationary measures for such systems, and my MSCA fellowship is titled ‘Fourier decay for nonlinear fractal measures.’ I have also done a lot of work exploring different ways one can define ‘dimension,’ to provide refined information about the global or local scaling properties of classes of sets or measures. I enjoy finding connections between these topics and other areas of mathematics such as number theory and probability theory.

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## PUBLICATIONS AND PREPRINTS

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Submitted preprints:

15. A. Banaji, H. Chen, A. Rutar, W. Wang. Attainable forms of lower spectra, [arXiv](#)
14. S. Baker, A. Banaji. *Self-similar and self-conformal measures with slow Fourier decay*, [arXiv](#)
13. S. Baker, A. Banaji, D.-J. Feng, C.-K. Lai, Y. Xiong. *Distinct dimensions for attractors of bi-Lipschitz iterated function systems*, [arXiv](#)
12. A. Banaji, H. Yu. *Fourier transform of nonlinear images of self-similar measures: quantitative aspects*, [arXiv](#)
11. A. Banaji, A. Rutar. *Lower box dimension of infinitely generated self-conformal sets*, [arXiv](#)

Published:

10. A. Banaji, J. M. Fraser, I. Kolossváry, A. Rutar. *Assouad spectrum of Gatzouras–Lalley carpets*, **Advances in Mathematics** 484 (2026), no. 110707, [arXiv](#)
9. S. Baker, A. Banaji. *Polynomial Fourier decay for fractal measures and their pushforwards*, **Mathematische Annalen** 392 (2025), 209–261. [arXiv](#)
8. A. Banaji, A. Rutar, S. Troscheit. *Interpolating with generalized Assouad dimensions*, **Journal of Geometric Analysis** 35 (2025), no. 270, 57pp. [arXiv](#)
7. A. Banaji, I. Kolossváry. *Intermediate dimensions of Bedford–McMullen carpets with applications to Lipschitz equivalence*, **Advances in Mathematics** 449 (2024), no. 109735, 69pp [arXiv](#)
6. A. Banaji, J. M. Fraser. *Assouad type dimensions of infinitely generated self-conformal sets*, **Nonlinearity** 37 (2024), no. 045004, 31pp. [arXiv](#)
5. A. Banaji. *Generalised intermediate dimensions*, **Monatshefte für Mathematik** 202 (2023), 465–506. [arXiv](#)
4. A. Banaji. *Metric spaces where geodesics are never unique*, **American Mathematical Monthly** 130 (2023), 747–754. [arXiv](#)
3. A. Banaji, J. M. Fraser. *Intermediate dimensions of infinitely generated attractors*, **Transactions of the American Mathematical Society** 376 (2023), 2449–2479. [arXiv](#)
2. A. Banaji, H. Chen. *Dimensions of popcorn-like pyramid sets*, **Journal of Fractal Geometry** 10 (2023), 151–169. [arXiv](#)
1. A. Banaji, A. Rutar. *Attainable forms of intermediate dimensions*, **Annales Fennici Mathematici** 47 (2022), 939–960. [arXiv](#)

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## EMPLOYMENT HISTORY AND EDUCATION

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**University of Jyväskylä**

2025–present

**Postdoctoral Researcher in Mathematics**

Working with Tuomas Orponen, on fractal geometry and Fourier decay, with an MSCA postdoctoral fellowship since September 2025

**Loughborough University**

2023–2025

**Research Associate in Mathematics**

Working with Simon Baker, on fractal geometry and Fourier decay

University of St Andrews  
2019–2023

### PhD Mathematics

**Thesis:** “[Interpolating between Hausdorff and box dimension](#)” (defended May 2023)

**Topic:** Fractal geometry and dimension theory, with the [Analysis Research Group](#)

**Supervisors:** [Jonathan Fraser](#) (primary), [Kenneth Falconer](#)

University of St Andrews  
2018–2019

### MSc Mathematics, Distinction

**GPA:** 19.5/20. Ranked 1<sup>st</sup> 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

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## GRANTS AND PRIZES

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- 2025: Awarded **€226,000 Marie Skłodowska-Curie Actions Postdoctoral Fellowship** with 100% score, "Fourier decay for nonlinear fractal measures" (FoDeNoF, grant no. 101210409), University of Jyväskylä.
- 2023–4: Awarded **LMS Travel Grant** for Early Career Researchers to visit the University of Oulu
- 2019: **Postgraduate Gray Prize** for the best MSc student in the Faculty of Science and Medicine at the University of St Andrews.

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## TALKS AND MINICOURSES

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I have given more than 50 talks (see <https://amlan-banaji.github.io/files/BanajiTalks.pdf>) at conferences and seminar series including:

- Invited minicourse, Shenzhen Technology University, China, 25/6/25–27/6/25
- Invited minicourse, [Focused workshop on Harmonic analysis methods in fractal geometry](#), Budapest, 4/11/24–8/11/24
- [Fractal Geometry and Stochastics 7](#) (Chemnitz, 26/9/24)
- [British Early Career Mathematicians’ Colloquium](#) (keynote talk, Birmingham, 14/6/24)
- [British Mathematical Colloquium \(BMC\)](#) (Manchester, 19/6/24)
- [Fractal Geometry](#) (celebrating Prof. Kenneth Falconer’s 70th birthday, ICMS, Edinburgh, 4/7/23)
- [Multifractal analysis and self-similarity](#) (CIRM, Marseille, 30/6/23)
- [Thermodynamic Formalism: Non-additive Aspects and Related Topics](#) (Będlewo, 16/5/23)
- [One World Fractals](#) (online talks by myself and Hong Wang, 18/1/23)
- [Shenzhen Technology University Mathematics Colloquium](#) (inaugural talk, China (online), 22/10/22)
- [Fractals and Related Fields IV](#) (Porquerolles, 5/9/22)
- [Geometry of Deterministic and Random Fractals](#) (Budapest, 30/6/22 and 2/9/24)

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## TEACHING EXPERIENCE

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- March–May 2024: **lectured** second-year course ‘Elements of Topology’ at Loughborough to 90 students
- 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)
- 2018–2022: **Tutoring** mathematics (undergraduate, A level and STEP) with G5 Education, Oxford Exclusif Tutorial Agency, PhD Tutors, Sishu Chinese School, and privately.

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## SERVICE AND MEMBERSHIPS

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- 2022–present: **Referee** for *Math. Ann.*; *Int. Math. Res. Not. IMRN*; *Adv. Math.*; *J. Lond. Math. Soc.*; *Ergodic Theory Dynam. Systems*; *Proc. Roy. Soc. Edinburgh Sect. A*; *Nonlinearity*; *Colloq. Math.*; *Amer. Math. Monthly*; *Acta Math. Sin. (Engl. Ser.)*; *J. Math. Anal. Appl.*; *Real Anal. Exchange*; *MathSciNet*
- 2026: **Host** of Haipeng Chen as a University of Jyväskylä Visiting Fellow.
- 2026: **Organiser** of a session on Fractal Geometry at the [Finnish Mathematical Days 2026](#).
- 2023–2025: **Co-organiser** of the [Loughborough University Dynamical Systems Seminar](#)
- 2024: **Co-organiser** of [Workshop on Ergodic Theory and Fractal Geometry](#) at Loughborough University
- 2022: **Organiser** of St Andrews Analysis Reading Group
- 2021: **Co-organiser** of the Postgraduate Interdisciplinary Mathematics Symposium (PIMS), St Andrews.
- Member of professional bodies: [LMS](#), [IMA](#), [EMS](#).