

GAUSSIAN FREE FIELDS ON SELF-SIMILAR FRACTALS

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Over the last two decades significant progress has been made to construct calculus on self-similar sets, e.g. Sierpinski gasket and carpet. This involves a careful study of the associated Laplacians and Brownian motions. Armed with this machinery, we can now systematically investigate Gaussian free fields (GFFs)–centered Gaussian process with covariance given by the Green’s function (or resolvent) of the Laplacian–on fractals. In this talk I will describe GFFs on the so-called post-critically finite fractals, which admit an explicit Lévy-type representation; and on generalized Sierpinski carpets. I will present results on regularity properties, the abstract Wiener measure, and expected maxima of GFFs. Besides obvious implications in building a quantum field theory from the ground up, our results on GFFs can also be applied to obtaining the cover time of random walk on fractal graphs, and the superconcentration of random potentials on a fractal landscape. This is joint work with Baris Ugurcan (Cornell).