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Title: 56th Cascade Topology Seminar
Event Type: Conference-Workshop

Location:
Banff International Research Station (BIRS), Banff, AB Canada

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Dates:
April 29 - May 1, 2016

Topic:
Topology, widely interpretted

Methodology:
Lectures.

Objectives Achieved:
The Cascade Topology Seminar is a bi-annual event which aims to gather topologists from the Pacific Northwest and Western Canada and share topological discoveries from diverse perspectives within the field. At this particular meeting, we were able to include more geographical diversity by taking advantage of the coincidence of many participants who were already visiting the region for other conferences or workshops, notably the Women in Topology II workshop. Thus, this workshop served as a way to mingle the Cascade community with a more geographically broad community of topologists. As is typical for Cascade Topology Seminars, both the audience and the speaker list included a mix of recent PhD's and established-career researchers.

Scientific Highlights:
As this was a two-day meeting, the focus of the meeting was reporting research results and any collaborations that do not yet have apparent results. There were six talks, roughly half of which were in the realm of homotopy theory, while the other half were a mix of geometric and toric topology. The titles and abstracts of the talks can be found on the BIRS website:
http://www.birs.ca/events/2016/2-day-workshops/16w2679/schedule

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Organizers:
Bauer, Kristine, Department of Mathematics and Statistics, University of Calgary

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Speakers:

Soumen Sarkar, Department of Mathematics and Statistics, University of Calgary, A retraction of polytopes and integral homology of toric orbifolds.

Abstract: In algebraic geometry actions of the torus on algebraic varieties with nice properties produce bridges between geometry and combinatorics. We see a similar bridge called moment map for Hamiltonian action of compact torus on symplectic manifolds. In particular whenever the manifold is compact the image of moment map is a simple polytope, the orbit space of the action. A topological counterpart called quasitoric manifolds were introduced by Davis and Januskiewicz in 1991. They also initiated the topological idea of toric orbifolds. Inspired by this idea, Poddar and Sarkar formalized the definition of (quasi)toric orbifolds. A class of examples of quasitoric orbifolds are weighted progective spaces. In this talk I will discuss the following: 1) Some relations between quasitoric orbifolds and polytopes. 2) Several combinatorial properties of simple polytopes and a combinatorial question. 3) A sufficient condition to compute integral homology of quasitoric orbifolds. This is a joint work with Tony Bahri and Jongbaek Song.

Diego Vela, Department of Mathematics, University of Victoria, New Concordance Classes From Infection By A String Link.

Abstract: Knots and links play an important role in 3-manifolds and the equivalence relation of concordance of knots and links plays an important role in 4-manifolds. We will discuss our work that shows, loosely speaking, that we cannot hope to classify knot concordance without simultaneously classifying link concordance for links of an arbitrary number of components. Cochran-Friedl-Teichner considered generalized satellite operations R:SL(m)\rightarrowAS, called â€œinfection by a string linkâ€•, where SL(m) is the set of concordance classes of m-component links, AS is the set of concordance classes of algebraically slice knots, and the â€œpatternâ€• knot R is some ribbon knot R. They proved that, for any such knot K there exists some R, m and L such that R(L)=K. We show that one cannot put an upper bound on m. Links arise from knots since the spine of a Seifert surface is essentially a link. Our obstructions are related to the Alexander polynomials of such links.

Magdalena Kedziorek, EPFL, Accessible model structures.

Abstract: This is joint work with K.Hess, E.Riehl and B.Shipley. In this talk I will introduce a class of accessible model structures on locally presentable categories, which includes, but is more general than, combinatorial model structures. An accessible model structure is particularly good if one wants to left or right induce it along an adjunction - by a theorem of Burke and Garner the induced weak factorization systems always exist, so one needs to check only a compatibility condition. If it holds then the resulting model structure is again accessible. One example of an accessible model structure is the Hurewicz model structure on ChR (the category of unbounded chain complexes over a ring R), which can be induced to many categories of interest, like algebras, coalgebras, comodules, comodule algebras, coring comodules and bialgebras. I will discuss ideas behind some of the proofs for induced model structures and give examples.

Kathryn Hess, EPFL, Waldhausen K-theory and topological coHochschild homology.

Abstract: I will present joint work with Brooke Shipley, in which we have defined a model category structure on the category of \Sigma^\infty X_+-comodule spectra such that the K-theory of the associated Waldhausen category of homotopically finite objects is naturally weakly equivalent to the usual Waldhausen K-theory of X, A(X). I will describe the relation of this comodule approach to A(X) to the more familiar description in terms of \Sigma^\infty \Omega X_+ -module spectra. I will also explain the construction and properties of the topological coHochschild homology of X, which is a potentially interesting approximation to A(X).

Agnes Beaudry, Department of Mathematics, University of Chicago, A preliminary report on the K(2)-local Picard group at p=2.

Abstract: The Picard group is an important invariant of a symmetric monoidal category. In the homotopy category of spectra, these are precisely the isomorphism classes of the n-spheres and the Picard group is a copy of the integers. However, after K(n)-localization, the Picard group can become much more complicated. The K(n)-local categories thus provide examples of interesting Picard groups. Their importance in chromatic homotopy theory is highlighted by the fact that the dualizing object for Brown-Commenetz duality comes from an invertible element. The K(n)-local Picard groups have been computed at all primes when n=1 and all odd primes when n=2. Mahowald predicted that the K(2)-local Picard group at the prime 2 would be very large in comparison to the situation at other primes. In this talk, I will explain why he was right and explain our current, although incomplete, understanding of the structure of this group. This project is joint work with Bobkova, Goerss and Henn.

James Davis, Department of Mathematics, Indiana University, Any finite group acts freely and homologically trivially on a product of spheres.

Abstract: Suppose K is a finite CW complex with finite fundamental group G whose universal cover is homotopy equivalent to a product of spheres X. Suppose the G-action on the cover is trivial on homology. I will prove the following theorem using classical techniques from geometric topology. Theorem: G acts freely, smoothly, and homologically trivially on X x S^n whenever n is greater than or equal to the dimension of X. Unlu and Yalcin have constructed such a K for any finite fundamental group. Thus the title of the talk is a corollary.

Links:
http://www.birs.ca/events/2016/2-day-workshops/16w2679
