Spring 2024

- **February 15th**
  Speaker: **Sebastian Hurtado** (Yale University)
  Title: **Groups with full Limit Set vs Lattices** *Abstract:* We show the existence of an (infinitely generated) discrete subgroup of a Lie group (such as SL_n(R)) that has full limit set in its (Furstenberg) boundary and which is not a lattice, we also discuss the possibility of whether this is possible for finitely generated groups. All notions will be explained. Based on work in progress with Subhadip Dey.

- **February 22nd**
  Speaker: **Nima Hoda** (Cornell University)
  Title: **Tree of graph boundaries of hyperbolic groups** *Abstract:* Regular trees of graphs are inverse limits of particularly simple inverse systems of finite graphs. They form a 1-dimensional subclass of the Markov compacta: a class of finitely describable inverse limits of simplicial complexes, which includes all boundaries of hyperbolic groups. I will discuss upcoming joint work with Jacek Swiatkowski in which we use Bowditch's canonical JSJ decomposition to characterize the 1-ended hyperbolic groups whose boundaries are (regular) trees of graphs.

- **February 29th**
  Speaker: **Xin Li** (University of Glasgow) (virtual talk)
  Title: **Ample groupoids, topological full groups, algebraic K-theory spectra and infinite loop spaces**
  Abstract: Topological groupoids describe orbit structures of dynamical systems by capturing their local symmetries. The group of global symmetries, which are pieced together from local ones, is called the topological full group. This construction gives rise to new examples of groups with very interesting properties, solving outstanding open problems in group theory. This talk is about a new connection between groupoids and topological full groups on the one hand and algebraic K-theory spectra and infinite loop spaces on the other hand. Several applications will be discussed. Parts of this connection already feature in work of Szymik and Wahl on the homology of Higman-Thompson groups.

- **March 7th**
  No seminar this week (spring break)

- **March 14th**
  Speaker: **Lucas Williams** (Binghamton University)
  Title: **Periodic Points and Equivariant Parameterized Cobordism** *Abstract:* In this talk we investigate invariants that count periodic points of a map. Given a self map f of a compact manifold we could detect n-periodic points of f by computing the Reidemeister trace of f^n or by computing the equivariant Fuller trace. In 2020 Malkiewich and Ponto showed that the collection of Reidemeister traces of f^k for varying $k|n$ and the equivariant Fuller trace are equivalent as periodic point invariants, and they conjecture that for families of endomorphisms the Fuller trace will be a strictly richer invariant for n-periodic points. In this talk we will explain our new result which confirms Malkiewich and Ponto's conjecture. We do so by proving a new Pontryagin-Thom isomorphism between equivariant parameterized cobordism and the spectrum of sections of a particular parametrized spectrum and using this result to carry out geometric computations.

- **March 21st**
  Speaker: **Lei Chen** (University of Maryland)
  Title: **Mapping class groups of circle bundles over a surface** *Abstract:* In this talk, we study the algebraic structure of mapping class group Mod(M) of 3-manifolds M that fiber as a circle bundle over a surface. We prove

an exact sequence, relate this to the Birman exact sequence, and determine when this sequence splits. We will also discuss the Nielsen realization problem for such manifolds and give a partial answer. This is joint work with Bena Tshishiku and Alina Beaini.

- **March 28th**
  Speaker: **Mark Pengitore** (University of Virginia)
  Title: **Residual finiteness growth functions of the mapping class group and the question of linearity**
  Abstract: Residual finiteness growth functions of groups have attracted much interest in recent years. These are functions that roughly measure the complexity of the finite quotients needed to separate particular group elements from the identity in terms of word length. One potential application of these functions is towards linearity of the mapping class group, and we will present some partial progress towards understanding these functions for the mapping class group.

- **April 4th**
  Speaker: **Giuseppe Martone** (Sam Houston State University)
  Title: **Correlation theorem and (cusped) Hitchin representations** *Abstract:* Given distinct hyperbolic structures m and m' on a closed orientable surface, how many closed curves have m- and m'-length roughly equal to x, as x gets large? Schwartz and Sharp's correlation theorem answers this question. Their explicit asymptotic formula involves a term exp(Mx) and 0<M<1 is the correlation number of the hyperbolic structures m and m'. In this talk, we will show that the correlation number can decay to zero as we vary m and m', answering a question of Schwartz and Sharp. Then, we discuss extensions of this correlation theorem to the context of higher rank Teichmüller theory and find diverging sequences of SL(3,R)-Hitchin representations along which the correlation number stays uniformly bounded away from zero. This talk is based on joint work with Xian Dai and joint work in progress with Nyima Kao.

- **April 11th**
  PETER HILTON MEMORIAL LECTURE
  SPECIAL TIME AND LOCATION: April 11, 3pm, Lecture Hall 009
  Speaker: **Alex Eskin** (University of Chicago)
  Title: **Polygonal Billiards and Dynamics on Moduli Spaces** *Abstract:* Billiards in polygons can exhibit bizarre behavior, some of which can be explained by deep connections to several seemingly unrelated branches of mathematics. These include algebraic geometry, Teichmuller theory and ergodic theory on homogeneous spaces. The talk will be an introduction to these ideas, aimed at a general mathematical audience.

- **April 18th**
  Speaker: **Alex Wright** (University of Michigan)
  Title: **Spheres in the curve graph and linear connectivity of the Gromov boundary** *Abstract:* For a vertex c and an integer radius r, the sphere $S_r(c)$ is the induced graph on the set of vertices of distance r from c. We will show that spheres in the curve graph are typically connected, and discuss connectivity properties of the Gromov boundary. We will also explain the motivation and context for this work, touching tangentially on Cannon's conjecture and convex cocompactness.

- **April 25th**
  No seminar this week (Monday classes meet)

- **May 2nd**
  Speaker: **Cary Malkiewich** (Binghamton University)
  Title: **A Solomon-Tits theorem for arbitrary hyperplane collections** *Abstract:* Suppose we take an arbitrary

collection of hyperplanes in n-dimensional Euclidean, hyperbolic, or spherical geometry, along with all of their nonempty intersections. These form a partially ordered set, so we can take the realization and get a topological space, called the Tits complex. One version of the Solomon-Tits theorem says that, if we were to take *all* hyperplanes, the space we get is homotopy equivalent to a wedge of spheres of dimension (n-1). In this talk I'll describe how to prove a variant of this theorem where we can take just about any reasonable subset of the hyperplanes, and the result still holds. We can furthermore give a presentation of the homology of the resulting space: it has a generator for each polytope cut out by the hyperplanes, and the relations encode subdivision of the polytopes. The proof is quite fun, it's an inductive proof where we add the hyperplanes one at a time and count how many new polytopes, and spheres in the Tits complex, are created. Our main application is to the groups of cut-and-paste operations between these polytopes.