

MINI SYMPOSIUM New development in Teichmüller space theory; MCM2017

November 28–30, 2017
OIST C210, Center Building

Organizers: Shinobu Hikami (OIST), Nariya Kawazumi (Univ. of Tokyo), Takuya Sakasai (Univ. of Tokyo)

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Schedule

Tuesday, November 28

10:00–10:30 Registration

10:30–11:30 Rinat Kashaev (Geneve Univ.)

Equivalence of two formulations of the Teichmüller TQFT for integer homology spheres

11:30–14:00 Lunch

14:00–15:00 Rei Inoue (Chiba Univ.)

Networks on a cylinder and discrete integrable systems

15:30–17:00 Discussion

18:30– Dinner

Wednesday, November 29

10:30–11:30 Anastasiia Tsvietkova (OIST)

Volume of links and the colored Jones polynomial

11:30–14:00 Lunch

14:00–15:00 Anton Alekseev (Geneve Univ.)

Formality of the Goldman-Turaev Lie bialgebras

15:30–16:30 Florian Naef (Geneve Univ.)

Goldman-Turaev formality in genus 0 from the KZ connection

17:00–18:00 Discussion

18:30– Dinner

Thursday, November 30

10:30–11:30 Takahiro Kitayama (Univ. of Tokyo)
Representation varieties and essential surfaces

11:30–14:00 Lunch

14:00–15:00 Atsuo Kuniba (Univ. of Tokyo)
Tetrahedron equation, 3D reflection equation and generalized quantum groups

15:30–17:00 Discussion

18:30– Dinner

(Last modified: November 21)

Abstract

Anton Alekseev

Formality of the Goldman-Turaev Lie bialgebras

The vector space spanned by homotopy classes of free loops on an oriented 2-manifold carries a structure of a Lie bialgebra. The Lie bracket was defined by Goldman as a tool to study the Atiyah-Bott symplectic form on moduli of flat connections, the cobracket is due to Turaev. The Goldman-Turaev (GT) Lie bialgebra admits a natural filtration, its associated graded was studied by Schedler.

In the talk, we will state the formality theorem (isomorphism to the associated graded) for GT Lie bialgebras and explain its relation to the Kashiwara-Vergne problem in Lie theory. The talk is based on joint works with N. Kawazumi, Y. Kuno and F. Naef.

Rei Inoue

Networks on a cylinder and discrete integrable systems

I introduce a combinatorial model of network on an orientable surface developed by Lam and Pylyavskyy, and show its applications to integrable rational maps and soliton cellular automata. A key is that the networks on a cylinder diagrammatically describe the affine symmetric group and some geometric R-matrices. This talk is based on joint works with Max Glick, Thomas Lam and Pavlo Pylyavskyy.

Rinat Kashaev

Equivalence of two formulations of the Teichmüller TQFT for integer homology spheres

After describing two formulations of the Teichmüller TQFT, I will explain their equivalence in the case of integer homology spheres. This is a joint work with Joergen Andersen.

Takahiro Kitayama

Representation varieties and essential surfaces

In an extension of the Culler-Shalen construction every essential surface in a 3-manifold is given by an ideal point of its SL_n -character variety for some n . We will discuss how the homology classes of such a given essential surface and its boundary are restricted by regularity of special functions on character varieties at an ideal point.

Atsuo Kuniba

Tetrahedron equation, 3D reflection equation and generalized quantum groups

I shall survey the interrelation among the Isaev-Kulish 3D reflection equation, the Soibelman representations of quantized algebra of functions, connection coefficients of the PBW bases of the nilpotent subalgebra of quantum groups, 2D reductions of the tetrahedron equation and the relevant generalized quantum groups. If time allows, recent applications to the matrix product stationary states of the multispecies asymmetric simple exclusion and zero range process will also be explained.

Florian Naef

Goldman-Turaev formality in genus 0 from the KZ connection

This talk is about the same topic as the one of Anton Alekseev. We show that in the restricted case of a genus 0 surface and over the field of complex numbers there is a more direct proof of the formality of the Goldman-Turaev Lie bialgebra. More precisely, it is given by the monodromy of the Knizhnik-Zamolodchikov connection, and all the computations can be carried out explicitly. This is joint work with Anton Alekseev.

Anastasiia Tsvietkova

Volume of links and the colored Jones polynomial

Since quantum invariants were introduced into knot theory, there has been a strong interest in relating them to the intrinsic geometry of the corresponding 3-manifolds: link complements. This is for example reflected in the Volume Conjecture, which claims that the hyperbolic volume of a link complement in 3-sphere is determined by the colored Jones polynomial. In the work of M. Lackenby, and of I. Agol and D. Thurston, an upper bound for volume of a hyperbolic link complement that depends only on combinatorics of a link diagram is obtained. We will discuss how to refine this bound, and how to generalize it from hyperbolic to simplicial volume. We will also show how to express the refined bound in terms of the three first and three last coefficients of the colored Jones polynomial for alternating links. This is joint work with O. Dasbach.