Institute for Applied Mathematics, Bonn University

Oberseminar Stochastik

Thursday, 20 Mai 2021, 17:30

Fredrik Viklund

KTH Royal Institute of Technology

The Loewner-Kufarev energy and Weil-Petersson foliations

The Loewner energy, introduced by Wang in 2016, is a Mobius invariant deterministic quantity attached to Jordan curves in the plane. It arises is as a large deviations rate function for the Schramm-Loewner evolution with small parameter. A curve has finite Loewner Energy if and only if it is a Weil-Petersson quasicircle, a class of curves that in the last decades has received significant attention by both physicists and mathematicians, but only very recently by probabilists. The Loewner-Kufarev energy is a dual quantity attached to certain continuous families of Jordan curves, which arises in the context of large deviations of SLEs with large parameter.

I will discuss recent joint work with Yilin Wang (MIT) that describes the interplay between these energies (and the Weil-Petersson quasicircles) with the usual Dirichlet energy on the plane. The results are closely related to recent ideas and developments in Random Conformal Geometry but proofs are purely analytic.

I will focus in particular on the Loewner-Kufarev energy and corresponding families of Weil-Petersson quasicircles. We associate to such a family a (geometric) “winding function” on the plane whose Dirichlet energy equals the (analytic) Loewner-Kufarev energy. This duality entails several interesting results: for example, the Loewner-Kufarev Energy is in fact reversible and we obtain a new characterisation of Weil-Petersson quasicircles. Time permitting, I will end by discussing further implications and open problems.