

Universität zu Köln
Institut für Mathematik
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Büro: 205 (Mathematisches Institut)

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Important note. For both, the lecture as well as the seminar described below, **please register at Ilias** (also if you're just planning to drop by for listening without officially taking the class), through which we will handle communication and provide teaching material.

1 Lecture: Nodal sets of random fields: topology and geometry

1.1 Lectures

The current situation is new to us, so we will be experimenting a bit with the format in the first part of the semester, and subsequently adapt to how things are evolving.

In the first part of the semester, the lectures will consist of a mix of

- live online lectures via zoom and a graphics tablet;
- self-study of parts of (mostly) [1] and [3];
- discussion sessions / Q&A;
- (possibly) short video lectures which will be put on Ilias;

The online lectures and the Q&A will take place during (some of) the lecture time slots for this class, i.e., Mondays 10:00 am – 11:30 am and Thursdays, noon – 1:30 pm. The lectures will be hold either in English or German, depending on the preference of the audience.

1.2 Exercise classes

Exercise classes will take place using a graphics tablet at a fixed weekly time slot (to be determined) via zoom. Homework is expected to be sent to Lars Schmitz (zoom account number 819-205-0136) by email as a pdf-file, and will be graded in the pdf file.

Resources

Further helpful sources include [2], [4], as well as [5]. Parts of the above-named sources are already available through the university network (log in via VPN). Also, the university is working on making more books available online. However, this might tend to take some time. As an alternative I suggest you have a look at google books where you find great parts of the relevant sources. Otherwise, there are also the usual suspects of dodgy internet sites where you might obtain access to these sources as well. However, it is not clear to me whether these are legal, so I cannot recommend this procedure.

There will be some notes of (sketches of) the material treated in the lectures.

2 Seminar: Concentration of measure and applications

Not much is changing here, except for the fact the your preparatory meeting with Gioele Gallo (zoom account number 881-725-4397), as well as your actual seminar talk is going to take place using zoom. For the latter, you can either use a graphics tablet or slides, both via screen sharing on zoom.

The talks can be given either in English or German, depending on the preference of the speaker.

Also, time slots remain as before, i.e., Mondays 10:00 am – 11:30 am for the seminar talks.

Literaturliste

- [1] Robert J. Adler and Jonathan E. Taylor. *Random fields and geometry*. Springer Monographs in Mathematics. Springer, New York, 2007.
- [2] Jean-Marc Azaïs and Mario Wschebor. *Level sets and extrema of random processes and fields*. John Wiley & Sons, Inc., Hoboken, NJ, 2009.
- [3] Ofer Zeitouni. *Gaussian fields*, 2016.
- [4] Svante Janson. *Gaussian Hilbert spaces*, volume 129 of *Cambridge Tracts in Mathematics*. Cambridge University Press, Cambridge, 1997.
- [5] Nalini Anantharaman. Topologie des hypersurfaces nodales de fonctions aléatoires gaussiennes [d’après Nazarov et Sodin, Gayet et Welschinger]. Number 390, pages Exp. No. 1116, 369–408. 2017. Séminaire Bourbaki. Vol. 2015/2016. Exposés 1104–1119.