研究集会　Intelligence of Low-dimensional Topology

京都大学数理解析研究所 RIMS 研究集会として、また、大阪市立大学数学研究所から後援をうけて、トポロジープロジェクトの一環として、標記の研究集会を開催いたします。また、この研究集会は科学研究費補助金 基盤研究 B 「グラフィクスとカンドル理論の観点からの４次元トポロジーの研究」（課題番号 26287013、研究代表者 鎌田聖一氏（大阪市立大学））と科学研究費補助金 基盤研究 B 「結び目と３次元多様体のトポロジー」（課題番号 24340012、研究代表者 大槻知忠（京都大学））の援助をうけています。

日程：２０１５年 5月２０日 (水)〜 ２２日 (金)
場所：京都大学 数理解析研究所 420 大講演室
アクセス：http://www.kurims.kyoto-u.ac.jp/ja/access-01.html

5月２０日 (水)

13:20〜14:10　市原 一裕 (日本大学文理学部)
On partitions of components for closed random braids

14:30〜15:20　田神 慶士 (東京工業大学大学院情報理工学研究科)
Fibered knots with the same 0-surgery and the slice-ribbon conjecture

15:40〜16:30　川室 圭子 (University of Iowa)
Removing local extrema of surfaces in open book decompositions

5月２１日 (木)

10:00〜10:50　古宇田 悠哉 (広島大学大学院理学研究科)
The Goeritz groups of Heegaard splittings for 3-manifolds

11:10〜12:00　吉田 建一 (東京大学大学院数理科学研究科)
Stable presentation length of 3-manifold groups

13:20〜14:10　Sergei Matveev (Chelyabinsk State University and Russian Academy of Sciences)
Prime decompositions of geometric objects

14:30〜15:20　Patrick Dehornoy (University of Caen)
Braid order: History and connection with knots

15:40〜　Problem Session

5月22日 (金)

10:00〜10:50　高田 敏恵 (九州大学大学院数理学研究院)
On the Kashaev invariant and the twisted Reidemeister torsion of two-bridge knots

11:10〜12:00　伊藤 哲也 (京都大学数理解析研究所)
Ordering of groups as a tool to understand random 3-manifolds and knots

13:20〜14:10　伊藤 昇 (早稲田大学高等研究所)
Strong and weak (1, 3) homotopies on spherical curves and related topics (joint work with Y. Takimura and K. Taniyama)

14:30〜15:20　中西 康剛 (神戸大学大学院理学研究科)
A survey: From a surgical view of Alexander invariants

組織委員： 河内明夫、河野俊丈、金信泰造、鎌田聖一、大槻知忠
世話人：　大槻知忠 (京大数理研)、北山貴裕 (東工大)

Intelligence of Low-dimensional Topology

May 20–22, 2015
Room 420, RIMS, Kyoto University
Access: http://www.kurims.kyoto-u.ac.jp/en/access-01.html

Program

May 20 (Wed)

13:20–14:10 Kazuhiro Ichihara (College of Humanities and Sciences, Nihon University)
On partitions of components for closed random braids

14:30–15:20 Keiji Tagami (Tokyo Institute of Technology)
Fibered knots with the same 0-surgery and the slice-ribbon conjecture

15:40–16:30 Keiko Kawamuro (University of Iowa)
Removing local extrema of surfaces in open book decompositions

May 21 (Thu)

10:00–10:50 Yuya Koda (Department of Mathematics, Hiroshima University)
The Goeritz groups of Heegaard splittings for 3-manifolds

11:10–12:00 Ken'ichi Yoshida (Graduate School of Mathematical Science, University of Tokyo)
Stable presentation length of 3-manifold groups

13:20–14:10 Sergei Matveev (Chelyabinsk State University and Russian Academy of Sciences)
Prime decompositions of geometric objects

14:30–15:20 Patrick Dehornoy (University of Caen)
Braid order: History and connection with knots

15:40– Problem Session

May 22 (Fri)

10:00–10:50 Toshie Takata (Kyushu University)
On the Kashaev invariant and the twisted Reidemeister torsion of two-bridge knots

11:10–12:00 Tetsuya Ito (RIMS, Kyoto University)
Ordering of groups as a tool to understand random 3-manifolds and knots

13:20–14:10 Noboru Ito (Waseda Institute for Advanced Study)
Strong and weak (1, 3) homotopies on spherical curves and related topics (joint work with Y. Takimura and K. Taniyama)

14:30–15:20 Yasutaka Nakanishi (Graduate School of Science, Kobe University)
A survey: From a surgical view of Alexander invariants

Intelligence of Low-dimensional Topology

May 20–22, 2015

RIMS, Kyoto University

Abstract

Patrick Dehornoy (University of Caen)

Braid order: History and connection with knots

We shall review some of the many aspects of the standard braid order, including its origins connected with some bizarre questions of set theory. A special emphasis will be put on the few known connections with knot theory, and on recent seemingly promising developments in this direction.

Kazuhiro Ichihara (College of Humanities and Sciences, Nihon University)

On partitions of components for closed random braids

I will talk about closed random braids introduced by Jiming Ma. In his work, the expected value of the number of components for a closed random braid is computed. In this talk, in more detail, we determine the most expected partition of components for a closed random braid.

Noboru Ito (Waseda Institute for Advanced Study)

Strong and weak (1, 3) homotopies on spherical curves and related topics (joint work with Y. Takimura and K. Taniyama)

A spherical curve is the image of a generic immersion of a circle into the 2-sphere. It is well-known that any two spherical curves are transformed into each other by a finite sequence of the first, second and third Reidemeister moves. Hagge and Yazinski showed an example of a spherical curve that is not transformed into a simple closed curve by a finite sequence of the first and third Reidemeister moves. We call the equivalence relation generated by the first and third Reidemeister moves (1, 3) homotopy. Their argument is geometric and no numerical invariant of (1, 3) homotopy is known. Toward the study of (1, 3) homotopy, we introduce strong (1, 3) homotopy and weak (1, 3) homotopy and study them. There are two types of the third Reidemeister move with respect to the string connection and one is said to be strong and the other is said to be weak. The strong (resp. weak) (1, 3) homotopy is the equivalence relation generated by the first Reidemeister move and strong (resp. weak) third Reidemeister move. We determine the strong (resp. weak) (1, 3) homotopy class containing the simple closed curve. We also introduce further results.

Tetsuya Ito (RIMS, Kyoto University)
Ordering of groups as a tool to understand random 3-manifolds and knots

It is well-known that one can use the braid group or the mapping class group to represent knots or 3-manifolds hence by taking a "random" element of such groups we are able to get a "random" knots or 3-manifolds. In this talk, based on the joint works with Keiko Kawamuro we explain how an ordering of mapping class group or braid group can be used to understand the properties of random knots and 3-manifolds.

Keiko Kawamuro (University of Iowa)
Removing local extrema of surfaces in open book decompositions

Thurston states that an incompressible surface in general position relative to a taut foliation can be isotopic to a surface which is either a leaf of the foliation, or has only saddle singularities. In this talk I will discuss a parallel result with respect to open book decompositions. I will also give applications of our theorem to low-dimensional topology and contact topology. This is joint work with Tetsuya Ito.

Yuya Koda (Department of Mathematics, Hiroshima University)
The Goeritz groups of Heegaard splittings for 3-manifolds

The Goeritz group of a Heegaard splitting for a closed orientable 3-manifold is defined to be the subgroup of the mapping class group of the Heegaard surface consisting of mapping classes that extend to both handlebodies. It is natural to study the structures of these groups, and so finding their generating sets or presentations has been an interesting problem. However, generating sets or presentations of them have been obtained only for few manifolds with their splittings of small genus. In this talk, we give a short historical overview of this problem and introduce its recent progress together with some applications. This is joint work with Sangbum Cho.

Sergei Matveev (Chelyabinsk State University and Russian Academy of Sciences)
Prime decompositions of geometric objects

We describe a general method for proving or disproving several statements on prime decompositions of topological objects. For example, we prove the existence and uniqueness of prime decomposition for knots in thickened surfaces and for virtual knots but also construct counterexamples to the prime decomposition theorem for 3-orbifolds (which long time had been circulated as a "folklor" theorem.

Yasutaka Nakanishi (Graduate School of Science, Kobe University)
A survey: From a surgical view of Alexander invariants

The Alexander polynomial is an effective knot invariant untill now. Levine and Rolfsen introdoced a surgical view of Alexander invariants. In this talk, the speaker will talk on the surgical view and its applications: unknotting number and knot adjacency.

Keiji Tagami (Tokyo Institute of Technology)
Fibered knots with the same 0-surgery and the slice-ribbon conjecture

In 1962, Fox conjectured that any slice knot in the 3-sphere bounds a ribbon disk in the standard 4-ball. Now, this conjecture is called the slice-ribbon conjecture. There are many studies on the slice-ribbon conjecture. However, until recently, few direct consequences of the slice-ribbon conjecture were known.

In 2014, Baker conjectured that two fiber knots supporting the tight contact structure on the 3-sphere is the same knot if and only if they are concordant. Moreover, he proved that if the slice-ribbon conjecture is true his conjecture is also true.

In this talk, I give another consequence of the slice-ribbon conjecture. In particular, I prove that if the slice-ribbon conjecture is true then Akbulut- Kirby's conjecture is false. Here, Akbulut-Kirby's conjecture asks whether two knots with the same 0-surgery are concordant.

This is a joint work with Tetsuya Abe (Osaka City University, OCAMI).

Toshie Takata (Kyushu University)
On the Kashaev invariant and the twisted Reidemeister torsion of two-bridge knots

We define an invariant of a parametrized knot diagram to be a modification of the Hessian of the potential function obtained from the parametrized knot diagram. Further, we show that this invariant is equal (up to sign) to a constant multiple of the twisted Reidemeister torsion for any two-bridge knot.

Ken'ichi Yoshida (Graduate School of Mathematical Science, University of Tokyo)
Stable presentation length of 3-manifold groups

We will introduce the stable presentation length of a finitely presentable group, which is defined by stabilizing the presentation length for the finite index subgroups. The stable presentation length of the fundamental group of a 3-manifold is an analogue of the simplicial volume and the stable complexity introduced by Francaviglia, Frigerio and Martelli. We will explain some similarities of the stable presentation length with the simplicial volume and the stable complexity.