The 11th East Asian School of Knots and Related Topics

Osaka City University
January 26–29 2016

Program

Tuesday, Jan 26

Tanaka Memorial Hall

9:10–9:20 Opening remark

Chairperson: Toshitake Kohno (University of Tokyo)

9:20–10:10 Hyunshik Shin (KAIST)
Pseudo-Anosov mapping classes not arising from Penner's construction

Chairperson: Ruifeng Qiu (East China Normal University)

10:20–11:10 Teruhisa Kadokami (Kanazawa University)
$\mathbb{Z}_p$-covering not coming from $\mathbb{Z}$-covering
(in progress; discussed with Yasushi Mizusawa and Jun Ueki)

Room 1 (E408)

Chairperson: Naoyuki Monden (Osaka Electro-Communication University)

13:20–13:40 Susumu Hirose (Tokyo University of Science)
A finite presentation for the hyperelliptic handlebody group

13:45–14:05 Eiko Kin (Osaka University)
The asymptotic behavior of the minimal pseudo-Anosov dilatations in the hyperelliptic handlebody groups

14:10–14:30 Xiaoming Du (South China University of Technology)
Torsion generators of the mapping class groups

14:35–14:55 Jianchun Wu (Soochow University)
Fixed subgroups are compressed in surface groups

Chairperson: Eiko Kin (Osaka University)

15:20–15:40 Ximin Liu (Dalian University of Technology)
Finite Group Actions on Elliptic Surfaces

15:45–16:05 Takefumi Nosaka (Kyushu University)
On the fundamental relative 3-classes of knot group representations

16:10–16:30 Shunsuke Aimi (Hiroshima University)
Parabolic generating pairs of 2-bridge link groups

16:35–16:55 Naoyuki Monden (Osaka Electro-Communication University)
Upper bounds on stable commutator lengths of Dehn twists

Room 2 (F415)

Chairperson: Xian'an Jin (Xiamen University)

13:20–13:40 Yongju Bae (Kyungpook National University)
On an equivalence relation on the set of finite quandles

13:45–14:05 Akiko Shima (Tokai University)
Properties of CS-minimal charts

14:10–14:30 Inasa Nakamura (University of Tokyo)
On addtion of 1-handles with chart loops to 2-dimensional braids

14:35–14:55 Jieon Kim (Osaka City University, JSPS)
Shadow biquandle cocycle invariants of oriented surface-links

Chairperson: Yongju Bae (Kyungpook National University)

15:20–15:40 Yuka Kotorii (University of Tokyo)
On HBL-homotopy classes of 3-component handlebody-links with vanishing linking numbers

15:45–16:05 Shin'ya Okazaki (OCAMI)
Irreducibility of a handlebody-knot

16:10–16:30 Kodai Wada (Waseda University)
The Milnor invariants of clover links

16:35–16:55 Ikuo Tayama (Osaka City University)
Representing 3-manifolds in the complex number plane

Room 3 (F215)

Chairperson: Sangyop Lee (Chung-Ang University)

13:20–13:40 Hyoungjun Kim (Korea University)
Intrinsically knotted graphs and the restoring argument

13:45–14:05 Hwa Jeong Lee (KAIST)
Knot mosaic tabulation

14:10–14:30 Youngjin Bae (IBS Center for Geometry and Physics)
Legendrian singular links and singular connected sums

14:35–14:55 Atsushi Mochizuki (Kyoto University (RIMS))
On the Casson-Walker invariant for 3-manifolds admitting genus one open book decompositions

Chairperson: Susumu Hirose (Tokyo University of Science)

15:20–15:40 Tao Li (Boston College)
Tunnel numbers of satellite knots

15:45–16:05 Yimu Zhang (Jilin University)
Alternating diagrams and solenoids

16:10–16:30 Chao Wang (University of Science and Technology of China)
Half unknotted 2-orbifolds in orientable spherical 3-orbifolds

16:35–16:55 Yanqing Zou (Dalian Minzu University)
3-manifolds admitting Locally large distance two Heegaard splittings

Wednesday, Jan 27

Tanaka Memorial Hall

Chairperson: Gyo Taek Jin (KAIST)

9:20–10:10 Yi Liu (BICMR)
Separability of surface subgroups for 3-manifold groups

Chairperson: Seiichi Kamada (Osaka City University)

10:20–11:10 Tetsuya Abe (OCAMI, Osaka City University)
Ribbon disks via handle decompositions

Room 1 (E408)

Chairperson: Tsukasa Yashiro (Sultan Qaboos University)

13:20–13:40 Boju Jiang (Peking University)
On the skein polynomial for knots and links

13:45–14:05 Xian'an Jin (Xiamen University)
Zeros of Jones polynomials of graphs

14:10–14:30 Zhiqing Yang (Dalian University of Technology)
Techniques for constructing knot invariants

14:35–14:55 Naoko Kamada (Nagoya City University)
Converting a virtual link diagram to a normal one

Chairperson: Naoko Kamada (Nagoya City University)

15:20–15:40 Tsukasa Yashiro (Sultan Qaboos University)
On a surface-knot invariant obtained from surface-knot diagram

15:45–16:05 Hideo Takioka (OCAMI)
On knots with clasp number at most two

16:10–16:30 Ho Lee (KAIST)
Non semi-alternating mutant knots which have the same arc index

Room 2 (F415)

Chairperson: Seungsang Oh (Korea University)

13:20–13:40 Sangbum Cho (Hanyang University)
Haken spheres for genus two Heegaard splittings

13:45–14:05 Jung Hoon Lee (Chonbuk National University)
Bridge surfaces with the topological minimality preserved by perturbation

14:10–14:30 Sangyop Lee (Chung-Ang University)
Four-punctured spheres in the exteriors of knots

14:35–14:55 Kun Du (Lanzhou University)
A simple proof of Gordon's Conjecture

Chairperson: Jiming Ma (Fudan University)

15:20–15:40 Hirotaka Akiyoshi (Osaka City University)
Ford domains for cone hyperbolic manifolds

15:45–16:05 Mikio Furokawa (Hiroshima University)
A certain family of once-punctured Klein bottle groups commensurable with once-punctured torus groups

16:10–16:30 Naoki Sakata (Hiroshima University)
Veering structures of the canonical decompositions of hyperbolic fibered two-bridge link complements

Room 3 (F215)

Chairperson: Youlin Li (Shanghai Jiao Tong University)

13:20–13:40 Taehee Kim (Konkuk University)
Topologically and smoothly doubly slice knots

13:45–14:05 Kyungbae Park (Korea Institute for Advanced Study (KIAS))
The Upsilon invariant in branched covers

14:10–14:30 Min Hoon Kim (KIAS)
Rasmussen s-invariants of satellites do not detect slice knots

14:35–14:55 Hironobu Naoe (Tohoku University)
Infinitely many corks with special shadow complexity one

Chairperson: Taehee Kim (Konkuk University)

15:20–15:40 Takahiro Oba (Tokyo Institute of Technology)
Compact Stein surfaces as branched covers with same branch sets

15:45–16:05 Juhyun Lee (IBS CGP)
The existence of dividing curve minimizing convex fiber

16:10–16:30 Youlin Li (Shanghai Jiao Tong University)
Hyperbolic 3-manifolds admitting no fillable contact structures

Thursday, Jan 28

Tanaka Memorial Hall

Chairperson: Akio Kawauchi (OCAMI, Osaka City University)

9:20–10:10 Yuichi Yamada (The University of Electro-Communications)
Dehn surgery along the Mazur link and Akbulut-Yasui links

Chairperson: Jiajun Wang (Peking University)

10:20–11:10 Zhongtao Wu (The Chinese University of Hong Kong)
Concordance invariants from knot Floer homology

Room 1 (E408)

Chairperson: Shin Satoh (Kobe University)

13:20–13:40 Seiichi Kamada (Osaka City University)
Normal forms of immersed surface-links and ribbon-clasp

13:45–14:05 Kengo Kawamura (Osaka City University)
Singular surface-knots and quandle (co)homology groups

14:10–14:30 Kaori Hasegawa (Osaka City University)
Cocycle invariants of the dihedral qualgebra of order 6

14:35–14:55 Byeorhi Kim (Kyungpook National University)
On the inner automorphism groups of finite quandles

Chairperson: Zhiqing Yang (Dalian University of Technology)

15:20–15:40 Takao Matumoto (Kyoto University)
Smooth unknotting conjecture in dimension four

15:45–16:05 Amal Al-Kharusi (Sultan Qaboos University)
No orientable surface-knot of genus one has the triple point number two

16:10–16:30 Hitesh Raundal (IISER Pune)
Spaces of Polynomial Knots

16:35–16:55 Shin Satoh (Kobe University)
Dehn colored knot diagrams

Room 2 (F415)

Chairperson: Fengchun Lei (Dalian University of Technology)

13:20–13:40 Seungsang Oh (Korea University)
Combinatorics on two-dimensional lattice models

14:10–14:30 Seong Gu Jeong (KAIST)
Geometry of complexes of non-crossing partitions

14:35–14:55 Qiang Zhang (Xi'an Jiaotong University)
Bounds for fixed points on hyperbolic manifolds

Chairperson: Tetsuya Abe (OCAMI, Osaka City University)

15:20–15:40 Taizo Kanenobu (Osaka City University)
Nakanishi's criterion on Gordian distance one knots and band surgery

15:45–16:05 Saori Kanenobu (Kobe University)
The OU sequences for the figure-eight knot

16:10–16:30 María de los Angeles Guevara Hernández (Instituto Potosino de Investigaci, Osaka City University)
Families of non-alternating knots

16:35–16:55 Takuji Nakamura (Osaka Electro-Communication University)
A characterization of a knot with a trefoil factor by Fox 3-coloring

Room 3 (F215)

Chairperson: In Dae Jong (Kindai University)

13:20–13:40 Sang-Jin Lee (Konkuk University)
Embeddability between RAAGs and immersion of graphs

13:45–14:05 Youngjin Cho (KAIST)
Automorphism groups of connected, large-type, triangle-free Artin groups

14:10–14:30 Sangrok O (KAIST)
Quasi-isometries between graph 2-braid groups and right-angled Artin groups

14:35–14:55 Hyo Won Park (PMI, POSTECH)
On a class of right-angled Artin groups

Chairperson: Sang-Jin Lee (Konkuk University)

15:20–15:40 Erika Kuno (Tokyo Institute of Technology)
Right-angled Artin groups on finite subgraphs of disk graphs

15:45–16:05 Takuya Katayama (Hiroshima University)
RAAGs in knot groups

16:10–16:30 In Dae Jong (Kindai University)
Chirally cosmetic fillings on a hyperbolic manifold

16:35–16:55 Kazuhiro Ichihara (Nihon University)
Thin position for incompressible surfaces in 3-manifolds

Friday, Jan 29

Chairperson: Ki Hyoung Ko (KAIST)

9:20–10:10 Jae Choon Cha (POSTECH)
Casson towers, gropes, and disk embedding

Abstracts (plenary talks)

Tuesday, Jan 26

Hyunshik Shin (KAIST)
Title: Pseudo-Anosov mapping classes not arising from Penner's construction

Abstract: In this talk, we will discuss one property that is shared by all pseudo-Anosov mapping classes from Penner's construction. That is, all Galois conjugates of stretch factors of pseudo-Anosov mapping classes arising from Penner's construction lie off the unit circle. As a consequence, we show that for all but a few exceptional surfaces, there are examples of pseudo-Anosov mapping classes so that no power of them arises from Penner's construction. This resolves a conjecture of Penner. This is a joint work with Balazs Strenner.

Teruhisa Kadokami (Kanazawa University)
Title: $\mathbb{Z}_p$-covering not coming from $\mathbb{Z}$-covering
(in progress; discussed with Yasushi Mizusawa and Jun Ueki)

Abstract: Jun Ueki pointed out that until now all examples of $\mathbb{Z}_p$-coverings are coming from $\mathbb{Z}$-coverings, and raised some examples of $\mathbb{Z}_p$-coverings 'not' coming from $\mathbb{Z}$-coverings. As a result, most of $\mathbb{Z}_p$ -coverings are not coming from $\mathbb{Z}$-coverings. I believe that this kind of phenomenon is unfamiliar to most of low-dimensional topologists. It shows one of differences between Knot Theory and Number Theory.

Wednesday, Jan 27

Yi Liu (BICMR)
Title: Separability of surface subgroups for 3-manifold groups

Abstract: An immersed subsurface of a 3-manifold is said to be essential if it induces an embedding of the fundamental group. In this talk, I will present a topological characterization for such a subsurface to lift to be an embedding in some finite cover of the 3-manifold group. This is equivalent to say that the corresponding surface subgroup of the 3-manifold group is separable. With the criterion, we give (new) examples that some surface subgroups are not separable in certain non-geometric 3-manifold groups.

Tetsuya Abe (OCAMI, Osaka City University)
Title: Ribbon disks via handle decompositions

Abstract: The slice-ribbon conjecture states that any slice knot bounds a ribbon disk in the standard 4-ball. In this talk, we survey the slice-ribbon conjecture and discuss related topics. In particular, we describe ribbon disks in terms of handle decompositions of the 4-ball. This is a joint work with Motoo Tange.

Thursday, Jan 28

Zhongtao Wu (The Chinese University of Hong Kong)
Title: Concordance invariants from knot Floer homology

Abstract: We will discuss applications of knot Floer homology to concordance. In particular, we will compare the four-ball genus bounds given by epsilon, Upsilon(t), tau, and nu-plus, which are all concordance invariants associated to the knot Floer complex. Parts of this talk are joint work with Jennifer Hom.

Yuichi Yamada (The University of Electro-Communications)
Title: Dehn surgery along the Mazur link and Akbulut-Yasui links

Abstract: A hyperbolic 3-manifold that has torus boundaries can change to a non-hyperbolic 3-manifold by filling a boundary by a solid torus. But the number of such fillings are at most finitely many (for a fixed hyperbolic manifold), and they are called exceptional Dehn filling/surgery. The Akbulut-Yasui link is a family of generalization of the Mazur link, a symmetric two-component hyperbolic link, as diagrams of corks, ie, a contractible piece that can change the differential structures of 4-manifolds by cork twists. We study the exceptional Dehn surgeries along the Akbulut-Yasui links by using Martelli-Petronio-Roukema's results on exceptional Dehn surgeries on the minimally twisted five-chain link. Here, I thank to Y.Kabaya for his nice suggestion.

Friday, Jan 29

Jae Choon Cha (POSTECH)
Title: Casson towers, gropes, and disk embedding

Abstract: We prove that a height 4 Casson tower contains a flat embedded disc bounded by the attaching circle. This generalizes prior results of Freedman and Gompf-Singh. We also prove disc embedding results for height 2 and 3 Casson towers in a 4-manifold, with some additional fundamental group assumptions. In the proof, we employ capped gropes and develop a refined height raising technique. As an application, we present new classes of slice links. The main results are joint with Mark Powell.

Abstracts (parallel sessions)

Tuesday, Jan 26

Room 1 (E408)

Susumu Hirose (Tokyo University of Science)

A finite presentation for the hyperelliptic handlebody group

Abstract: A 3-dimensional handlebody $\mathbb{H}_g$ of genus g is an oriented 3-manifold constructed from a 3-ball with attaching g copies of 1-handles. The hyperelliptic handlebody group is a subgroup of the mapping class group of $\mathbb{H}_g$ whose elements commute with the hyperelliptic involution of $\mathbb{H}_g$. Under the correspondence, introduced by Birman and Hilden, between the hyperelliptic mapping class group of $\Sigma_g = \partial\mathbb{H}_g$ and the braid group on $2g+2$ strands, the hyperelliptic handlebody group corresponds to the wicket group for which Brendle and Hatcher gave a finite presentation. In this talk, we give a finite presentation for the hyperelliptic handlebody group by using this correspondence. This is a joint work with Eiko Kin.

Eiko Kin (Osaka University)

The asymptotic behavior of the minimal pseudo-Anosov dilatations in the hyperelliptic handlebody groups

Abstract: We consider the hyperelliptic handlebody group on a closed surface of genus g. This is the subgroup of the mapping class group on a closed surface of genus g consisting of isotopy classes of homeomorphisms on the surface that commute with some fixed hyperelliptic involution and that extend to homeomorphisms on the handlebody. We prove that the logarithm of the minimal dilatation (i.e, the minimal entropy) of all pseudo-Anosov elements in the hyperelliptic handlebody group of genus g is comparable to $1/g$. This means that the asymptotic behavior of the minimal pseudo-Anosov dilatation of the subgroup of genus g in question is the same as that of the ambient mapping class group of genus g. This is a joint work with Susumu Hirose.

Xiaoming Du (South China University of Technology)

Torsion generators of the mapping class groups

Abstract: We prove that for oriented closed surfaces of genus larger than 4, the mapping class groups can be generated by 4 torsion elements. Three generators are involutions and the forth one is an order 3 element.

Jianchun Wu (Soochow University)

Fixed subgroups are compressed in surface groups

Abstract: For a compact surface Σ (orientable or not, and with boundary or not) we show that the fixed subgroup, Fix$B$, of any family B of endomorphisms of $\pi_1(\Sigma)$ is compressed in $\pi_1(\Sigma)$ i.e., rank(Fix$B$)$\leqslant$ rank(H) for any subgroup Fix$B \leqslant H \leqslant \pi_1(\Sigma)$. On the way, we give a partial positive solution to the inertia conjecture, both for free and for surface groups. We also investigate direct products, G, of finitely many free and surface groups, and give a characterization of when G satisfies that rank(Fixϕ)$\leqslant$ rank(G) for every $\phi \in Aut(G)$. This is a joint work with Enric Ventura and Qiang Zhang.

Ximin Liu (Dalian University of Technology)

Finite Group Actions on Elliptic Surfaces

Abstract: Let $X = E(n)$ be the relatively minimal elliptic surface, where $n \geq 2$. In this talk, we consider homologically trivial, cyclic group actions on X, and some rigidity results are obtained.

Takefumi Nosaka (Kyushu University)

On the fundamental relative 3-classes of knot group representations

Abstract: Given any knot-group representation, we discuss the push-forward of the fundamental (relative) 3-class of the knot. This situation appears in some topological discussion, including the hyperbolic volume, Dijkgraaf- Witten invariant, triple cup product and Milnor link invariant etc. Then, the speaker succeeded in concretely describing a diagrammatic computation of the 3-class for every knot. Further, concerning the triple cup product, he gave a computation as a clear formula. The point is an observation of a bridge between the relative group homology and quandle homology.

Shunsuke Aimi (Hiroshima University)

Parabolic generating pairs of 2-bridge link groups

Abstract: Ian Agol announced a classification of meridian generating pairs of 2-bridge link groups. Donghi Lee and Makoto Sakuma gave an alternative proof to Agol's announcement for genus one hyperbolic 2-bridge knots by using small cancellation theory. In this talk, we give a progress report on our project to give an alternative proof of the classification theorem by using Alexander invariants.

Naoyuki Monden (Osaka Electro-Communication University)

Upper bounds on stable commutator lengths of Dehn twists

Abstract: Let $[G, G]$ denote the commutator subgroup of a group G. For $x \in [G, G]$, we define the commutator length $\mathrm{cl}_G(x)$ of x to be the smallest number of commutators in G whose product is equal to x. The stable commutator length $\mathrm{scl}_G(x)$ of x is the limit $\mathrm{scl}_G(x) = \lim_{n\to\infty} \mathrm{cl}_G(x^n)/n$. We give factorizations of powers of Dehn twists as products of commutators. As a corollary, we give new upper bounds on stable commutator lengths of Dehn twists. This talk includes joint work with Kazuya Yoshihara.

Tuesday, Jan 26

Room 2 (F415)

Yongju Bae (Kyungpook National University)
On an equivalence relation on the set of finite quandles

Abstract: We will introduce a relation on the set of finite quandles, in fact, on the set of quandle operations on a fixed finite sets, and prove that the relation is an equivalence relation. By using the partition of the set of quandle operations induced by the equivalence relation, we will try to study the properties of various invariants of quandles, e.g., the (inner) automorphism group, quandle (co)homology group, etc.

Akiko Shima (Tokai University)
Properties of CS-minimal charts

Abstract: Two charts are said to be CS-equivalent if one deforms to the other by a finite sequence of C-moves, conjugations, stabilizations and destabilizations. Let Γ be an n-chart, $w(\Gamma)$ the number of white vertices in Γ, and $f(\Gamma)$ the number of free edges in Γ. The pair $(w(\Gamma), n - f(\Gamma))$ is called the CS-complexity of Γ. A chart Γ is CS-minimal if its CS-complexity is minimal among the set of charts CS-equivalent to Γ with respect to the lexicographical order of the pair of integers. In this talk, we prove that if Γ is a CS-minimal chart with $w(\Gamma) = 6$, then Γ is CS-equivalent to the product of a ribbon chart and a 'chart' representing a 2-twist spun trefoil. This is a joint work with Teruo Nagase.

Inasa Nakamura (The University of Tokyo)
On addition of 1-handles with chart loops to 2-dimensional braids

Abstract: A 2-dimensional braid over an oriented surface-knot F is presented by a graph called a chart on a surface diagram of F. We consider 2-dimensional braids obtained from addition of 1-handles equipped with chart loops. We introduce moves of 1-handles with chart loops, called 1-handle moves, and we investigate how much we can simplify a 2-dimensional braid by using 1-handle moves.

Jieon Kim (Osaka City University, JSPS)

Shadow biquandle cocycle invariants of oriented surface-links

Abstract: A quandle is a set equipped with a binary operation satisfying certain axioms derived from the Reidemeister moves in knot theory. Quandle homology and cohomology theories have been studied extensively in recent years. L.H. Kauffman and D.E. Radford introduced a generalization of quandles, called biquandles and J.S. Carter, M. Elhamdadi and M. Saito defined a (co)homology theory and cocycle invariants for biquandles. J.S. Carter, S. Kamada and M. Saito defined shadow quandle colored diagrams and shadow quandle cocycle invariants of oriented links and surface-links. Surface-links are represented by broken surface diagrams and marked graph diagrams. In this talk, we'd like to introduce shadow biquandle colorings of oriented broken surface diagrams and those of oriented marked graph diagrams, and describe shadow biquandle cocycle invariants of oriented surface-links via broken surface diagrams and marked graph diagrams. This is a joint work with Sang Youl Lee.

Yuka Kotorii (The University of Tokyo)

On HBL-homotopy classes of 3-component handlebody-links with vanishing linking numbers

Abstract: A HBL-homotopy is an equivalence relation on handlebody-links generated by self-crossing changes. Mizusawa and Nikkuni showed that HBL-homotopy classes of 2-component handlebody-links are completely classified by linking numbers. In this talk, we give a bijection between HBL-homotopy classes of 3-compnent handlebody-links with vanishing linking numbers and 3-dimensional hyper matrix up to elementary transformations, by using Milnor's $\bar{\mu}$-invariants. Moreover, we construct an invariants of handlebody-links under HBL- homotopy. This is a joint work with Atsuhiko Mizusawa.

Shin'ya Okazaki (OCAMI)

Irreducibility of a handlebody-knot

Abstract: A handlebody-knot is a handlebody embedded in the 3-sphere. Last year, the speaker introduced an invariant for handlebody-knots which comes from the multivariable Alexander polynomial and showed there exist infinitely many handlebody-knots which are classified by this invariant. In this talk, we describe a sufficient condition that a handlebody-knot is irreducible as an application of the invariant.

Kodai Wada (Waseda University)

The Milnor invariants of clover links

Abstract: J.P. Levine introduced a clover link to investigate the indeterminacy of the Milnor invariants of a link. It is shown that for a clover link, the Milnor numbers of length at most $2k+1$ are well-defined if those of length at most k vanish, and that the Milnor numbers of length at least $2k+2$ are not well-defined if those of length $k+1$ survive. For a clover link c with the Milnor numbers of length at most k vanishing, we show that the Milnor number $\mu_c(I)$ for a sequence I is well-defined up to the greatest common devisor of $\mu_c(J)'s$, where J is a subsequence of I obtained by removing at least $k+1$ indices. Moreover, if I is a non-repeated sequence with length $2k+2$, the possible range of $\mu_c(I)$ is given explicitly. As an application, we give an edge-homotopy classification of 4-clover links. This is a joint work with Akira Yasuhara.

Ikuo Tayama (Osaka City University)

Representing 3-manifolds in the complex number plane

Abstract: A complete invariant defined for (closed, connected, orientable) 3-manifolds is an invariant defined for the 3-manifolds such that any two 3-manifolds with the same invariant are homeomorphic. Further, if the 3-manifold itself is reconstructed from the data of the complete invariant, then it is called a characteristic invariant defined for the 3-manifolds. In this talk, a complex number-valued characteristic invariant for the 3-manifolds whose norm is smaller than or equal to one half is introduced by using an embedding of a set of lattice points called the ADelta set into the set of complex numbers. By using this complex number-valued characteristic invariant, a holomorphic function with the unit open disk as the definition domain is constructed as the characteristic invariant for the 3-manifolds. This is a joint work with Akio Kawauchi.

Tuesday, Jan 26

Room 3 (F215)

Hyoungjun Kim (Korea University)
Intrinsically knotted graphs and the restoring argument

Abstract: A graph is intrinsically knotted if every embedding contains a knotted cycle. It is known that a intrinsically knotted graph is not 2-apex. The restoring argument is a constructing operation that constructs the graph from the given incomplete connection while avoiding being the graph 2-apex as much as possible. By using this operation, we classify triangle-free intrinsically knotted graphs with 22 edges which has exactly one degree 5 vertex.

Hwa Jeong Lee (KAIST)
Knot mosaic tabulation

Abstract: In 2008, Lomonaco and Kauffman introduced a knot mosaic system to define a quantum knot system. A quantum knot is used to describe a physical quantum system such as the topology or status of vortexing that occurs on a small scale can not see. Kuriya and Shehab proved that knot mosaic type is a complete invariant of tame knots. In this talk, we consider the mosaic number of a knot which is a natural and fundamental knot invariant defined in the knot mosaic system. We determine the mosaic number for all eight-crossing or fewer prime knots. This is a joint work with Lewis Ludwig, Joseph Paat, and Amanda Peiffer.

Youngjin Bae (IBS Center for Geometry and Physics)
Legendrian singular links and singular connected sums

Abstract: We study Legendrian singular links up to contact isotopy. Using a special property of the singular points, we can define the singular connected sum of Legendrian singular links. This concept is a generalization of the connected sum and can be interpreted as a kind of tangle replacement. This method provides a way to classify Legendrian singular links.

Atsushi Mochizuki (Kyoto University (RIMS))

On the Casson-Walker invariant for 3-manifolds admitting genus one open book decompositions

Abstract: An open book decomposition of a 3-manifold is a presentation of the 3-manifold as a union of solid tori and a mapping torus of a homeomorphism of a surface with boundary. In this talk, I calculate the Casson-Walker invariant of rational homology 3-spheres admitting genus one open book decompositions.

Tao Li (Boston College)

Tunnel numbers of satellite knots

Abstract: We prove that the tunnel number of a satellite knot is no smaller than the tunnel number of its companion. We also discussion a relation between Heegaard genus and degree-one maps.

Yimu Zhang (Jilin University)

Alternating diagrams and solenoids

Abstract: We find all Heegaard diagrams with the property "alternating" or "weakly alternating" on a genus two orientable closed surface.

Using these diagrams we give infinitely many genus two 3–manifolds, each admits an automorphism whose non-wondering set consists of two Williams solenoids, one attractor and one repeller. These manifolds contain half of Prism manifolds, Poincaré's homology 3–sphere and many other Seifert manifolds, all integer Dehn surgeries on the figure eight knot, also many connected sums. The result shows that many kinds of 3–manifolds admit a kind of "translation" with certain stability. This is a joint work with Chao Wang.

Chao Wang (University of Science and Technology of China)

Half unknotted 2-orbifolds in orientable spherical 3-orbifolds

Abstract: If an embedding of a 2-orbifold in an orientable spherical 3-orbifold splits the 3-orbifold into two parts, and at least one part is a handlebody orbifold, then we call it half unknotted. We will give some algebraic conditions on the embedding such that it is half unknotted. The results will be applied to questions about extendable actions on surfaces. For example, we can show that embeddings realizing the maximum order of extendable cyclic actions on genus $g > 1$ surfaces must be unknotted. This is a joint work with Yimu Zhang.

Yanqing Zou (Dalian Minzu University)

3-manifolds admitting Locally large distance two Heegaard splittings

Abstract: We introduce the definition of a locally large geodesic in curve complex and also a locally large distance two Heegaard splitting. Then we discuss the geometry of a 3-manifold admitting a locally large distance two Heegaard splitting.

Wednesday, Jan 27

Room 1 (E408)

Boju Jiang (Peking University)
On the skein polynomial for knots and links

Abstract: We report a new characterization of the HOMFLY polynomial. The usual 'smoothing a crossing' move is not used. As by-product we obtain a characterization of HOMFLY polynomial in the realm of knots.

Xian'an Jin (Xiamen University)
Zeros of Jones polynomials of graphs

Abstract: Motivated by the Jones polynomial of knots and links, we introduce the Jones polynomial of a graph $G = (V, E)$ with k components as the following specialization of the Tutte polynomial:

$$J_G(t) = (-1)^{|V|-k} t^{|E|-|V|+k} T_G(-t, -t^{-1}).$$

Its basic properties and certain extreme coefficients will be firstly given. Then we prove:
(1) $(-\infty, 0]$ is a zero-free interval of Jones polynomials of connected bridgeless graphs while for any small $\epsilon > 0$ or large $M > 0$, there is a zero of the Jones polynomial of a plane graph in $(0, \epsilon)$, $(1-\epsilon, 1)$, $(1, 1+\epsilon)$ or $(M, +\infty)$.
(2) Let $r(G)$ be the maximum moduli of zeros of $J_G(t)$. By applying Sokal's result on zeros of Potts model partition functions and Lucas's theorem, we prove that

$$\frac{q_s - |V| + 1}{|E|} \leq r(G) < 1 + 6.907652\Delta_G$$

for any connected bridgeless and loopless graph $G = (V, E)$ of maximum degree Δ_G with q_s parallel classes.

As a consequence of the upper bound, X.-S. Lin's conjecture holds if the positive checkerboard graph of a connected alternating link has a fixed maximum degree and a sufficiently large number of edges.

This is a joint work with Fengming Dong.

Zhiqing Yang (Dalian University of Technology)

Techniques for constructing knot invariants

Abstract: We introduce a few techniques for constructing knot invariants. 1. Instead of defining knot invariants on knot diagrams, we extend the domain to marked diagrams. Then there are more freedom to change the skein relations. 2. The usual skein relation is a homogenous linear equation. We can add a constant term to get a none homogenous linear equation. 3. We divide crossing points into different types, and use different skein relations.

Using those techniques, knot invariant become more powerful the classical invariants. We then give some examples.

Naoko Kamada (Nagoya City University)

Converting a virtual link diagram to a normal one

Abstract: A virtual link diagram is called normal if it admits a checkerboard coloring. H. Dye introduces the notion of cut points so that any virtual link diagram becomes normal by inserting cut points. In this talk, we give a method of converting a virtual link diagram to a normal one using the double covering. We discuss a relationship between Dye's method using cut points and our method.

Tsukasa Yashiro (Sultan Qaboos University)

On a surface-knot invariant obtained from surface-knot diagram

Abstract: A surface-knot is a closed oriented surface embedded in 4-space. A surface-knot diagram of a surface-knot is the projected image in 3-space under the orthogonal projection with crossing information. The pre-image of multiple point sets of a surface-knot diagram is called a double decker set that is the union of lower and upper decker sets. The lower decker set induces a complex consisting of rectangular cells. We define pseudo-cycles in the complex. In this talk, we define a surface-knot invariant using the pseudo-cycles.

Hideo Takioka (OCAMI)

On knots with clasp number at most two

Abstract: It is known that every knot bounds a singular disk with only clasp singularities, which is called a clasp disk. The clasp number of a knot is the minimum number of clasp singularities among all clasp disks of the knot. In this talk, we give some results on knots with clasp number at most two by applying the Conway and Γ-polynomials, where the Γ-polynomial is the common zeroth coefficient polynomial of both the HOMFLYPT and Kauffman polynomials.

Ho Lee (KAIST)

Non semi-alternating mutant knots which have the same arc index

Abstract: For non semi-alternating knots, we want to know whether the arc index is invariant under mutation or not. We find some classes of non semi-alternating mutant knots which have the same arc index.

Wednesday, Jan 27

Room 2 (F415)

Sangbum Cho (Hanyang University)

Haken spheres for genus two Heegaard splittings

Abstract: A manifold which admits a reducible genus two Heegaard splitting is one of the 3-sphere, $S^2 \times S^1$, lens spaces or their connected sums. For each of those splittings, the complex of Haken spheres is defined. When the manifold is the 3-sphere, $S^2 \times S^1$ or the connected sum whose summands are lens spaces or $S^2 \times S^1$, the combinatorial structure of the complex has been studied by several authors. In particular, it was shown that those complexes are all contractible. In this talk, we look at the remaining cases, that is, when the manifolds are lens spaces. We give a precise description of each of the complexes for the genus two Heegaard splittings of lens spaces. A remarkable fact is that the complexes for most lens spaces are not contractible and even not connected. This is a joint work with Yuya Koda.

Jung Hoon Lee (Chonbuk National University)

Bridge surfaces with the topological minimality preserved by perturbation

Abstract: We show that except for $n = 2$ if a bridge surface for a knot is an index n topologically minimal surface, then after a perturbation it is still topologically minimal with index at most $n + 1$.

Sangyop Lee (Chung-Ang University)

Four-punctured spheres in the exteriors of knots

Abstract: We show that every essential four-punctured sphere in the exterior of a knot is meridional.

Kun Du (Lanzhou University)

A simple proof of Gordon's Conjecture

Abstract: In this talk, we give a simple proof of Gordon's Conjecture.

Hirotaka Akiyoshi (Osaka City University)

Ford domains for cone hyperbolic manifolds

Abstract: The Ford domain for a hyperbolic 3-manifold is a fundamental domain for the action of its fundamental group on the hyperbolic 3-space. It is known that the Ford domain for a hyperbolic knot complement is the geometric dual of the Epstein-Penner's canonical decomposition. In this talk, we generalize the notion of Ford domains for a certain class of cone hyperbolic 3-manifolds, and see several examples.

Mikio Furokawa (Hiroshima University)

A certain family of once-punctured Klein bottle groups commensurable with once-punctured torus groups

Abstract: The once-punctured torus and the once-punctured Klein bottle are topologically commensurable, in the sense that both of them are doubly covered by the twice-punctured torus. In my talk at the 10th East Asian School, I gave a condition for a faithful type-preserving PSL(2,C)-representation of the fundamental group of the once-punctured Klein bottle to be "commensurable" with that of the once-punctured torus. In this talk, we show that such a pair of PSL(2,C)-representations extend to a representation of the fundamental group of a common quotient orbifold. If time permits, we also describe what happens if we drop the faithfulness of the representations.

Naoki Sakata (Hiroshima University)

Veering structures of the canonical decompositions of hyperbolic fibered two-bridge link complements

Abstract: Agol introduced the concept of a veering structure of a taut triangulation. In my previous work, I have proved that the canonical decompositions of hyperbolic fibered two-bridge link complements are layered. This implies that they admit taut structures. In this talk, we completely determine those canonical decompositions of hyperbolic fibered two-bridge link complements which are veering with respect to the taut structures.

Wednesday, Jan 27

Room 3 (F215)

Taehee Kim (Konkuk University)

Topologically and smoothly doubly slice knots

Abstract: A knot in the 3-sphere is topologically (resp. smoothly) doubly slice if it is a slice of a topologically (resp. smoothly) unknotted 2-sphere in the 4-sphere. In this talk, I will give a new example of smoothly slice, topologically doubly slice, but not smoothly doubly slice knots. This is joint work with Se-Goo Kim.

Kyungbae Park (Korea Institute for Advanced Study (KIAS))

The Upsilon invariant in branched covers

Abstract: Recently, Ozsváth, Stipsicz and Szabó introduced a function valued knot concordance invariant, called Upsilon, using a modified version of knot Floer homology. We study analogous invariants by considering the knot Floer homology of the preimage of a knot in the cyclic branched covers of 3-sphere along the knot. In this talk we introduce the invariants, their properties and applications. This is a joint work with Min Hoon Kim.

Min Hoon Kim (KIAS)

Rasmussen s-invariants of satellites do not detect slice knots

Abstract: In his work on the knot Floer homology of cabled knots, Hedden asked a question: "Does the Rasmussen s-invariant, applied to all iterated cables of K, determine whether K is smoothly slice?" In this talk, we present a large family of knots for which the Rasmussen s-invariants of satellites do not detect sliceness. This answers Hedden's question in the negative. The proof hinges on work of Kronheimer-Mrowka and Cochran-Harvey-Horn. This is joint work with Prof. Jae Choon Cha.

Hironobu Naoe (Tohoku University)

Infinitely many corks with special 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 special shadow complexity one among the 4-manifolds constructed from contractible special polyhedra having one true vertex by using the notion of Turaev's shadow.

Takahiro Oba (Tokyo Institute of Technology)

Compact Stein surfaces as branched covers with same branch sets

Abstract: Loi and Piergallini showed that any compact Stein surface is the total space of a simple branched covering of a 4-disk whose branch set is a positive braided surface. They also showed that the opposite is true. Unfortunately, although the fact is well-known, little is known about how Stein structures behave towards positive braided surfaces. In this talk, we give an infinite family of positive braided surfaces as branch sets of simple branched coverings whose total spaces are all diffeomorphic but admit mutually different Stein structures.

Juhyun Lee (IBS CGP)

The existence of dividing curve minimizing convex fiber

Abstract: We show that if a surface bundle over the circle admits a tight contact structure, there exists a dividing curve components minimizing convex fiber. This can help classifying tight contact structures on surface bundles over the circle.

Youlin Li (Shanghai Jiao Tong University)

Hyperbolic 3-manifolds admitting no fillable contact structures

Abstract: Using the correction terms in Heegaard Floer theory, we find infinite examples of hyperbolic 3-manifolds that admit no weakly symplectically fillable contact structures. This is joint work with Yajing Liu.

Thursday, Jan 28

Room 1 (E408)

Seiichi Kamada (Osaka City University)
Normal forms of immersed surface-links and ribbon-clasp surface-links

Abstract: We generalize the notion of a normal form of embedded surface-links to the case of immersed surface-links and prove that any immersed surface-link can be described in a normal form. It is known that an embedded surface-link is a ribbon surface-link if and only if it can be described in a symmetric normal form. We prove that an immersed surface-link is a ribbon-clasp surface-link if and only if it can be described in a symmetric normal form. We also introduce the notion of a ribbon-clasp normal form, which is a simpler version of a symmetric normal form. This is a joint work with Kengo Kawamura.

Kengo Kawamura (Osaka City University)
Singular surface-knots and quandle (co)homology groups

Abstract: A singular surface-knot is a closed connected surface immersed in $\mathbb{R}^4$. In this talk, we introduce quandle (co)homology groups deeply related to diagrams of singular surface-knots.

Kaori Hasegawa (Osaka City University)
Cocycle invariants of the dihedral qualgebra of order 6

Abstract: A qualgebra is a quandle with a multiplication. By using a qualgebra, V. Lebed defined colorings and cocycle invariants of spatial trivalent graphs. We consider the qualgebra obtained from the dihedral group of order 6. We show some examples of shadow 2-cocycles of the qualgebra, and calculate cocycle invariants for some spatial trivalent graphs.

Byeorhi Kim (Kyungpook National University)
On the inner automorphism groups of finite quandles

Abstract: Let Q be a finite set. Let $*_1$ and $*_2$ be two quandle operations on Q. Then the product $*_1*_2 : Q \times Q \to Q$ defined by $a *_1*_2 b = (a *_1 b) *_2 b,\ a, b \in Q$, is not a quandle operation in general. In this talk, we will study the relationship between the inner automorphism groups $Inn(Q, *_1), Inn(Q, *_2)$ and $Inn(Q, *_1*_2)$ in the case that $(Q, *_1*_2)$ is a quandle.

Takao Matumoto (Kyoto University)

Smooth unknotting conjecture in dimension four

Abstract: The conjecture was reduced to the following conjecture assuming a generalization of Markov type theorem due to S. Kamada. See RIMS kokyuroku 1766(2011), 1-14. (If we have a time, we will discuss also this part.)
Conjecture: Any one-parameter family of simple singular surface braids with at most a pair of cusp birth and death between a non-singular surface braid and a trivial one can be simplified to be without double points keeping two ends unchanged.
The above conjecture will be proved by using the fact that if $w\sigma_{i_1}^2 w^{-1} = \sigma_{i_2}^2$ then the word w can be simplified until the identity element e by the following three kinds of steps:
(1) $x\sigma_i^2 x^{-1} = \sigma_i^2 \ \ (x \sim e)$,
(2) $\sigma_k^{\epsilon}\sigma_i^2\sigma_k^{-\epsilon} = \sigma_i^2 \ \ (|i-k| \neq 1, \epsilon = \pm 1)$ and
(3) $\sigma_i^{\epsilon}\sigma_j^{\epsilon}\sigma_i^2\sigma_j^{-\epsilon}\sigma_i^{-\epsilon} = \sigma_j^2 \ \ (|i-j| = 1, \epsilon = \pm 1)$.

Amal Al-Kharusi (Sultan Qaboos University)

No orientable surface-knot of genus one has the triple point number two

Abstract: The triple point number of a surface-knot F, denoted by $t(F)$, is the minimum number of triple points taken over all possible diagrams representing it. It is known that there is no surface-knot F with triple point number one. It is also proved that if F is a non-ribbon 2-knot, then $t(F) \geq 4$. In this talk, we show that there is no surface-knot of genus one with triple point number two by using quandle colourings of surface diagrams.

Hitesh Raundal (IISER Pune)

Spaces of Polynomial Knots

Abstract: For $d \geq 2$, let $\mathcal{A}_d$ be the set of all polynomial maps $(f, g, h) : \mathbb{R} \to \mathbb{R}^3$ such that $\deg(f) \leq d-2$, $\deg(g) \leq d-1$ and $\deg(h) \leq d$. This set can be identified with $\mathbb{R}^{3d}$ and it has a topological structure which is inherited from the topology of $\mathbb{R}^{3d}$. We discuss the subspaces $\mathcal{O}_d$, $\mathcal{P}_d$ and $\mathcal{Q}_d$ of the space $\mathcal{A}_d$, where $\mathcal{O}_d$ is the set of all polynomial knots in $\mathcal{A}_d$, $\mathcal{P}_d$ is the set of all polynomial knots $(f, g, h) : \mathbb{R} \to \mathbb{R}^3$ such that $\deg(f) < \deg(g) < \deg(h) \leq d$, and $\mathcal{Q}_d$ is the set of all polynomial knots $(u, v, w) : \mathbb{R} \to \mathbb{R}^3$ for which $\deg(u) = d-2$, $\deg(v) = d-1$ and $\deg(w) = d$. All these spaces are homeomorphic to semialgebraic subsets of $\mathbb{R}^{3d}$ and hence they have only finitely many path components. If two polynomial knots in $\mathcal{Q}_d$ are connected by a path in it, then they are topologically equivalent; however, the converse is not true. For $d \geq 3$, we show that the space $\mathcal{P}_d$ is path connected, and the space $\mathcal{O}_d$ has homotopy

type of S^2. The interesting thing is that the space $\mathcal{P}$ of all polynomial knots with the inductive limit topology of the stratification $\mathcal{P} = \bigcup_{d\geq 2} \mathcal{O}_d$ also has homotopy type of S^2. Moreover, every polynomial knot is connected to some trivial polynomial knot by a smooth isotopy $F : [0,1] \times \mathbb{R} \to \mathbb{R}^3$ such that for each $s \in [0,1]$, the map $F_s = F(s,\cdot)$ is a polynomial knot.

Shin Satoh (Kobe University)

Dehn colored knot diagrams

Abstract: Dehn n-coloring for a knot diagram is an assignment of an integer from 0 to $n-1$ to each complementary region of the diagram with a certain condition. We prove that any effective Dehn n-coloring with $n > 3$ needs at least four colors among 0 to $n-1$, and in the case $n = 5$, any 5-colorable knot has a diagram equipped with a non-trivial Dehn 5-coloring for which exactly four colors are used. We also study a Dehn coloring for a surface-knot diagram.

Thursday, Jan 28

Room 2 (F415)

Seungsang Oh (Korea University)

Combinatorics on two-dimensional lattice models

Abstract: We will introduce the state matrix recursion algorithm producing recursive formulae for generating functions related to combinatorics problems on two-dimensional lattice models.

Seong Gu Jeong (KAIST)

Geometry of complexes of non-crossing partitions

Abstract: By using a decomposition of the complex of non-crossing partition of n, we show that they are CAT(0) under the ortho-scheme metric for small n. This is an alternative proof of the fact that the n-braid is CAT(0) by Brady and McCammond for $n \leq 5$ and by Haettel, Kielak and Schwer for $n = 6$.

Qiang Zhang (Xi'an Jiaotong University)

Bounds for fixed points on hyperbolic manifolds

Abstract: For a homeomorphism $f : M \to M$ of a compact hyperbolic n-manifold M with $n \geq 3$, we show that there exists a finite bound $\mathcal{B}$ for any fixed point class $\mathbf{F}$ of f, the index $|\mathrm{ind}(f, \mathbf{F})| \leq \mathcal{B}$, which is a partial positive answer of a question given by Boju Jiang. Moreover, when M is a compact hyperbolic 3-manifold, a compact hyperbolic 4-manifold, or a compact hyperbolic n-manifold ($n \geq 5$) with isometry group a p-group, we give some explicit descriptions of the bound $\mathcal{B}$.

Taizo Kanenobu (Osaka City University)

Nakanishi's criterion on Gordian distance one knots and band surgery

Abstract: Using Nakanishi's criterion on knots with Gordian distance one, we deduce a criterion on knots and links which are related by a band surgery. We also give a criterion on knots with $H(2)$-Gordian distance two by using a special value of the Jones polynomial. Then we give an improved table of $H(2)$-Gordian distances between knots with up to seven crossings, where we add Zeković's result.

Saori Kanenobu (Kobe University)

The OU sequences for the figure-eight knot

Abstract: We go along a knot diagram, and get a sequence of over- and under-crossing points. We will study which kinds of sequences are realized by diagrams of the figure-eight knot.

María de los Angeles Guevara Hernández
(Instituto Potosino de Investigaci, Osaka City University)

Families of non-alternating knots

Abstract: First, we will give formulas to calculate the Homfly polynomial of knots formed by 3-tangles. Then, we will construct families of non-alternating knots and give explicit formulas to calculate the Alexander polynomial of them. The knots in these families are prime and of alternation number one. We also give several properties of the knots in these families. The families contain the first non-alternating knots: 8_{19}, 8_{20}, 8_{21}.

Takuji Nakamura (Osaka Electro-Communication University)

A characterization of a knot with a trefoil factor by Fox 3-coloring

Abstract: For any non-trivially 3-colored knot diagram D, the number of arcs of D colored with 0, 1, or 2 is greater than or equal to one, respectively. In this talk, we show that a knot K has a trefoil factor if and only if K can be presented by a non-trivially 3-colored diagram which has only one arc colored with one of the three. This is a joint work with Pedro Lopes and Shin Satoh.

Thursday, Jan 28

Room 3 (F215)

Sang-Jin Lee (Konkuk University)

Embeddability between RAAGs and immersion of graphs

Abstract: For a finite simplicial graph Γ, let $G(\Gamma)$ denote the right-angled Artin group on the complement graph of Γ. In the talk, we introduce the notions of "induced path lifting property" and "semi-induced path lifting property"for immersions between graphs,and obtain graph theoretical criteria for the embedability between right-angled Artin groups. We recover the result of Sang-hyun Kim and Thomas Koberda that an arbitrary $G(\Gamma)$ admits a quasi-isometric group embedding into $G(T)$ for some finite tree T. The upper bound on the number of vertices of T is improved from a double exponential function to an exponential function in the number of vertices of Γ. This is a joint work with E.-K. Lee.

Youngjin Cho (KAIST)

Automorphism groups of connected, large-type, triangle-free Artin groups

Abstract: John Crisp studied a class of Artin groups that do not uniquely determine their defining diagrams and he listed types of generators for automorphism groups of these Artin groups. They are inversions, partial and global conjugations and graph isomorphisms among diagrams that defines the same Artin group. The last type causes difficulties in finding presentations of the automorphism groups. We show that a graph isomorphism can be decomposed into graph automorphisms and switch isomorphisms and an automorphism group of an Artin group in this class can be written as an iterated semidirect product of the four subgroups generated by four types of generators.

Sangrok O (KAIST)

Quasi-isometries between graph 2-braid groups and right-angled Artin groups

Abstract: Quasi-isometries between graph 2-braid groups and right-angled Artin groups preserve the maximal product sub-complexes. From this fact, we show that some graph 2-braid groups are not quasi-isometric to right-angled Artin groups though they are simply commutator related.

Hyo Won Park (PMI, POSTECH)

On a class of right-angled Artin groups

Abstract: Let C be the class of right-angled Artin groups (RAAGs) whose defining graphs have neither a square nor a path with 4 vertices as induced subgraphs. We show that a RAAG is in C if and only if its every finite index subgroup is a RAAG. We classify RAAGs in the class up to quasi-isometry and show that if two RAAGs in the class are quasi-isometric then they are commensurable.

Erika Kuno (Tokyo Institute of Technology)

Right-angled Artin groups on finite subgraphs of disk graphs

Abstract: We prove that if a graph Γ is a (full-)subgraph of a disk graph, then the right-angled Artin group (RAAG) $A(\Gamma)$ is a subgroup of the corresponding handlebody group. On the other hand, we show that there is a graph which is not contained some disk graphs, but the RAAG is a subgroup of the corresponding handlebody groups.

Takuya Katayama (Hiroshima University)

RAAGs in knot groups

Abstract: A right-angled Artin group (RAAG) associated to a finite simplicial graph Γ is a group given by the following presentation:

$$A(\Gamma) = \langle\ V(\Gamma)\ \mid\ [v_i, v_j] = 1 \text{ whenever } \{v_i, v_j\} \in\ E(\Gamma)\ \rangle$$

In 2003, Crisp-Wiest considered embeddings from surface groups to RAAGs and proved that most surface groups can be embedded in RAAGs. Recently, Agol, Liu, Przytycki, Wise et al. considered "virtual" embeddings from the fundamental groups of compact aspherical 3-manifolds to RAAGs and obtained deep theorems such as Virtual Haken Conjecture for 3-manifolds. In this talk, we consider embeddings from RAAGs to knot groups, and we give a complete classification of RAAGs which admit embeddings into the knot group of K for each knot K in S^3.

In Dae Jong (Kindai University)

Chirally cosmetic fillings on a hyperbolic manifold

Abstract: A pair of Dehn fillings on a 3-manifold with a torus boundary are called *chirally cosmetic* if the obtained pair of manifolds are orientation reversingly homeomorphic. Cosmetic fillings on a 3-manifold are said to be *exotic* if there is no self-homeomorphism of the manifold which takes one of the surgery slopes into the other. We will present the first example of a pair of exotic cosmetic fillings on a hyperbolic 3-manifold yielding closed hyperbolic 3-manifolds. This gives a counterexample to the conjecture raised by Bleiler, Hodgson and Weeks. This is a joint work with Kazuhiro Ichihara (Nihon University).

Kazuhiro Ichihara (Nihon University)

Thin position for incompressible surfaces in 3-manifolds

Abstract: First I will talk about an algorithm to build Haken 3-manifolds. Precisely I will explain our algorithm to build all compact orientable atoroidal Haken 3-manifolds with tori boundary or all closed orientable Haken 3-manifolds, so that in both cases, there are embedded closed orientable separating incompressible surfaces which are not tori. Next, relations of such incompressible surfaces and Heegaard splittings will be considered. To describe the relation, the key is to apply a thin position method for such surfaces. This talk is based on a joint work with Makoto Ozawa and J. Hyam Rubinstein.