第 14 回仙台広島整数論集会アブストラクト

7 月 14 日 (火)

田嶋 和明/Kazuaki Tajima (東北大学/Tohoku University)

On the GIT stratification in the non-split case

In early 80's, the notion of the GIT stratification of reductive group actions was studied by Kempf, Ness and Kirwan. We are interested in the stratification of finite dimensional representations of reductive groups. If the group is split over a perfect field k, their works tell us that this stratification is rationally defined over the good ground field k. In this talk, we extend these stratifications to all (not necessarily split) reductive algebraic groups over k. This is a joint work with Akihiko Yukie (Kyoto University).

石塚 裕大/Yasuhiro Ishitsuka (京都大学/Kyoto University)

大域体における平面曲線の対称行列式表示
(Symmetric determinantal representation of plane curves over global fields)

I will talk about some geometric interpretation of tuples of matrices over general fields. Then I give an arithmetic application, the local-global principle for symmetric determinantal representation of plane curves. Some of these results are joint works with Tetsushi Ito (Kyoto University).

許斐 豊/Yutaka Konomi (学習院大学/Gakushuin University)

有理数体上の円分的 $\mathbb{Z}_l$-拡大体の類半群について
(On the class semigroup of the cyclotomic $\mathbb{Z}_l$-extension of the rational numbers)

For an infinite algebraic extension of the rational numbers, the integer ring is not always a Dedekind domain. Its fractional ideals do not form a group but a commutative semigroup generally. In this case, the "class semigroup" is naturally defined using the principal fractional ideals. In this talk, I will discuss the structure of the class semigroup of the cyclotomic Z_l-extension of the rationals.

Gantsooj Batzaya (東京大学/University of Tokyo)

On simultaneous approximation to powers of a real number by rational numbers

The problem of uniform simultaneous approximation by rational numbers to a certain set of real numbers was initiated by Davenport-Schmidt. An upper bound for the uniform exponent of approximation by rational numbers is found by Davenport-Schmidt, Laurent and Roy for a set of the form $(1, \xi, \xi^2, ..., \xi^n)$, and it is found by Lozier-Roy for a set of the form $(1, \xi, \xi^3)$. In our talk, we explain our result on an upper bound for a set of the form $(1, \xi^l, \xi^k)$ with $1 \leq l < k$. Our result is a partial generalization of the result of Lozier-Roy.

Lasse Grimmelt (早稲田大学/Waseda University)

Representation of squares by cubic forms

Given a nonsingular cubic form with integral coefficients, $C(x_1, \ldots, x_{n-1})$, what can we say about the existence of nontrivial integral solutions of $C(x_1, \ldots, x_{n-1}) = x_n^2$? Using Heath-Browns new form of the circle method the goal is to prove the Hasse-Principle for n being as small as possible. Doing this, the case $n = 8$

requires estimates of the appearing exponential sums that can be derived from Heath-Browns Paper on nonsingular cubic forms in 10 variables. Trying to apply the bounds of Hooleys results about nonary cubic forms on $n = 7$ leaves us with one case that has to be dealt with in different fashion.

7 月 15 日 (水)

山本 健人/Kento Yamamoto (中央大学/Chuo University)

On generators of the Chow group of zero-cycles on diagonal cubic surfaces over 3-adic fields

In this talk, we give an explicit construction of generators of the degree-zero part of the Chow group of zero-cycles on some diagonal cubic surfaces over 3-adic fields. A key point is to check that such cycles have non-zero values under the Brauer-Manin pairing. We will show this by calculating Hilbert symbols.

廣津 孝/Takashi Hirotsu (東北大学/Tohoku University)

Chow groups of Châtelet surfaces over dyadic fields

A Châtelet surface X over a p-adic field is a typical surface whose Chow group $A_0(X)$ of degree-zero zero-cycles varies depending on fine conditions of the defining equation. Many researchers have computed $A_0(X)$ by a number-theoric method in many cases. We extend their computation and determine the structure of $A_0(X)$ in some new cases. It turns out that $A_0(X)$ behaves rather unexpectedly when the splitting field of X is wildly ramified.

坂垣内 誠/Makoto Sakagaito (Harish-Chandra Research Institute)

On problems about a generalization of the Brauer group

We generalize the Brauer group by using etale motivic cohomology. Then we can consider problems whether the generalized Brauer group satisfies properties which the Brauer group satisfies. We show the exactness of the sequence for generalized Brauer groups which is an analogy of the Gersten conjecture for the Quillen K-theory in a smooth and proper curve $\mathfrak{X}$ over a Henselian discrete valuation ring. Moreover, we show a generalization of the Artin theorem for the Brauer group, i.e., the surjectivity of the homomorphism on generalized Brauer group which is induced by the closed fiber of $\mathfrak{X}$.

甲斐 亘/Wataru Kai (東京大学/University of Tokyo)

アフィン空間におけるモジュラス付き移動補題
(A moving lemma in the affine space with modulus)

The additive higher Chow group of an algebraic scheme X is an object in algebraic cycle theory which has been explored by Bloch, Esnault, Rülling, Park et al. since the early 2000's. It is expected to behave as the relative cohomology theory for the pair of spaces $(X \times \mathbb{A}^1, X \times \{0\})$. In this talk I will show that the additive higher Chow group has a natural contravariant functoriality with respect to morphisms of smooth affine schemes by proving a moving lemma of algebraic cycles.

宮崎 弘安/Hiroyasu Miyazaki (東京大学/University of Tokyo)

On moving algebraic cycles with modulus of bounded degree

Friedlander and Lawson developed the theory of moving algebraic cycles of bounded degree. In other words, for a family of cycles $\{Z\}$, $\{W\}$ of bounded degree on a projective variety, we can move all Z uniformly so that they intersect properly with all W. The moving lemma of this type plays an important role in Voevodsky's $\mathbb{A}^1$-homotopy theory of motives. For example, the moving lemma enables us to prove the duality theorem of motives. Recently, a non-homotopical generalization of Voevodsky's $\mathbb{A}^1$ -homotopy theory of motives is studied by Kahn-Saito-Yamazaki. The aim of this talk is to present a modification of the moving lemma of Friedlander-Lawson which will be used in the (future) non-homotopical theory of motives.

越川 皓永/Teruhisa Koshikawa (University of Chicago)

On heights of motives

Kazuya Kato defined a height of a pure motive, which is a generalization of the Faltings height of an abelian variety. He conjectured that basic properties of Faltings heights can be generalized to heights of motives. Some properties can be proved if we modify the definition slightly. I will explain such a definition and what can be proved.

7 月 16 日 (木)

望月 哲史/Satoshi Mochizuki (中央大学/Chuo University)

On Koszul cubes and Gersten's conjecture

In my talk, I will give an interpretation of Gersten's conjecture via non-commutative motives theory. The key objects in my talk are Koszul cubes. I make a classification theory of Koszul cubes and structure theorems of non-commutative motives associated with infinity categories of Koszul cubes. Finally I will mention applications of these results to Gersten's conjecture.

町出 智也/Tomoya Machide (国立情報学研究所/National Institute of Informatics)

多重ゼータ値の Parity Result の精密化について
(On improvement of the parity result of multiple zeta values)

The parity result of multiple zeta values is a kind of reduction property, which was proved by Ihara, Kaneko, and Zagier, and by Tsumura, independently. It states that a multiple zeta value can be written in terms of these values of smaller depth and weight if the argument satisfy a parity condition. In this talk, we improve the parity result. Using the equations that are given for the proof of the parity result, we also obtain new congruence relations of multiple zeta values.

小野 雅隆/Masataka Ono (慶應義塾大学/Keio University)

有限多重ポリログのシャッフル積
(Shuffle product of finite multiple polylogarithms)

Finite polylogarithms were defined by Elbaz-Vincent and Gangl and studied by several authors. In this talk, we will introduce a multiple version of finite polylogarithms and prove that a certain module generated by finite multiple polylogarithms forms an algebra. This result is obtained by using a finite analogue of the shuffle relation for the usual multiple polylogarithms. This is a joint work with Shuji Yamamoto.

飯島 優/Yu Iijima (京都大学/Kyoto University)

Difference between l-adic Galois representations and pro-l outer Galois representations associated to hyperbolic curves

Let l be a prime number, k a field of characteristic zero, and V an algebraic variety over k. By consideration of (respectively, the abelianization of) the maximal pro-l quotient of the geometric fundamental group of V, we may obtain the pro-l outer Galois representation (respectively, an l-adic Galois representation) associated to V. In this talk, we explain the *nonexistence* of isomorphisms from the image of this pro-l outer Galois representation to the image of this l-adic Galois representation in the case where V is a hyperbolic curve and k satisfies a mild assumption concerning l.

長町 一平/Ippei Nagamachi (東京大学/University of Tokyo)

On a good reduction criterion of proper polycurves with sections

Oda and Tamagawa showed that whether a hyperbolic curve over a discrete valuation field has good reduction can be determined by its outer Galois representation. In this talk, we give a higher dimensional version of this criterion, i.e., a good reduction criterion for proper polycurves with sections (successive extensions of family of proper curves with section), under mild assumption.

Yu Yang (京都大学/Kyoto University)

On the existence of vertical fibers of coverings of curves

Let X be a stable curve over a complete discrete valuation ring R of mixed characteristic or positive characteristic with smooth generic fiber. A closed point x of X is called vertical point if there exists a covering $\rho_Y : Y \longrightarrow X$ that is étale over the generic fiber of $X \longrightarrow \mathrm{Spec}\, R$, where Y is a stable curve, such that $\dim \rho_Y^{-1}(x) = 1$. Write X^{ver} for the set of vertical points of X. We can post a natural question as follows:

Question What is X^{ver}?

This problem was first studied by Akio Tamagawa with motivation arising from anabelian geometry. In this talk, I will explain the results obtained by Tamagawa and the author.

7 月 17 日 (金)

小関 祥康/Yoshiyasu Ozeki (京都大学/Kyoto University)

ガロア像がアーベルとなるあるアーベル多様体の非存在性について
(Non-existence of certain abelian varieties with abelian Galois images)

In this talk, we show that there exists an absolute, effectively computable constant C, depending only on a number field K and a positive integer g such that, for any prime number $\ell > C$, there does not exist a g-dimensional abelian variety A over K such that it has abelian Galois images and $K(A[\ell])/K(\mu_\ell)$ is an ℓ-extension. We apply this result to a finiteness conjecture on abelian varieties of Rasmussen and Tamagawa.

三原 朋樹/Tomoki Mihara (東京大学/University of Tokyo)

局所体上の局所凸空間の反射性について
(Reflexivity of locally convex spaces over local fields)

We give a new criterion of the refexivity of a locally convex space over a local field k, and construct an explicit pair (C, D) of a category C containing the categories of Banach k-vector spaces and compact Hausdorff flat linear topological O_k-modules and a contravariant automorphism D on C extending the Iwasawa-type duality equivalence between the categories of strictly Cartesian Banach k-vector spaces and compact Hausdorff flat linear topological O_k-modules.

Haoyu Hu (東京大学/University of Tokyo)

Ramification and nearby cycles for l-adic sheaves on relative curves

I will present a new approach for a formula of Deligne and Kato that computes the dimension of the nearby cycle complex of an ℓ-adic sheaf on a smooth relative curve over a strictly henselian trait such that p is not one of its uniformizer. Deligne considered the case where the sheaf has no vertical ramification and Kato extended the formula to the general case. My approach is based on ramification theory of Abbes and Saito. It computes the nearby cycle complex in terms of the refined Swan conductor. In fact, I compare Abbes-Saito's refined Swan conductor with Kato's Swan conductor with differential values, which is the key ingredient in Kato's formula; the case of rank one sheaves is due to Abbes and Saito. My approach provides also a new independent proof of Deligne-Kato's formula.

跡部 発/Hiraku Atobe (京都大学/Kyoto University)

The local Gan-Gross-Prasad conjecture for symplectic-metaplectic groups.

The local Gan-Gross-Prasad conjecture gives an answer for restriction problems of classical groups in terms of local root numbers via the local Langlands correspondence. This conjecture consists of four cases. Three of them are proven by Waldspurger, Moeglin-Waldspurger, Beuzart-Plessis, and Gan-Ichino. In this talk, we consider the symplectic-metaplectic case, which is the last case of the local conjecture.

高田 芽味/Megumi Takata (九州大学/Kyushu University)

混標数局所体の APF 拡大に付随する無限次ベースチェンジについて
(The infinite base change lifting associated to an APF extension of a mixed characteristic local field)

In the Langlands conjecture, the base change lifting is the counterpart on the automorphic side of the restriction functor on the Galois side. For a finite cyclic extension of a number field or a mixed characteristic local field, the lifting was constructed by Langlands for GL(2) and by Arthur-Clozel for GL(n). In this talk, we give such a lifting for a totally ramified $\mathbb{Z}_p$-extension of a mixed characteristic local field. By Kazhdan's theory of close fields, we can interpret this as an operation which maps an automorphic representation of GL(n) over a local field of mixed characteristic to that of positive characteristic.