The 12th East Asian School of Knots and Related Topics
February 13–16, 2017

Graduate School of Mathematical Sciences
The University of Tokyo

3-8-1 Komaba, Meguro-ku, Tokyo 153-8914, Japan

Program Committee :
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Kimihiko Motegi, Takuya Sakasai, Yuichi Yamada

Talk Schedule

Time	13 February MONDAY		
	Lecture Hall		
9:00–9:10	Opening Remarks		
9:10–10:10	Sangyop Lee		
10:30–11:30	Tamas Kalman		
11:30–13:00	Lunch		
	Room 1	Room 2	Room 3
13:00–13:25	Taizo Kanenobu	Ximin Liu	Ying Zhang
13:30–13:55	Sang Youl Lee	Yuuki Tadokoro	Yasuhiko Asao
14:05–14:30	Zhiqing Yang	Naoki Sakata	Youngjin Bae
14:35–15:00	Naoko Kamada	Hyunshik Shin	Youlin Li
15:00–15:30	Tea Time		
15:30–15:55	Inasa Nakamura	Yi Liu	Byunghee An
16:00–16:25	Mizuki Fukuda	Yuta Nozaki	Hironobu Naoe
16:35–17:00	María de los Angeles Guevara Hernández	Delphine Moussard	Hyoungjun Kim
17:05–17:30	Shin'ya Okazaki	Fumikazu Nagasato	Noboru Ito
17:35–18:00		Shinnosuke Suzuki	Yusuke Takimura

Time	14 February TUESDAY		
	Lecture Hall		
9:10–10:10	Shin Satoh		
10:30–11:30	Yi Ni		
11:30–13:00	Lunch		
	Room 1	Room 2	Room 3
13:00–13:25	Jae Choon Cha	Jun O'Hara	Xiaoming Du
13:30–13:55	Shengkui Ye	Se-Goo Kim	Genki Omori
14:05–14:30	Masaaki Suzuki	Byeorhi Kim	Yongju Bae (canceled)
14:35–15:00	Erii Ogawa	Katsumi Ishikawa	Eri Matsudo
15:00–15:30	Tea Time		
15:30–15:55	Taehee Kim	Zhi Chen	Erika Kuno
16:00–16:25	Gihyeon Lee	Eon-Kyung Lee	Megumi Hashizume
16:35–17:00	Bin Yu	Zhiyun Cheng	Tsukasa Yashiro
17:05–17:30	Hiroyuki Ishiguro	Migiwa Sakurai	Amal Al Kharusi
18:00–20:00	Banquet		

Time	15 February WEDNESDAY		
	Lecture Hall		
9:10–10:10	Min Hoon Kim		
10:30–11:30	Eiko Kin		
11:30–13:00	Lunch		
	Room 1	Room 2	Room 3
13:00–13:25	Sangbum Cho	Yanqing Zou	Youngjin Cho
13:30–13:55	Teruaki Kitano	Sangrok O	Ye Liu
14:05–14:30	Yuanyuan Bao	Takuya Katayama	Takefumi Nosaka
14:35–15:00	Kyungbae Park	Qiang Zhang	Seonmi Choi
15:00–15:30	Tea Time		
15:30–15:55	Atsushi Mochizuki	Teruhisa Kadokami	Hongzhu Gao
16:00–16:25	Fengling Li	Jieon Kim	Kodai Wada
16:35–17:00	Sheng Bai	Celeste Damiani	Bo-hyun Kwon
17:05–17:30	Eri Kamikawa, et al	Jun Yoshida	Kazuto Takao

Time	16 February THURSDAY
	Lecture Hall
9:10–10:10	Hiroshi Goda
10:30–11:30	Yin Tian
11:30–11:40	Closing Remarks
11:40–13:00	Lunch
13:00–19:00	Excursion
19:00–	Dinner

Room 1 = Lecture Hall,   Room 2 = Room 056,   Room 3 = Room 002

Talk Titles

13 February MONDAY

LECTURE HALL

09:00–09:10 Opening remarks: Toshitake Kohno

09:10–10:10 **Sangyop Lee** (Chung-Ang University)

Knot types of twisted torus knots

10:30–11:30 **Tamas Kalman** (Tokyo Institute of Technology)

The Homfly polynomial and Floer homology

ROOM 1

13:00–13:25 **Taizo Kanenobu** (Osaka City University)

Classification of ribbon 2-knots presented by virtual arcs with up to four crossings

13:30–13:55 **Sang Youl Lee** (Pusan National University)

On invariants for surface-links satisfying skein relations

14:05–14:30 **Zhiqing Yang** (Dalian University of Technology)

Enhanced brackets

14:35–15:00 **Naoko Kamada** (Nagoya City University)

Virtual doodles and semiquandles

15:30–15:55 **Inasa Nakamura** (University of Tokyo)

Simplifying covering surface-knots by an addition of 1-handles with chart loops

16:00–16:25 **Mizuki Fukuda** (Tohoku University)

On classification of branched twist spins via their knot groups

16:35–17:00 **María de los Angeles Guevara Hernández** (Instituto Potosino de Investigación Científica y Tecnológica, and Osaka City University)

Infinite families of prime knots with alternation number 1 and dealternating number n

17:05–17:30 **Shin'ya Okazaki** (OCAMI)

Constituent knots of a handlebody-knot

ROOM 2

13:00–13:25 **Ximin Liu** (Dalian University of Technology)

Homologically trivial group actions on elliptic surfaces

13:30–13:55 **Yuuki Tadokoro** (Kisarazu National College of Technology)

Pointed harmonic volume and its relation to extended Johnson homomorphism

14:05–14:30 **Naoki Sakata** (Hiroshima University)

  Veering triangulations of mapping tori of some pseudo-Anosov maps arising from Penner's construction

14:35–15:00 **Hyunshik Shin** (KAIST)

  Small asymptotic translation lengths of pseudo-Anosov maps on the curve complex

15:30–15:55 **Yi Liu** (BICMR/Peking University)

  Virtual 1-domination onto 3-manifolds

16:00–16:25 **Yuta Nozaki** (University of Tokyo)

  Any lens space contains a genus one homologically fibered knot

16:35–17:00 **Delphine Moussard** (RIMS, Kyoto University)

  Finite braid group orbits in $\text{Aff}(C)$-character varieties of the punctured sphere

17:05–17:30 **Fumikazu Nagasato** (Meijo University)

  Ghost characters, character varieties and abelian knot contact homology

17:35–18:00 **Shinnosuke Suzuki** (Meijo University)

  On a special $SL(2, C)$-representation of $\pi_1(\Sigma_2 K)$ (joint work with Fumikazu Nagasato)

ROOM 3

13:00–13:25 **Ying Zhang** (Soochow University)

  On Atiyah's independence conjecture for four points in a hyperbolic plane

13:30–13:55 **Yasuhiko Asao** (University of Tokyo)

  Loop homology of some global quotient orbifolds

14:05–14:30 **Youngjin Bae** (IBS-CGP)

  Chekanov-Eliashberg algebra for Legendrian graph

14:35–15:00 **Youlin Li** (Shanghai Jiao Tong University)

  Fillings of unit cotangent bundles of nonorientable surfaces

15:30–15:55 **Byunghee An** (IBS-CGP)

  Grid diagrams for singular knots

16:00–16:25 **Hironobu Naoe** (Tohoku University)

  The acyclic 4-manifolds with shadow complexity zero

16:35–17:00 **Hyoungjun Kim** (Ewha Womans University)

  Best packing of identical helices

17:05–17:30 **Noboru Ito** (University of Tokyo)

  Strong and weak $(1, 3)$ homotopies on knot projections

17:35–18:00 **Yusuke Takimura** (Gakushuin Boys' Junior High School)
　　　Strong and weak $(1, 2, 3)$ homotopies on knot projections

14 February TUESDAY

LECTURE HALL
09:10–10:10 **Shin Satoh** (Kobe University)
　　　On the double of a surface-link
10:30–11:30 **Yi Ni** (California Institute of Technology)
　　　The realization problem of spherical 3-manifolds

ROOM 1
13:00–13:25 **Jae Choon Cha** (POSTECH)
　　　L^2-acyclic bordism and Whitney towers
13:30–13:55 **Shengkui Ye** (Xi'an Jiaotong-Liverpool University)
　　　The L^2-Betti numbers and acylindrically hyperbolicity of matrix groups
14:05–14:30 **Masaaki Suzuki** (Meiji University)
　　　Epimorphisms between two-bridge knot groups and their crossing numbers
14:35–15:00 **Erii Ogawa** (University of Tokyo)
　　　A representation of the category of braided graphs and its applications

15:30–15:55 **Taehee Kim** (Konkuk University)
　　　Unknotted gropes and Whitney towers in 4-space and double sliceness of knots
16:00–16:25 **Gihyeon Lee** (POSTECH)
　　　Controlled chain homotopy and complexity
16:35–17:00 **Bin Yu** (Tongji University)
　　　Smale solenoid attractors and affine Hirsch foliations
17:05–17:30 **Hiroyuki Ishiguro** (University of Tokyo)
　　　Non-contractible orbits for Hamiltonian functions on Riemann surfaces

ROOM 2
13:00–13:25 **Jun O'Hara** (Chiba University)
　　　From energy of knots to regularized Riesz energy of submanifolds
13:30–13:55 **Se-Goo Kim** (Kyung Hee University)
　　　Secondary Upsilon invariants of knots

14:05–14:30 **Byeorhi Kim** (Kyungpook National University)

On the decomposition of finite quandles and inner automorphism groups

14:35–15:00 **Katsumi Ishikawa** (RIMS, Kyoto University)

The automorphism group of a smooth quandle

15:30–15:55 **Zhi Chen** (Hefei University of Technology)

Generalized Lawrence-Krammer representations (LK representations) for Artin groups

16:00–16:25 **Eon-Kyung Lee** (Sejong University)

Conjugacy Problem for Periodic Braids

16:35–17:00 **Zhiyun Cheng** (Beijing Normal University)

Chord index and its ramifications

17:05–17:30 **Migiwa Sakurai** (National Institute of Technology, Ibaraki College)

On n-trivialities of classical and virtual knots for some unknotting operations

ROOM 3

13:00–13:25 **Xiaoming Du** (South China University of Technology)

The extended mapping class groups can be generated by two torsions

13:30–13:55 **Genki Omori** (Tokyo Institute of Technology)

A small normal generating set for the handlebody subgroup of the Torelli group

14:05–14:30 **Yongju Bae** (Kyungpook National University) (CANCELED)

On coloring cover of links

14:35–15:00 **Eri Matsudo** (Nihon University)

On the minimal coloring number of even parallels of links

15:30–15:55 **Erika Kuno** (Tokyo Institute of Technology)

Abelian subgroups of the mapping class groups for non-orientable surfaces

16:00–16:25 **Megumi Hashizume** (Nara Women's University)

Link version of Inoue-Shimizu's result on region crossing change

16:35–17:00 **Tsukasa Yashiro** (Sultan Qaboos University)

On covering diagrams and triple points

17:05–17:30 **Amal Al Kharusi** (Sultan Qaboos University)

A non-trivial surface-knot of genus one having a diagram with two triple points is pseudo-ribbon

18:00–20:00 **Banquet**

15 February WEDNESDAY

LECTURE HALL

09:10–10:10 **Min Hoon Kim** (KIAS)

On the bipolar filtration of topologically slice knots

10:30–11:30 **Eiko Kin** (Osaka University)

Braids, orderings and minimal volume cusped hyperbolic 3-manifolds

ROOM 1

13:00–13:25 **Sangbum Cho** (Hanyang University)

The mapping class groups of reducible Heegaard splittings of genus two

13:30–13:55 **Teruaki Kitano** (Soka University)

A polynomial invariant of a homology 3-sphere defined by Reidemeister torsion

14:05–14:30 **Yuanyuan Bao** (University of Tokyo)

The Alexander polynomial of a bipartite graph

14:35–15:00 **Kyungbae Park** (KIAS)

Irreducible 3-manifolds that are not obtained by 0-surgery along a knot

15:30–15:55 **Atsushi Mochizuki** (RIMS, Kyoto University)

On a quantum representation of the mapping class group through the LMO invariant in the case of genus one

16:00–16:25 **Fengling Li** (Dalian University of Technology)

Essential subsurfaces and self-amalgamations of 3-manifolds

16:35–17:00 **Sheng Bai** (Peking University)

Counterexamples to the quadrisecant approximation conjecture

17:05–17:30 **Eri Kamikawa** (FMS, Meiji University)

   Yuumu Rikiishi (FMS, Meiji University)

   Kazushi Ahara (FMS, Meiji University)

Towards an integrated knot diagram editor that allows us to manipulate Reidemeister moves

ROOM 2

13:00–13:25 **Yanqing Zou** (Dalian Minzu University)

The R^3 and metrics on the curve complex

13:30–13:55 **Sangrok O** (KAIST)

Quasi-isometric classification of planar graph 2-braid groups

14:05–14:30 **Takuya Katayama** (Hiroshima University)
    An obstruction to the existence of embeddings between right-angled Artin groups
14:35–15:00 **Qiang Zhang** (Xi'an Jiaotong University)
    Fixed subgroups in direct products of free and surface groups

15:30–15:55 **Teruhisa Kadokami** (Kanazawa University)
    Analytic function for an infinite family of graphs via Blaschke product (joint work with Akio Kawauchi (OCAMI))
16:00–16:25 **Jieon Kim** (Osaka City University)
    Marked graph diagrams of immersed surface-links
16:35–17:00 **Celeste Damiani** (Osaka City University)
    The many faces of Loop Braid Groups
17:05–17:30 **Jun Yoshida** (University of Tokyo)
    Relative settings in differential topology

ROOM 3

13:00–13:25 **Youngjin Cho** (KAIST)
    A structure of the automorphism groups on connected, large-type and triangle-free Artin groups
13:30–13:55 **Ye Liu** (Hokkaido University)
    Second mod 2 homology of Artin groups
14:05–14:30 **Takefumi Nosaka** (Kyushu University)
    Milnor invariants via unipotent Magnus embeddings
14:35–15:00 **Seonmi Choi** (Kyungpook National University)
    Rack homology groups of certain finite quandles via permutations

15:30–15:55 **Hongzhu Gao** (Beijing Normal University)
    Some polynomial invariants of virtual string links
16:00–16:25 **Kodai Wada** (Waseda University)
    Link invariants of Milnor type
16:35–17:00 **Bo-hyun Kwon** (Korea University)
    Rectangle condition and a family of alternating 3-bridge knots
17:05–17:30 **Kazuto Takao** (RIMS, Kyoto University)
    On bridge positions and bridge decompositions

16 February THURSDAY

LECTURE HALL

09:10–10:10 **Hiroshi Goda** (Tokyo University of Agriculture and Technology)
   Twisted Alexander invariants and Hyperbolic volume of knots

10:30–11:30 **Yin Tian** (Yau Mathematical Sciences Center, Tsinghua University)
   A categorification of super Hopf algebra $U_t sl(1|1)$ via contact topology

11:30–11:40 Closing remarks

13:00–19:00   **Excursion**
19:00–   **Dinner**

Abstracts

Plenary talks

Hiroshi Goda (Tokyo University of Agriculture and Technology)

Twisted Alexander invariants and Hyperbolic volume of knots

Abstract: A twisted Alexander polynomial was first described by X.S.Lin, where the polynomial is defined for knots in the 3-sphere. Wada generalized this work and showed how to define a twisted polynomial given only a presentation of a group and its representations. The twisted Alexander polynomials have been studied from various viewpoints since then. In this talk, we discuss a volume formula of a hyperbolic knot using the twisted Alexander polynomials.

Tamas Kalman (Tokyo Institute of Technology)

The Homfly polynomial and Floer homology

Abstract: I will report on a formula that expresses certain extremal coefficients in the Homfly polynomial of a homogeneous link from the Seifert graph G of the link. This happens in a combinatorially novel way, using the so-called interior polynomial $I(G)$. There is an intermediate step in the computation of $I(G)$ where we consider a particular set of vectors called 'hypertrees'. It turns out that hypertrees can be identified with spin-c structures that support a certain sutured Floer homology group. Hence in effect we are computing Homfly coefficients from Floer theory. If time permits, I will speculate on a possible generalization to the non-homogeneous case. I plan to mention joint results with A. Juhasz, H. Murakami, A. Postnikov, and J. Rasmussen.

Min Hoon Kim (KIAS)

On the bipolar filtration of topologically slice knots

Abstract: Let $\mathcal{T}$ be the smooth concordance group of topologically slice knots. Understanding the structure of $\mathcal{T}$ is of fundamental importance since $\mathcal{T}$ measures the subtle difference between topological and smooth category in dimension 4. Cochran, Harvey and Horn proposed a framework to study $\mathcal{T}$ systematically by introducing a geometrically defined filtration on $\mathcal{T}$ which is called the bipolar filtration. They interpreted many smooth concordance invariants in terms of the bipolar filtration. The non-triviality of this filtration has been a key problem, which was answered only for the zeroth and first level. In this talk, we prove that the bipolar filtration on $\mathcal{T}$ is non-trivial at every level. The proof employs Cheeger-Gromov L^2 ρ-invariants and Heegaard Floer d-invariants. This is joint work with Jae Choon Cha.

Eiko Kin (Osaka University)

Braids, orderings and minimal volume cusped hyperbolic 3-manifolds

Abstract: It is well-known that there is a faithful representation of braid groups on automorphism groups of free groups, and it is also well-known that free groups are bi-orderable. We investigate which n-strand braids give rise to automorphisms which preserve some bi-ordering of the free group of rank n. As a consequence of our work we find that of the two minimal volume hyperbolic 2-cusped orientable 3-manifolds, one has bi-orderable fundamental group whereas the other does not. We prove a similar result for the 1-cusped case, and have further results for more cusps. In addition, we study pseudo-Anosov braids and find that typically those with minimal dilatation are not order-preserving. This is joint work with Dale Rolfsen (University of British Columbia).

Sangyop Lee (Chung-Ang University)

Knot types of twisted torus knots

Abstract: John Dean introduced twisted torus knots, which lie on a genus two Heegaard surface of the 3-sphere. We discuss the knot types of these knots.

Shin Satoh (Kobe University)

On the double of a surface-link

Abstract: We define the "double" of an oriented surface-link which is determined up to stable equivalence. We also study several properties of the double; in particular, we prove that any double has a ribbon representative, that the fundamental quandle of the double is isomorphic to that of the original surface-link, and that the 0- and 1-turned spinning of a link give the same double.

Yi Ni (California Institute of Technology)

The realization problem of spherical 3-manifolds

Abstract: Given a spherical 3-manifold, one can ask whether this manifold can be obtained by Dehn surgery on a knot in S^3. In recent years, a lot of progress has been made on this so-called realization problem using Heegaard Floer homology. As a result, the realization problem has been solved for C,T,O,I-type spherical manifolds, and for half cases of D-type spherical manifolds. I will talk about these results and the methods used in the proof.

Yin Tian (Yau Mathematical Sciences Center, Tsinghua University)

A categorification of super Hopf algebra $U_t sl(1|1)$ via contact topology

Abstract: Representation theory of quantum groups has profound applications to low-dimensional topology in the framework of Reshetikhin-Turaev invariants. The Alexander polynomial of knots can be recovered from the representation theory of super quantum group $U_q sl(1|1)$; moreover, the knot Floer homology gives rise to a categorification of the Alexander polynomial. In this talk, we will construct triangulated categories motivated by contact topology to categorify $U_t sl(1|1)$ as a variant of $U_q sl(1|1)$ and its tensor product representations.

Amal Al Kharusi (Sultan Qaboos University)

A non-trivial surface-knot of genus one having a diagram with two triple points is pseudo-ribbon

Abstract: It is well-known that if a non-trivial 2-knot F has a diagram with two triple points, then F is a ribbon 2-knot. In this talk, we show that there is no surface-knot of genus one with triple point number two by using diagrammatic methods. In particular, we use Roseman moves and the algebraic intersection number of simple closed curves in the double decker set. The method used is also valid for 2-knots and thus it gives another proof of 2-knot case. This is a joint work with Tsukasa Yashiro.

Byunghee An (IBS-CGP)

Grid diagrams for singular knots

Abstract: A grid diagram is a link diagram of vertical strands and the same number of horizontal strands with the properties that at every crossing the vertical strand crosses over the horizontal strand and no two horizontal segments are co-linear and no two vertical segments are co-linear. It is known that every knot admits a grid diagram, and moreover, so do the relatives such as Legendrian knots, transverse knots, closures of braids, as well. Indeed, Ng and D. Thurston in 2009 showed that all these knot theories can be obtained from the set of grid diagrams up to appropriate sets of moves, respectively.

In this talk, we consider the generalization of this result to singular knots. This is a joint work with Hwajeong Lee.

Yasuhiko Asao (University of Tokyo)

Loop homology of some global quotient orbifolds

Abstract: Let LX be the function space $Map(S^1, X)$ for a topological space X. The loop homology of X is the homology group $H_*(LX)$ equipped with some algebraic structure defined by Chas- Sullivan, which is called string topology. Lupercio, Uribe and Xicoténcatl extended the framework of string topology to global quotient orbifolds. We determine the ring structure of the loop homology of some global quotient orbifolds. We can compute by our theorem the loop homology ring with suitable coefficients of the global quotient orbifolds of the form $[M/G]$ for M being some kinds of homogeneous manifolds, and G being a finte subgroup of a connected topological group $\mathcal{G}$ acting on M. It is shown that these homology rings split into the tensor product of the loop homology ring of the manifold $\mathbb{H}_*(LM)$ and that of the classifying space of the finite group,which coincides with the center of the group ring $Z(k[G])$.

Yongju Bae (Kyungpook National University) (CANCELED)

On coloring cover of links

Abstract: Colorability of a link via a quadle is an important link invariant which can be used to calculate quandle cocycle invariants. In this talk I will introduce a method to make a covering link of a non-colorable link which is colorable. Also we will try to use quandle cocycle invariants to study non-colorable links.

Youngjin Bae (IBS-CGP)

Chekanov-Eliashberg algebra for Legendrian graph

Abstract: For Legendrian links, one can associate a differential graded algebra, so called Chekanov-Eliashberg algebra. This is nothing but a combinatorial realization of curve counting method in symplectic geometry. We extend this idea to Legendrian graphs and discuss about underlying geometric candidate. This is a joint work with Byung Hee An.

Sheng Bai (Peking University)

Counterexamples to the quadrisecant approximation conjecture

Abstract: A quadrisecant of a knot is a straight line intersecting the knot at four points. If a knot has finitely many quadrisecants, then we can replace each subarc between two adjacent secant points by the line segment between them so that we get the quadrisecant approximation of the original knot. It was conjectured that the quadrisecant approximation is always a knot with the same knot type as the original knot. However, we will show that every knot type contains two knots, the quadrisecant approximation of one knot has self intersections while the quadrisecant approximation of the other knot is a knot with different knot type. This is a joint work with Wang Chao and Wang Jiajun.

Yuanyuan Bao (University of Tokyo)

The Alexander polynomial of a bipartite graph

Abstract: The speaker defined the Heegaard Floer homology for a bipartite graph, the Euler characteristic of which is called the Alexander polynomial. In this talk, we introduce different interpretations of this polynomial invariant and its properties.

Jae Choon Cha (POSTECH)

L^2-acyclic bordism and Whitney towers

Abstract: Recently Sylvain Cappell, Jim Davis and Shmuel Weinberger studied L^2-acyclic bordism groups in high dimensions. In this talk we address 4-dimensional L^2-acyclic bordism between 3-manifolds. We introduce a Whitney tower approach to study the structure in this dimension, and show that Cheeger-Gromov invariants over amenable groups give obstructions. Also we answer some questions of Cappell, Davis and Weinberger which concern the relationship of L^2-acyclic bordism and knot concordance.

Zhi Chen (Hefei University of Technology)

Generalized Lawrence-Krammer representations (LK representations) for Artin groups

Abstract: The LK representation for braid group Bn are $n(n-1)/2$ dimensional linear representations with two parameters. These geometricly defined representations were proved to be faithful around 2000. later Cohen and Wales, Paris defined similar representations for finite type simply laced Artin groups, and any simply laced Artin groups. Around 2007, Marin defined GLK for any finite type Artin groups as monodromy of certain flat connection. It is a problem to write down the monodromy of these flat connections explicitly. In this talk we use certain algebraic method to get the explicit monodromy in the cases of odd dihedral type Artin groups, which could be the base to write down the GLK explicitly for all "oddly laced" Artin groups.

Zhiyun Cheng (Beijing Normal University)

Chord index and its ramifications

Abstract: In this talk, I will introduce some virtual knot invariants derived from the chord index. The relation between these invariants and the finite type invariant, real/virtual crossing number and biquandle structure will be discussed. Finally, I will show that how to generalize the notion of chord index via a given finite biquandle.

Sangbum Cho (Hanyang University)

The mapping class groups of reducible Heegaard splittings of genus two

Abstract: Any closed orientable 3-manifold which admits a genus-2 reducible Heegaard splitting is one of the 3-sphere, $S^2 \times S^1$, lens spaces or their connected sums. We discuss the mapping class group of the genus-2 splitting for each of those manifolds. This is a joint work with Yuya Koda.

Youngjin Cho (KAIST)

A structure of the automorphism groups on connected, large-type and triangle-free Artin groups

Abstract: For Artin groups with unique defining graphs, such as right-angled Artin groups, generator-permuting automorphisms are given by graph automorphisms of defining graph. If an Artin group does not uniquely determine its defining graph, we also need to consider graph isomorphisms among defining graphs. In this talk, we will completely describe the automorphism group of an Artin groups considered by John Crisp.

Seonmi Choi (Kyungpook National University)

Rack homology groups of certain finite quandles via permutations

Abstract: A quandle is a set equipped with a binary operation satisfying three quandle axioms. It also can be expressed as a sequence of permutations of the underlying set satisfying certain conditions. In this talk, we will study a rack homology group of certain finite quandles.

Celeste Damiani (Osaka City University)

The many faces of Loop Braid Groups

Abstract: Loop braid groups, are a generalization of braid groups. These groups have been an object of interest in different domains of mathematics and mathematical physics, and have been called, in addition to loop braid groups, with several names such as of motion groups, groups of permutation-conjugacy automorphisms, braid-permutation groups, welded braid groups and untwisted ring groups. We unify all the formulations that have appeared so far in the literature, with a complete proof of the equivalence of these definitions. We also introduce an extension of these groups that appears to be a more natural generalization of braid groups from the topological point of view.

Xiaoming Du (South China University of Technology)

The extended mapping class groups can be generated by two torsions

Abstract: The extended mapping class group is the group of the mapping class that contains the orientation reversing ones. Whether the extended mapping class group can be generated only by two torsions is an open question asked by Korkmaz four years ago in the book "Handbook of Teichmüller Theory (Volume 3)". In this talk, we will give an affirmative answer. In fact, we prove that if the genus of the surface is at least 5, then the extended mapping class group of a closed oriented surface is generated by 2 torsion elements. In this case, one of them is an order 2 element while the other one is an order $4g + 2$ element.

Mizuki Fukuda (Tohoku University)

On classification of branched twist spins via their knot groups

Abstract: It is known that a branched twist spin is a fibered 2-knot with periodic monodromy and its fiber is a punctured branched cover of a 1-knot. In this talk, I give a criterion to distinguish branched twist spins by two presentations, given by the knot complement of the 1-knot and some conditions, of their knot groups.

Hongzhu Gao (Beijing Normal University)

Some polynomial invariants of virtual string links

Abstract: In this talk, I will introduce two polynomial invariants for virtual string links.

María de los Angeles Guevara Hernández (Instituto Potosino de Investigación Científica y Tecnológica, and Osaka City University)

Infinite families of prime knots with alternation number 1 and dealternating number n

Abstract: The alternation number of a knot K, denoted by $alt(K)$, is the minimum number of crossing changes necessary to transform a diagram of K into some (possibly non-alternating) diagram of an alternating knot. And the dealternating number of a knot K, denoted by $dalt(K)$, is the minimum number of crossing changes necessary to transform a diagram D of K into an alternating diagram. So, from these definitions it is immediate that $alt(K) \leq dalt(K)$ for any knot K. In this talk, we will show that for each positive integer n there exists a family of infinitely many hyperbolic prime knots with alternation number 1 and dealternating number n.

Megumi Hashizume (Nara Women's University)

Link version of Inoue-Shimizu's result on region crossing change

Abstract: Recently, a new local transformation on link diagram called region freeze crossing change is proposed as a mutant of region crossing change. It is known that any change of crossings on any knot diagram can be realized as a region crossing change. Inoue-Shimizu showed there is a knot diagram such that some change of crossings can NOT be realized by region freeze crossing change. They showed necessary and sufficient condition for the exchangeability of any given crossing of the knot diagram via region freeze crossing change. In this talk, we discuss about a generalization of this result for links.

Hiroyuki Ishiguro (University of Tokyo)

Non-contractible orbits for Hamiltonian functions on Riemann surfaces

Abstract: We consider two disjoint and homotopic non-contractible embedded loops on a Riemann surface and prove the existence of a non- contractible orbit for a Hamiltonian function on the surface whenever it is sufficiently large on one of the loops and sufficiently small on the other one. This gives the first example of an estimate from above for a generalized form of the Biran-Polterovich-Salamon capacity for a closed symplectic manifold.

Katsumi Ishikawa (RIMS, Kyoto University)

The automorphism group of a smooth quandle

Abstract: A smooth quandle is a differentiable manifold with a smooth quandle operation. In this talk, we show that the automorphism group of a smooth transitive connected quandle is a Lie group. As a corollary, such a quandle is described as a homogeneous space with an operation defined from a group automorphism.

Noboru Ito (University of Tokyo)

Strong and weak $(1,3)$ homotopies on knot projections

Abstract: This talk consists of two works: a joint work with Yusuke Takimura (Gakushuin Boys' Junior High School) and the joint work with Takimura and Kouki Taniyama (Waseda University).

Every knot projection (i.e., generic immersed spherical curve) can be related to a simple closed curve by a finite sequence generated by the first, second, and third Reidemeister moves. To the best of our knowledge, the equivalence class containing the simple closed curve under an equivalence relation generated by the first and third Reidemeister moves has yet to be determined. Since the third Reidemeister move consists of strong and weak third Reidemeister moves, we introduce two equivalence relations as follows. An equivalence relation is said to be strong $(1,3)$ homotopy (resp. weak $(1,3)$ homotopy) if it is generated by the first and strong (resp. weak) third Reidemeister move. We determine which knot projections are trivialized under strong (resp. weak) $(1,3)$ homotopy.

Teruhisa Kadokami (Kanazawa University)

Analytic function for an infinite family of graphs via Blaschke product (joint work with Akio Kawauchi (OCAMI))

Abstract: For an infinite family of graphs $\mathcal{G} = \{G_n\}$, we define an analytic function $\Phi(z) = \Phi_{\mathcal{G}}(z)$ of $\mathcal{G}$. Even if $\mathcal{G}$ is not given explicitly, we can recover $\mathcal{G}$ completely from $\Phi(z)$. We compute $\Phi_{\mathcal{G}}(z)$ for some special cases, and raise some fundamental questions. This is a joint work with Akio Kawauchi (OCAMI).

Naoko Kamada (Nagoya City University)

Virtual doodles and semiquandles

Abstract: A doodle was defined by R. Fenn and P. Taylor in 1979. In their definition, a doodle is an equivalence class of a collection of embedded circles in the 2-sphere by Reidemeister move of type II. M. Khovanov extended it to immersed circles in 2-sphere. We generalize it to immersed circles on surfaces modulo surface surgeries besides Reidemeister moves of type I and II. It is presented by a virtual doodle diagram on the plane. We discuss a quandle type invariant for virtual doodle. This is a joint work with Andrew Bartholomew, Roger Fenn, and Seiichi Kamada.

Eri Kamikawa (FMS, Meiji University)
Yuumu Rikiishi (FMS, Meiji University)
Kazushi Ahara (FMS, Meiji University)

Towards an integrated knot diagram editor that allows us to manipulate Reidemeister moves

Abstract: In this talk, we introduce a project BeadsKnot of building an integrated editor of knot diagrams. As an editor of knots, KnotPlot is very famous. This software allows us to simulate three-dimensional knot embeddings. On the other hands, our system is based on a knot diagram. In the current stage, BeadsKnot allows users to load a scanned image of a knot diagram, to manipulate Reidemeister moves on a knot diagram, and to modify a knot diagram to get a standard configuration of it.

Taizo Kanenobu (Osaka City University)

Classification of ribbon 2-knots presented by virtual arcs with up to four crossings

Abstract: Ribbon 2-knots presented by virtual arcs with up to four crossings have been enumerated in a joint work with Seiya Komatsu. In this talk we consider classification of these ribbon 2-knots. We show the difference by: the 2-fold branched covering space; the Alexander polynomial; the number of representations of the knot group to $SL(2, F)$; the twisted Alexander polynomial. This is a joint work with Toshio Sumi, Kyushu University.

Takuya Katayama (Hiroshima University)

An obstruction to the existence of embeddings between right-angled Artin groups

Abstract: Crisp-Sageev-Sapir in 2008 proposed the following problem: for given two right-angled Artin groups, decide whether one can be embedded into the other. Concerning this problem, it is well-known that the maximal rank of a free abelian subgroup of a right-angled Artin group is equal to the largest size of a clique of the defining graph of the given right-angled Artin group. We introduce a generalization of this fact to the complement graphs of linear forests in this talk. If time permits, we discuss embeddings of right-angled Artin groups into mapping class groups.

Byeorhi Kim (Kyungpook National University)

On the decomposition of finite quandles and inner automorphism groups

Abstract: In 2006 and in 2008, S.Nelson, C.-Y. Wong and G. Erhman, A. Gurpinar, M. Thibault, D. N. Yetter showed that every finite quandle can be decomposed as connected subquandles. In this talk, we will study about precise conditions for the operation tables which can be quandles and their inner automorphism groups.

Hyoungjun Kim (Ewha Womans University)

Best packing of identical helices

Abstract: In this paper we prove the unique existence of a ropelength-minimizing conformation of the θ-spun double helix in a mathematically rigorous way, and find the minimal ropelength $\mathrm{Rop}_*(\theta) = -\frac{8\pi}{t}$ where t is the unique solution in $[-\theta, 0]$ of the equation $2 - 2\cos(t+\theta) = t^2$. Using this result, the pitch angles of the standard, triple and quadruple helices are around $39.3771°$, $42.8354°$ and $43.8351°$, respectively, which are almost identical with the approximated pitch angles of the zero-twist structures previously known by Olsen and Bohr. We also find the ropelength of the standard N-helix.

Jieon Kim (Osaka City University)

Marked graph diagrams of immersed surface-links

Abstract: An immersed surface-link is the image of the disjoint union of oriented surfaces in the 4-space $\mathbb{R}^4$ by a smooth immersion. By using normal forms of immersed surface-links defined by S. Kamada and K. Kawamura, we define marked graph diagrams of immersed surface-links. In addition, we generalize Yoshikawa moves for marked graph diagrams of surface-links to local moves for marked graph diagrams of immersed surface-links. We give some examples of marked graph diagrams of immersed surface-links. This is a joint work with S. Kamada and A. Kawauchi.

Se-Goo Kim (Kyung Hee University)

Secondary Upsilon invariants of knots

Abstract: The knot invariant Upsilon, defined by Ozsváth, Stipsicz, and Szabó, induces a homomorphism from the smooth knot concordance group to the group of piecewise linear functions on the interval $[0, 2]$. Here we define a set of related secondary invariants, each of which assigns to a knot a piecewise linear function on $[0, 2]$. These secondary invariants provide bounds on the genus and concordance genus of knots. Examples of knots for which Upsilon vanishes but which are detected by these secondary invariants are presented. This is a joint work with Charles Livingston.

Taehee Kim (Konkuk University)

Unknotted gropes and Whitney towers in 4-space and double sliceness of knots

Abstract: Gropes and Whitney towers are main tools for the study of 4-manifolds. In this talk, we study the structure of gropes and Whitney towers via their exteriors in a 4-manifold. In particular, we introduce a new notion of unknottedness of gropes and Whitney towers in 4-space in terms of the fundamental group. We show that this new notion is preserved under known transformations on gropes and Whitney towers. As an application, via taking a slice in 3-space of unknotted gropes and Whitney towers in 4-space, we give bi-filtrations of knots in 3-space whose intersections contain all doubly slice knots. We also show that these bi-filtrations are highly nontrivial using amenable signatures. This is joint work with Jae Choon Cha.

Teruaki Kitano (Soka University)

A polynomial invariant of a homology 3-sphere defined by Reidemeister torsion

Abstract: In the end of 1980s Dennis Johnson studied Reidemeister torsion for a homology 3-sphere from the view point of Casson invariant. Let M be a homology 3-sphere with a fixed Heegaard splitting. Johnson gave volume forms on the spaces of conjugacy classes of $SU(2)$-irreducible representations for the closed surface and handlebodies. Here we assume the set of conjugacy classes of representations are finite and transversal for M. Under this assumption, he considered a weight for any transversal intersection point and proved this weight is equal to Reidemeister torsion of M for the corresponding irreducible representation composed with the adjoint representation. Then he proposed to study polynomials whose zeros are the values of Reidemeister torsion of M. For algebraic simplicity, he consider $SL(2;C)$-reprensentations and Reidemeister torsion for such a representation. In this talk, we would like to explain Johnson theory and show some formulas of the above polynomials for Brieskorn homology spheres and surgeried manifolds along the figure-eight knot. This is a partially joint work with Anh Tran.

Erika Kuno (Tokyo Institute of Technology)

Abelian subgroups of the mapping class groups for non-orientable surfaces

Abstract: Birman-Lubotzky-McCarthy proved that any abelian subgroup of the mapping class groups for orientable surfaces is finitely generated. We apply Birman-Lubotzky-McCarthy's arguments to the mapping class groups for non-orientable surfaces. Especially for any torsion-free subgroup of the mapping class groups, we find a finitely generated group which is isomorphic to it.

Bo-hyun Kwon (Korea University)

Rectangle condition and a family of alternating 3-bridge knots

Abstract: In this talk, we define the rectangle condition on the bridge sphere for a n-bridge decomposition of a knot whose definition is analogous to the definition of the rectangle condition for Heegaard splittings of 3-manifolds. We show that the satisfaction of the rectangle condition for a n-bridge decomposition can guarantee that the Hempel distance for the n-bridge decomposition is greater than or equal to 2. We give an algorithm to detect the satisfaction of the rectangle condition and especially we give an interesting family of alternating 3-bridge knots by using the rectangle condition and a sort of train track argument.

Eon-Kyung Lee (Sejong University)

Conjugacy Problem for Periodic Braids

Abstract: A braid is called periodic if it has a central power. In this talk, I will show a new method for solving the conjugacy problem for periodic braids. This method directly provides a conjugating braid.

Gihyeon Lee (POSTECH)

Controlled chain homotopy and complexity

Abstract: In his 2016 paper, Cha showed that Cheeger-Gromov ρ invariants give new lower bounds of the complexity of 3-manifolds, using controlled chain homotopy as one of the key ingredients of the proof. We will discuss some aspects of controlled chain homotopy, focusing on the optimality of quantitative estimates.

Sang Youl Lee (Pusan National University)

On invariants for surface-links satisfying skein relations

Abstract: A surface-link is a closed 2-manifold smoothly embedded in 4-space. Two surface-links are said to be equivalent if they are ambient isotopic. A marked graph diagram is a link diagram possibly with some 4-valent vertices equipped with markers. Every surface-link is presented by an admissible marked graph diagram modulo Yoshikawa moves. In this talk, I would like to introduce a series of new invariants for (orientable and non-orientable) surface-links defined by skein relations on marked graph diagrams presenting the surface-links and discuss some applications.

Fengling Li (Dalian University of Technology)

Essential subsurfaces and self-amalgamations of 3-manifolds

Abstract: Suppose $M = V \cup_S W$ is a strongly irreducible Heegaard splitting and F_1, F_2 are pairwise disjoint homeomorphic essential subsurfaces in $\partial_- V$. In this talk, we will give a sufficient condition such that the self-amalgamation of $M = V \cup_S W$ along F_1, F_2 is untabilized and not critical.

Youlin Li (Shanghai Jiao Tong University)

Fillings of unit cotangent bundles of nonorientable surfaces

Abstract: We will prove that every minimal weak symplectic filling of the canonical contact structure on the unit cotangent bundle of a nonorientable closed surface other than the real projective plane is s-cobordant relatively on boundary to the disk cotangent bundle of the surface. Moreover, if the nonorientable surface is the Klein bottle, then we will show that the minimal weak symplectic filling is unique up to homeomorphism. This is a joint work with Burak Ozbagci.

Ximin Liu (Dalian University of Technology)

Homologically trivial group actions on elliptic surfaces

Abstract: In this talk, we consider homologically trivial symplectic group actions on elliptic surface $E(n)$, where $n \geq 2$, and some rigidity results are obtained.

Ye Liu (Hokkaido University)

Second mod 2 homology of Artin groups

Abstract: In this talk, after a survey on known results concerning the $K(\pi, 1)$ conjecture and homology of Artin groups, I will introduce a new result, that is a formula of the second mod 2 homology of an arbitrary Artin group, without assuming the $K(\pi, 1)$ conjecture is true. This is joint work with Toshiyuki Akita.

Yi Liu (BICMR/Peking University)

Virtual 1-domination onto 3-manifolds

Abstract: In this talk, I will show that every closed hyperbolic 3-manifold virtually 1-dominates any other closed oriented 3-manifold. In other words, for any target 3-manifold, the given closed hyperbolic 3-manifold has a finite cover and there is a degree-one map from that cover onto the target. This is a joint work with Hongbin Sun.

Eri Matsudo (Nihon University)

On the minimal coloring number of even parallels of links

Abstract: A parallel of a link is defined as the link given by replacing each component of the given link with several parallel strands. An even parallel of a link is shown to be $\mathbb{Z}$-colorable except for the case of 2 parallels with non-zero linking number. In this talk, we report some results on the minimal number of colors for such even parallels of links.

Atsushi Mochizuki (RIMS, Kyoto University)

On a quantum representation of the mapping class group through the LMO invariant in the case of genus one

Abstract: We construct a representation of the mapping class group through the degree one part of the LMO invariant and give concrete matrices, especially for the compact surface with genus one, one boundary component. Besides, we calculate the Casson-Walker invariant of genus one open books as the trace of the represetnation of monodromies.

Delphine Moussard (RIMS, Kyoto University)

Finite braid group orbits in $\mathrm{Aff}(C)$-character varieties of the punctured sphere

Abstract: The group of n-strands pure braids of the sphere acts naturally on the representations of the fundamental group of the n-punctured sphere. Gaël Cousin has shown that nite orbits of such actions provide interesting at connections on vector bundles over projective ruled varieties. Motivated by this result, we consider the representations of the fundamental group of the n-punctured sphere in the complex affine group. I will describe the nite orbits of the action of the group of n-strands pure braids of the sphere on these representations.Joint work with Gaël Cousin.

Fumikazu Nagasato (Meijo University)

Ghost characters, character varieties and abelian knot contact homology

Abstract: We will introduce a notion called ghost characters for a knot K in 3-sphere, using the trace-free characters of $SL(2, C)$-representations of the knot group. This gives us a tool to describe exactly a relationship of degree 0 abelian knot contact homology of K with the character variety of the 2-fold branched cover of 3-sphere branched along K. Using this, we will give a criterion to check whether Ng's conjecture concerned with the above relationship holds true or not.

Inasa Nakamura (University of Tokyo)

Simplifying covering surface-knots by an addition of 1-handles with chart loops

Abstract: We consider a surface in the form of a simple branched covering over an oriented surface-knot F, which is called a covering surface-knot over F or a 2-dimensional braid over F. Such a surface is presented by a certain graph called a chart on a surface diagram of F. We show that for a covering surface-knot, an addition of 1-handles with chart loops is a simplifying operation which deforms the chart to a union of free edges.

Hironobu Naoe (Tohoku University)

The acyclic 4-manifolds with shadow complexity zero

Abstract: The shadow complexity of a 4-manifold is defined as the minimum number of true vertices of a shadow of the 4-manifold. The closed 4-manifolds having (special) shadow complexity zero have been completely classified by Costantino and Martelli. In this talk, we focus on the case of 4-manifolds with boundary. We show that every acyclic 4-manifold with shadow complexity zero is diffeomorphic to a 4-ball.

Takefumi Nosaka (Kyushu University)

Milnor invariants via unipotent Magnus embeddings

Abstract: We reconfigured the Milnor invariant, in terms of central group extensions and unipotent Magnus embeddings, and develop a diagrammatic computation of the invariant. In this talk, I will explain the reconfiguration and the computation with mentioning some examples. This is a joint work with Hisatoshi Kodani.

Yuta Nozaki (University of Tokyo)

Any lens space contains a genus one homologically fibered knot

Abstract: It is known that some lens spaces have no genus one fibered knot. In this talk, we prove that any lens space has a genus one homologically fibered knot. Some number-theoretic tools play a key role in the proof.

Sangrok O (KAIST)

Quasi-isometric classification of planar graph 2-braid groups

Abstract: Let Γ be a planar graph. We classify the quasi-isometric types of planar graph 2-braid groups, $B_2(\Gamma)$. In fact, we use an axillary finite complex $M(\Gamma)$ constructed from a given planar graph Γ. If Γ satisfies a certain condition, then $M(\Gamma)$ has exactly one main component and possibly one more vertex component. If the main component has an induced rotation symmetry, but does not have a reflection symmetry along cut vertices, then $B_2(\Gamma)$ is not quasi-isometric to a free product of a right-angled Artin group(RAAG) and a free group but instead quasi-isometric to a free product of finitely iterated HNN extension of a RAAG and a free group. Otherwise, $B_2(\Gamma)$ is quasi-isometric to a free product of a RAAG and a free group.

Erii Ogawa (University of Tokyo)

A representation of the category of braided graphs and its applications

Abstract: The Burau representation is a linear representation of the braid groups and is applied to the knot theory. In this talk, I define a representation of the category of braided graphs which are spatial graphs with external verticies and introduce some applications of it to calculation of the Alexander polynomial of knots and graphs.

Jun O'Hara (Chiba University)

From energy of knots to regularized Riesz energy of submanifolds

Abstract: Energy of knots, introduced about 30 years ago, can be generalized by analytic continuation to regularized Riesz energy of submanifolds in Euclidean space. It can produce geometrically important quantities as residues. I will give a survey of the recent development of the theory, its connection to convexity, and integral geometry.

Shin'ya Okazaki (OCAMI)

Constituent knots of a handlebody-knot

Abstract: A handlebody-knot is a handlebody embedded in the 3-sphere. A handlebody-knot is represented by a spatial graph in the 3-sphere. A constituent knot of a handlebody-knot is a constituent knot of a spatial graph in the 3-sphere which represents the handlebody-knot. In general, there are infinitely many constituent knots of a handlebody-knot. In this talk, we discuss constituent knots of a handlebody-knot by using the Alexander invariant for handlebody-knots.

Genki Omori (Tokyo Institute of Technology)

A small normal generating set for the handlebody subgroup of the Torelli group

Abstract: We consider the handlebody subgroup of the Torelli group, i.e. the intersection of the handlebody group and the Torelli group of an orientable surface. The handlebody subgroup of the Torelli group is related to integral homology 3-spheres through the Heegaard splittings. In this talk, we give a small normal generating set for the handlebody subgroup of the Torelli group.

Kyungbae Park (KIAS)

Irreducible 3-manifolds that are not obtained by 0-surgery along a knot

Abstract: It is well known, due to Lickorish and Wallace, that any closed orientable 3-manifold can be obtained by Dehn-surgery along a link. The surgery number is a natural invariant of 3-manifold M, defined as the smallest number of components in a link in a Dehn surgery description of M.

In their recent textbook, Aschenbrenner, Friedl and Wilton asked the following question regarding this invariant. Let M be a closed, orientable, irreducible 3-manifold such that $b_1(M) = 1$ and $\pi_1(M)$ has weight 1. Is M the result of Dehn surgery along a knot in S^3? (i.e. Is the surgery number of M one?) We answer the question negatively by presenting two infinite families of such 3-manifolds that cannot be obtained by surgery of a single knot. We use an obstruction from Heegaard Floer correction term, introduced by Ozsváth-Szabó. This is a joint work with Matt Hedden, Min Hoon Kim and Tom Mark.

Naoki Sakata (Hiroshima University)

Veering triangulations of mapping tori of some pseudo-Anosov maps arising from Penner's construction

Abstract: Agol proved that every pseudo-Anosov mapping torus of a surface, punctured along the singular points of the stable and unstable foliations, admits a canonical "veering" ideal triangulation. In this talk, I will describe the veering triangulations of the mapping tori of some pseudo-Anosov maps arising from Penner's construction.

Migiwa Sakurai (National Institute of Technology, Ibaraki College)

On n-trivialities of classical and virtual knots for some unknotting operations

Abstract: This is a joint work with Noboru Ito (The University of Tokyo). In this talk, we introduce a new degree and a filtration to obtain Vassiliev-type invariants. In 1990, Vassiliev introduced a filtered space of knot invariants via a standard unknotting operation, called "crossing change". In 2000, Goussarov, Polyak, and Viro introduced other degree and filtration via other unknotting operation, called "virtualization", for classical and virtual knots and using their theory, we can have another framework to obtain concrete Vassiliev invariants via dual spaces generated by chord diagrams. In these theories, a notion of "n-trivialities", which is a special case of "n-equivalences", has played a significant role, which obtains a relationship between local moves and filtered invariants. However, to the best of our knowledge, for an integer $n(> 2)$, any example of n-trivial classical and virtual knot of GPV-degree is still missing. A notion of n-trivialities is defined as follows. Let A be a collection of n pairwise disjoint, nonempty subset which consists of isolated sufficiently small disks on which unknotting operations are applied. For any subset T of the power set of A, denote a knot diagram by $K(T)$ by applying an unknotting operation in each small disk in T. A knot K is n-trivial if there exists T such that $K(\emptyset)$ is a diagram of K and $K(T)$ is an unknot diagram. In this talk, we obtain an example of n-trivial knots of GPV-degree. We also introduce a new filtration of Vassiliev-type (finite type) invariant by using an unknotting operation, called Forbidden moves (Kanenobu, and independently Nelson showed that this move is an unknotting operation). We obtain n-trivial knots of this new degree.

Hyunshik Shin (KAIST)

Small asymptotic translation lengths of pseudo-Anosov maps on the curve complex

Abstract: Let M be a hyperbolic fibered 3-manifold and let S be a fiber with pseudo-Anosov monodromy ψ. We show that there exists a sequence (S_n, ψ_n) of fibers whose projective classes coverge to $[(S, \psi)]$ in the fibered face such that the asymptotic translation length of ψ_n on the curve complex $\mathcal{C}(S_n)$ converges to 0 at a rate of $1/|\chi(S_n)|^2$. As an application, we show that minimal asymptotic translation lengths of mapping class group, hyperelliptic mapping class group, and hyperelliptic handlebody group of a closed surface of genus g are bounded below and above by C/g^2 and D/g^2 for some constants C and D, respectively.

Masaaki Suzuki (Meiji University)

Epimorphisms between two-bridge knot groups and their crossing numbers

Abstract: In this talk, we study the relationship between epimorphisms of two-bridge knot groups and their crossing numbers. In particular, if there exists an epimorphism from the knot group of a two-bridge knot K onto that of another knot K', then the crossing number of K is greater than or equal to three times of that of K'. Moreover, we formulate the generating function which determines the number of two-bridge knot groups admitting epimorphisms onto the knot group of a given two-bridge knot.

Shinnosuke Suzuki (Meijo University)

On a special $\mathrm{SL}(2, C)$-representation of $\pi_1(\Sigma_2 K)$ (joint work with Fumikazu Nagasato)

Abstract: It is known that by the result of Nagasato-Yamaguchi, a trace-free $SL_2(C)$-representation of a knot group $G(K)$ always gives an $SL_2(C)$-representation the fundamental group $\pi_1(\Sigma_2 K)$ of the 2-fold branched cover $\Sigma_2 K$ of 3-sphere branched along K. Moreover, this correspondence turns out to be surjective for 2-bridge knots and pretzel knots.

In this talk, for a certain knot K, we will give an $SL_2(C)$-representation of $\pi_1(\Sigma_2 K)$ which cannot be given by any trace-free $SL_2(C)$-representations of $G(K)$.

Yuuki Tadokoro (Kisarazu National College of Technology)

Pointed harmonic volume and its relation to extended Johnson homomorphism

Abstract: The period for a compact Riemann surface, defined by integration of differential 1-forms, is a classical complex analytic invariant. It has a strong relationship with the complex structure of the surface. In this talk, we treat another complex analytic invariant called the pointed harmonic volume. It is a natural extension of the period defined using Chen's iterated integrals and captures more detailed information of the complex structure. It is also one of a few explicitly computable examples of complex analytic invariants. We obtain its new value for a certain pointed hyperelliptic curve. Let us introduce one application of the pointed harmonic volume. We explain a relation between the harmonic volume and first extended Johnson homomorphism on the mapping class group of a pointed oriented closed surface.

Kazuto Takao (RIMS, Kyoto University)

On bridge positions and bridge decompositions

Abstract: The concept of "bridge" is fundamental in knot theory, and the notions of bridge position and bridge decomposition are defined naturally in the respective points of view. They are seemingly equivalent, but substantial differences appear in the classification problems. I will give an example of a knot such that the number of isotopy classes of 3-bridge decompositions disagrees with that of 3-bridge positions of the knot type. I will also give the stable equivalence theorem for bridge decompositions, as well as Birman gave that for bridge positions. This is joint work with Y. Jang, T. Kobayashi and M. Ozawa.

Yusuke Takimura (Gakushuin Boys' Junior High School)

Strong and weak $(1, 2, 3)$ homotopies on knot projections

Abstract: This is a joint work with Noboru Ito (The University of Tokyo). An image of a generic immersion from a circle into a 2-spehre is called a knot projection. It is known that any two knot projections are related by a finite sequence generated by local replacements of knot projections of three types, called Reidemeister moves. We introduce an equivalence relation for knot projections called weak $(1, 2, 3)$ homotopy, which is generated by Reidemeister moves of type 1, weak type 2, and weak type 3. We also introduce the first non-trivial invariant under weak $(1, 2, 3)$ homotopy. By using this invariant, we show that there exist an infinite number of weak $(1, 2, 3)$ homotopy equivalence classes of knot projections. By contrast, for each of the other triples, i.e., Reidemeister moves of (type 1, strong type 2, strong type 3), (type 1, strong type 2, weak type 3), and (type 1, weak type 2, strong type 3), all equivalence classes of knot projections are contractible.

Kodai Wada (Waseda University)

Link invariants of Milnor type

Abstract: J. Milnor defined a family of link invariants indexed by sequences, and gave an algorithm to compute these invariants by using the Wirtinger presentation.

M. Wada considered some group presentations obtained from a link diagram, and proved that the groups derived from these presentations are invariants of the link. We can regard one of Wada's group presentations as a generalization of the Wirtinger presentation. In this talk, we construct link invariants of Milnor type by using the Wada's group presentation.

Zhiqing Yang (Dalian University of Technology)

Enhanced brackets

Abstract: In [1], Sam Nelson, Michael E. Orrison, Veronica Rivera constructed biquandle brackets. Their invariant Φ_X^β takes values in $Z_2[t]/(1 + t + t^3)$, and Φ_X^β is not determined by the HOMFLY-PT polynomials. We will show that bracket can be further enhanced in many ways. For example, one can use tricoloring, regional coloring, biquandle to enhance the bracket. One can also use regional coloring mixed with tricoloring or biquandle to enhance the bracket. Furthermore, one can add virtual crossing in the construction. The enhanced brackets generally have more variables and more powerful than Jones polynomial.

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[1] Sam Nelson, Michael E. Orrison, Veronica Rivera, *Quantum Enhancements and Biquandle Brackets*, arXiv:1508.06573.

Tsukasa Yashiro (Sultan Qaboos University)

On covering diagrams and triple points

Abstract: A surfaceknot is an embedded oriented connected surface in 4-space. A surface diagram is a generic projection of a surface-knot into 3-space. In this talk we construct 3-colourable surface-knot diagrams which contains cross exchangeable (ce-) curves. Also we introduce pseudo-cycles and covering diagrams over surface-knot diagrams. Then we discuss about some relation between the ce-curves and pseudo-cycles. As an application, we give some lower bounds of triple point numbers for special surface-knots.

Shengkui Ye (Xi'an Jiaotong-Liverpool University)

The L^2-Betti numbers and acylindrically hyperbolicity of matrix groups

Abstract: Let R be an infinite commutative ring with the identity and let $n > 2$ be an integer. Denote by G the general linear group, the special linear group, the group generated by elementary matrices, the symplectic group, the elementary symplectic group, the or- thogonal group, or the elementary orthogonal group. In a joint work with Feng Ji, we will prove that the L^2-Betti number $b_i(G) = 0$ for each integer $i = 0, 1, ..., n - 2$. Furthermore, we will prove that G is not acylindrically hyperbolic if $n > 2$.

Jun Yoshida (University of Tokyo)

Relative settings in differential topology

Abstract: In the realm of differential topology, there seem to be poor notions describing relative situations, e.g. manifolds equipped with submanifolds. I will suggest a candidate for this and show how classical results lift to relative ones. In particular, in this talk, we focus on Transversality Theorem and its applications.

Bin Yu (Tongji University)

Smale solenoid attractors and affine Hirsch foliations

Abstract: In this talk, we will introduce how to use affine Hirsch foliations to study a class of Ω-stable diffeomorphisms (North-South Smale solenoid diffeomorphisms, abbreviated as *NSSS* diffeomorphisms) on 3-manifolds.

The crucial observation is that an NSSS diffeomorphism f automatically induces two non-isotopically leaf-conjugate affine Hirsch foliations $\mathcal{H}^s$ and $\mathcal{H}^u$ on the orbit space of the wandering set of f (abbreviated as the *wandering orbit space* of f) by the stable and unstable manifolds of Λ_a and Λ_r respectively.

Under this point of view, we will build some close relationships between NSSS diffeomorphisms and Hirsch foliations. Moreover, as some applications, we will consider several more concrete questions. For instance, we will prove that every diffeomorphism in many Ω-conjugate classes of NSSS diffeomorphisms is not structure stable.

Qiang Zhang (Xi'an Jiaotong University)

Fixed subgroups in direct products of free and surface groups

Abstract: For a group G and a set of endomorphisms B, the fixed subgroup Fix B consists of elements fixed by every endomorphism in B, which has many interesting properties on the intersection of subgroups. In this talk, we will introduce some progresses on the fixed subgroups of direct products of finitely many free and surface groups. This is a joint work with E. Ventura and Jianchun Wu.

Ying Zhang (Soochow University)

On Atiyah's independence conjecture for four points in a hyperbolic plane

Abstract: Atiyah proposed his independence conjecture in about 2000 aiming at a solution to a problem in physics. Given n distinct points in a Euclidean space, a set of $n - 1$ unit vectors is naturally associated to each of the given points, and, regarding each unit vector as a complex number via the stereographic projection, one obtains a monic polynomial of degree $n - 1$ having as roots the $n - 1$ complex numbers corresponding to the unit vectors. The conjecture asserts that the set of n polynomials so obtained is linearly independent. There is a similar conjecture for points in a hyperbolic space. The conjecture has been proved for the case of four points in a Euclidean space, and the case of four points in a hyperbolic space which do not lie in a hyperbolic plane. In joint work with Jiming Ma, we confirm Atiyah's independence conjecture for the case of four points in a hyperbolic plane.

Yanqing Zou (Dalian Minzu University)

The R^3 and metrics on the curve complex

Abstract: We will introduce some metrics on the curve complex from R^3 and discuss the properties of those metric spaces. Later we will present the maximal subset of R^3 realizing metrics on the curve complex. This is a joint work with Ruifeng Qiu and Faze Zhang.