

Low dimensional topology and number theory XVIII (Part I)

November 25 - 27, 2026; Osaka University (Toyonaka), Japan

Program

November 25 (Wednesday)

14:00~15:00:

Christopher-Lloyd Simon (Institut de recherche mathématique de Rennes)
TBA

15:20~ 16:20

Toshiki Matsusaka (Kyushu University)
Cycle integrals and modular knots

November 26 (Thursday)

10:00~11:00

Hisatoshi Kodani (Kyushu University)
TBA

11:20~12:20

Dimitrios Noulas (University of Athens)
The Heisenberg covering tower of $\mathbb{P}^1 \setminus \{0, 1, \infty\}$

14:00~15:00

Densuke Shiraishi (National Institute of Technology, Kagawa College)
Galois dilogarithms and relations among their special values at distinct Galois elements

15:20~16:20

Yi Wang (University of Illinois Urbana-Champaign)
Conway spheres, real characters, and left-orderable surgeries

November 27 (Friday)

10:00~11:00

Magnus Carlson (Göthe University Frankfurt)
TBA

11:20~12:20

Yuichiro Hoshi (RIMS, Kyoto University)
The arithmetic fundamental groups of curves over local fields

Abstract

November 25

Christopher-Lloyd Simon (Institut de recherche mathématique de Rennes)
TBA

Toshiki Matsusaka (Kyushu University)
Cycle integrals and modular knots

Ghys asked for an arithmetical or combinatorial computation of the linking numbers of two modular knots. As an extension of the arithmetic formula expressing linking numbers with trefoil in terms of the Rademacher symbol, Duke-Imamoglu-Toth gave in 2017 an approach based on the generating function of Kaneko's val function. Their construction, however, requires symmetrizing modular knots so that they become null-homologous, and they noted that its relation to the linking numbers of individual modular knots was not immediately clear.

In this talk, I will first review Kaneko's val function and its connection with modular knots. I will then refine the method of Duke-Imamoglu-Toth and compare the resulting cycle integral formula with Simon's formula for linking numbers. This gives a modular answer to Ghys' question for individual modular knots.

November 26

Hisatoshi Kodani (Kyushu University)
TBA

Dimitrios Noulas (University of Athens)
The Heisenberg covering tower of $\mathbb{P}^1 \setminus \{0, 1, \infty\}$

Before the introduction of higher cyclotomic units, Y. Ihara aimed to understand the kernel and the image of the pro- ℓ Galois representation associated to $\mathbb{P}^1 \setminus \{0, 1, \infty\}$ via filtrations arising from towers of curves, and most famously Fermat curves. This led him to a question in 1987 whether some specific cyclic covers of Fermat curves, known as Heisenberg curves, do not have Complex Multiplication Jacobian varieties. In this talk, we aim to present the motivation behind this question and recent progress. Finally, we will discuss how this sheds new light on a question by F. Oort: "Do curves with many automorphisms have CM Jacobians?".

Densuke Shiraishi (National Institute of Technology, Kagawa College)
Galois dilogarithms and relations among their special values at distinct Galois elements

Let K be a number field, and let $X = \mathbb{P}^1 \setminus \{0, 1, \infty\}$. The simplest non-trivial part of the Galois action on the étale fundamental groupoid of $X_{\overline{K}}$ with K -rational base points is described by the Galois polylogarithms, which are étale analogues of the classical polylogarithms. The classical polylogarithm depends on a point $z \in X(\mathbb{C})$ together with a path on $X(\mathbb{C})$ from the tangential base point $\overrightarrow{01}$ to z ; the Galois polylogarithm likewise depends on a K -rational point z and an étale path on $X_{\overline{K}}$ from $\overrightarrow{01}$ to z , and, in addition, it is a function on the absolute Galois group G_K of K . Previous works have established, for the Galois polylogarithms, various functional equations that mirror those of the classical polylogarithms; in all of them, the point and the path vary while the element of G_K is kept fixed. In this talk, we let not only the K -rational point and the étale path but also the element of G_K vary, and discuss the resulting relations among special values of Galois dilogarithms by exploring their connection with triple symbols.

Yi Wang (University of Illinois Urbana-Champaign)
 Conway spheres, real characters, and left-orderable surgeries

Culler-Shalen theory associates essential surfaces to ideal points of character varieties. I will describe an approach that starts with the surface and uses representations of the complementary pieces to construct families of $\mathrm{SL}_2(\mathbb{R})$ -representations approaching an ideal point. With suitable control of their peripheral behavior, these families yield intervals of surgeries with left-orderable fundamental group. The main focus will be essential Conway spheres, which split a knot complement into two tangle exteriors. The L -space conjecture predicts that every nontrivial surgery on a knot containing such a sphere has left-orderable fundamental group. A central difficulty is that representations of the tangle groups can have matching boundary characters without actually gluing. I will explain how a real deformation-and-gluing construction overcomes this obstruction, producing ideal points that detect the Conway sphere, and how peripheral translation numbers determine whether the resulting real arcs give orderability. As an application, I will present three infinite families of knots for which every rational surgery outside a bounded interval has left-orderable fundamental group, verifying a prediction of the L -space conjecture for these surgeries.

November 27

Magnus Carlson (Göthe University Frankfurt)
 TBA

Yuichiro Hoshi (RIMS, Kyoto University)
 The arithmetic fundamental groups of curves over local fields

In a paper published in 1999, Shinichi Mochizuki proved that an arbitrary continuous isomorphism over the absolute Galois group of the basefield between the étale fundamental groups of hyperbolic curves over a sub- p -adic field arises from a unique isomorphism between the given hyperbolic curves over the basefield. Recall that the main ingredients of his proof are various results in p -adic Hodge theory. The purpose of this talk is to give an outline of a recent alternative proof of the above anabelian result that does not appeal to the comparison theorems of p -adic Hodge theory for the étale cohomology of curves. In this alternative proof, one makes use of a result on the logarithmic infinitesimal Torelli problem for generalized Prym varieties, a classical extension result for homomorphisms between p -divisible groups, a classical result in the deformation theory of ordinary semi-abelian varieties, and a classical result in the degeneration theory of polarized abelian varieties. This is joint work with Yu Yang.