CURRICULUM VITAE

Jonathan M. Fraser

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RESEARCH INTERESTS

I am primarily interested in the dimension theory and geometry of fractal sets and measures. I often work with dynamically defined fractals such as attractors of iterated function systems. I am interested in finding links between fractal geometry and other areas of mathematics including: real and complex analysis, hyperbolic geometry, Fourier analysis, geometric measure theory, ergodic theory, and probability theory.

EMPLOYMENT

- Aug 2021 – present: Professor of Mathematics and Statistics, University of St Andrews.
- Aug 2018 – July 2021: Reader in Mathematics and Statistics, University of St Andrews.
- Aug 2016 – July 2018: Lecturer in Mathematics and Statistics, University of St Andrews.
- Sept 2014 – July 2016: Lecturer in Pure Mathematics, University of Manchester.
- July 2013 – Aug 2014: Research Fellow, University of Warwick.
    - Funded by Mark Pollicott's EPSRC grant EP/J013560/1 *Thermodynamic formalism and flows on moduli spaces.*

EDUCATION

- Sept 2009 – Jun 2013: PhD in Pure Mathematics, University of St Andrews (EPSRC funded).
    - Thesis: *Dimension theory and fractal constructions based on self-affine carpets.*
- Sept 2005 – May 2009: MMath (with Hons), First Class, University of St Andrews.
    - Dissertation: *Multifractals and irregular measures on the middle third Cantor set.*
    - Honours average: 19.0/20

FINANCIAL SUPPORT

Total grant income since 2015 of £824,482 including:

- 2021–22: RSE Sabbatical Research Grant - £62,916
    - *Fractal dimension in nonlinear nonconformal settings*, award number: 70249
- 2020: ICMS Workshop grant - £29,000
- 2019–23: Leverhulme Trust Research Project Grant (PI) - £324,135
    - *New perspectives in the dimension theory of fractals*, RPG-2019-034
- 2018–21: EPSRC Standard Grant (PI) - £336,123
    - *Fourier Analytic Techniques in Analysis and Geometry*, EP/R015104/1
- 2016–18: Leverhulme Trust Research Fellowship - £48,003
    - *Fractal Geometry and Dimension Theory*, RF-2016-500
- Several smaller grants, including from: LMS, RSE, EMS, Scottish Crucible, Glasgow Mathematical Journal Trust, and Oberwolfach Research Institute for Mathematics.

SELECTED AWARDS AND PRIZES

Research and scholarship

• 2022: *Sir Thomas Makdougall Brisbane Medal* RSE Early Career Medal in Physical, Engineering & Informatic Sciences.
• 2018: *RSE Young Academy of Scotland* - member.

Teaching awards

• 2023: *Outstanding Teacher (Science & Medicine)* - winner, Students' Association Teaching Awards.
• 2015: *Best Lecturer within the Faculty of Engineering and Physical Sciences* (Uni. Manchester).
• 2013: *Best Postgraduate Tutor* - St Andrews Students' Association Teaching Awards.

Undergraduate prizes

• 2009: *Class Medal* for best student in 4th/5th level MMath mathematics.
• 2009: *Arthur Hinton Read Memorial Prize* for best student in senior honours pure mathematics.
• 2009: *IMA prize* for best student in senior honours.
• 2008: *Class Medal* for best student in 3rd level MMath mathematics.
• 2008: *Alexander Stewart Prize* for best student in junior honours pure mathematics.

RESEARCH ACTIVITY

Complete lists of publications and talks are provided at the end of this CV.

• Written 74 research articles, 5 survey articles, and a book entitled *Assouad Dimension and Fractal Geometry* - CUP, *Tracts in Mathematics Series*, **222**, (2020). To date, 69 research articles accepted for publication by internationally leading peer reviewed journals including:

◦ Advances in Mathematics (×4)
◦ Analysis & PDE
◦ Bulletin of the AMS
◦ Bulletin of the LMS (×2)
◦ Ergodic Theory and Dynamical Systems (×7)
◦ Geometriae Dedicata
◦ Indiana University Mathematics Journal (×5)
◦ International Mathematics Research Notices (×2)
◦ Israel Journal of Mathematics (×2)
◦ Journal of the LMS
◦ Mathematische Zeitschrift (×3)
◦ Proceedings of the AMS (×7)
◦ Proceedings of the LMS
◦ Transactions of the AMS (×4)

• Over 1200 citations and an h-index of 20 (Google Scholar).
• Supervised 8 PhD students, 3 postdoctoral researchers, and written papers with over 40 different collaborators.
• Invited longer term research visits include: Mittag-Leffler Institute (2017); ICERM Brown (2016); Chinese University of Hong Kong (2017); East China Normal University (2012); Universities of Helsinki (2015), Oulu (2015), Waterloo (2018), Vienna (2017), and Bremen (2010).
• Given over 70 (external) research talks ◦ regularly invited to speak at large international conferences, including the opening keynote lecture at *Fractal Geometry and Stochastics VI* in 2018 ◦ numerous seminars in the UK and abroad, including at Warwick; Edinburgh; Glasgow; Imperial; Hebrew U. Jerusalem; Chinese U. Hong Kong; Waterloo, Canada; Stony Brook, USA; Vienna; CNRS Paris.

SUPERVISION AND MENTORSHIP

Postdoctoral researchers supervised

• 2020–22 : Natalia Jurga, funded by *EPSRC* Standard Grant EP/R015104/1.
  ◦ Natalia took up a *Leverhulme Trust Early Career Fellowship* in May 2022.

- 2019– : István Kolossváry, funded by *Leverhulme Trust* Research Project Grant RPG-2019-034.
  - Istvan was recently awarded a *Marie Curie Fellowship* which he will take up in Budapest later in 2023.
- 2018–19 : Jonathan Hickman, funded by *EPSRC* Standard Grant EP/R015104/1.
  - Jonathan took up a Lectureship at the University of Edinburgh in August 2019.

PhD students supervised

- 2023– : Ana Emilia de Orellana, *Handsel scholarship*.
- 2020– : Alex Rutar, funded by the University of St Andrews and *NSERC*.
- 2019–23 : Amlan Banaji, funded by *Leverhulme Trust* Research Project Grant RPG-2019-034.
  - Thesis: *Interpolating between Hausdorff and box dimension*.
  - Amlan took up a Research Associate position at Uni. Loughborough in March 2023.
- 2019–22 : Liam Stuart, funded by the University of St Andrews.
  - Thesis: *Limit sets, Julia sets and Sullivan's dictionary: a dimension theoretic analysis*.
  - Liam took up a Research Fellowship in St Andrews in October 2022.
- 2019–20 : Haipeng Chen, visit funded by the *Chinese Scholarship Council*.
  - Thesis: *Lower Assouad type dimensions of fractal sets* (South China University of Technology)
  - Haipeng took up a Tenure-track Assistant Professorship at the Shenzhen Technology Uni. in 2021.
- 2017–21 : Stuart Burrell, funded by the *Carnegie Trust*.
  - Thesis: *Coincidence and disparity of dimensions in four fractal families*.
  - Stuart took up an LMS Early Career Postdoctoral Fellowship at Uni. St Andrews in January 2021
- 2017–21 : Lawrence Lee, funded by the *EPSRC*.
  - Thesis: *Multifractal measures - from self-affine to nonlinear*.
  - Lawrence took up an EPSRC Doctoral Prize Fellowship at the Uni. Manchester in April 2021.
- 2016–20 : Douglas Howroyd, funded by the *EPSRC*.
  - Thesis: *On the regularity dimensions of measures*.
  - Douglas took up a position as Software Engineer at the Home Office in 2020.
- 2015–19 : Han Yu, funded by the University of St Andrews.
  - Thesis: *Assouad type dimensions and dimension spectra*.
  - Han took up a three year postdoctoral position at the University of Cambridge in September 2019, as well as a Research Fellowship in Corpus Christi College.

Other researchers supervised

- 2018–19 : Andrew Mitchell, funded by a *Scottish Crucible* research grant.
  - Andrew took up a funded PhD position at the University of Birmingham in September 2019.

SELECTED ACADEMIC RESPONSIBILITIES

Membership of Editorial Boards

- 2022– : Editor-in-Chief, *Proceedings of the Royal Society of Edinburgh (Section A, Mathematics)*
- 2022– : *Journal of Fractal Geometry*
- 2020– : *Royal Society Open Science*
- 2017– : *Newsletter of the London Mathematical Society*
  - March 2021-: author of the *Mathematics New Flash* section of the bi-monthly Newsletter.
- 2015– : *Proceedings of the Royal Society of Edinburgh (Section A, Mathematics)*

External appointments

- 2022: Swedish Research Council - Mathematics Panel.
- 2022: YAS recruitment - Panel 6: Informatics, Mathematics, Computing and Statistics.
- January 2022: Pure mathematics hiring committee (external member), University of Glasgow.

• 2020–22: REF 2021 Sub-panel 10: Mathematical Sciences.
• January 2020: EPSRC Mathematical Sciences Fellowship Interviews Panel.
• 2020– : Full Member on the *Scottish Mathematical Council*.
• 2018– : EMS representative, London Mathematical Society *International Affairs Committee*.
• 2018–23: *Young Academy of Scotland*.
• 2017–19: *EPSRC Mathematical Sciences Early Career Forum*.
• 2017: *Scottish Crucible*.

Society memberships

• 2010– : *London Mathematical Society*.
• 2009– : *Edinburgh Mathematical Society*.
• 2009–10: *Institute for Mathematics and its Applications*.

Refereeing and reviewing

• Refereed over 60 research articles for over 30 research journals, including: ◦ *Advances in Mathematics* ◦ *IMRN* ◦ *Inventiones Mathematicae* ◦ *Israel Journal of Mathematics* ◦ *Journal of the European Mathematical Society* ◦ *Proceedings of the London Mathematical Society* ◦ *Transactions of the American Mathematical Society*.
• Refereed several research proposals, including for: ◦ *Austrian Science Fund (FWF)* ◦ *EPSRC* ◦ *German Academic Exchange Service (DAAD)* ◦ *Israel Science Foundation (ISF)* ◦ *Marsden Fund - Royal Society of New Zealand* ◦ *National Research, Development and Innovation Office of Hungary* ◦ *Natural Sciences and Engineering Research Council of Canada* ◦ *South Africa's National Research Foundation* ◦ *Swiss National Science Foundation*
• Refereed several book proposals, including for: ◦ *CRC Press (Taylor and Francis)* ◦ *Springer Undergraduate Mathematics Series*.
• 2012– : regular reviewer for the *American Mathematical Society Mathematical Reviews*.

PhD examination

• 2019: Alexandros Margaris (Uni. Warwick) - *Dimensions, Embeddings and Iterated Function Systems*.
• 2018: Demi Allen (Uni. York) - *Mass Transference Principles and Applications in Diophantine Approximation*.
• 2016: Vuksan Mijovic (University of St Andrews) - *Multifractal Zeta Functions*.
• 2015: Eino Rossi (Uni. of Jyväskylä, Finland) - *Local structure of fractal sets: tangents and dimension*.
• 2015: Anthony Chiu (Uni. Manchester) - *Iterated function systems that contract on average*.

Selected departmental and University roles

• 2022– : member of School Postgraduate Research Committee.
• 2020– : member of School Research Committee.
• 2020– : Honours Advisor of Studies in the School of Mathematics and Statistics.
• 2019– : Head of Analysis Research Group.
• 2018– : member of University Academic Advising Best Practise Group.
• 2018–23: Outreach Officer in the School of Mathematics and Statistics.
• 2016–20: Sub-honours Advisor of Studies in the School of Mathematics and Statistics.
• 2016– : member of various shortlisting and interview panels at Manchester and St Andrews.

TEACHING

Undergraduate modules lectured since joining St Andrews in 2016:
◦ MT1002: Mathematics - 2017
◦ MT2502: Analysis - 2019, 2020
◦ MT3502: Real Analysis - 2017, 2018

◦ MT5830/MT5870: Hyperbolic Geometry - 2017, 2019, 2021, 2023

I wrote the Hyperbolic Geometry course and a full set of illustrated lecture notes is available on my webpage. I have always received excellent student feedback (both unofficial and official). The formal feedback I have received is summarised below, where the numbers are average scores given by students on scale of 1-5 with 1 the best. There are four categories directly relating to the lecturer, two of which changed from 2019: ◦ Lecture material was well organised (organisation) ◦ Lecturer was good at explaining things/Lecture material was well explained (explanation) ◦ Teaching style was engaging/Lecture material was well presented (engagement) ◦ I was able to contact the lecturer if I needed to (availability).

	organisation	explanation	engagement	availability	class size
MT5870 (Spring 2021)	1.36	1.36	1.18	1.0	27
MT2502 (Fall 2020)	1.32	1.33	1.25	1.42	132
MT2502 (Fall 2019)	1.18	1.13	1.16	1.27	142
MT5830 (Spring 2019)	1.29	1.18	1.18	1.24	29
MT3502 (Fall 2018)	1.27	1.11	1.05	1.26	82
MT3502 (Fall 2017)	1.13	1.1	1.03	1.33	66
MT1002 (Fall 2017)	1.28	1.26	1.18	1.42	213
MT5830 (Spring 2017)	1.4	1.13	1.07	1.13	28

Undergraduate modules taught while at Uni. Manchester:
◦ 0C1/1C1: Mathematics for Optometry and Foundation Year - 2014, 2015
◦ MATH10101: Sets Numbers and Functions - 2015

The formal feedback I have received is summarised below, where the numbers are average scores given by students on scale of 1-5 with 5 the best. This time there is only one category directly relating to the lecturer: "(The lecturer's) teaching was excellent".

	overall	class size
MATH10101 (Fall 2015)	4.86	229
0C1/1C1 (Fall 2015)	0C1:4.92, 1C1:4.76	105
0C1/1C1 (Fall 2014)	0C1:4.9, 1C1:4.6	109

Invited workshops and mini-courses

• July 2023: Assouad dimension and fractal geometry - *Mini-course aimed at postgraduate students in fractals*, (delivered online) East China Normal University, Shanghai, China.
• July 2017: Fractal geometry and dimension theory - *LMS Undergraduate Summer School*, U. Manchester, UK.
• August 2016: How to give a good presentation - *Young Researchers in Mathematics Conference*, U. St Andrews, UK.

PARTICIPATION AND ORGANISATION

Selected meetings and events organised

• 2023: ICMS, RSE, GMJT funded conference on *Fractal Geometry* at the ICMS in Edinburgh.
• 2019: EMS funded workshop on *Fractal Geometry and Geometric Measure Theory* in St Andrews.
• 2019– : weekly *Analysis Seminar* in St Andrews.
• 2018: Dynamics Workshop during the *British Mathematical Colloquium (BMC)* in St Andrews.
• 2018: LMS funded *one day ergodic theory meeting* in St Andrews (with Mike Todd).
• 2016: *LMS Northern Regional Meeting* and associated two day workshop on *Dynamical systems, ergodic theory and applications* in Manchester.

• 2016: one day *STEM* event in Manchester for Larbert High School, which included the schools of *Mechanical and Civil Engineering*, *Computer Science*, and *Mathematics*.
• 2015–16: weekly *dynamical systems and analysis seminar* in Manchester.
• 2015–16: series of *Pure Mathematics Colloquia* in Manchester (with Gareth Jones and Henrik Suess).
• 2015: LMS funded one day meeting on *Fractal geometry and dimension theory* in Manchester.
• 2015: LMS funded *one day ergodic theory meeting* in Manchester (with Charles Walkden).

Selected outreach and engagement activities

• Participated in several events or workshops as an invited speaker or facilitator, including:

• Secondary School level: Mathematics in Action (The Training Partnership), U. College London, (audience size: 901) ◦ Mathematics Masterclass, U. York ◦ The Sutton Trust, Uni. St Andrews ◦ First Chances Project, Maths and Science Workshop, U. St Andrews ◦ Making Maths at Manchester, Uni. Manchester ◦ Highland Senior Maths Weekend, Lagganlia (2013–16) ◦ Taking Maths Further, Uni. Manchester ◦ International Science Summer School, Uni. St Andrews ◦ Summer Academic Experience Course, U. St Andrews ◦ visits to give lectures or run workshops at: St Leonard's College, Larbert High School, Glenalmond College, The Bolton School, St Ninian's High School.

• General audience: St Andrews Bright Club ◦ Pint of Science, Edinburgh. ◦ Scottish Mathematical Council conference ◦ public lecture at the ICMS, Edinburgh.

• Undergraduate level: LMS Undergraduate Summer School, Uni. Manchester ◦ Research in the UK afternoon, Uni. Cambridge ◦ St Andrews Student Radio (to discuss life as an academic) ◦ LMS Undergraduate Summer School, The University of Manchester, UK.

• Postgraduate level: Young Researchers in Mathematics Conference, U. Oxford ◦ Lunchtime Legends, Uni. St Andrews ◦ LMS Early Career Researcher Continuing Professional Development panellist: Writing and publication.

TALKS GIVEN

International conferences

• Hölder solutions to the winding problem: 12/12/19, *Thermodynamic Formalism: Dynamical Systems, Statistical Properties and their Applications*, Luminy, France.
• Interpolating between dimensions: 01/10/18, Opening Keynote, *Fractal Geometry and Stochastics VI*, Germany.
• Fourier transforms of measures on the Brownian graph: 10/03/16, ICERM workshop *Fractal Geometry, Hyperbolic Dynamics and Thermodynamical Formalism*, Brown University, USA.
• Recent progress on the Assouad dimension: 21/09/15, *Fractals and Related Fields III*, Porquerolles Island, France.
• The Assouad dimension of self-similar sets with overlaps: 09/06/14, *Workshop on Fractals*, Jerusalem, Israel.
• Inhomogeneous iterated function systems: 26/03/14, *Fractal Geometry and Stochastics V*, Tabarz, Germany.
• Modified singular value functions and self-affine carpets: 11/12/12, *Advances in Fractals and Related Topics*, Chinese University of Hong Kong, Hong Kong.
• The Hausdorff dimension of graphs of prevalent continuous functions: 16/06/11, *Fractals and Related Fields II*, Porquerolles Island, France.

Smaller international meetings and workshops

• Assouad dimension of distance sets: 14/05/22 (online), invited speaker, AMS Sectional Meeting - Special Session on Fractal Geometry and Dynamical Systems.
• Assouad dimension of distance sets: 05/12/21 (online), invited speaker, Winter Meeting of the Canadian Mathematical Society.
• A new perspective on the Sullivan dictionary via the Assouad dimension and spectrum: 17/12/20 (online), invited speaker, *Séminaire Cristolien d'Analyse Multifractale*, Laboratoire d'Analyse et de Mathématiques Appliquées, CNRS. Paris, France.
• Box dimensions of projections and dimension interpolation: 17/01/20, invited speaker, *Geometric Measure Theory in Padova*, Italy.
• The Assouad spectrum: 05/12/17, invited speaker, *Fractals and Dimensions*, Mittag-Leffler Institute, Stockholm, Sweden.
• Dimensions of equilibrium measures on some self-affine sets: 11/07/17, invited speaker, *Thermodynamic formalism - Applications to geometry and number theory* , Bremen, Germany.
• Scaling scenery of $(\times m, \times n)$ invariant measures: 23/05/14, invited speaker, *Numbers in Ergodic Theory*, Leiden, The Netherlands.
• On the analyticity of Falconer's subadditive pressure function: 12/05/14, *Conference in honour of Kenneth Falconer's 60th birthday*, INRIA, Paris, France.
• Fourier transforms of measures supported on graphs: 24/01/14, invited speaker, *Ergodic Theory and Dynamical Systems mini-workshop*, Jagiellonian University, Krakow, Poland.
• Random self-affine multifractal Sierpiński sponges in $\mathbb{R}^d$: 14/10/10, *CODY Workshop*, Warsaw, Poland.
• The visibility conjecture: 09/03/10, *Winter School on operators and fractals*, Siegmundsburg, Germany.

Conferences and workshops in the UK

• Fourier analytic tools in geometric measure theory and dimension interpolation: 31/04/23, invited speaker, *Paris-London Analysis seminar*, University College London.
• Dimension interpolation in conformal dynamics: 14/09/22, invited speaker, *Geometry, Stochastics, & Dynamics*, Imperial College London.
• An expanded Sullivan dictionary via dimension interpolation: 15/06/22, invited speaker, *One day ergodic theory meeting*, University of Exeter.
• Dimensions of limit sets of Kleinian groups: 06/09/18, invited talk at *Dynamics Days Europe*, Loughborough University.

• Dynamics on fractals (public lecture): 19/06/18, invited public lecture, *Thermodynamic formalism in dynamical systems*, ICMS.
• Ito drift-diffusion processes and applications to Fourier decay problems on random graphs: 31/05/18, invited speaker, *Sixth Scottish Partial Differential Equation Colloquium*, University of Edinburgh.
• Regularity of measures: 11/12/17, invited speaker, *LMS Network on Harmonic Analysis and PDEs*, University of Warwick.
• (Almost) arithmetic progressions and dimension: 29/06/17, invited speaker, *Diophantine approximation and related fields*, University of York.
• Fourier decay of measures on the Brownian graph: 23/10/15, invited speaker, *LMS Harmonic Analysis and PDEs network meeting*, University of Edinburgh.
• Dynamically defined fractals: 17/08/15, invited keynote speaker for dynamics, *Young Researchers in Mathematics Conference*, 17/08/15 - 20/08/15, University of Oxford.
• Fourier analytic properties of the Brownian graph: 22/07/15, *Fractal geometry and dimension theory one day meeting*, University of Manchester.
• The Kakeya Problem: invited plenary speaker for analysis 13/05/15, *Birmingham Young Mathematician Colloquium*, University of Birmingham.
• How to prove Falconer's distance set conjecture using ergodic theory: 03/12/14, invited speaker, *One day ergodic theory meeting*, Queen Mary University of London.
• Dimension and measure for typical random fractals: 16/04/12, *EPSRC Workshop*, University of Warwick.
• The horizon problem for prevalent surfaces: 19/04/11, *EPSRC Workshop*, University of Warwick.

Invited seminars and colloquia abroad

• Assouad dimension and the Falconer distance problem: 14/07/23, colloquium (online), East China Normal University, Shanghai, China.
• Sullivan's dictionary, conformal dynamics, and Assouad type dimensions: 10/11/22, Fractals seminar (online), Shenzhen Technology University, China.
• A new perspective on the Sullivan dictionary: 3/11/20, Dynamics Seminar (online), Hebrew University of Jerusalem, Israel.
• Dimension theory and the Sullivan dictionary: 29/10/20, Dynamics Seminar (online), Uni. Vienna, Austria
• Parabolic points, Poincaré exponents, and Patterson-Sullivan measures: 30/04/20 (online), Wesleyan University Colloquium, USA.
• Dimensions of Kleinian limit sets: 27/03/19, Stony Brook University, New York, USA.
• The Assouad Spectrum: 23/03/18, University of Waterloo, Canada.
• (Almost) arithmetic progressions, weak tangents, and Assouad dimension: 14/09/17, Chinese University of Hong Kong.
• Fourier transforms of measures on the Brownian graph: 11/09/17, Chinese University of Hong Kong.
• The Assouad spectrum: scaling and homogeneity in metric spaces: 20/10/16, University of Vienna, Austria.
• Dimensions of self-affine carpets and Bernoulli convolutions: 18/07/16, Wesleyan University, USA.
• Inhomogeneous self-similar sets with overlaps: 17/03/16, Ohio State University, USA.
• The Brownian graph has maximal Fourier dimension: 31/08/15, University of Oulu, Finland.
• Fourier transforms of measures on the Brownian graph: 25/08/15, University of Helsinki, Finland.
• Fourier transforms of measures supported on graphs: 12/08/14, Cornell University, USA.
• Generic dimensions of graphs and images: 07/12/12, East China Normal University, Shanghai, China.
• The visible part of fractal sets: 03/03/10, University of Bremen, Germany.

Invited seminars and colloquia in the UK

• Dimensions of parabolic Julia sets and Kleinian limit sets, 07/09/22, University of Liverpool.
• Intermediate dimensions of infinitely generated self-conformal sets, 08/02/22 (online), Queen Mary Uni. London
• Dimensions of exceptional self-affine sets in $\mathbb{R}^3$, 12/11/19, University of Birmingham.
• Kleinian groups, parabolic points, and dimension, 24/10/19, University of Bristol.

• Approximate arithmetic structure in large sets of integers: 23/05/19, Imperial College London.
• The Assouad dimension of Kleinian limit sets: 16/05/19, Colloquium, Open University, Milton Keynes.
• Sets of integers containing (almost) arithmetic progressions: 24/10/18, Colloquium, University of Surrey.
• Dimension and measure for limit sets of Kleinian groups: 20/02/18, University of Warwick.
• Regularity of Kleinian limit sets and Patterson-Sullivan measures: 12/02/18, University of Manchester.
• Geometrically finite Kleinian groups and dimension: 09/02/18, University of Liverpool.
• (Almost) arithmetic progressions and dimension: 21/03/17, University of Glasgow.
• (Almost) arithmetic progressions and dimension: 27/02/17, University of Edinburgh.
• Exact dimensionality and Ledrappier-Young formulae for Gibbs measures on some planar self-affine sets: 31/05/16, University of Warwick.
• Brownian motion, Fourier transforms, and dimension: 29/04/16, Pure Maths Colloquium, Uni. Manchester.
• Inhomogeneous self-similar sets with overlaps: 21/04/16, University of Bristol.
• Inhomogeneous attractors: structure and dimension: 06/10/15, Open University, Milton Keynes.
• Dimension theory for parabolic limit sets: 16/06/15, University of Warwick.
• Scaling scenery and the distance set problem: 19/05/15, University of York.
• Equality of Hausdorff measure and Hausdorff content: 06/05/15, University of Liverpool.
• Blowing up ergodic measures: 19/03/15, Imperial College London.
• On the dimensions of a family of overlapping self-affine carpets: 26/02/15, University of Bristol.
• The Assouad dimension of self-similar sets with overlaps: 11/03/14, University of St Andrews.
• On the L^q-spectrum of planar self-affine measures: 19/11/13, University of Manchester.
• Assouad type dimensions and homogeneity of fractals: 01/04/13, University of Edinburgh.
• Assouad type dimensions and homogeneity of fractals: 21/02/13, University of Bristol.

Educational and outreach: University level

• Engaging with the Public - schools and public engagement: 06/04/22, *Lunchtime Legends*, University of St Andrews.
• Getting Published (Sciences): 27/01/21, *Lunchtime Legends*, University of St Andrews.
• Engaging with the Public - schools and public engagement: 22/04/20, *Lunchtime Legends*, University of St Andrews.
• Engaging with the Public - schools and public engagement: 22/04/20, *Lunchtime Legends*, University of St Andrews.
• Fractals and the hidden geometry of nature: 21/05/19, *Pint of Science*, The Canons' Gate, Edinburgh.
• Undergraduate workshop on 'Fractal geometry and dimension theory': July 2017, *LMS Undergraduate Summer School*, University of Manchester.
• An academic career?: 08/03/17, *Careers afternoon*, University of St Andrews.
• How thick is your metric space?: 22/09/16, *St Andrews University Mathematics Society.*
• Workshop on 'How to give a good presentation': 01/08/16, *Young Researchers in Mathematics Conference*, University of St Andrews.
• Patterns in the primes: 11/05/16, *University of Manchester Mathematics Society (Galois Group).*
• The academic career - from PhD to first lectureship: 01/06/15, *Career Development Forum*, University of Manchester.
• Pursuing a career in academia after your PhD: 27/01/15, *Postgraduate Interdisciplinary Mathematics Symposium*, The Burn House.
• Fractal geometry and an exploration of self-similarity: 05/11/14, *University of Manchester Mathematics Society (Galois Group).*
• Fractal geometry and dimension theory: 01/11/12, *Research in the UK afternoon*, Cambridge.
• Furstenberg's proof of the infinitude of the primes: 25/10/12, *St Andrews University Mathematics Society.*

Educational and outreach: secondary school level

• What is a fractal and how to spot one, 11/07/23, *Summer Academic Experience Course*, St Andrews.
• S3 Experience Day - Subject Speed Dating Session (maths rep.), 18/05/23, St Andrews.
• Fractals in Nature and Science: 06/03/21, *Scottish Mathematical Council Conference*, online.
• Prime numbers and internet security: 12/02/20, *First Chances Project, Maths and Science Workshop*, University of St Andrews.
• Fractals and problem solving: 13/02/19, *First Chances Project, Maths and Science Workshop*, University of St Andrews.
• Fractals: 14/09/18, St Leonard's College.
• What does a broccoli have in common with the stock market?: 05/07/18, *Sutton Trust*, St Andrews.
• Fractals: 17/03/18, *Mathematics Masterclass*, University of York.
• Fractals and problem solving: 14/02/18, *First Chances Project, Maths and Science Workshop*, University of St Andrews.
• Mathematics, fractals and gnome related problem solving: 16/03/17, *STEM week*, Larbert High School.
• Fractals: patterns in nature and science: 26/01/17, *Academic Enrichment Programme*, Glenalmond College.
• Mathematics, fractals and problem solving: 18/11/16, *Highland Senior Maths Weekend*, Lagganlia.
• Why study mathematics?: 27/06/16, *Taking Maths Further*, University of Manchester.
• Fun with Fractals: 03-04/02/16, *University of Manchester Mathematics Interview Day.*
• Fractals and exploring the infinite: 01/02/16, The Bolton School.
• Fractals: describing nature with mathematics: 03/12/15, invited speaker, *Mathematics in Action (The Training Partnership)*, University College London, (audience size: 901).
• Fractals, problem solving, and fun with primes: 13/11/15, *Highland Senior Maths Weekend*, Lagganlia.
• What is mathematics all about?: 25/06/15, *Taking Maths Further*, University of Manchester.
• Mathematics beyond calculation: 25/03/15, *University of Manchester Mathematics Open Day.*
• Fractals, problem solving, and mathematical proof: 08/11/14, *Highland Senior Maths Weekend*, Lagganlia.
• What does a mathematician do?: 09/10/14, *Gymnasium Eppendorf (Hamburg, Germany) field trip*, Manchester.
• A brief introduction to fractals: 09/11/13, *Highland Senior Maths Weekend*, Lagganlia.
• Fractal geometry and problem solving in mathematics: 19/07/13, *International Science Summer School*, St Andrews.
• Fractals and other fun mathematics: 03/07/13, *Sutton Trust*, St Andrews.

PUBLICATIONS

Books

(1) Assouad Dimension and Fractal Geometry, *CUP Tracts in Mathematics Series*, **222**, (2020).

Survey and expository papers

(5) The Poincaré exponent and the dimensions of Kleinian limit sets,
The American Mathematical Monthly, **129**, (2022), 480–484.
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