Low-dimensional Topology
Topologie en basses dimensions
(Org: **Hans U. Boden** (McMaster) and/et **Duncan McCoy** (UQAM))

DROR BAR-NATAN, University of Toronto, Mathematics
Simple, Concise, Powerful, and Not Understood

I will give a simple and concise description of a strong and fast to compute knot invariant which seems to actually see some topology. Your homework will be to explain why it makes sense for a topologist to invert a presentation matrix for the Alexander module of a knot and consider quadratic combinations of the entries of said inverse.

STEVE BOYER, UQAM
The JSJ graph of knot exteriors and the L-space conjecture

We report on joint work with Cameron Gordon and Ying Hu which shows that the underlying space of the JSJ graph of a knot in the 3-sphere is an interval if it admits an irreducible surgery which is either an L-space or has non-left-orderable fundamental group. The L-space conjecture predicts that a similar conclusion holds for knots having irreducible surgeries admitting no co-oriented taut foliations and we discuss to what extent we can prove this.

KEEGAN BOYLE, UBC
Equivariant slice disks for symmetric knots

A symmetric knot K is *equivariantly slice* if there is an extension of the symmetry to the 4-ball and K bounds a smooth disk with respect to this extension. In this talk I will discuss this notion for several types of symmetric knots, and applications of these ideas to 4-manifold topology. This is joint work: some with Ahmad Issa, and some with Wenzhao Chen.

ALBERTO CAVALLO, Universite du Quebec a Montreal
Slice links and smooth 4-manifolds

An appropriate variation of the trace embedding lemma allows us to prove results about smooth, closed, simply connected 4-manifolds; studying smoothly slice links in them. We focus on homotopy 4-spheres, which are potential counterexamples to the smooth 4-dimensional Poincaré conjecture. In particular, we split them, in the same way as exotic $\mathbb{R}^4$'s, in large and small 4-spheres and show that links cannot distinguish the latter ones from the standard S^4.

JIE CHEN, McMaster University
FlatKnotInfo: A Table of Flat Knots

Flat knots (aka virtual strings) are homotopy classes of immersed curves on surfaces up to stabilization. They naturally arise in studying unknotting operations applied to virtual knots. By work of Turaev, Hass and Scott, and others, there is a known algorithm for classifying flat knots, and in this talk I will present the results of implementing the algorithm on the set of flat knots with up to eight crossings. In prior work, Gibson had classified flat knots up to four crossings, and I will discuss the invariants that were most helpful in distinguishing the flat knots, their symmetry type, and questions about concordance and sliceness. I will also showcase a web-based tool called FlatKnotInfo that gives users access to a table of flat knots and their invariants. This talk represents joint work with L. White.

CHARLES DALY, Brown University
Projective Rigidity of Dehn-Surgery on the Figure Eight Knot

A celebrated result of Thurston states that for all but finitely many relatively prime integers p and q, the (p,q)-Dehn Surgery of the Figure Eight Knot yields a closed hyperbolic manifold. Mostow Rigidity prevents this hyperbolic structure from being deformed in the sense that any two faithful representations of its fundamental group into $\mathrm{PSL}(2,\mathbb{C})$ are conjugate. Identifying $\mathrm{PSL}(2,\mathbb{C})$ with $\mathrm{PSO}(3,1)$ which sits in the larger projective linear group, $\mathrm{PGL}(4,\mathbb{R})$, we provide evidence that representations of the fundamental group of these surgered manifolds do not admit non-trivial deformations in the larger projective linear group.

TY GHASWALA, University of Waterloo
Small covers of big surfaces

Imagine the plane $\mathbb{R}^2$ where every point with integer coordinates has been removed. Call this surface X. Which surfaces arise as finite-sheeted covers of X? Which surfaces can X cover by finitely-many sheets?

I will talk about work Alan McLeay investigating the above seemingly innocent questions, and the more general version: Given two surfaces, when does there admit a finite-sheeted cover of one over the other? A complete answer is available if the two surfaces are of finite type. In the infinite-type world, the question is less innocent than one might expect.

ROBERT HARRIS, University of Waterloo
Non-cyclic branched covers of the complex projective plane

We will discuss the construction of 4-manifolds by means of non-cyclic abelian branched covers. In particular, if we choose our branch locus to be a line arrangement in $\mathbb{CP}^2$ then we will see conditions under which the branch cover is a surface of general type. We also look at when these surfaces can have non-negative signature. Furthermore, we see how this relates to the $geography$ problem for simply connected nonspin symplectic 4-manifolds and mention the speaker's recent joint work with his collaborators.

HOMAYUN KARIMI, McMaster University
Concordance invariants of null-homologous knots in thickened surfaces

In this talk, we describe the concordance properties of signature and determinant invariants for knots in thickened surfaces. If $K \subset \Sigma \times I$ is $\mathbb{Z}/2$ null-homologous and slice, we show that its signatures vanish and its determinants are perfect squares. These statements are derived from a cobordism result for closed unoriented surfaces in certain 4-manifolds. This talk is based on joint work with Hans U. Boden.

ALEXANDER KOLPAKOV, Université de Neuchâtel
Subspace stabilizers in hyperbolic lattices

I will speak about a recent joint work with Mikhail Belolipetsky (IMPA, Brazil), Nikolay Bogachev (University of Toronto) and Leone Slavich (University of Pavia). It turns out that properly immersed totally geodesic m-dimensional suborbifolds of n-dimensional arithmetic hyperbolic orbifolds ($m < n$) correspond to finite subgroups of the commensurator given a simple condition on m and n. We refer to such suborbifolds as "finite commensurator subgroup subspaces" (or fc-subspaces for short) and use them to formulate an arithmeticity criterion: a hyperbolic orbifold is arithmetic if and only if it contains infinitely many fc-subspaces. I will start by providing a short survey of arithmetic manifolds, and then move to showcasing some of the results that we obtained. Time permitting, I will also discuss some ideas behind the proofs.

PATRICK NAYLOR, Princeton University
Doubling Gluck twists

The Gluck twist of an embedded 2-sphere in the 4-sphere is a 4-manifold that is homeomorphic, but not obviously diffeomorphic to the 4-sphere. Despite considerable study, these homotopy spheres have resisted standardization except in special cases. In

this talk, I will discuss some conditions that imply the double of a Gluck twist is standard, i.e., is diffeomorphic to the 4-sphere. This is based on joint work with Dave Gabai and Hannah Schwartz.

PUTTIPONG PONGTANAPAISAN, University of Saskatchewan
Behaviors of meridional ranks under various operations

The meridional rank of a knot is the minimum number of nice generators needed to generate the fundamental group of the knot complement. It is not known whether the meridional rank of knots is additive under connected sum. The definition of meridional rank generalizes naturally to higher dimensional knots. In this talk, we will show that the meridional rank is not necessarily additive for surface knots. We will also discuss the exact values of the meridional ranks of some deform-spun knots and satellite 2-knots. This is joint work with Jason Joseph.

PATRICIA SORYA, Université du Québec à Montréal (UQÀM)
Pentes caractérisantes et nœuds satellites / Characterizing slopes for satellite knots

Une pente p/q est dite caractérisante pour un nœud K si la classe d'homéomorphisme de la p/q-chirurgie de Dehn le long de K détermine ce dernier à isotopie près. Des travaux antérieurs de Lackenby et McCoy donnent une condition pour que p/q soit caractérisante pour un nœud hyperbolique ou torique K. En étudiant la décomposition JSJ d'extérieurs de nœuds, nous étendons ce résultat aux nœuds satellites afin d'obtenir une condition caractérisante pour tout nœud K donné.

A slope p/q is said to be characterizing for a knot K if the homeomorphism type of the p/q-Dehn surgery along K determines the knot up to isotopy. Previous work of Lackenby and McCoy gives a condition for p/q to be characterizing for a hyperbolic or torus knot K. By studying the JSJ decomposition of knot exteriors, we extend this result to satellite knots and obtain a characterizing condition for any given knot K.

MATT STOFFREGEN, Michigan State University
Concordance of cables of the figure eight knot

We say a little about what "Equivariant involutive knot Floer homology" is, and then discuss how it may be applied to show that the (2,1)-cable of the figure eight knot is not slice. This is joint work with Irving Dai, Sungkyung Kang, Abhishek Mallick, and JungHwan Park.

YVON VERBERNE, University of Toronto
Automorphisms of the fine curve graph

The fine curve graph of a surface was introduced by Bowden, Hensel and Webb. Its vertices are essential simple closed curves in the surface and the edges are pairs of disjoint curves. We show that the group of automorphisms of the fine curve graph is isomorphic to the group of homeomorphisms of the surface, which shows that the fine curve graph is a combinatorial tool for studying the group of homeomorphisms of a surface. This theorem is analogous to the seminal result of Ivanov that the group of automorphisms of the (classical) curve graph is isomorphic to the extended mapping class group of the corresponding surface. This work is joint with Adele Long, Dan Margalit, Anna Pham, and Claudia Yao.

MIKE WONG, Louisiana State University
Ribbon homology cobordism

A cobordism between 3-manifolds is ribbon if it has no 3-handles. Such cobordisms arise naturally from several different topological and geometric contexts. In this talk, we describe a few obstructions to their existence, from Thurston geometries, character varieties, and instanton and Heegaard Floer homologies, and some applications.