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Wintersemester 19/20

Arithmetische und Algebraische Geometrie

Mittwoch 16-18, Theresienstr. 39, B 251

23.10.2020

Title:

Abstract:

30.10.2019 Kazuhiro Ito (Kyoto/TUM).

Title: CM liftings of K3 surfaces over finite fields and the Tate conjecture

Abstract: Using integral canonical models of orthogonal Shimura varieties and the Kuga-Satake construction, we will prove that any K3 surface of finite height over a finite field admits a characteristic 0 lifting whose generic fiber is a K3 surface with complex multiplication (CM). Combining our methods with the results of Mukai and Buskin on the Hodge conjecture for products of K3 surfaces, we will prove that the Tate conjecture for the square of a K3 surface over a finite field is true. This is a joint work with Tetsushi Ito and Teruhisa Koshikawa.

06.11.2019

Title:

13.11.2019

Title:

Abstract:

20.11.2019 Martin Hofer (LMU München)

Title: On two conjectures named after Gross

Abstract: First, I want to recall the Gross vanishing conjecture, connecting the vanishing order of a complex Artin L -function and of a p -adic L -function at zero in a suitable setting, and the Gross-Kuzmin conjecture, which asserts that the Γ -coinvariants of an Iwasawa module are finite. Then I will explain that (under some standard assumptions) a characterwise formulation of the Gross-Kuzmin conjecture is equivalent to the Gross vanishing conjecture and how this can be used to prove new cases for both conjectures. All results presented in this talk stem from joint work in progress with S. Kleine.

27.11.2019 Daniel Macias Castillo (Madrid)

Title: On refined conjectures of the Birch and Swinnerton-Dyer type

Abstract: Let A be an abelian variety defined over a number field k . The conjecture of Birch and Swinnerton-Dyer (BSD) predicts an explicit formula for the leading term at $z = 1$ of the Hasse-Weil L -series $L(A, z)$ of A/k . Deligne and Gross have also predicted the order of vanishing at $z = 1$ of Hasse-Weil-Artin L -series $L(A, \psi, z)$. In certain settings a conjecture of Mazur and Tate predicts integral congruence relations between the values $L(A, \psi, 1)$ as ψ ranges over certain families of characters. It has however

proved more difficult to formulate explicit refinements of BSD that take into account connections between the leading terms $L(A, \psi, 1)$ for varying characters ψ of arbitrary order of vanishing. Let F be a finite Galois extension of k . In this talk we present a completely general refined BSD conjecture for $(A, F/k)$ which provides an appropriate framework for the investigation of such connections as ψ ranges over the irreducible characters of $\text{Gal}(F/k)$.

Our refined BSD conjecture is consistent with the relevant case of the equivariant Tamagawa number conjecture and in particular renders the latter conjecture amenable to theoretical or numerical verifications in general situations.

This is joint work with D. Burns.

04.12.2019 Otmar Venjakob (Heidelberg)

Title: Reciprocity laws for (φ, Γ) -modules over Lubin-Tate extensions

Abstract: The talk is going to report on joint work with Peter Schneider: In the Lubin-Tate setting we study pairings for analytic (φ, Γ) -modules and prove an abstract reciprocity law which then implies a relation between the analogue of Perrin-Riou's Big Exponential map as developed by Berger and Fourquaux and a p -adic regulator map whose construction relies on the theory of Kisin-Ren modules generalising the concept of Wach modules to the Lubin-Tate situation.

11.12.2019 Jürgen Klüners (Paderborn)

Title: The negative Pell equation and the Cohen-Lenstra heuristic

Abstract: For a (squarefree) integer d the negative Pell equation is given by: $X^2 - dY^2 = -1$. It is easy to see that this equation has no solution over the integers, if d is negative or d is congruent to 3 modulo 4.

In this talk we would like to study the asymptotic behavior of integers d such that this equation is solvable. This question is related to the behavior of the class group of the quadratic field generated by a square root of d . The distribution of those class groups is described by the Cohen-Lenstra heuristics.

18.12.2019 Stefan Schreieder (LMU München)

Title: Torsion orders of Fano hypersurfaces

Abstract: We find new lower bounds on the torsion orders of very general Fano hypersurfaces over (uncountable) fields of arbitrary characteristic. Our results imply that unirational parametrizations of most Fano hypersurfaces need to have enormously large degree. Our results also hold in characteristic two, where they solve the rationality problem for hypersurfaces under a logarithmic degree bound, thereby extending a previous result of the speaker from characteristic different from two to arbitrary characteristic.

08.01.2020 ACHTUNG: Zwei Vorträge, Beginn 16:00

Fabian Gundlach (Harvard) und Remy van Dobben de Bruyn (Princeton)

16:00 Speaker: Fabian Gundlach

Title: Multiplication tables of Galois extensions

Abstract: How quickly can you specify a Galois extension (of $\mathbb{Q}$, say) with Galois group G ? For S_2 -extensions, you only need to say one (rational) number. For S_3 -extensions, Levi showed that a binary cubic form suffices. Wright and Yukie noticed that for S_4 -extensions, two symmetric 3×3 -matrices suffice, and for S_5 -extensions, four skew-symmetric 5×5 -matrices are enough. We explore a general strategy that reproduces these known examples and generates new parametrizations for other groups.

17:20 Speaker: Remy van Dobben de Bruyn

Title: A variety that cannot be dominated by one that lifts

Abstract: The recent proofs of the Tate conjecture for K3 surfaces over finite fields start by lifting the surface to characteristic 0. Serre showed in the sixties that not every variety can be lifted, but the question whether every motive lifts to characteristic 0 is open. We give a negative answer to a geometric version of this question, by constructing a smooth projective variety that cannot be dominated by a smooth projective variety that lifts to characteristic 0.

15.01.2020

Title:

22.01.2020 Sarah Zerbes (UCL)

Title: Euler systems and the Bloch-Kato conjecture for $\mathrm{GSp}(4)$

Abstract: Euler systems are compatible families of Galois cohomology classes attached to a global Galois representation, and they play an important role in proving cases of the Bloch-Kato conjecture.

In my talk, I will review the construction of an Euler system attached to the spin representation of a genus 2 Siegel modular form. I will then sketch a proof of new cases of the Bloch-Kato conjecture in analytic rank 0. This is the consequence of an explicit reciprocity law, relating the Euler system to values of a p -adic L -function. This is joint work with David Loeffler and Chris Skinner.

29.01.2020 Julius Hermelink (LMU München)

Title: Identifying Frobenius elements and computing Galois Gauss sums

25.03.2020 Jakob Knauer (LMU München)

Title: Congruences for higher derivatives of Dirichlet L -functions