# 58th TGTC: Abstracts

November 17-19, 2017

### Josh Greene: Perspectives on Dehn Surgery

Dehn surgery is one of the most popular themes in low-dimensional topology. I will survey its study, with an emphasis on the different perspectives that have been brought to bear on it from across the field: hyperbolic geometry, character varieties, sutured manifolds, combinatorial methods, and Floer homology. I will highlight some fascinating problems that have been solved and many that remain for the future.

### Jen Hom: Heegaard Floer homology and homology cobordism

Heegaard Floer homology is an invariant of closed three-manifolds. We consider three-manifolds up to a weaker notion of equivalence known as homology cobordism. Using additional data from the involutive Heegaard Floer homology package of Hendricks and Manolescu, we discuss applications of Heegaard Floer homology to homology cobordism. This is joint work with Kristen Hendricks and Tye Lidman.

### Jeremy Kahn: Surface Subgroups in Nonuniform Lattices

In 2009 the speaker and Vladimir Markovic constructed nearly geodesic surfaces in a given closed hyperbolic 3-manifold M. The construction proceeded by taking all "good pants" in M and matching them at their boundaries to produce a closed surface. I will describe this construction, as well as a new construction with Alexander Wright, of a nearly geodesic surface in the case where M has a cusp. If time permits, I will discuss the potential applications of this construction to higher rank nonuniform lattices and mapping class groups.

### David Gay: Basic questions about trisections of 4-manifolds

Trisections are to 4-manifolds as Heegaard splittings are to 3-manifolds. I'll survey the subject with the aim of highlighting the foundational questions that I think are most compelling and have the most promise to shed light on smooth 4-dimensional topology. Along the way I'll present the basic results coming from my work with Kirby and subsequent work of several others.

### Emmy Murphy: Graph Legendrians, contact homology, and $SL_2$ local systems

We will discuss some connections between framed $SL_2$ local systems on punctured surfaces and pseudo-holomorphic curves in 5 dimensional contact manifolds. We will also discuss connections with planar graph colorings, representations of dg algebras, Lagrangian cobordisms, loose Legendrians, and maybe some other things.

### Dan Margalit: The Botany of Normal Subgroups of Mapping Class Groups

I'll give an overview of recent results that describe some of the different behaviors of normal subgroups of the mapping class group. For instance, we produce many normal subgroups that have automorphism group isomorphic to the extended mapping class group. On the other hand, we produce new normal subgroups that are isomorphic to infinitely generated right-angled Artin groups. Also, we give many new examples of mapping classes whose normal closure is the whole mapping class group, in particular answering a 30-year-old question of Darren Long. This work is joint with Tori Akin, Tara Brendle, Matt Clay, Justin Lanier, and Johanna Mangahas.

### Josh Greene: Fibered simple knots

I will discuss joint work with John Luecke in which we classify the simple knots in lens spaces that fiber. The answer takes a peculiar and elementary number theoretic form.

### Robert Lipshitz: Bordered Floer homology and compressible surfaces

After recalling some of the key properties of bordered Heegaard Floer homology, we will describe how it detects homologically essential compressing disks, and how bordered-sutured Floer homology detects boundary-parallel tangles. Time permitting, we will also sketch an algorithm to compute bordered-sutured Floer homology. This is joint work with Akram Alishahi, and uses earlier joint work with Peter Ozsvth and Dylan Thurston.

### Dani Wise: A graph coloring problem and its application towards virtual algebraic fibering

I will first describe a simple graph coloring problem and survey some examples of graphs for which the coloring problem has or has no solution. I will then give a quick introduction to Bestvina-Brady Morse theory. Finally, I will describe the relationship between the coloring problem and some amusing virtual algebraic fibering consequences for geometric group theory and hyperbolic 4-manifolds. This is joint work with Kasia Jankiewicz and Sergey Norin.