

Ana Emilia de Orellana

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University of St Andrews

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EDUCATION

- School of Mathematics and Statistics, University of St Andrews** *Sep. 2023 - Present*
PhD in Mathematics

Dissertation Title: *On the Fourier Spectrum and its Applications.*

Supervisors: Prof. Jonathan M. Fraser, Regius Prof. Kenneth J. Falconer.

- Facultad de Ingeniería Química, Universidad Nacional del Litoral** Feb. 2018 - Mar. 2023
Licentiate Degree in Mathematics (equivalent to M.Sc.)
GPA: 8.68/10, part of the honour board.

Dissertation Title: *Homogeneous Type Spaces and Metrisation.*

Supervisors: Dr. Marisa Toschi, Dr. Mauricio Ramseyer.

Keywords: Muckenhoupt weights, spaces of homogeneous type, Hardy–Littlewood maximal operator.

PUBLICATIONS

- L^2 restriction estimates from the Fourier spectrum, with M. Carnovale and J. M. Fraser. 2024. arXiv: 2412.14896.
 - Obtaining the Fourier spectrum via Fourier coefficients, with M. Carnovale and J. M. Fraser. *Proceedings of the American Mathematical Society* (to appear). arXiv: 2403.12603.
 - A Fourier analytic approach to exceptional set estimates for orthogonal projections, with J. M. Fraser. *Indiana University Mathematics Journal* (to appear). arXiv: 2404.11179.

TALKS

- Fourier Restriction and Fractal Dimensions.
Workshop on Regularity Theory of PDEs and Calculus of Variations, University of Essex, UK. Jun. 2025
 - Extending the Stein–Tomas Theorem.
Workshop in Harmonic Analysis and PDEs, University of St Andrews, UK. Apr. 2025
 - Dimension Interpolation and Restriction Theorems.
Young Functional Analysts’ Workshop, University of Glasgow, UK. Apr. 2025
 - Fourier Restriction for Multifractals.
Ergodic Theory and Dynamical Systems Seminar, University of Bristol, UK. Mar. 2025
 - A New Perspective on the Stein–Tomas Theorem.
One World Fractals (online). Nov. 2024
 - Fourier Analytic Methods for Orthogonal Projections.
Analysis Seminar, Shenzhen Technology University, China (online talk). Oct. 2024
 - Orthogonal Projections and a Continuum of Dimensions.
Analysis Seminar, University of Birmingham, UK. Oct. 2024
 - Dimension Interpolation and Exceptional Set Estimates.
Analysis Seminar, University of Edinburgh, UK. Sep. 2024

- The Continuity of Exceptional Estimates for Orthogonal Projections. Fractal Geometry and Stochastics 7, Chemnitz, Germany. *Sep. 2024*
- Orthogonal Projections and the Fourier Spectrum. Workshop on Fourier Analysis, Fractals, and Finite Fields, University of St Andrews, UK. *Sep. 2024*
- Projection Theorems for the Fourier Spectrum. Workshop on the Geometry of Deterministic and Random Fractals II, Rényi Institute, Budapest, Hungary. *Sep. 2024*
- Fourier Analysis for Fractal Measures. Workshop on Ergodic Theory and Fractal Geometry, University of Loughborough, UK. *Jul. 2024*
- Exceptional Projections and Dimension Interpolation. Geometry and Fractals under the Midnight Sun Conference, University of Oulu, Finland. *Jun. 2024*

EVENTS ORGANISED

- Harmonic Analysis and PDEs Workshop at the University of St Andrews. One day workshop for the LMS funded HAPDE Network. Co-organised with Jonathan Fraser. *8th Apr. 2025*
- Pure PhD Seminar at the University of St Andrews. Seminar series given by PhD students of the Analysis, Algebra, and Geometry research groups Co-organised with Violeta Lopez (Geometry PhD student). *Sep. 2025 - May 2026*

Analysis Reading Groups

- Topics in Fractal Geometry, Harmonic Analysis, and Dynamical Systems. *Sep.-Dec. 2024*
- A short proof of the multilinear Kakeya conjecture. *Sep.-Dec. 2025*

AWARDS

- St Leonard's College Scholarship, University of St Andrews. Funding to attend the 'Workshop on Ergodic Theory and Fractal Geometry' at the University of Loughborough. *Jul. 2024*
- Santander Development Fund Scholarship. Funding to attend the 'Geometry and Fractals under the Midnight Sun Conference' at the University of Oulu. *Jun. 2024*
- University of St Andrews - Handsel Scholarship for PhD in Mathematics. *Sep. 2023 - Mar. 2027*
- Second place in the National Monograph competition held by the Argentinian Mathematical Union. Title: 'Knot Theory'. *Sep. 2019*

EXPERIENCE

Academic Tutor and Demonstrator

Sep. 2023 - Dec. 2025

Tutor at the University of St Andrews for a variety of pure and applied undergraduate mathematics modules. Marking summative and formative assessment for over 250 students. Demonstrator for over 550 students in examples classes.

Lecturer

Feb. 2023

Lecturer at the Universidad Nacional del Litoral's 'Summer School' for entrance level students studying core mathematics modules. Lectured two groups of 70 students twice per week in two-hour sessions.

Teaching Assistant*Aug. 2022 - Mar. 2023*

Teaching assistant at Universidad Nacional del Litoral for first-year level undergraduate students.

Educational outreach*Mar. 2017 - Dec. 2018*

Collaborating with the Universidad Nacional del Litoral, providing one-to-one tuition in a variety of STEM subjects to less affluent members of the community.

Programming

Python, MatLab, Mathematica, R, Shiny-r, HTML, CSS, JavaScript.

REFERENCES

- Prof. Jonathan Fraser: jmf32@st-andrews.ac.uk
- Regius Prof. Kenneth Falconer: kjf@st-andrews.ac.uk