Bern-Fribourg Graduate Seminar

a seminar for Master and PhD students

Wednesday 26$^{\text{th}}$ April, 2023: 17:15 - 18:00

Room 2.73, Perolles 08, Fribourg

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Geometry of the Gaussian free field and its vector-valued descendant

Abstract

The Gaussian free field (GFF) is a natural and universal mathematical object in the sense that it describes many physical systems and is a limiting object to a whole range of different mathematical models. Heuristically, it can be seen as a generalization of the Brownian bridge indexed by a higher dimensional domain. But what about the dimension of the range then, to get a generalization of the n-dimensional Brownian bridge? The vector-valued Gaussian free field would be the answer. In this talk, I will rigorously define these two continuum objects as well as their discrete counterparts and will then focus on their geometry. I will present some of the results about the GFF (discrete and continuum, mostly 2D case), including the behavior of its extrema, its thick-points and boundary oscillations as well as how to explore the GFF using so-called local sets. I will conclude with my result about the vector-valued GFF, which establishes a "phase transition" in the picture of its range intersected with a bounded box depending on the dimension of the domain and number of coordinates of the vector.