

Hausdorff School on **Log-correlated fields**

Time: June 11-14 2018

Location: Endenicher Allee 60, 53115 Bonn Center in Bonn

Lectures

Random matrices and logarithmically correlated fields by Paul Bourgade (NYU)

A connection between branching structures and characteristic polynomials of random matrices emerged in the past few years. We will illustrate this for two models of random matrices, corresponding to dimension 1 and 2 spectra: the Circular Unitary Ensemble and Ginibre random matrices. The discussed topics will include the second moment method, extrema, the Gaussian free field and Gaussian multiplicative chaos.

Extreme level sets of branching Brownian motion by Lisa Hartung (NYU)

Branching Brownian motion (BBM) is a classical process in probability theory, describing a population of particles performing independent Brownian motion and branching according to a Galton Watson process. It also belongs to the class of so called *log-correlated random fields*. We will focus on the behaviour of the extremal particles of BBM.

First, we will understand how the correlations in the model affect the order of the maximum. Then, I will explain why the extremal process of BBM converges to a *random cluster process*. Building on these known results, we will move on to recent results on the extreme level sets of BBM. We find the asymptotic size of extreme level sets and the typical height and shape of those clusters which carry such level sets. We also find the right tail decay of the distribution of the distance between the two highest particles. I will explain how truncated moments help to reduce questions on the size / shape of extreme level sets to random walk like estimates.

Riemann zeta function and log-correlated fields by Jon Keating (Bristol)

I will review some aspects of the theory of the Riemann zeta-function, especially those aspects relating to the value distribution of the zeta function on the critical line and the connections with Random Matrix Theory. I will then review conjectural connections between the extreme value statistics of the zeta function and those of log-correlated Gaussian fields, recent progress towards developing a rigorous understanding of these, and open problems.