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Sommersemester 2025

Arithmetische und Algebraische Geometrie

Mittwoch 16-18, LMU Theresienstr. 39, Raum B251 oder TUM, Garching, Boltzmannstr. 3,
Raum 02.08.020

30.04.2025 .

Title:
Abstract:

07.05.2025 .

Title:
Abstract:

14.05.2025 Jürgen Rathmann

Title: Non-classical Enriques surfaces and rank 2 vector bundles

Abstract: Classical Enriques surfaces gained importance as a class of non-rational algebraic surfaces with vanishing irregularity and geometric genus. In the 1970s Bombieri and Mumford constructed non-classical Enriques surfaces in characteristic 2 with a trivial canonical bundle. I will present a new rank 2 vector bundle on $\mathbb{P}^2 \times \mathbb{P}^2$ in characteristic 2, and discuss the geometry of the non-classical Enriques surfaces which form the zero sets of a suitable twist.

21.05.2025 Cornelius Greither (UniBw)

Title: Algebraic power series and automata

Abstract: This talk will try to explain a fascinating link between two apparently different topics: algebraic power series over finite fields, and a certain type of finite automata. The main result in this area is Christol's theorem, which dates back to 1979, and deserves to be known much more widely. We will take our time, introducing all the concepts and the links between them. No new results should be expected; and in particular no research contributions of the speaker. The examples given are the only aspect which may be remotely original.

28.05.2025 Tim Gehringer (ETH Zürich)

Title: Stable Reduction of Hyperelliptic Curves in Residue Characteristic 2

Abstract: The stable reduction of a hyperelliptic curve encodes many of its arithmetic invariants, such as the curve's conductor, minimal discriminant and Galois representation. In the case of odd residue characteristic, these models may be classified via their cluster pictures, which provides an explicit way to compute the invariants. In the talk, we will explain recent progress towards a similar result in residue characteristic 2. In particular, we use marked models of the projective line to classify all genus 2 curves in residue characteristic 2.

- 04.06.2025 .
 Title:
 Abstract:
- 11.06.2025 Michael Cuntz (Hannover)
 Title: Frieze patterns and beyond
 Abstract: Frieze patterns have a long history in mathematics; they have implicitly been used in the study of continued fractions and Farey graphs over a hundred years ago, but they also appear in modern areas like cluster algebras, hyperplane arrangements, quantum groups, and toric geometry. This talk provides an introduction to the topic including some recent results.
- 18.06.2025 Chiara Sabadin (Regensburg)
 Title: Cohomological approach to Ribet’s method
 Abstract: Ribet’s Method relates zeta-values and class groups of cyclotomic fields using modular forms. In this talk, based on my ongoing PhD thesis, we will construct an analogous version of Ribet’s Method using instead étale cohomology classes of modular curves over the same cyclotomic field.
- 25.06.2025 .
 Title:
 Abstract:
- 02.07.2025 Uli Walther (Purdue University).
 Title: On the arithmetic rank of nullcones of classical groups
 Abstract: Suppose G is a group (linearly), acting on a polynomial ring $R = \mathbb{K}[x_1, \dots, x_n]$ via a morphism $\phi : G \rightarrow \text{Aut}_{\mathbb{K}}(\mathbb{K}^n)$. If R^G is the (graded) invariant ring, let m_G be the graded maximal ideal of R^G . The ideal extension $m_G \cdot R$ to the full polynomial ring is the “nullcone of the action”, although frequently the same phrase is applied to the quotient ring $R/m_G \cdot R$, or (if \mathbb{K} is algebraically closed) to the zeroset of $m_G \cdot R$ in \mathbb{K}^n .
 The nullcone was (perhaps invented and definitely) studied and used by David Hilbert in his studies of (finite-generatedness of) invariant rings, and modern research (for example by Harm Derksen, Hans-Peter Kraft, Gregor Kemper) has shown tight connections between the generators of the nullcone, and the invariant ring that can be used for algorithms.
 In this talk we consider the “standard” actions of the general linear, the special linear, the orthogonal, and the symplectic group and discuss the “arithmetic rank” of their nullcones: the minimal number of hypersurfaces needed to cut out the nullcone variety set-theoretically. The talk begins with a general discussion of arithmetic rank, including its connection to topology. Winfried Bruns and Roland Schwaenzl used “algebras with straightening laws” and topology 40 years ago to find the arithmetic rank of the nullcone for the (standard action of the) general linear group $\text{Gl}(n)$ (on matrices). The second half of the talk will focus on a theorem that generalizes their results to the nullcones of all linearly acting linear reductive groups, as well as the outline of a topological argument for the standard actions of $\text{SL}(n)$, $\text{SP}(n)$, $\text{O}(n)$. All results of the second half are joint work with Jack Jeffries, Vaibhav Pandey, Anurag K. Singh.
- 09.07.2025 .
 Title:
 Abstract:
- 16.07.2025 Jan Ole Hesse (LMU).
 Title: Rationale K-Theorie von Zahlkörpern via Iwasawatheorie
 Abstract: In “Stable real cohomology of arithmetic groups” berechnet Borel die rationalisierten K-Gruppen von Zahlkörpern oder ihrer Ganzheitsringe mit Methoden

aus der Differentialgeometrie/globaler Analysis. Die Motivation der zu diesem Vortrag zugehörigen Masterarbeit war einen algebraischeren Beweis via neuerer Resultate zu algebraischer K-Theorie und aus Iwasawatheorie zu finden:

Im Vortrag wird erklärt wie die höheren rationalisierten K-Gruppen von obigen Ringen in Verbindung zu Iwasawatheorie stehen. Im Anschluss werden Fälle, in denen Iwasawatheorie eines dieser Kriterien beweist, erklärt.

23.07.2025 Katharina Müller (UniBw).

Title: Murmurationen von P^2 Fourier-Koeffizienten

Abstract: Anhand des Beispiels von elliptischen Kurven werden wir Murmurationen einführen, um dann Murmurationen von Fourier-Koeffizienten von Modulformen zu erklären. Hierbei handelt es sich um gemeinsame Arbeit mit Debanjana Kundu.