Fourier analytic properties of the Brownian graph

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Abstract

Roughly speaking, a Salem set is a set which carries a measure whose Fourier transform decays like $x^{-s/2}$ where s is the Hausdorff dimension of the set (such measures cannot decay faster than this). Salem sets are often found via random processes, like the image, graph, or level sets of a random function; like Brownian motion, for example. It was an open problem of Kahane whether or not the graph of the classical Brownian motion is almost surely a Salem set. In this talk I will discuss this problem: first I will show that the answer is 'no, it is not almost surely a Salem set', and secondly I will give the optimal almost sure rate of Fourier decay for measures on the Brownian graph (which is less than $s/2$).

The first part of the talk is joint work with Tuomas Orponen and Tuomas Sahlsten and the second part is joint with Tuomas Sahlsten.