	MONDAY JUNE 8th	TUESDAY JUNE 9th	WEDNESDAY JUNE 10th	THURSDAY JUNE 11th	FRIDAY JUNE 12th
	Plain talks Chairman: K. Falconer	**Plain talks** Chairman: P. Mattila	**Plain talks** Chairman: M. Hochman	**Plain talks** Chairman: T. Orponen	**Plain talks** Chairman: U. Freiberg
8h30–8h45	*Welcome talk*				
8h45–9h30	Pablo SHMERKIN	Stéphane JAFFARD	Tuomas ORPONEN	Victor BERESNEVICH	Marcel FILOCHE
9h35–10h20	Xiangyu LIANG	Mike HOCHMAN	Janet PREHL	Timotée BENARD	Meng WU
	Coffee Break	*Coffee Break*	*Coffee Break*	*Coffee Break*	*Coffee Break*
10h45–11h30	Ariel RAPAPORT	Céline ESSER	Pertti MATTILA	Evgeny SPODAREV	Svitlana MAYBORODA
11h35–12h20	Hong WANG	Karoly SIMON	Patricia ALONSO-RUIZ	Rémi RHODES	Kenneth FALCONER

	MONDAY JUNE 8th		TUESDAY JUNE 9th		THURSDAY JUNE 11th	
Topic: Chairman:	**Geometric measure theory** X. Liang, A. Rapaport	**Harmonic and real analysis** A.-H. Fan, H. Wang	**IFS** K. Simon, M. Wu	**Multifractals** C. Esser, S. Jaffard	**Random fractals** P. Alonso-Ruiz, Y. Xiao	**Metric number theory** Chairman: V. Beresnevich, N. de Saxcé
14h30–15h00	Iqra ALTAF	Amlan BANAJI	Ayreena BAKHTAWAR	Yann DEMICHEL	Balász BÁRÁNY	Edouard DAVIAUD
15h05–15h35	András MÁTHÉ	Kiko KAWAMURA	De-Jun FENG	Adam ŚPIEWAK	Sacha TROSCHEIT	Esa JÄRVENPÄÄ
15h40–16h10	Tamás KELETI	Chun Kit LAI	Aleksi PYÖRÄLÄ	Shunsuke USUKI	Steffen WINTER	Sanju VELANI
Coffee Break			*Coffee Break*		*Coffee Break*	
16h40–17h00	Krzysztof BARAŃSKI	Gaétan LECLERC	Antti KÄENMÄKI	Ai Hua FAN	Claire LAUNAY	Demi ALLEN
17h05–17h25	Zoltan BUCZOLICH	William O'REGAN	István KOLOSSVÁRY	Mathieu HELFTER	Benjamin BONNEFONT	Benjamin WARD
17h30–17h50	Ryan BUSHLING	Tom RUSH	Ian MORRIS	Hélène HALCONRUY	Xiong JIN	Markus MYLLYOJA
17h55–18h15	Eugen MIHAILESCU	Félix LEQUEN	Rudolf Daniel PROKAJ	Richard BALKA	Hyunchul PARK	Roope ANTTILA
			Late Session Chairman: P. Shmerkin			
20h45-...			Pieter ALLAART	Ana DE ORELLANA		
...			Caiyun MA	Danny MALLITASIG		
...-21h45			Vilma ORGOVÁNYI	Alex RUTAR		

WEDNESDAY JUNE 10th						
POSTER SESSION 17h30–19h30						
Camel ABOUA	Micky BARTHMANN	Ayesha BENNETT	Hugo BERTRAND	Alvaro BÉTERMIER	Levente DAVID	Bernat ESPIGULE
Attila GASPAR	Zhou FENG	Jacob FIEDLER	Thomas JAFFARD	Jonathan HODGSON	Richard HOWAT	Thomas LAMBY
Jonas LIPPOLD	Fran MIŠKOVIĆ	Vilma ORGOVÁNYI	Sampo PAUKKONNEN	Amit PRIYADARSHI	Firdavs RAKHMONOV	Quentin RIBLE
David SIUKAEV	Anna SOOS	Yuefeng TANG	Manuj VERMA	Charlie WILSON		

Talks : titles and abstracts

Carmel Aboua

Université Gustave Eiffel

Title: *Wavelet analysis of a multifractal object : case of a generalized family of Riemann functions.*

Abstract: In this presentation, we study the pointwise behavior of a family of Riemann functions. First, we present the family of Riemann functions $phi_{\lambda,s}$ with $s > 1/2$ and $\lambda \in \mathbb{R}$. Then, we determine its Hölderian regularity at each point when λ is rational, and we deduce from this analysis its spectrum of singularities, or multifractal spectrum. Finally, we conclude that $phi_{\lambda,s}$ is multifractal when λ is rational.

Pieter Allaart

University of North Texas

Title: *Dimensions of random subsets of self-similar sets*

Abstract: Consider the following method for constructing a random fractal: Let $f_1, \ldots, f_N$ be an iterated function system of similarities on $\mathbb{R}^d$ satisfying the open set condition, and let C be its attractor. In an infinite M-ary tree, where $Mgeq2$, label all edges independently with a number from $1, 2, \ldots, N$ according to a fixed probability vector $(p_1, \ldots, p_N)$. Each infinite labeled path down the tree thus determines a unique point in C via its coding, and the collective of all these points is a random subset of C, denoted by F. In recent work with T. Jones, we gave nontrivial upper and lower bounds for the almost-sure Hausdorff dimension of F in the case of a homogeneous IFS. In this talk I will give the exact Hausdorff dimension of F, also for nonhomogeneous IFS. This is based on joint work with Lauritz Streck. Time permitting, I will also briefly discuss current work with Lauritz and Jonathan Fraser on the Assouad spectrum of F.

Demi Allen

University of Exeter

Title: *Rectangular Shrinking Targets on Self-Similar Carpets*

Abstract: Suppose (X, d) is a metric space equipped with a Borel probability measure and suppose $(B_n)_{n\in\mathbb{N}}$ is a sequence of measurable sets in X. Suppose $T : X \to X$ is a measure preserving transformation and consider the set: $B = \{x \in X : T^n x \in B_n \text{ for infinitely many } n \in \mathbb{N}\}$. This is a *shrinking target set*. The terminology of "shrinking targets" was first introduced by Hill and Velani in 1995. Since then, shrinking target problems have received a great deal of interest, especially with regards to studying the measure-theoretic and dimension-theoretic properties of shrinking target sets. In this talk, I will discuss some recent work with Thomas Jordan (Bristol, UK) and Ben Ward (York, UK) where we establish the Hausdorff dimension of a shrinking target set where our "targets" (the B_n) are rectangles and X is a self-similar carpet.

Patricia Alonzo Ruiz

University of Jena

Title: *How can an isoperimetric inequality look like on a fractal?*

Abstract: An inequality with a long history, the isoperimetric one! Among its practical applications, think of being able to decide the shape of a given amount of material that maximizes the volume that you can wrap with it. If that material presents any kind of fractal features, you may need to go back to the isoperimetric inequality and check how it looks like in that case: Volume, perimeter measure, and also their relationship (!) need a suitable (fractal) counterpart.

This talk will review these aspects in the context of (fractal) metric measure spaces, including some that comprise different scaling in their micro- and macrostructure. The ideas are based on a beautiful connection between Brownian motion and functions of bounded variation originally due to Ledoux, and part of the results are joint work with Fabrice Baudoin (Aarhus University).

Iqra Altaf

University of California Los Angeles

Title: *On the modulus of continuity of functions whose image has positive measure, and metric embeddings into $\mathbb{R}^d$ without shrinking*

Abstract: A generalization of the classical Sard theorem in the plane is the following. Let f be a function defined on a $\subset A \subset \mathbb{R}^2$. If f has modulus of continuity $\omega(r) \lesssim r^2$, then $f(A) \subset \mathbb{R}$ has Lebesgue measure zero. Choquet claimed that this was a full characterization, i.e. for every ω for which $\omega(r)/r^2$ converges to ∞ as $r \to 0$, there is a counterexample. We disprove this by showing that the correct characterization, in R^d, is $\int_0^1 \omega(r)^{-1/d} = \infty$.

Roope Anttila

University of St Andrews

Title: *Dvoretzky covering problem on self-conformal sets*

Abstract: The Dvoretzky covering problem asks for characterisations for when a random covering set generated by balls with deterministic radii and centres chosen at random according to some Borel probability measure fully covers a given set almost surely. In a recent joint work with Markus Myllyoja, we proved a potential theoretic characterisation for fully covering analytic sets by random covering sets driven by arbitrary Borel probability measures on the real line. Markus will discuss the general result in his talk, and in this talk, I will discuss an application of the result to the Dvoretzky covering problem on self-conformal fractals. An important special case for the covering problem is when the radii are given by a polynomially decreasing sequence of the form cn^{-t}. For these sequences, there often is a critical exponent s, such that for all $t > s$ one almost surely does not. The first result I will present is a characterisation of the critical exponent for arbitrary Borel probability measures in Euclidean spaces. The proof for this characterisation is elementary, and does not use our general characterisation, and unlike our general result, the technique works in higher dimensions as well. However, at exactly the critical exponent the covering problem is more subtle and the covering property generally depends on the multiplicative constant c. Determining the critical constant requires more sophisticated techniques and, as a non-trivial application of our general result, we are able to characterise the critical constant for random covering sets driven by natural measures on self-conformal sets on the real line. The critical constant depends on the multifractal structure of the average densities of the driving measure, and the result is new even in the simplest case of the Hausdorff measure on the middle third Cantor set.

Ayreena Bakhtawar

Institute of Mathematics of the Polish Academy of Sciences (IM PAN), Warsaw

Title: *Dimension Theory of* $\limsup$ *sets in d-Decaying Iterated Function Systems*

Abstract: In this talk I will discuss the Hausdorff dimension of sets defined by the growth of weighted products of multiple digits at arbitrary positions in d-decaying Gauss-like iterated function systems. We provide the complete Hausdorff dimensional result for product of more than two digits, which was an open problem even for consecutive digits in the classical Gauss map and Lüroth map. In our approach we do not need to assume the Bounded Distortion Property (BDP). This is a joint work with Michal Rams.

Richard Balka

HUN-REN Alfred Renyi Institute of Mathematics

Title: *Uniform dimension results for graphs of continuous functions*

Amlan Banaji

University of Jyväskylä

Title: *Fractal measures with slow Fourier decay*

Abstract: Given a fractal measure, it is natural to ask whether it satisfies the Rajchman property (which means that its Fourier transform decays to 0), and if so, to estimate the rate of decay. This problem has a long history going back to work

of Erdös in the 1930s; much work has focused on finding classes of fractal measures with quite fast Fourier decay. In this talk we will show that there are Rajchman self-similar measures (and nonlinear self-conformal measures) whose Fourier transform decays as slowly as we wish. This is based on joint work with Simon Baker.

Krzysztof Barański

University of Warsaw

Title: *Regularity of almost-surely injective projections in Euclidean spaces*

Abstract: Let μ be a finite Borel measure in a Euclidean space, with a compact support X . We prove that if X has (respectively) the Hausdorff, upper box-counting or Assouad dimension smaller than an integer k, then the orthogonal projection of X onto almost every k-dimensional linear subspace is injective on a set of full μ-measure, with the inverse which is (respectively) continuous, pointwise α-Hölder for some $\alpha \in (0, 1)$ or pointwise α-Hölder for every $\alpha \in (0, 1)$. The results generalize to the case of typical linear perturbations of Lipschitz maps. We provide examples showing the sharpness of the statements. Additionally, we construct a non-trivial measure on the plane which admits almost-surely injective projections in every direction, and show that no homogeneous self-similar measure has this property. Joint work with Yonatan Gutman and Adam Śpiewak.

Balázs Bárány

Budapest University of Technology and Economics

Title: *Statistically self-similar sets on the line: existence of an interior point*

Abstract: In this talk, we study the smoothness of the density function of absolutely continuous measures supported on statistically self-similar sets on the line. We show that the natural projection of a measure with symbolic local dimension greater than 1 at every point is absolutely continuous with a Hölder-continuous density almost surely. In particular, if the similarity dimension is greater than 1, then the random self-similar set on the line contains an interior point almost surely. This is a joint work with Michał Rams.

Micky Barthmann

Chemnitz University of Technology

Title: *Vector-valued pointwise ergodic theorems for operators*

Abstract: The pointwise ergodic theorem of Birkhoff has been generalized in many directions. One direction of generalization has been to consider linear operators that are more general than Koopman operators, such as Dunford-Schwartz operators, i.e., $L^1 - L^\infty$ contractions on a σ-finite measure space. Another direction of generalization is to consider (finite) measure preserving systems that have stronger mixing properties than ergodicity, as was done for example in the Wiener-Wintner Theorem. I will discuss a uniform vector-valued Wiener-Wintner Theorem for a class of operators that includes compositions of ergodic Koopman operators and contractive multiplication operators. This is based on joint work with Sohail Farhangi.

Timothée Bénard

Université Sorbonne Paris Nord

Title: *Khintchine theorem on fractals and multislicing*

Abstract: The Khintchine theorem is one of the cornerstone of Diophantine approximation. It predicts how well Lebesgue-typical real numbers can be approximated by rationals. I will explain how to extend this theorem to typical points chosen by a fractal measure (e.g. the middle-thirds Cantor measure). This result answers a question of K. Mahler from the 80s regarding Diophantine approximation on fractals. The proof relies on the effective equidistribution of an associated random walk on the homogeneous space $\mathrm{SL}_{d+1}(\mathbb{R})/\mathrm{SL}_{d+1}(\mathbb{Z})$, which in turns exploits a multislicing extension of Bourgain's projection theorem. Joint work with Weikun He and Han Zhang.

Ayesha Bennett

University of Cambridge

Title: *Shrinking Target and Recurrence for Non-Autonomous Systems*

Abstract: Traditionally, shrinking target and recurrence sets have been studied for autonomous measure-preserving systems satisfying, at minimum, certain mixing properties. Here, the dynamics are driven by the repeated iteration of a single map. In this talk, we transition to the non-autonomous setting, considering systems developed through the composition of a sequence of maps from a given family.

I will present a non-autonomous zero-one law for the shrinking target set and a zero law for the recurrence set within this general framework. We will examine the proof strategies for both results and discuss the obstacles encountered when attempting to upgrade the recurrence result to a full zero-one law. Time permitting, we will explore applications to the frequency of digit strings in multi-base expansions, and also to subclasses of inner functions, which can be used to study wandering domains in transcendental dynamics.

Victor Beresnevich

University of York

Title: *Rational Approximation on Manifolds: From Standard to Weighted to the Multiplicative Setting*

Abstract: I will discuss recent progress in Diophantine approximation, focusing on how well points on submanifolds of a Euclidean space can be approximated by rational points. I will present recent developments concerning well-approximable points on non-degenerate manifolds, particularly in the weighted and multiplicative settings, where different coordinates may be approximated at different rates. I will outline the main ideas behind the methods used, explain the role of non-degeneracy, and discuss possible generalisations, including those involving Hausdorff dimension, as well as some open problems. This is based on joint work with Shreyasi Datta and Lei Yang.

Hugo Bertrand

University of Liège

Title: *Generalized interpolation of metric spaces*

Abstract: Presentation of the notion of interpolation spaces with a function parameter in the context of metric spaces with the category point of view. Application of these concepts to the study of Sobolev spaces related to multifractal analysis.

Alvaro Bétermier

Université de Liège

Title: *Propriétés topologiques avancées d'espaces S_ν*

Abstract: Les espaces S_ν constituent des espaces de suites apparaissant en analyse multifractale et offrent un cadre particulièrement adapté à l'étude de spectres non concaves. Nous en proposons ici une généralisation selon plusieurs axes. Sur le plan topologique avant tout : ces espaces demeurent largement inexplorés du point de vue de l'analyse fonctionnelle, et leur structure profonde reste encore énigmatique. L'examen systématique de situations pathologiques pourrait permettre de cerner les frontières du formalisme multifractal - lequel constitue l'aspect appliqué de cette théorie - et d'en préciser les limites conceptuelles.

Benjamin Bonnefont

Université de Genève

Title: *Fourier dimension of imaginary Gaussian multiplicative chaos*

Abstract: We investigate the Fourier coefficients of imaginary Gaussian multiplicative chaos on the unit circle in the subcritical regime $\beta \in (0, 1)$. We show that their almost-sure decay is governed by a Fourier dimension equal to $1 - \beta^2$, and we prove a central limit theorem for the appropriately rescaled coefficients. The proof relies on moment computations, exact Selberg-type formulas, and Jack polynomial identities, along with a sharp asymptotic analysis

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Zoltan Buczolich

ELTE Eötvös Loránd University

Title: *Level sets of prevalent Weierstrass functions*

Abstract: The α-Weierstrass function is defined as $W_g^{\alpha,b}(x) = \sum_{k=0}^{\infty} b^{-\alpha k} g(b^k x)$, where g is a Lipschitz function on the unit circle. For a prevalent α-Weierstrass function, we prove that the upper Minkowski dimension of every level set is at most $1 - \alpha$, and the Hausdorff dimension of almost every level set equals $1 - \alpha$ with respect to its occupation measure. We further demonstrate that the occupation measure of a prevalent α-Weierstrass function is absolutely continuous with respect to the Lebesgue measure. Consequently, the result on the Hausdorff dimension of level sets applies to a set of level sets with positive Lebesgue measure. A central tool in our analysis is the Weierstrass embedding. For a sufficiently large dimension d, we construct Lipschitz functions $g_0, g_1, \dots, g_{d-1}$ such that the mapping $x \mapsto \big(W_{g_0}^{\alpha,b}(x), W_{g_1}^{\alpha,b}(x), \dots, W_{g_{d-1}}^{\alpha,b}(x)\big)$ is α-bi-Hölder. We also prove that such an embedding requires at least $1/\alpha$ coordinate functions. This is a joint work with Antti Käenmäki and Balázs Maga.

Ryan Bushling

Budapest University of Technology and Economics

Title: *Nonlinear slices of sets and measures, and an application to the Heisenberg group*

Abstract: For a Borel set $A \subset \mathbb{R}^n$ with $\mathcal{H}^s(A) > 0$ and $m < s \leq n$, the classical Marstrand–Falconer slicing theorem states that, for almost every m-plane V, many of the linear slices $A \cap (x + V^{\perp}), \quad x \in V$, have the maximum possible Hausdorff dimension, namely, $s - m$. We discuss a nonlinear analogue of this statement for fibers of smoothly parameterized families $(\Pi_\lambda)_{\lambda \in U \subset \mathbb{R}^N}$ satisfying the Peres-Schlag transversality and regularity conditions. Our main result establishes a sharp dimension bound of $N + m - s$ on the set of parameters λ for which $\dim \big(\Pi_\lambda^{-1}(x) \cap A\big) < s - m$ holds for Lebesgue-almost every x. The exceptional set of parameters λ can be taken to be universal in the sense that this statement holds simultaneously for every positive-measure $\subset$ of A. More generally, we have exceptional set bounds under limited transversality and regularity, or when "Lebesgue-almost every x" is strengthened to "$\mathcal{H}^t$-almost every x". We conclude with an application to the Heisenberg group, where the theorem yields new exceptional parameter bounds for vertical slices. This strengthens a result of Orponen.

Edouard Daviaud

Université de Liège

Title: *Hausdorff dimension of self-similar Shrinking targets with large overlaps*

Abstract: The topic of shrinking targets on overlapping self-similar sets has been a topic of interests in the field of metric number theory as one expects the dimension formulas to depend in general on the algebraic relations between the parameters involved. In this talk, given a self-similar IFS satisfying the exponential separation condition (with possible exact overlaps) we provide a complete result regarding this topic for target that are small enough. In particular, the result we present may be, in an appropriate sense, as general as possible regarding self-similar IFS with algebraic parameters.

Levente David

Budapest University of Technology and Economics

Title: *Weakly separated self-affine carpets*

Abstract: We study the Hausdorff and box-counting dimensions of diagonally aligned self-affine carpets whose projections onto the x- and y-axes satisfy the weak separation condition. We show that the Hausdorff dimension is given by the limit of the Barański formula, while the box-counting dimension is given by the limit of the Feng–Wang formula, both taken over the nth-level systems. These results align with a theorem of Zerner, who proved that for weakly separated self-similar sets, the dimension equals the limit of the similarity dimensions of the nth-level systems. We illustrate our results with explicit examples in which the Hausdorff and box-counting dimensions are computed.

Ana de Orellana

University of St Andrews

Title: *The Fourier restriction problem and a continuum of dimensions*

Abstract: Fourier restriction is a field of harmonic analysis that establishes the connection between Fourier analysis and the geometric properties of measures The Stein-Tomas theorem is a result in Fourier restriction for fractal measures, where fractality is captured by a Frostman condition and Fourier decay. We present an extension of this theorem to the L^q-dimensions: a family of dimensions that capture the multifractal behaviour of measures. This improves on the Stein—Tomas result for measures exhibiting multifractal behaviour such as the Mandelbrot cascade measure.

Yann Demichel

Université Paris Nanterre

Title: *Is the von Koch function multifractal?*

Abstract: The Swedish mathematician Helge von Koch is renowned for constructing one of the earliest and most famous self-similar fractal curves, the iconic 'snowflake curve'. However, the von Koch function, which he describes at the end of his historic 1904 article, is almost completely unknown. In this talk, we will introduce generalisations of this function and examine their regularity and multifractal properties, namely the Hölder pointwise exponent and the Hausdorff singularity spectrum. This analysis is based on the study of a dynamical system and a self-similar measure canonically associated with the geometric construction of these functions.

This is ongoing joint work with Zoltán Buczolich (Eötvös Loránd University, Budapest) and Stéphane Seuret (Université Paris-Est Créteil, Paris).

Bernat Espigule

Universitat de Girona

Title: *Level-Set Stratification in the Connectedness Loci of Collinear Fractals*

Abstract: We study the connectedness locus of a family of planar "collinear" self-similar sets. For an integer $n \geq 2$ and a complex parameter c with $|c| > 1$, let $E(c, n)$ be the attractor of the iterated function system $z \mapsto t + z/c$, $t \in A_n$ with evenly spaced digits $A_n = \{-n+1, -n+3, \ldots, n-1\}$. The connectedness locus M_n consists of parameters c for which $E(c, n)$ is connected; it admits an algebraic–dynamical characterization via the associated difference system (with $N = 2n - 1$): connectedness is equivalent to the condition $2c \in E(c, N)$. For non-real parameters we introduce canonical coordinates adapted to c and construct two explicit parameter-dependent parallelograms in phase space: a self-covered open "canonical trap", contained in $\mathring{E}(c, N)$, and a smallest canonical "enclosure" containing $E(c, N)$. Together these yield a certified inverse-iteration algorithm that rigorously decides interior and exterior parameters (in particular inside a natural lens region). Iterating the trap forward defines an entry-time level function $k(c)$ for $2c$ and level sets $\Omega_k(n)$, producing a level-set stratification of parameter space (and similarly of the dynamical plane). We prove that the trap-captured interior $\Theta(n) = \cup_k \Omega_k(n)$ is open and dense in $\mathring{M}_n$, and that level boundaries are contained in finite unions of real-algebraic curves, hence consist of finitely many real-analytic arcs. As an application, we combine certified exterior witnesses with level-set Jordan loops to show that M_n is not simply connected for every $n \geq 2$.

Céline Esser

Université de Liège

Title: *Prescription of level sets of Hölder functions*

Abstract: In this talk, we investigate the Hausdorff dimension of the level sets

$$L_f(y) = \{x \in \mathbb{R} : f(x) = y\}$$

associated with Hölder continuous functions f. We address the following questions: how large can a level set be, how many levels may correspond to a given size, and how can we prescribe the dimensions of the level sets of a function. We also discuss connections with multifractal analysis and applications to multifractional Brownian motion. It is based on a joint work with Stéphane Seuret.

Kenneth Falconer
University of St Andrews

Title: *Convergent sequences in fractals*

Abstract: We examine several different settings where it is possible to find convergent sequences contained in given fractal sets that reflect fractal and dimensional properties of the whole set. Examples include intermediate dimensions and dimension profiles, with applications, for example, to Bedford-McMullen and other carpets. This is joint work with Yuyang Liu.

Ai-Hua Fan
University of Picardie

Title: *Multifractal analysis of Wiener measure on* $C([0, 1])$

Abstract: The space $C([0, 1])$ of continuous functions, with the supremum norm, is a complete separable metric space of infinite dimension. We present the Wiener measure as a typical exampe on such a space and study its multifractal behavior– the small ball probability is very sensitive to the center of the ball. We measure the sizes of level sets by using scales (replacing dimensions in the classical multifractal analysis) and obtain the multifratal spectrum of the Wiener measure. On the metric spaces for which the increasing sets lemma holds (for example, σ-compact spaces), we prove the fundamental Frostman lemma. This is a joint work with Mathieu Helfter.

De-Jun Feng
The Chinese University of Hong Kong

Title: *Distinct dimensions for attractors of bi-Lipschitz iterated function systems*

Abstract: In this talk, I will present an iterated function system on the real line consisting of two bi-Lipschitz contractions whose attractor exhibits distinct lower, Hausdorff, lower box, upper box and Assouad dimensions. I will also describe a related bi-Lipschitz iterated function system for which the pushforward of any ergodic measure with positive entropy fails to be exact dimensional. This work is based on joint research with Simon Baker, Amlan Banaji, Chun-Kit Lai, and Ying Xiong.

Zhou Feng
Technion

Title: *Distinct dimensions for attractors of bi-Lipschitz iterated function systems*

Abstract: A self-conformal measure μ on $\mathbb{C}$ arises as the stationary measure of a random walk driven by a holomorphic iterated function system Φ. Understanding the dimensional properties of μ is a central problem in fractal geometry, especially in the presence of overlaps and nonlinearity. When Φ preserves $\mathbb{R}$, Rapaport recently made a breakthrough by showing that, if Φ satisfies a mild Diophantine condition and does not preserve any point, then the dimension of μ attains its natural upper bound. In the complex case, however, it turns out that additional obstructions may occur. In particular, a nonlinear version of the saturation phenomenon observed by Hochman in the self-similar setting may appear. Nevertheless, we are able to show that the expected dimension equality still holds under the Diophantine condition together with essentially necessary algebraic assumptions. This is joint work with Ariel Rapaport.

Jacob Fiedler
University of Wisconsin-Madison

Title: *Furstenberg-type sets and extensions of k-planes*

Abstract: We establish some bounds on the packing dimension of Furstenberg-type sets in higher dimensions. Furthermore, we discuss connections to k-plane extensions and prove Hausdorff and packing dimension bounds for this problem.

Attila Gáspár
Eötvös Loránd University

Title: *Lipschitz surjections between self-similar sets*

Hélène Halconruy
Télécom SudParis

Title: *What is the distribution of dominant wavelet coefficients?*

Abstract: We aim to estimate the multifractal parameters used for classification and model selection, namely the first-order scaling exponent c_1 and the second-order scaling exponent c_2. These exponents are derived from wavelet leaders, which are essential tools in applied multifractal analysis and play a central role in signal and image processing, with notable applications in the study of turbulence. Among the methods developed to estimate these parameters, bootstrap-based approaches and Bayesian methods have proven particularly effective. However, these approaches rely on a widely adopted assumption: the log-normality of the wavelet leaders used to compute multifractal quantities. The work underlying this talk challenges this assumption and introduces a new modeling framework based on log-concave distributions for wavelet leaders. In this presentation, I will first introduce the multifractal parameters c_1 and c_2, then present the proposed log-concave model and discuss the resulting estimation performance.

This work is joint with Wejdene Ben Nasr and Stéphane Jaffard.

Mathieu Helfter
Institute of Science and Technology Austria

Title: *Infinite-dimensional multifractals*

Abstract: This talk presents a joint work with Ai Hua Fan in which we propose a multifractal formalism for measures on infinite-dimensional metric spaces. The formalism is expressed in terms of scales rather than dimensions. A first main result is a generalized Frostman lemma established on a broad class of Polish spaces, which yields a mass distribution principle valid at arbitrary scales. With an appropriate choice of scaling, called order, we obtain what appears to be the first instance of an infinite-dimensional multifractal object: the standard Brownian motion. The corresponding multifractal spectrum is derived from small-ball probabilities around atypical paths classified by their regularity such as typical trajectories of fractional Brownian motion.

Michael Hochman
The Hebrew University of Jerusalem

Title: *Transverse orbits in dimension zero*

Abstract: Furstenberg's transversality conjecture predicts that when a, b are multiplicatively independent integers and x is irrational, if $a^n x \mod 1$ has box dimension zero, then $b^n x \mod 1$ should be dense in [0,1]. Existing results about the conjecture are based on analysis of intersection of positive-dimensional self-similar sets and do not give any information in dimension zero. I will discuss some new results on the problem, which say that in any infinite, zero-dimensional, minimal a-invariant set, and for any non-atomic zero-dimensional a-invariant measure, typical points have a dense b-orbit.

Jonathan Hodgson
University of Birmingham

Title: *Fractal analysis of the morphology of soot*

Abstract: Combustion engines emit soot nanoparticles (called agglomerates) which can be modelled as having a fractal structure. These agglomerates are composed of a large number of spherical primary particles, bound together in some random arrangement via a process named cluster-cluster aggregation. The calculation of these agglomerates' fractal dimension quantifies how irregular this arrangement is; this can help to inform the design of filters which prevent the release of these particles into the atmosphere.

There are two main methods used for the computation of such fractal quantities: firstly, a simple power law equation which connects an agglomerate's number N_p of primary particles (radius r) to its radius of gyration R_g by $N_p = K_f(R_g/r)^{D_f}$, where D_f is the agglomerate's fractal dimension and K_f its lacunarity, or fractal prefactor; and secondly, the box-counting method, which can be used to numerically estimate the box-counting dimension of individual particles of soot. This poster introduces results arising from both methods.

Richard Howat

University of Birmingham

Title: *Affine thickness*

Abstract: A new notion of thickness for subsets of $\mathbf{B}(0,1) \subset \mathbb{R}^n$ called affine thickness is defined; this notion of thickness is a generalisation of Falconer-Yavicoli thickness and is adapted to be used in the study of certain sets with affine cut outs. Thick sets can be shown to be winning for the matrix potential game introduced by Howat, Mitchell and Samuel and as an application we can demonstrate strong pattern and intersection results for thick sets. Additionally, we discuss how Newhouse's gap lemma does not directly extend to $\mathbb{R}^n$ and provide a gap lemma for affine thickness in $\mathbb{R}^n$ (for $n \geq 2$) under additional conditions to the classical Newhouse gap lemma.

Stéphane Jaffard

Université Paris Est Créteil

Title: *Càdlàg functions and Riemann series: two case studies challenging multifractal formalisms*

Abstract: Càdlàg functions are one variable real functions which have a right and a left limit at every point; though they play a central role in the theory of stochastic processes, the study of the regularity of their sample paths has been barely scratched. We will give general results on this topic, focusing on the new questions raised by their multifractal analysis. In parallel, generalizations of the Riemann trigonometric series recently met a renewed interest with the discovery of the surprizing role that they play in the dynamics of turbulent fluids, and their multifractal analysis rose important questions known as the "Seuret-Ubis" conjectures" that we will adress. Finally we will describe the new insights that these two sets of results open concerning the different avatars of the multifractal formalisms for functions that are available. This talk is partially based on joint works with Lingmin Liao and Qian Zhang on one hand and with Quentin Rible and Stéphane Seuret on the other hand.

Thomas Jaffard

Sorbonne Université - LPSM

Title: *Hölder regularity of distributional volume forms*

Abstract: Let $f, g^1, \ldots, g^d : \mathbb{R}^d \longrightarrow \mathbb{R}$ be continuous functions. When the functions $g^1, \ldots, g^d$ are of class $\mathcal{C}^1$, identifying the d-form $f dg^1 \wedge \cdots \wedge dg^d$ with the continuous function $f \det(dg)$ allows one to define the integral $\int_\Omega f dg^1 \wedge \cdots \wedge dg^d = \int_\Omega f(x) \det(dg(x)) dx$, for a bounded Borel set $\Omega \subset R^d$. If the functions $g^1, \ldots, g^d$ are not differentiable, it is not clear how to give a meaning to the object $f dg^1 \wedge \cdots \wedge dg^d$, nor even how to define certain integrals of the form $\int f dg^1 \wedge \cdots \wedge dg^d$.

When the functions under consideration are Hölder continuous with regularity strictly less than 1, we adopt a distributional viewpoint to address this problem. This approach allows one to define such integrals, by duality, over more general domains, including sets with fractal boundaries, and to extend integrability conditions previously obtained by Züst, Alberti-Stepanov-Trevisan, and Bouafia.

Esa Järvenpää

University of Oulu

Title: *Hitting probabilities and the Ekstróm-Persson conjecture*

Abstract: We consider the Ekstöm–Persson conjecture concerning the value of the Hausdorff dimension of random covering sets formed by balls with radii $(k^{-\alpha})_{k=1}^{\infty}$ and centres chosen independently at random according to an arbitrary Borel probability measure μ on $\mathbb{R}^d$. The conjecture has been solved positively in the case $\frac{1}{\alpha} \leq \dim_h u\mu$, where $\dim_h u^\mu$ stands for the upper Hausdorff dimension of μ. In this talk, we present a new approach in order to answer the full conjecture, proving in particular that the conjectured value is only a lower bound for the dimension. Our approach opens the way to study

more general lim sup sets, and has consequences on the so-called hitting probability questions. For instance, we are able to determine whether and what part of a deterministic analytic set can be hit by random covering sets formed by open sets.

This talk is based on a joint work with Markus Myllyoja and Stéphane Seuret.

Xiong Jin

University of Manchester

Title: *Non-degeneracy of Mandelbrot cascades and its application to dimension problems.*

Abstract: First part of the talk is about the non-degeneracy problem of Mandelbrot cascades acting on ergodic measures. In particular we shall fill the gap in the previous result by Barral and Jin regarding the degeneracy of Mandelbrot cascades acting on ergodic measures when their entropies are equal. The second part of the talk is about dimension problems in self-similar sets, we will apply the non-degeneracy of Mandelbrot cascades to study the size of fibres of self-similar sets with dense rotations.

Antti Käenmäki

University of Eastern Finland

Title: *Projections of self-affine sets onto lines*

Abstract: For self-affine sets in $\mathbb{R}^d$ satisfying a strong irreducibility condition, we prove, without requiring any separation assumptions, that the Marstrand-Mattila projection theorem extends to all one-dimensional linear subspaces. Additionally, for such sets with an upper Minkowski dimension of at most one, we establish the existence of their Minkowski dimension, providing a partial positive answer to a folklore open question. The talk is based on a joint work with Bárány and Kolossváry.

Kiko Kawamura

University of North Texas

Title: *Revisiting Lévy's Dragon Curve*

Abstract: We explore Lévy's Dragon Curve, a self-similar fractal renowned for its ability to tile the complex plane. By approaching the curve through the lens of functional equations, we show that every point on the curve admits a natural representation as a complex power series. This representation is characterized by a special revolving sequence, which reveals new aspects of the curve's underlying algebraic structure. We further investigate how this revolving sequence transforms under shifts, scaling, and rotations of the curve. This is joint work with Miguel Gonzales-Carriedo, Jonathan Leung, and Daniel Prokaj.

Tamás Keleti

Eötvös Loránd University, Budapest

Title: *The Kakeya problem and disjoint lines*

Abstract: We pose the following problem: (*) Does there exist a compact collection of pairwise disjoint lines (in the space of all lines in $\mathbb{R}^n$) that contains lines in every direction?

Although no dimension (or any other quantitative parameter) appears in this problem, it is still strongly connected to the Kakeya problem: it turns out that a negative answer would imply that $\mathbb{R}^n$ any Besicovitch set must have Hausdorff dimension at least n-1.

If we relax ”compact” to "closed" in (*), then we can give a construction.

Joint work with Attila Gáspár and András Máthé.

István Kolossváry

HUN-REN Alfréd Rényi Institute of Mathematics

Title: *Verifying exponential separation for analytic self-conformal sets*

Abstract: The dimension drop conjecture is a long standing open problem in fractal geometry. Rapaport recently extended the seminal work of Hochman on confirming the conjecture for exponentially separated self-similar sets and measures to analytic self-conformal setting on the real line. In a joint work with Balázs Bárány (BME) and Sascha Troscheit (Uppsala), we verify that the exponential separation condition (ESC) is a topologically typical property, moreover, we provide an explicit sufficient condition to verify the ESC. This is done by introducing a novel concept that we call the dual iterated function system which has connections to other problems such as conjugation to self-similar systems.

Chun-Kit Lai

San Francisco State University

Title: *A full-dimensional absolutely normal set of uniqueness*

Abstract: We construct a class of homogeneous Cantor-Moran measures with all contraction ratios being reciprocal of integers, and prove that they are pointwise absolutely normal. Our approach relies on criterion developed by Davenport, Erdös and LeVeque and generalize the classical results by Cassels.

As an application, for all gauge functions $\varphi(r)$ with $r/\varphi(r) \to 0$ as $r \to 0$, we obtain a set of uniqueness K with $\mathcal{H}^{\varphi}(K) > 0$. Moreover, there exists a pointwise absolutely normal measure μ of dimension one fully supported on K. This shows that the DEL criterion being satisfied for all integers does not guarantee any Fourier decay nor the supporting set is a set of multiplicity.

This is a joint work with Yu-Hao Xie.

Thomas Lamby

Luxembourg

Title: *Fine regularity of rational–irrational dichotomic functions.*

Abstract: We study rational–irrational dichotomic functions, namely functions which vanish on the irrationals and carry positive spikes on the rationals. We develop tools to describe their fine regularity, including pointwise Hölder estimates, critical Hölder spaces, variation and truncated variation, and jump exponents. These notions are applied throughout to the generalized Thomae functions, for which the relevant exponents are governed by Diophantine approximation. We also discuss functions with prescribed F_σ discontinuity sets and relate their regularity to the geometry of the underlying closed-set decomposition.

Claire Launay

Université Bretagne Sud

Title: *Estimating the Hurst exponent of degraded fractal textures: application to mammogram analysis*

Abstract: Fractal descriptors, in particular the Hurst exponent, have proven useful for mammogram texture characterization and breast cancer risk assessment. However, Hurst exponent estimates obtained from real mammograms exhibit notable variability across studies, questioning the robustness of existing estimators to acquisition-related degradations. This work inverstigates the impact of noise and blur on Hurst exponent estimation in degraded fractal textures. Two state-of-the-art estimators, based on wavelet leaders and monogenic wavelets, are evaluated on synthetic textures generated from several fractional random field models and on real mammograms from the VinDr-Mammo dataset. While consistent estimates are found for fatty tissues, significantly lower Hurst exponent values are obtained for dense tissues compared to those reported in seminal studies. These discrepancies cannot be explained by acquisition degradations alone, which suggest either a mismatch between real mammogram textures and the considered common fractional models, or limited robustness of existing estimators to population variability. This study was conducted in collaboration with Barbara Pascal (LS2N, Nantes Université) and Hermine Biermé (IDP, Université de Tours).

Gaétan Leclerc
University of Helsinki

Title: *Cantor spectrum of Schrödinger operators and Fourier decay for fractal measures*

Abstract: Quantum properties of physical objects can be modelled by Schrodinger operators. For quasicrystals, the associated Schrodinger operator typically have Cantor spectrum, and spectral measures are thus fractal. How can we relate the fractal properties of these measures to quantum dynamical properties of quasicrystals ? We will discuss briefly the particular case of the "Fibonacci Hamiltonian", a common model for 1D quasicrystals.

Félix Lequen
Université Sorbonne Paris-Nord

Title: *Quantitative Fourier decay for Patterson-Sullivan measures of dimension larger than* $\frac{1}{2}$.

Abstract: In this talk, we explain how to generalise the work of Sahlsten-Jordan on the Gauss map to prove Fourier decay for Patterson-Sullivan measures of Schottky subgroups of isometries of the hyperbolic plane whose dimension is larger than $\frac{1}{2}$. The proof is by approximation by Lebesgue measure and stationary phase method, and avoids Bourgain's sum-product theorem, which means that we get a quantitative polynomial rate of decay. This is joint work with Tuomas Sahlsten.

Xiangyu Liang
Beihang University

Title: *Plateau's Problem, Calibrated and Paired Calibrated Sets, and Their Products*

Abstract: Plateau's problem is a central topic in geometric measure theory. It seeks to understand the behavior of physical objects that possess certain minimizing properties, such as soap films. Physical soap films are likely more accurately modeled by Almgren's minimal sets; however, the lack of algebraic coherence makes it difficult to prove minimality in this setting.

The theory of calibrated geometry, introduced by Harvey and Lawson in the 1980s, provides a powerful tool for studying minimizing manifolds (possibly with singularities). It establishes a bridge between the classical theory of manifolds and geometric measure theory. On the other hand, it cannot be applied directly to the theory of minimal sets. In the 1990s, K. Brakke, G. Lawlor, and F. Morgan introduced the method of paired calibrations to prove the minimality of various sets satisfying a given separation condition. This method is frequently used in the classification of singularities for codimension-1 minimal sets. Compared to ordinary calibration methods, a major advantage of paired calibrations is that they ignore algebraic multiplicities, which aligns well with the spirit of Plateau's problem. However, a generalization to codimensions greater than one is not yet known, and at first glance, the minimality of products of calibrated or paired calibrated sets remains an open question.

In this talk, we will first present very simple examples to illustrate how calibration and paired calibration methods can be used to prove various minimalities for sets, and we will explain the main differences between these two theories. Next, we will introduce the background and definitions concerning Almgren minimal sets, the classification of singularities for Plateau's problem, and how the theories of calibration and paired calibration apply to this context. Finally, we will discuss the minimality of products of these two kinds of sets in codimensions greater than two.

Jonas Lippold
TU Chemnitz

Title: *A Family of non Minkowski-Measurable Fractals*

Abstract: A long-standing conjecture of Lapidus states that, under certain conditions, self-similar fractal sets are not Minkowski measurable if and only if they are of lattice type. In $\mathbb{R}^1$ the Lapidus conjecture has been confirmed. But in higher dimensions it remains unclear whether the considered lattice type self-similar sets are not Minkowski measurable. In this work, a family of lattice type subsets in $\mathbb{R}^2$ which fail to be Minkowski measurable are presented, supporting the conjecture.

This would preferably be presented in a night session with 7-minute talks, and possibly also as a poster.

Caiyun Ma

Budapest University of Technology and Economics

Title: *Box and packing dimensions of orthogonal projections of homogeneous Gatzouras-Lalley carpets and phase transitions*

Abstract: The study of orthogonal projections of sets and measures is an important topic in geometric measure theory. About two decades ago, Falconer and Howroyd established the projection theorems for the packing, and upper and lower box dimensions. They showed that for every Borel set A in $\mathbb{R}^d$, each of the packing, upper box and lower box dimensions of the projection $P_V(A)$ of A takes a constant value, which can be expressed as a certain dimension profile, for almost all k-dimensional subspaces V. However, these dimension profiles are defined indirectly and very difficult to compute. Recently, we have succeeded in obtaining the precise values of these dimension profiles for homogeneous Gatzouras-Lalley carpets, which exhibit remarkable phase transitions. The talk is based on joint work with Dejun Feng and Károly Simon.

Danny Mallitasig

Université Paris-Est Créteil

Title: *Prescription of multivariate multifractal behavior*

Abstract: Multifractal analysis mainly focuses on describing the local behaviors of a function, a measure, or a stochastic process X on $\mathbb{R}^d$. In this context, the pointwise behavior is measured by an exponent, which depends on the nature of the object. The multifractal spectrum D_X is then calculated, which describes the size of sets of points with the same regularity exponent.

The problem of prescribing the multifractal spectrum for a function or measure has been studied extensively by many researchers in multifractal analysis. However, a multivariate extension is essential because there are phenomena where the data are intrinsically composed of a family of correlated signals.

I will present a result extending the univariate construction of probability measures with a prescribed multifractal spectrum to the bivariate case. This amounts to simultaneously constructing several measures with different but prescribed behaviors.

András Máthé

University of Warwick

Title: *Translational Kakeya property of planar sets*

Pertti Mattila

University of Helsinki

Title: *Parabolic rectifiable and fractal sets*

Abstract: Parabolic metric in $\mathbb{R}^n \times \mathbb{R}$ is induced by the parabolic 'norm' $\|(x,t)\| = (|x|^2 + |t|)^{1/2}$. The related Hausdorff measures have been used for a long time in connection of the heath equation and other parabolic PDEs. During the last decades parabolic David-Semmes uniform (quantitative) rectifiability has been developed by a number of authors, with many deep connections to harmonic analysis, PDEs and other topics. In the talk I shall discuss more recent work on parabolic Besicovitch-Federer qualitative rectifiability, and on parabolic fractal geometry.

Eugen Mihailescu

Institute of Mathematics of the Romanian Academy

Title: *Dimension for slices of fractals and projection measures.*

Abstract: In this talk we will study some dynamical systems methods in order to estimate the Hausdorff dimension for a class of fractals and projection measures. This includes the amalgamated pressure of semigroups of non-uniformly hyperbolic maps, applied in particular to the dimension of intersections of fractals with submanifolds transversal to the stable cones, or with other fractals generated by hyperbolic or parabolic systems. In addition we will investigate a class of multidimensional continued fractions, obtained from a fibered system, and give estimates on the Hausdorff dimension of their invariant sets.

Fran Mišković
University of Zagreb

Title: *Parametric shell Minkowski content as an intermediary between classical and surface Minkowski contents*

Abstract: In 2010, Rataj and Winter introduced the S-content(s) and S-dimension(s) and related it to the Minkowski content and dimension. These concepts replace the volume of the parallel set in the definition of the Minkowski content with the "area" of the boundary of the parallel set. In this talk, we will present the new concept of the content and dimension based on the annulus, i.e., the shell of the parallel set, as an intermediary notion which was partially introduced by Radunović in 2025. We will study the connection with the Minkowski and S-contents and dimensions as well as the relation to the theory of fractal ζ functions and complex dimensions. Several interesting examples will be presented. This is a joint work with G. Radunović.

Ian Morris
Queen Mary University of London

Title: *Exceptional projections of self-affine sets*

Abstract: I will describe some examples of fractal sets for which the exceptional set in Marstrand's theorem contains a nontrivial algebraic variety. These examples arise from a general result extending Falconer's 1988 theorem on the dimensions of self-affine fractals to the dimensions of their projections. This is joint work with Çağrı Sert.

Markus Myllyoja
University of Oulu

Title: *Dvoretzky covering problem for general measures on the line*

Abstract: We consider the Dvoretzky covering problem for random covering sets driven by a general Borel probability measure supported on the line. In a joint work with Roope Anttila, we provide a necessary and sufficient condition for a given analytic set to be covered almost surely. The general result is stated in terms of a capacity with respect to a suitable kernel. In this talk I will focus on the general capacity result, and Roope will discuss an application of the result to the covering problem on self-conformal sets in his talk.

William O'Regan
University of British Columbia

Title: *Incidence estimates for balls and tubes with applications*

Abstract: We present new incidence estimates of Szemeredi-Trotter strength for balls and tubes with a product-like structure. As applications, we present new estimates relating to the Fourier decay of fractal measures on curves, discretised $\sum$-product problems, and Elekes-Ronyai problems. Joint work with Ciprian Demeter.

Vilma Orgoványi
Budapest University of Technology and Economics

Title: *Dimensions of Some Overlapping Statistically Self-Similar Sets*

Abstract: In this talk, we study the dimension theory of a family of statistically self-similar sets. This family arises as a natural generalisation of orthogonal projections of two-dimensional sponges onto lines in rational directions. For axis-aligned projections, dimension formulas were established by Dekking, Grimmett, and Falconer. We obtain an analogous dimension formula which takes into account the complex overlapping structure present in rational projections. Joint work with Károly Simon.

Tuomas Orponen

University of Jyväskylä

Title: *How much can heavy and light slices cover?*

Abstract: Marstrand's slicing theorem says that the slices of a t-dimensional planar set are "typically" (t - 1)-dimensional. In a generic direction, how much of the set can be covered by slices whose dimension is either (i) higher or (ii) lower than (t - 1)? For question (i) we have sharp answers, but for question (ii) only a weak partial result. These will be discussed in the talk, which is based on joint works with Damian Dabrowski, Alex Rutar, and Hong Wang.

Hyunchul Park

SUNY New Paltz

Title: *Small-time heat decay for stable processes on fractal drums*

Abstract: In this paper, we study the spectral heat content for isotropic stable processes on open sets with fractal boundary. Under suitable geometric conditions on the underlying domains, we show that the decay rate of the spectral heat content for stable processes differs substantially from that for subordinate killed Brownian motions when $\alpha = d - b$, where b is the interior Minkowski dimension of the underlying open set.

Sampo Paukkonen

University of Helsinki

Title: *Power Fourier decay at C(1+α) regular parabolic systems with overlaps*

Abstract: In this paper we establish power Fourier decay for equilibrium states of parabolic $C^{1+\alpha}$ iterated function systems with overlaps satisfying a multiscale nonlinearity condition. Important applications include the Lyons conductance measure for $0 < t < 1$, Patterson-Sullivan measures on $PSL(2, \mathbb{R})$ elements with parabolicity and the Manneville-Pomeau system, where the new decay condition can be verified.

Janett Prehl

Chemnitz University of Technology

Title: *Random Sierpinski carpets: From structure to dynamic*

Abstract: Fractal geometries provide a powerful framework for modeling diffusion processes in disordered media. Here, Sierpinski carpets and related structures are used to investigate anomalous diffusion in porous materials, where spatial constraints lead to subdiffusive behavior characterized by non-integer dimensions. We study how randomness, structural heterogeneity [1] and the spatial extent of particles [2] influence the topology and dynamical properties of the resulting fractal systems. Therefore, we randomly mix different Sierpinski carpet [1,2] and labyrinth fractal [3] generators with varying structural properties, such as shortest-path and random-walk dimensions. We find that even when the underlying generators share identical fractal dimensions, the resulting randomized structures exhibit significantly altered topological and dynamical properties, including a strong dependence of the random walk dimension on the mixture composition.

[1] D. Anh, et al., J. Phys. A: Math. Theor., 40, 11453 (2007)

[2] R. Haber, J. Prehl, K. H. Hoffmann, and Heiko Herrmann, J. Phys. A: Math. Theor. 47 (2014) 155001

[3] L.L. Cristea and B. Steinsky, Proc. Edinburgh Math. Soc. 54.4 (2011) 329.

Amit Priyadarshi

Indian Institute of Technology Delhi

Title: *On the dimension spectrum of certain continued fraction expansions*

Abstract: There has been significant recent interest in controlling L^2 weighted norms of the Fourier extension operator to suitable submanifolds of $\mathbb{R}^n$, a problem at the interface of harmonic analysis and geometric measure theory. Wave packet heuristics suggest that such control for the extension operator to a hypersurface may be governed by X-Ray transforms of the weight and the Mizohata-Takeuchi conjectural inequality and its variants seek to capture this. Though the Mizohata-Takeuchi conjecture has been proven false in its original form by Cairo, understanding variants of this problem remains to be of considerable interest.

We will discuss a Sobolev-variant of the Mizohata-Takeuchi inequality for space curves $\in R^3$. This is a consequence of a phase-space formulation for the extension operator to such curves and is inspired by recent progress of Bennett, Gutiérrez, Nakamura and Oliveira who proved a Sobolev-Mizohata-Takeuchi inequality for hypersurfaces.

Rudolf Daniel Prokaj
University of North Texas

Title: *On the level sets of Okamoto's function*

Abstract: In this talk, we will study the graph and the level sets of Okamoto's one-parameter family of self-affine functions. We determine the Hausdorff dimension of the graph and give a natural upper bound on the Hausdorff dimension of every level set. Further, we will show that it is attained Lebesgue almost everywhere for a typical choice of parameters (in a reasonable sense). This talk is based on a joint paper with Balázs Bárány.

Aleksi Pyörälä
University of Oulu

Title: *The dimension of the sumset of two self-conformal sets*

Abstract: Two subsets of the d-dimensional Euclidean space are said to dissonate if the Hausdorff dimension of their sumset equals the minimum of d and the $\sum$ of their individual dimensions. Intuitively, sets that lack strong arithmetic structure and are sufficiently "well-spread" in the ambient space might be expected to dissonate, possibly with any other set. In this talk, I will discuss recent results on dissonance of self-conformal sets. For example, totally non-linear self-conformal sets not contained in smooth hypersurfaces dissonate with all other self-conformal sets.

Firdavs Rakhmonov
University of St Andrews

Title: *L^p averages of the discrete Fourier transform and applications*

Abstract: The discrete Fourier transform has proven to be an essential tool in many geometric and combinatorial problems in vector spaces over finite fields. In general, sets that exhibit good uniform bounds for their Fourier transforms appear more random and are easier to analyze. However, there is a trade-off: in many cases, obtaining good uniform bounds is not possible, even when many points satisfy strong pointwise bounds. To address this limitation, a new approach has been proposed - one that replaces the need for uniform (L^∞) bounds with suitable bounds on the L^p average of the Fourier transform. This approach has been successfully applied to improve known results in Fourier restriction theory and the study of orthogonal projections. In particular, we will discuss this general approach, provide several examples, and highlight some recent applications.

Ariel Rapaport
Israel Institute of Technology

Title: *Dimension of self-conformal measures associated to an exponentially separated analytic IFS on $\mathbb{R}$*

Abstract: I will present a recent result concerning the dimension of self-conformal measures on $\mathbb{R}$ associated to an exponentially separated real-analytic IFS. This extends Hochman's work on exponentially separated self-similar measures on $\mathbb{R}$ to the real-analytic setting.

Rémi Rhodes

Université de Marseille

Title: *Tail estimates for Gaussian multiplicative chaos*

Abstract: In this talk, I will review some old and new results about the tail estimates for Gaussian multiplicative chaos (GMC) related quantities, like the GMC itself, its inverse or ratios of GMC.

Quentin Rible

Université Paris-Est Créteil

Title: *Inhomogeneous Besov Space: A Natural Model for Concave Multifractal Spectra*

Abstract: In the 1980s, Uriel Frisch and Giorgio Parisi developed a formalism to characterise local variations in the velocity of a turbulent fluid. These variations can be studied by examining the pointwise Hölder regularity of a function and the associated multifractal spectrum. Besov spaces provide a natural framework for studying such signals. I will explain this link and give the classical results on the regularity of functions in these spaces. However, the numerical estimation of irregularities in turbulence signals shows behaviours that are not completely modelled by Besov spaces. Therefore, I will present a generalised version of these spaces, introduced by Barral-Seuret in 2023, whose functions can modelise the irregular signals and textures found in empirical data, and give some of their generic multifractal properties.

Tom Rush

University of Warwick (currently)

Title: *Dimension properties of Furstenberg measure via transfer operators and Fourier analysis*

Abstract: In this talk I will discuss recent progress on obtaining more refined dimension-theoretic results for Furstenberg measure in the strongly irreducible and proximal setting.

(This will be based on my preprint, "Frostman dimension of Furstenberg measure for $\mathrm{SL}(2, \mathbb{R})$ random matrix products", and possible extensions between now and then.)

Alex Rutar

University of Jyväskylä

Title: *Conformal dimension beyond self-similarity*

Abstract: Quasisymmetric maps are homeomorphisms that distort relative distance in a controlled fashion. In this talk, I will focus on quasisymmetric distortion of a certain class of sets of non-integer dimension: sets which are invariant under a finite set of affine maps. Unlike more familiar fractal sets (such as self-similar sets), self-affine sets sets can exhibit large amounts of inhomogeneity at small scales and have geometric obstructions which appear 'at infinity'. In particular, I will present a recent result (joint with Roope Anttila) exhibiting a dichotomy for a broad class of self-affine sets: either the set has conformal Assouad dimension 0, or it is minimal for conformal Assouad dimension. Unlike previous results, we only require weak assumptions on the matrix parts, and no assumptions on separation. The talk will feature a general introduction to conformal (Assouad) dimension, and also discussion of a key (elementary) technique adapted from Furstenberg's dynamics on fractals.

Pablo Shmerkin

University of British Columbia

Title: *Restricted projections for Ahlfors-regular sets of directions*

Abstract: Marstrand's classical projection theorem states that the Hausdorff dimension of a planar Borel set is preserved under Lebesgue-almost all orthogonal projections. What if Lebesgue measure is replaced by a singular measure of dimension less than one? It is well-known that there are measures of dimension arbitrarily close to one for which a Marstrand-type theorem no longer holds. On the other hand, it wasn't known whether there exists a measure on the set of directions, of dimension less than full, for which dimension is preserved for almost all directions. I will discuss ongoing work with A. Cohen, T. Orponen, H. Wang and D. Zakharov in which we establish a Marstrand-type projection theorem for a wide class of singular measures that includes all uniformly perfect measures and, in particular, all Ahlfors-David regular measures on the unit circle. I will also discuss some applications.

Károly Simon

Budapest University of Technology and Economics

Title: *Box-like self-affine IFS with rotations*

Abstract: In this talk, we consider self-affine IFS on the plane. First, I give an account of some of the most important recent results about the Hausdorff dimension of the attractor of such IFSs. Then we focus on the irreducible but not strongly irreducible case. This leads us to the box-like self-affine sets with rotations. For these systems, we compute the dimension of the Kenmaki measure and prove that its coordinate projections are double-dimensional. The talk is based on our joint work with Demi Allen, Antti Kaenmaki, Daniel Prokaj, and Sascha Troscheit.

David Siukaev

Université Sorbonne Paris Nord

Title: *A Graph-Based Method for Invariant Densities of Multidimensional Continued Fractions*

Abstract: Multidimensional continued fraction algorithms generalize the classical continued fraction algorithm, which includes both the Euclidean algorithm and the Gauss algorithm (its projectivized version). We propose a novel method for computing invariant densities of certain multidimensional continued fraction algorithms. Inspired by Rauzy induction, our approach builds on the formalism of simplicial systems. We introduce a win-lose induction on a graph that is conjugate to the original algorithm, and construct its natural extension by introducing the notion of a dual graph. This method explicitly reconstructs the complete dynamics of the algorithm, yielding a partition of the invariant domain into pieces that map to one another. We show the limits of the method's applicability by constructing graphs yielding fractal invariant domains.

Anna Soos

Babes Bolyai University

Title: *Lagrange-type algebraic minimal bivariate fractal Interpolation function*

Abstract: We will give a method to construct a bivariate Lagrange-type fractal function in the case of a rectangular domain. The advantage of these method is that it is easy to construct and to implement for the approximation of different shapes. The constructed shape can be modified by the scaling vectors, in this way we can obtain various surfaces for the graph of the fractal interpolation function. So it can be a very effective tool in computer graphics and data visualization.

Adam Śpiewak

Institute of Mathematics of the Polish Academy of Sciences

Title: *Universal projection theorems with applications to multifractal analysis*

Abstract: I will talk about projection theorems for general families of maps satisfying the transversality condition. We extend classical results of this type to universal versions, holding simultaneously for families of measures satisfying a new condition called relative dimension separability. The setting is general enough to include orthogonal projections and natural projections for iterated function systems (as well as its non-autonomous and random generalizations). This allows us to provide novel applications, e.g. to the multifractal analysis of self-similar measures. This is based on a joint work with Balázs Bárány and Károly Simon (preprint arXiv:2412.03529)

Evgeny Spodarev

Ulm University

Title: *Non-ergodic inference for harmonizable stable fractal processes*

Abstract: We propose a non-ergodic inference method for harmonizable stable fractal processes, with a focus on stationary – increment real harmonizable symmetric α-stable processes and real harmonizable fractional stable motions. These models are natural heavy-tailed analogues of harmonizable Gaussian processes and are especially relevant when long-range dependence, self-similarity, and fractal roughness appear together. Because harmonizable stable processes are non-ergodic, classical estimators based on time averages fail, so we develop an alternative inference strategy based on smoothing a single observed path and extracting its hidden frequency structure.

The main idea is to convolve the path of such a process with a suitable mollifier, which transforms the original process into a stationary real harmonizable stable process with a finite control measure. This makes it possible to use periodogram peak detection and kernel density estimation to recover the spectral density, and hence to estimate the stability index and the kernel in the integral representation up to a constant factor. In the special case of real harmonizable fractional stable motions, the method yields consistent estimators for both the stability index and the Hurst parameter. The approach is computationally efficient, uses only one path, and remains effective precisely because it bypasses ergodicity rather than relying on it.

References

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- L. V. Hoang and E. Spodarev, "Non-ergodic inference for stationary-increment harmonizable stable processes," arXiv:2408.0995 2024.
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Yuefeng Tang

Wuhan University

Title: *Hausdorff Dimension of Sets of Continued Fractions with Restricted Partial Quotients*

Abstract: We will introduce some recent progress in the metric theory of continued fractions, specifically focusing on the Hausdorff dimension of sets defined by restrictions on ∂ quotients. We present results on how the prescribed growth rate of ∂ quotients along different subsequences affect the Hausdorff dimension. The results are basically based on https://arxiv.org/abs/2510. and https://arxiv.org/abs/2507.15552.

Sascha Troscheit

Uppsala University

Title: *Quasi-isometric rigidity of branching processes*

Abstract: In a breakthrough result by Basu, Sidoravicius, and Sly it was proved that any two percolated lattices $\mathbb{Z}^d$ are bi-Lipschitz equivalent almost surely. That is, up to a uniform distortion bound, any two independently percolated lattices share the same structure. In this talk we show that a similar statement holds for a large family of random trees. As a consequence, we show that many percolated fractal sets are quasi-symmetric. Based on a joint project with Jayadev Athreya.

Shunsuke Usuki

Keio University

Title: *On the L^q dimension of stationary measures for Möbius iterated function systems*

Abstract: In the paper published in 2019, Pablo Shmerkin showed that the L^q dimension ($q > 1$) of a self-similar measure for a linear IFS on the line satisfying the exponential separation condition is given by the naturally expected value, that is, the minimum of 1 and the zero of the L^q Bowen formula divided by $q - 1$. In this talk, we consider the problem of extending this result to non-linear IFSs on the line. The main difficulty is that, in non-linear cases, we cannot directly apply the inverse theorem for L^q norms of linear convolutions which plays an essential role in Shmerkin's work. I will explain the following result obtained in my paper (arXiv: 2501.13729). For an IFS Φ on the line consisting of linear fractional transformations (Möbius IFS), if we assume that Φ does not have a fixed point and the corresponding family of $SL_2(\mathbb{R})$ matrices satisfies the strong Diophantine condition, then, for any stationary measure μ for Φ, we have the dichotomy: for every $q > 1$, the L^q dimension of μ is equal to the expected value, or there exist a threshold $q_0 > 1$ and a value $0 < \alpha < 1$ such that, the L^q dimension of μ is equal to the expected value for $1 < q < q_0$, but it degenerates to $\alpha q/(q-1)$ for $qgeqq_0$.

Sanju Velani

University of York

Title: *Title 1: Intersecting well approximable and missing digit sets OR Title 2: Shrinking Targets versus Recurrence: a breif survey*

Abstract: Abstract 1. Let $b \geq 3$ be an integer and $C(b, D)$ be the set of real numbers in $[0, 1]$ whose b-ary expansion consists of digits restricted to a given set $D \subseteq \{0, ..., b-1\}$. Given an integer $t \geq 2$ and a real, positive function ψ, let $W(t, \psi)$ denote the set of $x \in [0, 1]$ for which $|x - p/t^n| < \psi(n)$ for infinitely many $(p, n) \in \mathbb{Z} \times \mathbb{N}$. We prove a general Hausdorff dimension result concerning the intersection of $W(t, \psi)$ with arbitrary self similar sets which implies that $\dim(W(t, \psi) \cap C(b, D) \leq \dim W(t, \psi) \times \dim C(b, D)$. When b and t have the same prime divisors, under certain restrictions of the digit set D, we give a sufficient condition for the Hausdorff measure of $W(t, \psi) \cap C(b, D)$ to be zero. This closes a gap in a recent result of Li, Li and Wu [LLW] and shows that the dimension of the intersection is strictly less than the product of the dimensions. The latter disproves the product conjecture of Li, Li and Wu. [LLW] B. Li, R.-F. Li and Y.-F. Wu, Zero-full law for well approximable sets in missing digit sets, Math. Proc. Camb. Phil. Soc., 178 (1) (2025): 81-102.

OR

Abstract 2. Let (X, d) be a compact metric space and (X, A, μ, T) a measure preserving dynamical system. Furthermore, given a real, positive function ψ, let $W(T, \psi)$ and $R(T, \psi)$ respectively denote the shrinking target set and the recurrent set associated with the dynamical system. Under certain mixing properties it is known that if the natural measure $\sum$ diverges then the recurrent and shrinking target sets are of full μ-measure. The purpose of this talk is to provide a brief overview of such results, to discuss the potential quantitative strengthening of the full measure statements and to bring to the forefront key differences in the theory

In short this will be based on my recent survey article: https://arxiv.org/pdf/2511.02377

Manuj Verma

Université Paris-Est Créteil (UPEC)

Title: *Hausdorff dimension of self-similar measures and sets with common fixed point structure*

Abstract: In this talk, I will discuss the dimension theory of self-similar measures and sets on the real line, where the generating iterated function system (IFS) consists of some maps that share the same fixed point. These IFS have exact overlaps due to the common fixed-point structure. In this exact overlapping situation, the dimension theory becomes significantly more complicated. We determine a formula for the Hausdorff dimension of the self-similar measures and sets out of a Hausdorff co-dimension one exceptional set of natural parameters. This work significantly strengthens the previous result on dimension theory. As an application, we give the Hausdorff dimension of self-affine measures supported on the generalised 4-corner set. This is joint work with Dr. Balázs Bárány.

Benjamin Ward

University of York

Title: *Sets of Exact(er) approximation order*

Abstract: In this talk we introduce a quantitative notion of exactness within Diophantine approximation. Given functions $\psi : (0, \infty) \to (0, \infty)$ and $\omega : (0, \infty) \to (0, 1)$, we study the set of points that are ψ-well approximable but not $\psi(1-\omega)$-well approximable, denoted $E(\psi, \omega)$. This generalises the set of ψ-exact approximation order as studied by Bugeaud (Math. Ann. 2003). We prove results on the cardinality and Hausdorff dimension of $E(\psi, \omega)$. In particular, for certain functions ψ we find a critical threshold on ω whereby the set $E(\psi, \omega)$ drops from positive Hausdorff dimension to empty when ω is multiplied by a constant. The results discussed can be found in https://arxiv.org/abs/2510.18451.

Charlie Wilson

University of Exeter

Title: *Dynamical properties of the map $\xi \to \xi\alpha^n$*

Abstract: The sequence x^n modulo 1 for x in the reals and n in the naturals has been one of immense interest for many years with many fundamental results on the structure of these sequences discovered at the turn of the last century by Hardy, Pisot, Weyl and others. Despite this there are many elementary questions whose answers are still unknown. For instance, does there exist a transcendental number x for which the sequence $x^n \mod 1$ tends to 0 as n tends to infinity? In recent work with Mark Holland (Exeter, UK), we study statistical and dynamical properties of the associated map $\xi \mapsto \xi\alpha^n \mod 1$ (where α is fixed), drawing from ideas in ergodic theory and dynamics. In particular, we examine the strong Borel Cantelli property, shrinking target problems, recurrence problems, return time problems and eventually always hitting problems.

Steffen Winter

Karlsruhe Institute of Technology

Title: *On the box dimension of connected components in fractal percolation*

Abstract: In essence, we will show that the box dimension of any connected component of fractal percolation F is almost surely strictly smaller than that of F. In contrast, a result of Broman, Camia, Joosten, and Meester says that the union CCC of all nontrivial connected components has full box dimension. The same authors have shown that the union C^ϵ of the connected components of F with diameter at least $\epsilon > 0$ has an expected dimension strictly smaller than the box dimension of F . Our result strengthens this to an almost sure statement and clarifies, that not the 'small' connected components determine the dimension of C , but the fact that the connected components accumulate. The proof uses a superbranching result due to Dekking and Grimmet.

Based on joint work with Moritz Jagla

Meng Wu

Hunan University

Title: *Projections of Regular Fractal Sets*

Abstract: I will discuss the dimension of orthogonal projections of regular fractal sets, with a focus on the higher-dimensional setting.
