Analysis day in memory of Mikael Passare

November 29, 2023

Stockholms universitet

Organizers:
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ANALYSIS DAY IN MEMORY OF MIKAEL PASSARE

DEPT. OF MATHEMATICS, STOCKHOLM UNIVERSITY

November 29, 2023

Program

Cramer room, Dept. of Mathematics, Building 1, Albano

11:00–11:50 Dan Petersen:
Moments of families of quadratic L-functions over function fields via homotopy theory

12:00-13:00 **Lunch** at restaurant *Provianten*

Kovalevsky room, Dept. of Mathematics, Building 1, Albano

13:00–13:50 Linus Lidman Bergqvist:
Supports of RP-measures on $\mathbb{T}^2$ *and uniform approximation of continuous functions.*

14:00–14:50 Pavel Kurasov:
Amoebae and quasicrystals

Coffee break

15:30–16:00 Christer Oscar Kiselman:
How can we define regularity at infinity of sets in a vector space?

Visit to *Norra begravningsplatsen*

Abstracts

Moments of families of quadratic L-functions over function fields via homotopy theory

Dan Petersen
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This is a report of joint work with Bergström-Diaconu-Westerland and Miller-Patzt-Randal-Williams. Based on random matrix theory, Conrey-Farmer-Keating-Rubinstein-Snaith have conjectured precise asymptotics for moments of families of quadratic L-functions over number fields. There is an extremely similar function field analogue, worked out by Andrade-Keating. I will explain that one can relate this problem to understanding the homology of the braid group with symplectic coefficients. With Bergström-Diaconu-Westerland we compute the stable homology groups of the braid groups with these coefficients, together with their structure as Galois representations. We moreover show that the answer matches the number-theoretic predictions. The goal of the project with Miller-Patzt-Randal-Williams is to prove an improved range for homological stability with these coefficients, which would imply the conjectured asymptotics for all moments in the function field case, for all sufficiently large (but fixed) q.

Supports of RP-measures on $\mathbb{T}^2$ and uniform approximation of continuous functions.

Linus Lidman Bergqvist
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In this talk, we will discuss properties of so called RP-measures on the torus $\mathbb{T}^2$ — measures whose Poisson integral is the real part of some holomorphic function on the bidisc $\mathbb{D}^2$. In particular, we investigate what subsets of $\mathbb{T}^2$ can support RP-measures, and we show that failure of a set S to support any RP-measure is directly related to uniform approximability of all continuous functions on the reflection of S by functions in the bidisc algebra.

Amoebae and quasicrystals

Pavel Kurasov
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Amoebae associated with multivariate polynomials were frequently used by Mikael Passare in his research. The goal of the talk is to explain how amoebae can be used to prove that any trigonometric polynomial with only real zeroes can be realised as a restriction of a certain multivariate stable polynomial $P(\mathbf{z})$, $\mathbf{z} \in \mathbb{C}^n$ to the curve $\mathbf{C} \ni k \mapsto e^{ik\ell}, \ell \in \mathbf{R}_+^n$. This fact was proven recently by Alon-Cohen-Vinzant implying that any one-dimensional Fourier quasicrystal with positive integer masses is related to stable multivariate polynomials.

How can we define regularity at infinity of sets in a vector space?

Christer Oscar Kiselman
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A subset of a vector space is considered as a subset of any of three compactifications of the space. We then study the smoothness of its closure in the compactified space. As an example let me mention here two parallel lines in the plane, which are mapped to two circles on the Riemann sphere. There they are tangent to each other at the north pole, thus with no problem concerning smoothness. On the other hand, we have a parabola, whose closure on the Riemann sphere is a curve of class C^1 but not of class C^2.