

Holomorphic Day 2017

program and abstracts

November 17, 2017
Copenhagen, Denmark

Aim

The purpose of Holomorphic Day is to bring together people who use holomorphy in an essential way in their research. The event is supported by grant DFF|181-00502 from The Danish Council for Independent Research | Natural Sciences.

Program

The talks take place in Auditorium 10 at the H.C. Ørsted Institute. The auditorium is near the department of Mathematical Sciences and is located on the first floor of the long walking area in the H.C. Ørsted Institute.

Coffee is served from 9:30 outside the auditorium. We take lunch in a self-service restaurant on campus. We propose to go there together.

A common dinner at a nearby restaurant is planned after the talks.

Each talk is scheduled for 50 minutes plus questions. We aim for a short intermission between the talks.

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|---------------|------------|---|
| 09:30 – 10:15 | Coffee | |
| 10:15 – 11:15 | Møller | Local Spectral Deformation |
| 11:15 – 12:15 | van Strien | Conjugacy classes of real analytic and smooth interval maps: do they have a manifold structure? |
| 12:15 – 13:30 | Lunch | |
| 13:30 – 14:30 | Kapińska | Fatou components and singularities of meromorphic functions |
| 14:30 – 15:30 | Aspenberg | Mating cubic polynomials and a conjecture by Tan Lei |
| 15:30 – 16:00 | Coffee | |
| 16:00 – 17:00 | Bondarenko | Extreme values of the Riemann zeta function |

Abstracts

Mating cubic polynomials and a conjecture by Tan Lei

MAGNUS ASPENBERG

LUND UNIVERSITY, SWEDEN

The idea of mating was invented by Douady and Hubbard in the 1980s as a way to partially parameterize the space of rational functions of a given degree $d \geq 2$ by pairs of polynomials. Given two polynomials p_1 and p_2 of the same degree, let their Julia sets be J_1 and J_2 respectively and their filled in Julia sets K_1 and K_2 . If these sets are locally connected and connected then it is possible to glue the filled in Julia sets along the boundaries in reverse order. The resulting set is under good circumstances the (homeomorphic copy of a) Julia set of a rational map of the same degree. Tan Lei conjectured that the cubic Newton maps can be represented as matings of pairs of cubic polynomials in this way. I will outline the ideas of how to prove part of this conjecture in a joint work with Pascale Roesch and possibly discuss the final part.

Extreme values of the Riemann zeta function

ANDRII BONDARENKO

NTNU, NORWAY

We prove that for every $c < 1$ there exists arbitrarily large T with

$$|\zeta(1/2 + iT)| > \exp\left(c\sqrt{\log T \log \log T / \log \log T}\right).$$

This improves classical results by Montgomery, Balasubramanian-Ramachandra, and Soundararajan. We will discuss the main components of the proof: Soundararajan's resonance method, multiplicative functions, and convolution formulas for the Riemann zeta function. The relation to the greatest common divisor sums will be also shown.

Fatou components and singularities of meromorphic functions

BOGUSŁAWA KAPIŃSKA

POLITECHNICA WARSZASKA, POLAND

In this talk we discuss the relation between the postsingular set and the boundary of Fatou components, which are specific for transcendental meromorphic maps: Baker domains and wandering domains. In particular we answer a question of Mihaljevic-Brandt and Rempe-Gillen for Baker domains. For wandering domains we show that if the iterates U_n of such a domain have uniformly bounded diameter, then there exists a sequence of postsingular values p_n such that the distance between p_n and U_n tends to 0. This allows to exclude the existence of wandering domains for some meromorphic maps.

The talk is based on a joint work with Krzysztof Baranski, Nuria Fagella and Xavier Jarque.

Local Spectral Deformation

JACOB SCHACH MØLLER

ÅRHUS, DENMARK

The topic of the talk is analytic perturbation theory for embedded eigenvalues of self-adjoint operators.

We begin by briefly recalling (parts of) Kato's analytic perturbation theory for isolated eigenvalues, and one or two examples illustrating that the usual picture may break down for embedded eigenvalues.

The main part of the talk is an exposition of an abstract setup, extending the more well-known theory of dilation analyticity, which enables one to analytically deform the continuous spectrum of a self-adjoint operator, leaving behind embedded eigenvalues of the original operator as isolated eigenvalues of a "complex dilated" non-normal operator. Finally one may apply Kato's analytic perturbation theory to the resulting non-normal operator.

The presentation is based on joint work with Matthias Engelman and Morten Grud Rasmussen.

Conjugacy classes of real analytic and smooth interval maps: do they have a manifold structure?

SEBASTIAN VAN STRIEN

IMPERIAL COLLEGE LONDON, UK

In this talk we will show that quasi-symmetric rigidity of smooth interval maps implies that the space of maps which are conjugate to a given interval map, is connected. We will also discuss other recent results. This work is joint with Trevor Clark.
