Polish Groups and Geometry

June 6 - June 8
Paris 7

Minicourse

Christian Rosendal
(University of Illinois at Chicago)

Coarse geometry of Polish groups

While geometric group theory of finitely generated discrete or compactly generated locally compact groups is a well-developed theory, hitherto there has been no framework for dealing with the large scale geometry of non locally compact Polish groups due to the perceived absence of canonical generating sets. We shall present a new approach to this problem via a notion of geometrically bounded sets in topological groups, which equips every topological group with a canonical coarse structure coinciding with the classical structure in previously studied cases. This leads to a rich theory connecting geometry, harmonic and functional analysis and model theory in a setting of Polish groups.

Research Talks

Yves Cornulier
(Université Paris-Sud 11)

Embeddings into compactly generated groups

The famous Higman-Neumann-Neumann theorem states that every countable group embeds into a finitely generated group. It is natural to wonder if it holds in the locally compact setting, namely whether every second countable locally compact group embeds as a closed subgroup of a compactly generated locally compact group. We show that the answer is negative (joint work with P-E. Caprace).

Michal Doucha
(Polish Academy of Sciences)

Metric ultraproducts of metric groups

Metric ultraproducts of metric groups are a helpful notion in the area of metric approximation of discrete groups. For instance, the famous class of sofic groups can be defined as those (discrete) groups that are subgroups of metric ultraproducts of finite permutation groups with the normalized Hamming distance.

In all the cases known to us, the metric ultraproduct of groups is taken over groups with bi-invariant metric. We will present a generalized definition of metric ultraproduct which can handle also groups with only left-invariant metric and present the result that there is a countable sequence of finite groups with left-invariant metric whose metric ultraproduct contains isometrically as a subgroup every separable topological group with left-invariant metric.

Aleksandra Kwiatkowska
(University of Bonn)

Groups of measurable functions

We study properties of groups $L^0([0,1],\mu,G)$ of measurable functions defined on the standard Lebesgue space $([0,1],\mu)$ with values in a Polish group G. I will first discuss several known properties concerning the structure and dynamics of such groups, some of them very recent, and then I will present a few new results. This is joint work with Maciej Malicki.

Jean Lécureux
(Université Paris-Sud 11)

Non-linearity for (some) groups acting on buildings

Let T be a regular tree. There are many very interesting actions of linear groups on T, for example of $SL_2(k)$, where k is a local field. However, the full group of automorphisms $\mathrm{Aut}(T)$ itself is not linear, and one can prove that this is also the case for many closed subgroups $G < \mathrm{Aut}(T)$.

Buildings are higher-dimensional analogs of trees. Most of them also admit actions by linear groups, such as $SL_3(k)$, and the full automorphism group is in general not much bigger. However, we can prove that, in some cases, there are discrete cocompact automorphism groups L of the building which are non-linear. The proof uses some ergodic-theoretic techniques and concludes by relating the linearity of L to the linearity of some subgroup of Aut(T).

This is a joint work with Uri Bader and Pierre-Emmanuel Caprace.

Adrien Le Boudec
(Université catholique de Louvain)

Commensurated subgroups in groups almost acting on trees

I will explain recent results about commensurated subgroups in groups of almost automorphisms of trees. Examples for which we obtain a complete

description of the commensurated subgroups include Thompson's groups F and T as well as the Neretin group of all almost automorphisms of a regular tree. As an application, we deduce rigidity results for the possible embeddings of these groups into locally compact groups. Joint work with Phillip Wesolek.

Julien Melleray
(Université Claude Bernard - Lyon 1)

Baire category in the space of actions by permutations of a countable group

Given a countable group G, I'll describe when there exists a generic action of G by permutations of an infinite, countable set, and how this property translates as a topological property of the compact space of all subgroups of G. If time permits, I'll discuss various questions/possible generalisations. Joint work with Y. Glasner and D. Kitroser.

Sven Raum
(University of Münster)

Operator algebras of locally compact groups acting on trees

I will present my work on C*-simplicity of locally compact groups, focusing on its relevance for studying locally compact groups acting on trees. First, I will summarising results that I could obtain in 2015 on simplicity and non-simplicity of reduced group C*-algebras of locally compact groups. After describing some examples of C*-simple groups acting on trees, I will describe the type I conjecture for closed subgroups of Aut(T) and how different C*-algebraic and von Neumann algebraic results can contribute to its clarification

Marcin Sabok
(Mcgill University)

Topological conjugacy of Toeplitz subshifts

We will discuss the the descriptive set theoretic complexity of the equivalence relation of conjugacy of Toeplitz subshifts of a residually finite group G. On the one hand, we will see that if G is the group of integers, then topological conjugacy on Toeplitz subshifts with separated holes is amenable. In contrast, if G is non-amenable, then conjugacy of Toeplitz G-subshifts is a non-amenable equivalence relation. The results are motivated by a general question, asked by Gao, Jackson and Seward, about the complexity of conjugacy for minimal, free subshifts of countable groups. This is joint work with Todor Tsankov.

Simon Smith
(City University of New York)

The structure of subdegree-finite primitive permutation groups

Every compactly generated, totally disconnected, locally compact group G has a permutation representation that is a transitive group of automorphisms of some connected, locally finite graph, such that the stabilizer of any vertex is both compact and open.

The permutation groups that arise are called *subdegree finite*, because all orbits of point stabilizers are finite. If the stabilizer of a vertex is a maximal subgroup, then the permutation group is said to be *primitive*.

In this talk I'll present a recent result which describes the structure of all subdegree-finite primitive permutation groups. It is akin to the seminal O'Nan–Scott Theorem for finite primitive permutation groups.

Andreas Thom
(Technische Universität Dresden)

Groups of finite type

First of all, I will report on joint work with Philip Dowerk on efficient normal generation of unitary groups of von Neumann algebras, with applications to questions on automatic continuity. Secondly, I am planning to present recent joint work with Hiroshi Ando, Yasu Matsuzawa and Asger Tornquist on a construction of a unitarily representable SIN polish group which is not of finite type. This answers a question of Sorin Popa.

Time	June 6, 2016	June 7, 2016	June 8, 2016
09:00	registration	Rosendal	Kwiatkowska
09:30	Rosendal		
10:00		coffee	coffee
10:30	coffee	Smith	Lécureux
11:00	Cornulier		
11:30		Le Boudec	Sabok
12:00	lunch		
12:30		lunch	
13:00			
13:30			
14:00	Thom		
14:30		Rosendal	
15:00	coffee		
15:30	Raum	coffee	
16:00		Melleray	
16:30	Doucha		
17:00			
17:30			
18:00			