Abstracts and Titles – Workshop on Finiteness Properties (KIT, 23 - 25 February 2022)

Kai-Uwe Bux (University of Bielefeld)
Minicourse: Thompson groups and their relatives.

Talk 1: Constructions of Thompson groups. I shall describe various ways to define (and understand) Thompson groups – e.g. via homeomorphisms of the Cantor set or via (decorated) pairs of binary trees. Here, I also shall address the closer relatives of Thompson groups.
Talk 2: Thompson groups act on cube complexes. I shall present the construction of Stein-Farley spaces for Thompson groups and derive finiteness properties from this action via Brown's criterion and combinatorial Morse theory.
Talk 3: More distant relatives. Finally, I would like to compare Thompson groups to other groups acting on trees or Cantor sets. Here, we encounter groups that are not of type F_∞.

Ian Leary (University of Southampton)
Minicourse: Constructing groups of type FP I-III

The existence of non-finitely presented groups of type FP was for a long time a well-known open problem in homological group theory. Bestvina-Brady constructed the first examples in the 1990's, as subgroups of right-angled Artin groups. Around 20 years later, I found a way to extend their construction to produce an uncountable family of groups of type FP.
In the *first lecture* I will explain aspects of the Bestvina-Brady construction (following Bux-Gonzalez in some aspects) and my generalization of the construction.
In the *second lecture* I will discuss some further applications of these generalized Bestvina-Brady groups, including joint work with R Kropholler, I Soroko and V Vankov and work of Brady-Kropholler-Soroko.
In the *third lecture* I will discuss a new alternative construction of non-finitely presented groups of type FP using graphical small cancellation theory, which is joint with T Brown.

Martin Bridson (University of Oxford)
Virtual surjection to k-tuples, binary subgroups, and finiteness properties.

The Virtual Surjection to Pairs (VSP) Theorem states that if a subgroup S of a direct product of finitely presented groups projects to a subgroup of finite index in each pair of factors, then S is finitely presented. If S is a full subdirect product of free or surface groups, the converse also holds. I shall discuss analogous results concerning higher finiteness properties and projections to k-tuples of factors, and I shall exploit these in an elementary construction that provides a new source of groups with varying finiteness properties – the binary subgroups of direct products.

Ilaria Castellano (University of Milan)
The rational discrete cohomological dimension of a totally disconnected locally compact groups

For a totally disconnected locally compact (= t.d.l.c.) group G several finiteness properties can be introduced and studied. The pivot of this talk is meant to be the so-called rational discrete cohomological dimension of G. Here the word "discrete" comes from the fact that we decide to look exclusively at those topological RG-modules which possess the discrete topology. The word "rational" appears once we choose the commutative ring R to be the field of rationals. Although cohomological dimension is often regarded over the integers, the divisibility of the ring R is here necessary for the existence of enough projectives (but it actually seems the natural assumption in the framework of geometric group theory). Several classical results concerning (discrete) groups of finite cohomological dimension find their rational discrete analogues in the realm of t.d.l.c. groups. Time permitting, some of the topics that will be touched on during the talk are t.d.l.c. groups of rational discrete cohomological dimension at most one, hyperbolic t.d.l.c. groups, Euler-Poincaré characteristic and double coset zeta functions.

Ged Corob Cook (University of Lincoln)
Homological finiteness conditions for totally disconnected, locally compact groups

One natural approach to studying totally disconnected, locally compact (tdlc) groups is by investigating their actions on CW-complexes with compact open cell stabilisers. Arising naturally as higher analogues of compact generation and presentation for these groups, this investigation suggests "type F_n" and "type FP_n" conditions,

similarly to these conditions for abstract groups. An obstacle is that the category of discrete modules for tdlc groups over $\mathbb{Z}$ does not have enough projectives. There are two possible remedies for this: working over $\mathbb{Q}$, and working with categories of topological modules. These two ideas allow us to reprove, in the tdlc case, a lot of the usual results on finiteness conditions for abstract groups.

Robert Kropholler (Warwick University)
Groups of type FP_2 over fields.

Abstract: Being of type FP_2 is an algebraic shadow of being finitely presented. A long standing question was whether these two classes are equivalent. This was shown to be false in the work of Bestvina and Brady. More recently, there are many new examples of groups of type FP_2 coming with various interesting properties. I will describe a variation on a construction of Leary to find groups that are of type $FP_2(F)$ for all fields F but not $FP_2(\mathbb{Z})$. I will also outline the key difficulties of this approach for proving a similar result for FP_n and FP.

Pierre Py (University of Strasbourg)
Complex geometry and higher finiteness properties of groups

Abstract: Following C.T.C. Wall, we say that a group G is of type F_n if it has a classifying space (a $K(G,1)$) whose n-skeleton is finite. The study of examples of groups which are of type F_{n-1} but not of type F_n has a long history (Stallings, Bestvina-Brady, ...). One says that these examples of groups have exotic finiteness properties. In this talk I will explain how to use complex geometry to build new examples of groups with exotic finiteness properties. This is part of a joint work with F. Nicolás, which generalizes earlier works by Dimca, Papadima and Suciu, Llosa Isenrich and Bridson and Llosa Isenrich.

Rachel Skipper (Ohio State University)
Finiteness Properties for braided groups of homeomorphisms of Cantor sets

Abstract: We'll talk about how to braid certain groups of homeomorphisms of Cantor sets including Higman-Thompson groups and self-similar groups as well as some results on the finiteness properties for these braided groups.