

Universität zu Köln
Institut für Mathematik
Prof. Dr. Alexander Drewitz

e-mail: drewitz@math.uni-koeln.de
Büro: 205 (Mathematisches Institut)

SS 2020: Nodal sets of random fields: topology and geometry

Update: The class will presumably take place mostly (or altogether) as an online class, the precise details of which are still being worked out. Also, it will only start on April 20. More details are to be announced in due course.

The understanding of nodal sets, or more generally, (sub-)level sets of random functions (or fields) is of major interest in mathematics as well as in theoretical physics, from a theoretical as well as from an applied point of view: Indeed, motivation ranges from the design of gas masks to brain scans to questions regarding astrophysics as well as eigenfunctions of quantum chaotic Hamiltonians.

While it is difficult to make non-trivial useful statements for general random fields, for a variety of models such as Bernoulli percolation or certain Gaussian fields, including the Gaussian free field and random polynomials, one has obtained more profound insights: In some situations an understanding of topological properties such as connected components is available, whereas in other situations more geometric information has also been obtained.

In this course we will touch upon some of the models where such insights have been obtained and along the way develop a set useful tools.

Related literature will be given along the course.

The course is aimed at MSc students in mathematics and business mathematics, and forms part of the area stochastics and insurance mathematics.

Prerequisites: Probability theory I and II

Lecture: Seminarraum 2 (room 204 MI),
Mondays 10:00 am – 11:30 am, Thursdays, noon – 1:30 pm

Start of lectures: ~~Monday, April 6, 2020~~ **Monday, April 20, 2020**

Exercise classes: tba