Topology and Geometry of Low-dimensional Manifolds

Schedule

	27 (Tue)	28 (Wed)	29 (Thu)	30 (Fri)
10:00-11:00		Florens II	Kabaya	Kitayama II
11:30-12:30		Naoe	Morita	Sakuma
13:00-14:00	Tsuji		(Lunch)	
14:30-15:30	Nozaki		Teragaito	
16:00-17:00	Florens I		Kitayama I	

Abstract

Vincent Florens (Université de Pau)

Title. Signatures of colored links

Abstract. The signatures of a colored links are multivariable extensions of the Levine-Tristram signatures. In the first talk, I will construct these concordance invariants in terms of generalized Seifert surfaces and present their 4-dimensional interpretation with intersection forms. Their properties are closely related to the Alexander polynomial of the link, and they provide estimation of the (colored) slice genus. In the second talk, I will study the behavior the signatures under the splice operation, and show how they are almost additive, with a correction term independent of the links.

Yuichi Kabaya (Kyoto University)

Title. Exotic components in linear slices of quasi-Fuchsian groups

Abstract. The linear slice of quasi-Fuchsian punctured torus groups is defined by fixing the length of some simple closed curve to be a fixed positive real number. It is known that the linear slice is a union of disks, and it has one 'standard' component containing Fuchsian groups. Komori-Yamashita proved that there exist non-standard components if the length is sufficiently large. In this talk, I will show that other components correspond to exotic complex projective structures with quasi-Fuchsian holonomy, which were classified by Goldman. I will also talk about how Goldman's classification looks like in the slice.

Takahiro Kitayama (Tokyo Institute of Technology)

Title. Representation varieties detect essential surfaces I, II

Abstract. Extending Culler-Shalen theory, Hara and I presented a way to construct certain kinds of branched surfaces (possibly without any branch) in a 3-manifold from an ideal point of a curve in the SL_n-character variety. There exists an essential surface in some 3-manifold known to be not detected in the classical SL_2-theory. We show that every essential surface in a 3-manifold is given by the ideal point of a line in the SL_n-character variety for some n. In the first talk we describe the background of this research, and review an analogous extension of Culler-Shalen theory for higher dimensional representaions. In the second talk we explain the proof of the main theorem, and discuss problems to study further. The talks are partially based on joint works with Stefan Friedl and Matthias Nagel, and also with Takashi Hara.

Shigeyuki Morita (The University of Tokyo)

Title. Cohomology of automorphism groups of free groups

Abstract. We first survey known results about the cohomology of the automorphism groups of free groups. Then we discuss various deep connections between this cohomology group and low dimensional topology as well as number theory. Finally we present some prospect and conjectures from our joint work with Takuya Sakasai and Masaaki Suzuki.

Hironobu Naoe (Tohoku University)

Title. Infinitely many corks with shadow complexity one

Abstract. A cork is a compact Stein surface which gives rise to exotic pairs of 4-manifolds. We find infinitely many corks with shadow complexity one among the 4-manifolds constructed from contractible special polyhedra having one true vertex by using the notinon of Turaev's shadow. We also show that there are just two types of polyhedra which are shadows of corks with shadow complexity one.

Yuta Nozaki (The University of Tokyo)

Title. An extension of the LMO functor and Milnor invariants

Abstract. Cheptea, Habiro and Massuyeau introduced the LMO functor as an extension of the LMO invariant of closed 3-manifolds. The LMO functor is 'the monoidal category of Lagrangian cobordisms between surfaces with at most one boundary component' to 'the monoidal category of certain Jacobi diagrams'. In this talk, we extend the LMO functor to the case of any number of boundary components. In particular, we focus on a relation with Milnor invariants of string links.

Makoto Sakuma (Hiroshima University)

Title. Parabolic generating pair of genus-one 2-bridge knot groups

Abstract. At a conference in Budapestin in 2002, Ian Agol announced (i) classification of non-free Kleinian groups generated by two parabolic transformations and (ii) classification of parabolic generating pairs of each of such groups. In this talk, I will give an alternative proof to the announcement (ii) for genus-one hyperbolic 2-bridge knots, by using small cancellation theory and a geometric observation suggested by Michel Boileau. As an application, we obtain a complete classification of the epimorphisms from 2-bridge knot groups to genus-one hyperbolic 2-bridge knot groups. I would also like to explain Agol's original argument by using checkerboard surfaces and Klein-Maskit combination theorem. This is a joint work with Donghi Lee.

Masakazu Teragaito (Hiroshima University)

Title. Generalized torsion elements in the knot groups of twist knots

Abstract. It is well known that any knot group is torsion-free, but it may admit a generalized torsion element. We show that the knot group of any negative twist knot admits a generalized torsion element. This is a generalization of the same claim for the knot 5_2, which is the (-2)-twist knot, by Naylor and Rolfsen.

Shunsuke Tsuji (The University of Tokyo)

Title. Skein algebras and mapping class groups on oriented surfaces

Abstract. We define some filtrations of skein modules and the skein algebra on an oriented surface, and define the completed skein modules and the completed skein algebra of the surface with respect to these filtration. We give an explicit formula for the action of the Dehn twists on the completed skein modules in terms of the action of the completed skein algebra of the surface. As an application, we describe the action of the Torelli group on the completed skein modules.