Topology Project

Topology and Geometry of Low-dimensional Manifolds

January 28 (Fri) - January 30 (Sun), 2022

Online, Zoom

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Schedule

JST (CET)	28 (Fri)	29 (Sat)	30 (Sun)
17:00-17:50 (9:00-9:50)	Konno	Wada	Sato
18:10-19:00 (10:10-11:00)	Kydonakis	Ben Aribi	Suzuki

Abstract

Fathi Ben Aribi (Université Catholique de Louvain)

Title. The Teichmüller TQFT volume conjecture for twist knots

Abstract. In 2011, Andersen and Kashaev defined an infinite-dimensional TQFT from quantum Teichmüller theory. This Teichmüller TQFT yields an invariant of triangulated 3-manifolds, in particular knot complements. The associated volume conjecture states that the Teichmüller TQFT of an hyperbolic knot complement contains the hyperbolic volume of the knot as a certain asymptotical coefficient, and Andersen-Kashaev proved this conjecture for the first two hyperbolic knots. In this talk, after a brief history of quantum knot invariants and volume conjectures, I will present the construction of the Teichmüller TQFT and how we proved its volume conjecture for the infinite family of twist knots, by constructing new geometric triangulations of the knot complements. No prerequisites in quantum topology or hyperbolic geometry are needed. (joint project with E. Piguet-Nakazawa and F. Guéritaud)

Hokuto Konno (University of Tokyo)

Title. Floer K-theory for knots

Abstract. This talk is based on joint work with Jin Miyazawa and Masaki Taniguchi where we established a version of Seiberg-Witten Floer K-theory for knots. This framework is used to prove a version of "10/8-inequality for knots", which effectively extracts difference between topological and smooth categories in knot theory. I will explain concrete applications, as well as how we construct this framework.

Georgios Kydonakis (Universität Heidelberg)

Title. Hyperbolic Dehn filling and gluing techniques in character varieties

Abstract. Hyperbolic Dehn surgery and the bending procedure provide two ways which can be used to describe hyperbolic deformations of a complete hyperbolic structure on a 3-manifold. In this talk, we will briefly review ideas on these constructions and describe a logical adaptation of those to the case of character varieties $\mathrm{Hom}(\pi_1(\Sigma), G)$, where Σ is a closed connected and oriented topological surface of genus $g \geq 2$ and G is a semisimple Lie group. This way one can obtain models in $\mathrm{Hom}(\pi_1(\Sigma), G)$ and use them to study open subsets (or connected components) of objects with essential geometric properties.

Masatoshi Sato (Tokyo Denki University)

Title. A non-commutative Reidemeister-Turaev torsion of homology cylinders

Abstract. We construct a non-commutative Reidemeister-Turaev torsion of homology cylinders which takes values in the K_1-group of the completed rational group ring of the fundamental group of a surface.

We show that it induces a finite type invariant of homology cylinders, and describe the induced map on the graded quotient of the Y-filtration of homology cylinders via the 1-loop part of the LMO functor and the Enomoto-Satoh trace. This talk is based on joint work with Yuta Nozaki and Masaaki Suzuki.

Masaaki Suzuki (Meiji University)

Title. Epimorphisms between knot groups and twisted Alexander polynomial

Abstract. The knot group is a fundamental knot invariant. However, it is not easy to distinguish two groups in general. Then it is worth considering a relation between two knot groups. In this talk, we discuss the existence of an epimorphism between knot groups as such a relation. First, we will survey several results on this topic. Then we see several results on two bridge knot groups.

Kodai Wada (Kobe University)

Title. Multiplexed virtual links

Abstract. For a virtual knot K and an integer r greater than or equal to 2, we give a construction of the r-component virtual link $L(K; r)$, which we call the r-multiplexing of the virtual knot K. Every invariant of the r-multiplexed virtual link $L(K; r)$ is an invariant of the original virtual knot K. We provide a way of understanding and calculating some invariants of $L(K; r)$, in terms of invariants of K. We also discuss a relationship between virtual n-colorings for K and classical n-colorings for $L(K; 2)$.