

# Analysis day in memory of Mikael Passare

November 6, 2024



Stockholms  
universitet

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# ANALYSIS DAY IN MEMORY OF MIKAEL PASSARE

DEPT. OF MATHEMATICS, STOCKHOLM UNIVERSITY

November 6, 2024

## Program

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

10:00–10:05 Pavel Kurasov

*Opening*

10:05–10:55 Benjamin Eichinger

*Necessary and sufficient conditions for universality limits*

**Coffee break**

11:20–12:10 Alan Sola:

*Stable polynomials and ideals of admissible numerators*

12:20–13:30 **Lunch** at restaurant *Provianten*

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

13:30–14:20 Sofia Tirabassi:

*The classification problem and semi abelian varieties*

**Coffee break**

Visit to *Norra begravningsplatsen*



Svalbard

## Abstracts

### Necessary and sufficient conditions for universality limits

**Benjamin Eichinger**

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In this talk I present necessary and sufficient conditions for universality limits for orthogonal polynomials on the real line. One of our results is that the Christoffel–Darboux kernel has sine kernel asymptotics at a point  $\xi$ , with regularly varying scaling, if and only if the orthogonality measure (spectral measure) has a unique tangent measure at  $\xi$  and that tangent measure is the Lebesgue measure. All previously known cases of sine kernel asymptotics, with absolutely continuous or singular measures, have regularly varying scaling. In fact, sine kernel asymptotics is a special case of a more general theory which also includes hard edge universality limits or Fisher–Hartwig singularities; we show that the Christoffel–Darboux kernel has a regularly varying scaling limit if and only if the orthogonality measure has a unique tangent measure at  $\xi$  and that tangent measure is not the point mass. The limit kernels are expressible in terms of confluent hypergeometric functions.

This talk is based on joint works with Milivoje Lukić, Brian Simanek, and Harald Woracek.

### Stable polynomials and ideals of admissible numerators

**Alan Sola**

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Given a polynomial  $p$  with no zeros in the polydisk, or equivalently the poly-upper half plane, we study the problem of determining the ideal of polynomials  $q$  having the property that the rational function  $q/p$  is bounded near a boundary zero of  $p$ . We give a complete characterization of this ideal in several important special cases, and we construct several illuminating examples to complement our results.

This reports on joint work with K. Bickel, G. Knese, and J. E. Pascoe.

## The classification problem and semi abelian varieties

**Sofia Tirabassi**

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Algebraic geometry studies algebraic objects with an algebraic soul, and the classification problem aims to group similar varieties together by leveraging on the algebraic soul. In my talk I will briefly explain the idea of the classification problem, and introduce birational equivalence, which is one of the most natural equivalence relations we can use to group varieties together. Then, I will overview how we produce invariants, numbers that allows us distinguish different types of varieties. Finally, I will explain how we can recover some specific varieties (abelian and semi abelian varieties) from their invariants. This is partly a joint work with M. Mendes Lopes and R. Pardini.