Evolution of zeros of polynomials under the heat flow

Jonas Jalowy

Paderborn University

Host: Andrew Campbell

The guiding question of the talk is "How do zeros of polynomials evolve under the action of differential operators?"For instance, taking a Weyl random polynomial and applying the heat flow operator, the (complex) limiting zero distribution evolves from the circular law into the elliptic law until it collapses to the Wigner semicircle law--a transition that is well known in Random Matrix Theory.In this talk, I will focus on the case of polynomials undergoing the (holomorphic) heat flow operator and begin with an overview on results of such type as well as a description of the roots from various points of view such as (optimal) transport, differential equations and free probability. Then, we will turn to a specific deterministic setting of polynomial powers P^n, where a novel limiting distribution can be described along the time evolution: For small time, the initial zeros spread out in approximately semicircular distributions, then intricate curves start to form and merge, until for large time, the zero distribution approaches a semicircle law through the initial center of mass.This talk is based on joint works with Brian Hall, Ching-Wei Ho, Antonia Hfert, Zakhar Kabluchko, and Alexander Marynych.

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Office Bldg West / Ground floor / Heinzel Seminar Room (I21.EG.101)

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