Characteristic cycle of an l-adic sheaf

SAITO, Takeshi

The University of Tokyo, t-saito@ms.u-tokyo.ac.jp

The graded pieces of the ramification groups are described in terms of differential forms. Using the description, we define the characteristic cycle of an l-adic sheaf and compute the Euler characteristic in certain cases.

Nearby cycles and D-modules of log schemes in characteristic $p > 0$

TSUJI, Takeshi

The University of Tokyo, t-tsuji@ms.u-tokyo.ac.jp

Abstract: For a log smooth scheme of semi-stable type over a log point of characteristic $p > 0$, we define nearby cycles as a single D-module and study its properties. P. Berthelot proved that the cohomology of the nearby cycles coincides with log crystalline cohomology (Hyodo-Kato cohomology).

p-adic elliptic polylogarithm, p-adic Eisenstein series and Katz measure

BANNAI, Kenichi (joint work with Guido Kings)

Keio University, bannai@math.keio.ac.jp

Abstract: The elliptic polylogarithm is a mixed motivic sheaf defined by Beilinson and Levin on an elliptic curve minus the identity. The construction is valid for the universal elliptic curve over the modular curve, and the classes in motivic cohomology constructed as the pull-backs of the elliptic polylogarithm sheaf by torsion points to the modular curve are called the Eisenstein classes. In this talk, I will explain my result with Guido Kings concerning the explicit determination of the p-adic realization of the Eisenstein classes on the ordinary locus of the modular curve. We show in particular that the p-adic Eisenstein classes may be explicitly described by p-adic Eisenstein series of negative weight – which are constructed using p-adic measures with values in p-adic modular forms defined by Katz.

Observations on the "values" of modular j-function at real quadratics

KANEKO, Masanobu

Kyushu University, mkaneko@math.kyushu-u.ac.jp

Abstract: Using Hecke's hyperbolic Fourier expansion, we define "values" of elliptic modular j-function at real quadratic numbers. We present some observations on these values based on numerical experiments. These experiments suggest a relation between the values and the Diophantine approximations of the argument quadratic irrationalities.

Refined Iwasawa theory

KURIHARA, Masato

Keio University, kurihara@math.keio.ac.jp

Abstract: In this talk, I will discuss on more refined relationships between arithmetic objects and p-adic analytic objects than the usual main conjecture in Iwasawa theory.

Log abelian varieties

NAKAYAMA, Chikara

Tokyo Institute of Technology, cnakayam@math.titech.ac.jp

Abstract: This talk is on the algebraic theory of log abelian varieties, a joint work with Takeshi Kajiwara and Kazuya Kato. The notion of log abelian varieties is a new formulation of degenerations of abelian varieties, which is defined via log geometry in the sense of Fontaine-Illusie. Log abelian varieties are group objects and behave like proper smooth objects. The toroidal compactifications of the moduli of polarized abelian varieties with level structure are the fine moduli of polarized log abelian varieties with level structure and with the fixed type of local monodromy with respect to the corresponding cone decomposition. The Satake-Baily-Borel compactifications are, in a sense, the coarse moduli of polarized log abelian varieties with level structure.

3-dimensional hyperbolic geometry and Hida theory

MORISHITA, Masanori

Kyushu University, morisita@math.kyushu-u.ac.jp

Abstract: Following the analogy between knot theory and number theory, I will discuss analogies between deformations of hyperbolic structures and of p-adic ordinary modular forms, and then present some results and conjectures on the following 2 topics:

1) the variation of mixed Hodge structures given by the Chern-Simons functionals on the deformation space,

2) the universal deformation of representations of a knot group and the associated Alexander invariant.

Waring's problem for polytope numbers

KIM, Hyun Kwang

Pohang Institute of Science and Technology, hkkim@postech.ac.kr

We propose a subclass of integer valued polynomials which are constructed geometrically from cpnvex polytopes of 'good' shape. We prove that the asymptotic order of the set of polytope numbers associated to a polytope V is of polynomial growth with respect to the dimension of V.

The basic bilateral hypergeometric series and the mock theta functions

CHOI, Youn-Seo

Korea Institute for Advanced Study, y-choi2@kias.re.kr

In 1893, M. Lerch introduced an interesting function which is defined in the form of the bilateral series. Later, G. N. Watson studied the relation between this Lerch's function and Ramanujan's fifth order mock theta functions. In this talk, we will see the relation between the basic bilateral hypergeometric series and the third, fifth and sixth order mock theta functions which were introduced by S. Ramanujan and others.

Cohomology of elliptic units

SEO, Soogil

Yonsei University, sgseo@yonsei.ac.kr

Let K be an imaginary quadratic field and F be an abelian extension of $\mathbb{Q}$ containing K. Let $F_\infty = \bigcup_n F_n \supseteq F_1 \supseteq F_0$ be the cyclotomic $\mathbb{Z}_p$-extension of F or the $\mathbb{Z}_p$-extension of F unramified outside p with $[F_n : F] = p^n$. We compute the Tate-cohomology groups of elliptic units of F_m and F_∞ when p is prime to the relative class number of F. This is joint with Prof. Bae.

Heegner points on elliptic curves

BYEON, Dongho

Seoul National University, dhbyeon@snu.ac.kr

Using Heegner points on elliptic curves, we construct points of infinite order on certain elliptic curves with a rational torsion point of odd order.

On some arithmetic properties of Siegel functions

KOO, Ja Kyung

KAIST, koojakyung@kaist.ac.kr

By making use of the singular values of Siegel funtions we construct the ray and ring class invariants over imaginary quadratic fields, and we further generate normal bases of the ray class fields over any imaginary quadratic fields of discriminant less than or equat to -7.

Congruences of the partition function

YANG, Yifan

Chiao-Tung University, yfyang@math.nctu.edu.tw,

Let $p(n)$ denote the number of ways to write a positive integer n as sums of positive integers. The famous congruence of Ramanujan states that the $p(5n+4)$ is divisible by 5 for all non-negative integers n, and there are similar congruences for the primes 7 and 11.

In a recent paper of K. Ono, it was shown that for each prime $m \geq 13$, there is a positive proportion of primes ℓ such that congruences $p(m\ell^3 n + B) = 0 \bmod m$ hold for all n not divisible by ℓ, where B is a certain integer depending on m and ℓ. In this talk, we will show that in fact, for all primes $m \geq 13$ and all primes ℓ different from $2, 3, m$, there exists an explicitly computable positive integer k and some integer B such that $p(m\ell^k n + B) = 0 \bmod m$ for all n not divisible by ℓ.

Eisenstein congruence and Iwasawa main conjecture for CM fields

HSIEH, Ming-Lun

Academia Sinica, mlhsieh@math.mcmaster.ca

We prove a divisibility relation in Iwasawa main conjecture for CM fields by the method of Eisenstein congruence on the quasi-split unitary gorup of degree three.

On periods of third kind for Drinfeld modules

CHANG, Chieh-Yu

CTS and Central University, cychang@math.cts.nthu.edu.tw

In this talk, we will introduce the concept of periods of third kind for Drinfeld modules and discuss the application of motivic transcendence theory to the algebraic independence of periods, quasi-periods and periods of third kind for Drinfeld modules.

Ordinary crystals with logarithmic poles

YU, Jeng-Daw

Taiwan University, jdyu@math.ntu.edu.tw

We formulate the abstract formalism of ordinary crystals with logarithmic poles over a smooth affine base and give some basic properties, which generalize some of Katz's work in the 60's.

Weak Néron models for Lattès

HSIA, Liang-Chung

Central University, hsia@math.ncu.edu.tw,

Let $\varphi : V \to V$ be a morphism on a smooth variety V over a discretely valued field K. In studying local canonical height associated to φ over K, G.Call and J.Silverman generalize Néron's theory by introducing the notion of a weak Néron model for the pair $(V/K, \varphi)$.

The existence /non-existence of a weak Néron model for the pair $(V/K, \varphi)$ is closely related to the dynamical systems arising from iterations of φ over the local field K. For the case where $V = \mathbb{P}^1$ and φ is a rational map of degree at least 2 over K, all known examples either the rational maps in question have good reduction or fail to have a weak Néron model over some finite field extension L of K.

It is a natural question to ask whether or not there is a rational map which does not have good reduction but has a a weak Néron model over any discretely valued extension L of K. In this talk, we'll show an important family, called the Lattès maps have the desired property. We'll also discuss the dynamics of the Lattès maps on the Berkovich space $\mathbb{P}^1_{Berk}$ associated to the projective line. This is a joint work with R.Benedetto.

Theta divisor and the variation of fundamental groups

TONG, Jilong

Paris Polytechnique/Tsinghua U., tong@math.polytechnique.fr

In this talk, I will first recall some results on the variation of fundamental groups of curves in positive characteristic. Then I will discuss our main tool (the theta divisor of Raynaud) to study this problem, and some improvements of the previous result of M. Raynaud and A. Tamagawa.

Euler system on Shimura curves

TIAN, Ye

Chinese Academy of Sciences, ytian@math.ac.cn

We use the technique of Euler systems on Shimura curves and congruence of modular forms to study some case of BSD conjecture for modular abelian varieties.

L-functions of Witt's $\mathbb{Z}_p$ coverings

LIU, Chunlei

Shanghai Jiao Tong University, chunleiliou@gmail.com

We shall introduce Witt's $\mathbb{Z}_p$ coverings of the torus over a finite field of characteristic p, study the measure given by the L-functions of a Witt covering, construct the corresponding (p,T)-adic L-function, and study its analytic properties and its zeros and poles.

Cyclic 2-textensions and Gross Conjecture over $\mathbb{Q}$

OUYANG, Yi

University of Science and Technology of China, yiouyang@ustc.edu.cn

The Gross Conjecture over $\mathbb{Q}$ was first claimed by Aoki, however, the proof contains too many mistakes and false claims to be considered as a serious proof. This paper is an attempt to find a sound proof of the Gross conjecture under the outline of Aoki. We reduce the conjecture to two elementary conjectures concerning arithmetic properties of cyclic 2-extensions of $\mathbb{Q}$.

Intrgral Points on Homogeneous Spaces of Algebraic Tori

WEI, Dasheng

Chinese Academy of Sciences, dshwei@amss.ac.cn

The integral points on homogeneous spaces of semi-simple and simply connected linear algebraic groups of non-compact type were studied by using the strong approximation theorem and the Brauer-Manin obstruction. Recently, Harari showed that the Brauer-Manin obstruction is the only obstruction for existence of the integral points of a scheme over the ring of integers of a number field whose generic fiber is a principal homogeneous space of tori. However, the Brauer groups of tori over a number field are infinite and this result does not provide an effective way to determine the existence of the integral points . In this lecture, we will show an effective method by class field theory.

Class groups under relative quadratic extensions

YUE, Qin

Nanjing U.of Aeronautics and Astronautics, yueqin@nuaa.edu.cn

Let E be a relative quadratic extension of a number field F. We have the following two results: (1) If the class group $C(F)$ has odd order, we have a generalized Redei's formula: 4-rank of $C(E) = m - 1 -$ rankR(E/F), where m is the number of all primes of F ramified in E, $R(E/F)$ is the generalized Redei-matrix of local Hilbert symbols with coefficients in F_2 and the rank is meant to the rank over F_2. (2) If the 2-Sylow subgroup of the class group of F is elementary and the S-ideal class number of F is odd, where S is a set consisting of all infinite primes and all finite primes of F ramified in E. We also have two formulas of the 2-rank and 4-rank of the class group of E.