FRACTAL SESSION (FRI 9/1/26)

ROOM C4 (12.45-15.35)

Mirmukhsin Makhmudov (University of Oulu)
Multifractal formalism from large deviations **(12.45-13.05)**

It has often been observed that the Multifractal Formalism and the Large Deviation Principles are intimately related. In numerous examples in which the multifractal results have been rigorously established, the corresponding Large Deviation results are valid as well. A natural question, then, is under what conditions the multifractal formalism can be deduced from the corresponding large deviation results. More specifically, given a sequence of random variables $\{X_n\}_{n\in\mathbb{N}}$, satisfying a Large Deviation principle, what can be said about the multifractal nature of the level sets $K_\alpha = \{\omega : \lim_n \frac{X_n(\omega)}{n} = \alpha\}$. In this talk, I will present sufficient conditions for establishing both upper and lower bounds for multifractal spectra in terms of the associated large deviation rate functions. I will also briefly demonstrate that the proposed setup covers many previously studied frameworks in multifractal formalism.

Gaétan Leclerc (University of Helsinki)
Cantor spectrum of some Schrödinger operators and Fourier transform of fractal measures **(13.15-13.35)**

Quantum properties of physical objects can be modelled by some Schrödinger operators. For quasicrystals, the associated Schrödinger 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.

Roope Anttila (University of St Andrews)
Dvoretzky covering problem for general measures on the real line **(13.45-14.05)**

A random covering set is the set of points covered infinitely often by a random collection of balls with radii given by a predetermined sequence of positive real numbers and centers chosen independently at random with respect to a fixed measure. In 1956, in the context of the Lebesgue measure on the one dimensional torus, Aryeh Dvoretzky posed the following question: When does the random covering set fully cover the support of the measure almost surely? This question, which became known as the Dvoretzky covering problem, was answered for the Lebesgue measure in 1972 by Shepp, who showed that a necessary and sufficient condition for full covering is given by the divergence of a certain series which only depends on the sequence of radii. Shepp's result was later generalised by Kahane, who characterised the covering of an arbitrary compact subset of the torus using a notion of capacity. In this talk, I will discuss an ongoing joint project with Markus Myllyoja, where we solve the Dvoretzky covering problem for arbitrary Borel probability measures and analytic subsets of the real line.

Guangzeng Yi (University of Jyväskylä)
Curvilinear Furstenberg set estimates and one application **(14:15-14.35)**

Following the same method of Orponen–Shmerkin and Ren–Wang, we prove the Furstenberg set estimates for transversal families. Moreover, we use this to prove a sharp decay of the L^p-norm of the Fourier transform of a fractal measure supported on a smooth curve with non-zero curvature.

Problem session (14.45-15.35)

Come and learn about open problems and potential avenues for future research in fractal geometry (and contribute your own!)