Abstracts

Alejandra Garrido Angulo (U. of Newcastle Australia)

Title: Polish topological full groups of Cantor homeomorphisms

Abstract: Topological full groups (henceforth piecewise full groups) of homeomorphisms of the Cantor set are a general construction obtained from actions on the Cantor set (more generally, from groupoids with unit space the Cantor set) that were initially introduced as invariants of minimal Cantor dynamical systems and have been used to produce examples of finitely presented simple groups with extra properties, e.g., amenability (Juschenko-Monod), torsion and intermediate growth (Nekrashevych). A non-discrete locally compact example of a piecewise full group is the much-studied group of almost automorphisms of a regular tree (Neretin's group), which is abstractly simple, and compactly generated (therefore Polish). I will report on work in progress with C. Reid and D. Robertson where we investigate the possible Polish topologies that piecewise full groups can admit and show that there is at most one, determined by the group structure. We also give conditions on the 'input' for the piecewise full group to be compactly generated. Thus we obtain many new 'relatives' of Neretin's group.

Daniel Groves (U. of Illinois at Chicago)

Title: Relatively geometric actions on CAT(0) cube complexes

Abstract: Given a group G and a finite collection P of subgroups of G, we define what it means for (G, P) to act "Relatively geometrically" on a cell complex X. An example to keep in mind is when X is a "coned-off" Cayley graph of the pair (G, P). In case (G, P) is relatively hyperbolic, and X is a CAT(0) cube complex, we develop the theory of (virtual) specialness in this setting, and prove analogues of results of Haglund-Wise and Agol. I will describe a complete conjectural picture for this theory, relationships with existing concepts (like proper and cocompact, or proper and cosparse actions), and applications. This is joint work with Teddy Einstein.

Camille Horbez (CNRS / U. Paris-Sud)

Title: Cocycle superrigidity with target $Out(F_n)$

Abstract: Theorems of Farb-Kaimanovich-Masur and Bridson-Wade assert that every group morphism from a higher rank lattice to either the mapping class group of a finite type surface, or to the outer automorphism group $Out(F_n)$ of a finitely generated free group, has finite image. I will present a joint work with Vincent Guirardel and Jean Lécureux in which we establish

a dynamical analogue for ergodic cocycles associated to measure-preserving actions of the lattice on a standard probability space.

Jingyin Huang (Ohio State University)

Title: The Helly geometry of some Garside and Artin groups

Abstract: Garside groups and Artin groups are two generalizations of braid groups. We show that weak Garside groups of finite type and FC-type Artin groups are Helly, hence equip these groups with a particular nonpositive-curvature-like (NPC) structure. Such structure shares many properties of a CAT(0) structure and, additionally, it has a combinatorial flavor implying e.g. biautomaticity. We shall explain this NPC structure in more detail and discuss new results on the topology and geometry of these groups which are immediate consequences of such structure. This is joint work with D. Osajda.

Kasia Jankiewicz (U. of Chicago)

Title: Fibering of groups and (in)coherence

Abstract: A group G fibers if G admits an epimorphism to integers with finitely generated kernel. This notion is a group-theoretic analogue of fibering over a circle for 3-manifolds, and in some setting is related to the coherence of G. A group is coherent if every finitely generated subgroup is finitely presented. A useful tool in constructing algebraic fibering is Bestvina-Brady Morse theory. I will discuss some applications in the realm of Coxeter groups. This is based on joint projects with Norin and Wise.

Fanny Kassel (CNRS / IHES)

Title: Projective convex cocompactness and Coxeter groups

Abstract: We will discuss a notion of convex cocompactness for discrete groups preserving a properly convex open domain in real projective space. Convex cocompact groups in this sense, even when they are not Gromov hyperbolic, still share some of the good properties of classical convex cocompact subgroups of rank-one Lie groups. We will explain how to construct examples using Coxeter groups. This is joint work with J. Danciger, F. Guéritaud, G.-S. Lee, and L. Marquis.

Dawid Kielak (U. Bielefeld)

Title: Handlebody fibres of hyperbolic 3-manifolds

Abstract: We will discuss how one can combine structural results on fibrings of 3-manifolds and free-by-cyclic groups to construct hyperbolic 3-manifolds with the following property: every monodromy associated to a fibring extends from the surface on which it is defined to a handlebody.

Sang-Hyun Kim (Seoul National U.)

Title: Diffeomorphism groups of critical regularity

Abstract: We prove that for each compact connected one-manifold M and for each real number $r \geq 1$, there exists a finitely generated group G inside the C^r—diffeomorphism group $Diff^r(M)$ such that G admits no injective homomorphisms into the group $\cup_{s>r} Diff^s(M)$. We also prove the dual result for $\cap_{s<r} Diff^s(M)$. (Joint work with Thomas Koberda)

Stephane Lamy (U. Toulouse)

Title: Looking for a CAT(0) space for polynomial automorphisms

Abstract: The group of tame polynomial automorphisms of the n-dimensional complex affine space is the group generated by linear maps and some polynomial transvections. I will describe an action of this group on a metric space whose construction is inspired from the theory of affine Bruhat-Tits buildings. In dimension $n = 3$, we show that this space is simply connected with non-positive curvature. This allows for instance to get a description of the finite subgroups of the 3-dimensional tame group. (Joint work with P. Przytycki)

Urs Lang (ETH Zurich)

Title: Visual metrics at infinity for spaces of higher asymptotic rank

Abstract: In a geodesic Gromov hyperbolic space, the δ-inequality for the Gromov product of points at infinity enables the construction of visual metrics on the ideal boundary. I will describe a closely analogous construction for any proper CAT(0) space X of asymptotic rank $n \geq 2$, where the Gromov product with respect to a basepoint in X is defined for integral $(n-1)$-cycles in the Tits boundary of X via the solution of an asymptotic Plateau problem. The analogue of the δ-inequality holds for the space of cycles with a bound on their mass, which turns out to be compact with respect to any of the resulting visual metrics. Any quasi-isometric embedding between two proper CAT(0) spaces of asymptotic rank n induces a bi-Hölder embedding

of respective cycle spaces. All of this works in a more general setting encompassing hyperbolic and other types of groups. (This is based on joint work with Bruce Kleiner.)

Nir Lazarovich (Technion)

Title: Flexible Stability of Surface Groups

Abstract: Roughly speaking, a finitely presented group is said to be (flexibly) stable if any approximate action of the group on a finite set is an approximation of an action. Stability is closely related to local testability (in CS), soficity, residual finiteness, and property (T). In this joint work with Arie Levit and Yair Minsky, we show that surface groups are flexibly stable using the geometry of CAT(-1) spaces and a new quantitative variant of LERF.

Alexander Lytchak (U. Cologne)

Title: Structure of geodesically complete spaces

Abstract: In the talk I would like to discuss metric, analytic and topological structure of locally compact, geodesically complete spaces with upper curvature bounds. The talk will be based on joint works with Koichi Nagano.

Jason Manning (Cornell U.)

Title: Dehn filling and the boundary of a relatively hyperbolic group

Abstract: I'll survey what is known about the way the boundary of a relatively hyperbolic group is affected by relatively hyperbolic Dehn filling. I'll talk both about geometric and algebraic topological properties of the boundary. Parts of this talk will be based on joint works with Groves, Groves–Sisto, and Wang.

Alexandre Martin (Heriot-Watt U.)

Title: Acylindrical actions for two-dimensional Artin groups of hyperbolic type

Abstract: Artin groups form an interesting class of groups that generalise braid groups. There are many open problems about such groups, and in particular they are conjectured to be non-positively curved. For a two-dimensional Artin group whose associated Coxeter group is hyperbolic, we construct a universal acylindrical action on a hyperbolic complex, showing similarities with other classes of non-positively curved groups: mapping

class groups, right-angled Artin groups, etc. We use the dynamics of this action to obtain certain structural properties of such Artin groups: strong form of the Tits alternative, classification of its maximal abelian subgroups, classification of its subgroups that virtually split as direct products. This is joint work with Piotr Przytycki.

Christian Rosendal (U. of Illinois at Chicago)

Title: Solution of Christensen's problem on universally measurable homomorphisms

Abstract: Answering a longstanding problem originating in J.P.R. Christensen's seminal work on Haar null sets and motivated by the work of Frechet, Banach, Sierpinski and Steinhaus from the early 1900s, we show that a universally measurable homomorphism between Polish groups is continuous. Using our general analysis of continuity of group homomorphisms, this result can be used to calibrate the strength of the existence of a discontinuous homomorphism between Polish groups and we shall give a couple of results in this direction.

Alessandro Sisto (ETH Zurich)

Title: Dehn filling Dehn twists

Abstract: The Dehn fillings of a relatively hyperbolic group are useful relatively hyperbolic quotients constructed in a certain way inspired by Thurston's hyperbolic Dehn filling theorem. In the context of Mapping class groups, a reasonable analogue of Dehn fillings are quotients by large powers of Dehn twists. I will discuss these quotients of mapping class groups, in particular showing that they are acylindrically hyperbolic, and in fact even hyperbolic in low complexity. Joint with Francois Dahmani and Mark Hagen.

Emily Stark (Technion)

Title: Cannon–Thurston maps for CAT(0) groups

Abstract: Two far-reaching methods for studying the geometry of a finitely generated group with non-positive curvature are (1) to study the structure of the boundaries of the group, and (2) to study the structure of its finitely generated subgroups. Cannon–Thurston maps, named after foundational work of Cannon and Thurston in the setting of fibered hyperbolic 3-manifolds, allow one to combine these approaches. Mj (Mitra) generalized work of Cannon and Thurston to prove the existence of Cannon–Thurston maps for normal hyperbolic subgroups of a hyperbolic group. These maps can be

used to understand the structure of the boundary of such groups. I will explain why similar theorems fail for certain CAT(0) groups. This is joint work with Benjamin Beeker, Matthew Cordes, Giles Gardam, and Radhika Gupta.

Matthew Stover (Temple U.)

Title: Finiteness of geodesic submanifolds of hyperbolic manifolds

Abstract: The most basic examples of codimension one subgroups of hyperbolic groups are those arising from totally geodesic immersed hypersurfaces in hyperbolic n-manifolds. Hyperbolic manifolds, $n \geq 3$, that are arithmetic are characterized by being infinite index in their abstract commensurator, and one can use this to show that a hyperbolic n-manifold either contains no totally geodesic hypersurfaces or they are everywhere dense. Reid and McMullen (for $n = 3$) asked whether having infinitely many totally geodesic hypersurfaces conversely implies arithmeticity. I will discuss work with Bader, Fisher, and Miller that answers this question in the positive.

Jacek Świątkowski (U. Wrocławski)

Title: Trees of graphs as boundaries of groups

Abstract: It is known that any 1-dimensional connected Gromov boundary of a hyperbolic group which has no local cut points is either Sierpinski or Menger curve. In my talk I will describe a vast class of 1-dimensional connected spaces that I call reflection trees of graphs, all of which have local cut points, and I will explain that each of them appears as Gromov boundary of many right angled hyperbolic Coxeter groups. If time permits, I will speculate on a potential role that trees of graphs can play in the classification of 1-dimensional Gromov boundaries.

Genevieve Walsh (Tufts U.)

Title: Schottky sets and relatively hyperbolic groups

Abstract: A Schottky set is the complement of at least three round discs in S^2. We investigate relatively hyperbolic group pairs whose Bowditch boundary is a Schottky set. We describe the relatively hyperbolic group pairs whose Bowditch boundary is a Schottky set where the incidence graph has one component. This is joint work with Peter Haissinsky and Luisa Paoluzzi.

Stefan Wenger (U. Fribourg)

Title: Dehn functions and non-positive curvature

Abstract: I will show that a locally compact geodesic metric space is CAT(0) if and only if its Dehn function is bounded by the Euclidean Dehn function at all scales. I will then discuss large scale and coarse analogs of this. Moreover, I will show that if the Dehn function of a locally compact, geodesic metric space is sufficiently close to the Euclidean Dehn function up to some scale then the space is not far (in a suitable sense) from being CAT(0) up to that scale. Based on joint work with A. Lytchak.