TITLES AND ABSTRACTS

Tetsuya Abe. Knots with infinitely many non-characterizing slopes.

A slope r is characterizing for a knot K in the 3-sphere if a knot K' is isotopic to K whenever the result of r-surgery on K' is orientation-preservingly homeomorphic to the result of r-surgery on K. In this talk, we prove that 6_3 has infinitely many non-characterizing slopes using the (generalized) annulus twist construction, which was developed by the speaker, Jong, Luecke, and Osoinach, which affirmatively answers a question by Baker and Motegi. We also give an alternative proof of the above result by using Baker-Motegi's technique, and prove that two proofs are the same. Finally, we introduce the notion of "trivial" for annulus twists, and study the property on trivial annulus twists. As a byproduct, we obtain a new method to construct equivalent knots in a 3-manifold which might be non-isotopic.

Peter Feller. Möbius bands in $B^3 \times S^1$ and the square peg problem.

Using an idea of Hugelmeyer's, we give a knot theory reproof of the following theorem. Every smooth Jordan curve in the Euclidean plane has an inscribed square. Our knot theory result, which allows the above application, is the following. For integers $n > 1$ that are not squares, the torus knot $T(1, 2n)$ in $S^2 \times S^1$ does not arise as the boundary of a locally-flat Möbius band in $B^3 \times S^1$. For context, we note that for $n > 2$ and the smooth setting, this result follows from a result of Batson's about the non-orientable 4-genus of certain torus knots. However, we show that Batson's result does not hold in the locally flat category: the smooth and topological non-orientable 4-genus differ for the $T(9, 10)$ torus knot in S^3. We will comment on how our locally flat knot theory result provides a result for Jordan curves with a weaker regularity assumption.

Josh Greene. On loops intersecting at most once.

How many simple closed curves can you draw on the surface of genus g in such a way that no two are isotopic and no two intersect in more than k points? It is known how to draw a collection in which the number of curves grows as a polynomial in g of degree $k + 1$, and conjecturally, this is the best possible. I will describe a proof of an upper bound that matches this function up to a factor of $\log(g)$. It is based on an elegant geometric argument due to Przytycki and employs some novel ideas blending covering spaces and probabilistic combinatorics.

Tetsuya Ito. Bennequin inequality and strongly quasipositive braids in annulus open books.

A closed braid b is naturally regarded as a transverse knot(link) in a standard contact S^3. It is widely known that Bennequin's inequality is an equality when b is strongly quasipositive. so it is interesting to ask whether the converse is true or not: if Bennequin's inequality is equality for a transverse knot K is equality, then is it possible to represent K by a strongly quasipositive braid? In the previous work with Kawamuro, we observed this is indeed true, under the assumption that the

FDTC of b is greater than one. In this talk we give a generalization of this result for closed braids in annulus open book.

Tamas Kalman. Tight contact structures on Seifert surface complements.

In joint work with Daniel Mathews, we examined complements of standard Seifert surfaces of special alternating links and used Honda?s method to enumerate those tight contact structures on them whose dividing sets are isotopic to the link. The number turns out to be the leading coefficient of the Alexander polynomial. The Euler classes of the contact structures are described combinatorially as hypertrees in a certain hypergraph. Using earlier results with Hitoshi Murakami and Alexander Postnikov, this yields a connection between contact topology and the Homfly polynomial. We also found that the contact invariants of our structures form a basis for the sutured Floer homology of the manifold.

Sungkyung Kang. The strong homotopy fusion number of ribbon knots.

The fusion number of a ribbon knot K is the minimal number of 1-handles needed to construct a ribbon disk for K. The strong homotopy fusion number of a ribbon knot K is the minimal number of 2-handles in a handle decomposition of a ribbon disk complement. The strong homotopy fusion number is a lower bound for the fusion number. We give examples of ribbon knots with strong homotopy fusion number one and arbitrarily large fusion number. Our main tools are Juhasz-Miller-Zemke's bound on fusion number coming from the torsion order of knot Floer homology and Hanselman-Watson's cabling formula for immersed curves.

Min Hoon Kim. Freely slice links.

The still open topological surgery conjecture for 4-manifolds is equivalent to the statement that all good boundary links are freely slice. In this talk, I will show that every good boundary link with a pair of derivative links on a Seifert surface satisfying a homotopically trivial plus assumption is freely slice. This subsumes all previously known methods for freely slicing good boundary links with two or more components, and provides new freely slice links. This is joint work with Jae Choon Cha and Mark Powell.

Seungwon Kim. Turaev genus and quasi alternating links.

Turaev genus is an invariant of links which measures how far a given link is from being alternating. There are only few methods to compute Turaev genus, using knot Floer homology, Khovanov homology and signature. In this talk, we introduce a new lower bound of Turaev genus using Lobb's $\mathfrak{sl}(n)$ concordance invariant. As an application, we show that for any positive integer g, we can find a quasi-alternating knot with Turaev genus g, which answers the question originally asked by Champanerkar and Kofman. This is a joint work with Sungkyung Kang and Hongtaek Jung.

Andrew Lobb. Concordance and $\mathfrak{sl}(n)$ knot cohomologies.

I shall talk about past and ongoing work with Lukas Lewark in extracting concordance information from Khovanov-Rozansky quantum $\mathfrak{sl}(n)$ knot cohomologies. In particular I'll discuss a homomorphism from the concordance group to a certain abelian group of indecomposable cochain complexes. The $\mathfrak{sl}(2)$ (Khovanov homology) case is equivalent to Rasmussen's invariant. But for new applications one can even use $\mathfrak{sl}(3)$ cohomology over the field of two elements. Doing this, we find an infinitely generated free subgroup (generated by quasi-alternating knots) in the quotient of the concordance group by quasipositive knots. No prior knowledge of quantum knot cohomologies will be assumed.

Allison Moore. Surgery, higher-order linking and Heegaard Floer homology.

Heegaard Floer homology is an extensive package of invariants associated to a closed, oriented three-manifold equipped with a Spin^c structure. One particularly useful piece of this package is the d-invariant, which is defined as the maximal grading of a non-torsion class in the Heegaard Floer module. Such d-invariants are in general difficult to compute. We will discuss how to leverage the "mapping cone" formula of Heegaard Floer homology in order to describe the d-invariants of integral surgeries along certain knots and links. We will also establish some new relations between higher-order linking invariants (in particular, the Sato-Levine invariant and Milnor's triple linking number) and the link Floer complex and use this to study Dehn surgery along links of several components.

Patrick Orson. Topologically embedding spheres in knot traces.

Given a compact topological 4-manifold X, when can a homotopy class in $\pi_2(X)$ be represented by a locally flatly embedded 2-sphere? This basic question has been studied by many authors in the case that X has no boundary. I will discuss the question for knot traces. These are manifolds with boundary, that are homotopic to the 2-sphere, and obtained by attaching a 2-handle to the 4-ball along a framed knot in the 3-sphere. I will describe recent joint work, where we completely characterise when this homotopy 2-sphere can be represented by a locally flat embedding with abelian exterior fundamental group. The answer is in terms of classical and computable invariants of the knot.

Radmila Sazdanovic. Computing torsion of Khovanov homology.

In the integral Khovanov homology of links, the presence of odd torsion is rare. Khovanov homology of homologically thin links only contains $\mathbb{Z}_2$ torsion. We prove a local version of this result and apply it to an infinite family of 3-braids, strictly containing all 3-strand torus links. This provides a partial answer to Sazdanovic and Przytycki's conjecture that 3-braids have only $\mathbb{Z}_2$ torsion in Khovanov homology. We provide explicit computations of integral Khovanov homology for all links in this family. Additionally, we prove an upper bound on the order of the torsion part of Khovanov homology in terms of the crossing number of the link. This is a joint work with A. Chandler, A. Lowrance, and V. Summers.

Robert Tang. Coarse and fine geometry of the saddle connection graph.

For a translation surface, the associated saddle connection graph has saddle connections as vertices, and edges connecting pairs of non-crossing saddle connections. This can be viewed as an induced subgraph of the arc graph of the surface. In this talk, I will discuss both the fine and coarse geometry of the saddle connection graph. We prove that the isometry type is rigid: any isomorphism between two such graphs is induced by an affine diffeomorphism between the underlying translation surfaces. However, the situation is completely different when one considers the quasi-isometry type: all saddle connection graphs form a single quasi-isometry class. Both parts are based on joint work with Valentina Disarlo, Huiping Pan, and Anja Randecker.

Motoo Tange. Lens space knot polynomials and the genus-2 Heegaard splitting of S^3.

Ozsváth and Szabó proved that Alexander polynomials of lens space knots in S^3 (aka lens space knot polynomials) have special properties; flat and alternating. These restrictions have given various constraints for lens space knots in S^3. On the other hand, studying S^3-surgery in lens spaces, Saito gave some restrictions of $(1,1)$-bridge knots in lens spaces yielding S^3 by using wave. We show that the latter result can be proven by using non-zero curves of lens space knots, which is induced by the flatness of lens space knot polynomials.

Masakazu Teragaito. Formal semigroups and Alexander polynomials of doubly primitive knots.

For any L-space knot, the formal semigroup can be defined via its Alexander polynomial. I will examine the formal semigroups and the Alexander polynomials for doubly primitive knots.

Zhongtao Wu. Studies of distance one surgeries on lens space $L(p,1)$ and band surgeries on torus knot $T(2,p)$.

It has been well known that any closed, orientable 3-manifold can be obtained by Dehn surgery on a link in S^3. One of the most prominent problems in 3-manifold topology is to list all the possible lens spaces that can be obtained by a Dehn surgery along a knot in S^3, which has been solved by Greene. A natural generalization of this problem is to list all the possible lens spaces that can be obtained by a Dehn surgery from other lens spaces. Besides, considering surgeries between lens spaces is also motivated from DNA topology. In this talk, we will discuss distance one surgeries between lens spaces $L(p,1)$ with $p \geq 5$ prime and lens spaces $L(n,1)$ for $n \in \mathbb{Z}$, correspondingly band surgeries from $T(2,p)$ to $T(2,n)$, by using Heegaard Floer d-invariant. This is a joint work with Jingling Yang.