Submittee: Dale Rolfsen
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Organizers:
Dale Rolfsen, Mathematics, UBC Steve Bleiler, Mathematics and Statistics, Portland State University

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Speakers:
Ryan Budney, Mathematics, University of Victoria, Title: Some simple triangulations Abstract: I'll describe the story of how Thurston observed some very simple triangulations of knot and link complements in the 3-sphere. This allowed for a relatively simple way to find hyperbolic structures on such manifolds, and was a key inspiration for the Geometrization Conjecture of 3-manifolds. Ben Burton and I have recently been studying 4-dimensional triangulations and we came across an analogous triangulation for the complement of an embedded 2-sphere in the 4-sphere. While this does not lead to an amazing conjecture like Geometrization, it does lead to an interesting insight into things called Cappell-Shaneson knots, which are historically related to the smooth 4-dimensional Poincare conjecture. This is joint work with Ben Burton and Jonathan Hillman. // Whitney George, Mathematics, University of Georgia, Title: Twist Knots and the Uniform Thickness Property Abstract: In 2007, Etnyre and Honda defined a new knot invariant called the Uniform Thickness Property (UTP) in order to better understand Legendrian knots. A knot is {\it{Uniformly Thick}} if every embedded solid torus $ S^1\times D^2\hookrightarrow \mathbb{R}^3$ representing K can be thickened to a standard neighborhood of a maximal Thurston-Bennequin Legendrian knot. A knot K is called {\it{simple}} if every Legendrian knot of type K can be determined (up to Legendrian isotopy) by its 3 classical invariants: the underlying topological knot type, rotation number, and Thurston-Bennequin number. Etnyre and Honda proved that if a knot type K is simple and satisfies the UTP, then all (p,q)-cables of K are also simple. In 2009, Lafountain showed that under the same hypotheses, the (p,q)-cables of K are also Uniformly Thick. Uniform Thickness has been studied with respect to torus knots (Etnyre and Honda) and iterated torus knots (Lafountain). In this talk, we will discuss the UTP with respect to twist knots using the methods of Etnyre, Ng, and Vertesi in their classification of twist knots. // John Ratcliffe, Mathematics, Vanderbilt University, Title: Right-angled Coxeter polytopes, hyperbolic 6-manifolds, and a problem of Siegel, Joint work with Brent Everitt and Steven Tschantz. Abstract: By gluing together the sides of eight copies of an all-right angled hyperbolic 6-dimensional polytope, two

orientable hyperbolic 6-manifolds with Euler characteristic -1 are constructed. They are the first known examples of orientable hyperbolic 6-manifolds having the smallest possible volume. The beautiful confluence of hyperbolic geometry, Coxeter groups, and number theory required to construct our manifolds will be described. // Kristine Pelatt, Mathematics, University of Oregon, Title: Geometric representatives of homology classes in the space of knots Abstract: In classical knot theory, one studies the components of the space of knots. More generally, one can consider the topology of the space of embeddings into higher dimensional Euclidean space. By resolving knots with k double points, Cattaneo, Cotta-Ramusino and Longoni produced explicit, non-trivial k(d-3)-dimensional cycles. We generalize these results to resolutions of singular knots with triple points, producing a non-trivial 3(d-8)-dimensional cycle. This extends and corrects the results in a preprint of Longoni. The techniques we use are closely related to the combinatorics of the embedding calculus homology spectral sequence due to Sinha, suggesting that they lead to recipes for geometric representatives for all of the cycles in that spectral sequence. // Gordana Matic, Mathematics, University of Georgia, Contact structures on 3-manifolds. // Mark Walsh, Mathematics, Oregon State University, Title: Generalised Morse Functions and the Space of Positive Scalar Curvature Metrics Abstract: The relationship between topology and curvature is one of the central themes of modern Geometry, going back all the way to the theorem of Gauss-Bonnet. An important question in this area is: Does a given smooth manifold admit a metric whose scalar curvature function is strictly positive (psc-metric)? A great deal is known about this problem. Indeed, in the simply connected case, this question is completely answered. Far is less is known however, about the topology of the space of all psc-metrics on a given manifold, or its corresponding moduli spaces. For example, is this space path connected, what can we say about its homotopy groups etc? In this talk, I will discuss some new developments in this subject which have a strong connection to Differential Topology.

Links:
http://www.mth.pdx.edu/cts/cts2011.htm
