Fall 2024

- **August 22nd**
  Organizational meeting, meet in WH 100E at 2:50pm

- **August 29th**
  No seminar this week

- **September 5th**
  Speaker: **Ezekiel Lemann** (Binghamton University)
  Title: **Scissors Automorphism Groups and Homological Stability** *Abstract:* In this talk we will outline the proof of homological stability for scissors automorphism groups and highlight a number of consequences and related results. These include plus and group completion constructions for assembler K-theory, interpreting higher K-theory in terms of automorphism groups, and homology calculations for some scissors automorphism groups. The content of the talk is joint work with Kupers, Malkiewich, Miller, and Sroka.

- **September 12th**
  Speaker: **Kimball Strong** (Cornell University)
  Title: **Strictification of ∞-groupoids** *Abstract:* An ∞-groupoid is a mathematical object which generalizes a groupoid by possessing not just objects and morphisms, but also 2-morphisms between morphisms, 3-morphisms between 2-morphisms, etc. Grothendieck conjectured that the category of ∞-groupoids up to homotopy was equivalent to the category of topological spaces up to homotopy, a still—unproven statement known as the “Homotopy Hypothesis.'' In this talk I will introduce a simpler object called a \textit{strict} ∞-groupoid, which encodes less information than an ordinary ∞-groupoid, but is easier to work with—much in the same way that homology groups are easier to work with than homotopy groups. I will then define a strictification functor that takes an ordinary ∞-groupoid and returns a strict ∞-groupoid, and prove that, up to homotopy, this functor can be used to encode the data of a topological space coalgebraically as a strict ∞-groupoid. Time permitting, I will discuss progress and open questions on generalizing this to ∞-categories.

- **September 19th**
  Speaker: **Chase Vogeli** (Cornell University)
  Title: **The Galois-equivariant K-theory of finite fields** *Abstract:* Abstract: Algebraic K-theory is an important invariant of rings defined using tools from homotopy theory. Recent progress in equivariant homotopy theory has enabled the study of equivariant algebraic K-theory for rings with actions by finite groups. In this talk, I will focus on the case of finite fields, where there is an action by their cyclic Galois groups. The nonequivariant K-groups of finite fields were computed by classical work of Quillen, and I will describe joint work with David Chan which extends this to a computation of the Galois-equivariant K-groups. In particular, we show the computation reduces to the well-studied coefficient groups of ordinary equivariant cohomology.

- **September 26th**
  Speaker: **Lorenzo Ruffoni** (Binghamton University)
  Title: **Atoroidal surface bundles with zero signature** *Abstract:* Hyperbolic geometry has been a powerful tool in the study of manifold topology. Beyond the classical theory of surfaces, Thurston showed that the family of surface bundles over the circle is a rich source of hyperbolic 3-manifolds. In dimension 4, the correct analogue is given surface bundles over surfaces. In order for such a bundle to admit a hyperbolic metric, it needs to satisfy some conditions, such as being atoroidal and having zero signature. Surprisingly enough, the first examples of

atoroidal surface bundles over surfaces were constructed only a few months ago by Kent-Leininger. In this talk I'll explain why these examples also have zero signature, meaning that they could admit hyperbolic metrics. This is joint work in progress with J-F. Lafont and N. Miller.

- **October 3rd**
  No seminar this week (Rosh Hashanah/Fall break)

- **October 10th**
  Speaker: **Hanh Vo** (Arizona State University)
  Title: **Curves with self-intersections on hyperbolic surfaces** *Abstract:* In this talk, I will discuss curves with self-intersections on hyperbolic surfaces. In the first part, I will speak about the k-systoles (where k is a natural number) of hyperbolic surfaces, which are the shortest closed geodesics with at least k self-intersections. In the second part, I will discuss how results regarding self-intersections of closed curves can be extended to arcs. This talk is based on joint work with A. Basmajian, M. Doan and H. Parlier.

- **October 17th**
  Speaker: **Yu-Chan Chang** (Wesleyan University)
  Title: **Graphical Properties of Bestvina–Brady Groups** *Abstract:* Given a finite simplicial graph, the associated right-angled Artin group has many properties that can be seen from the defining graph. For example, two right-angled Artin groups are isomorphic if and only if their defining graphs are isomorphic. Bestvina–Brady groups are exotic subgroups of right-angled Artin groups, and some algebraic structures of Bestvina–Brady groups can also be seen from the defining graphs. For instance, a Bestvina–Brady group is finitely generated if and only if the defining graph is connected. In this talk, I will discuss some properties of Bestvina–Brady groups from a graphical point of view. In particular, we will explore the Dehn functions and the RAAG recognition problem for Bestvina–Brady groups. Part of this talk is based on joint work with Lorenzo Ruffoni.

- **October 24th**
  Speaker: **Kate Ponto** (University of Kentucky)
  Title: **Iterated traces** *Abstract:* "Trace" usually evokes the trace of a matrix - so a number and so the idea of iterating feels a little strange. I'll discuss generalizations of the trace where taking the trace of a trace not only can be done, but feels almost inevitable.

- **October 31st**
  Speaker: **Danika Van Niel** (Binghamton University)
  Title: **Ghost Busting: How ghost maps helped solve a hard problem** *Abstract:* This spooky talk will discuss how to extend the classical concept of the affine line from algebraic geometry to equivariant algebra. The equivariant analogue to commutative rings are Tambara functors, classically the affine line is the spectrum of Z[x]. Equivariantly, this problem becomes significantly harder for two main reasons. First, G-Tambara functors are complex objects which send finite G-sets to commutative rings, and have maps between these rings. Second, when we adjoin a variable we can adjoin it to any level of the Tambara functor, even for the simple case of G = Cp we can add the variable at Cp/Cp or Cp/e. In this talk we will define Tambara functors, discuss these extended definitions, and demonstrate how the ghost map will make an extremely difficult question just difficult. This is joint work with David Chan, David Mehrle, J.D. Quigley, and Ben Spitz.

- **November 7th**
  Speaker: **Shuchen Mu** (Binghamton University)
  Title: **Transfer on Cyclic homology and Algebraic K-theory** *Abstract:* We will introduce a special kind of map called 'transfer' on Hochschild homology, cyclic homology and algebraic K-theory. And we will perform some

calculation of examples.

- **November 14th**
  Speaker: **Ismael Sierra** (University of Toronto)
  Title: **Homological stability of even (and odd) symplectic groups** *Abstract:* I will define the “odd” symplectic groups $Sp_{2g+1}(\mathbb Z)$, which fit in between the usual “even” symplectic groups, and state new homological stability results for them. I will explain the main ideas of the proof and the sense in which the above can be seen as an algebraic analogue of the proof of homological stability of mapping class groups of surfaces by Harr–Vistrup–Wahl. Finally I will mention some related open questions.

- **November 21st**
  No seminar this week

- **November 28th**
  No seminar this week (Thanksgiving break)

- **December 5th**
  Speaker: **Hari Rau-Murthy** (University of Rochester)
  Title: **The Hopkins Kuhn Ravenel character and iterated THH** *Abstract:* This expository talk will talk about how to access the character of a representation of a finite group using Hochschild homology - a certain generalization of differential forms. We will present ideas for covering the Hopkins Kuhn Ravenel character- a generalization of the character of a representation - using this technology as well. Specifically, we will use a modified version of iterated Topological Hochschild Homology (THH). This work in progress is joint with Sanjana Agarwal, Noah Wisdom and Preston Cranford.