LARGE SCALE DIMENSIONS, REGENSBURG 25-29.07.2016. ABSTRACTS.

Mini-courses

Mladen Bestvina: Asymptotic dimension of mapping class groups.

The goal of the three lectures is to give a detailed outline of the fact that mapping class groups have finite asymptotic dimension. A substantial amount of time will be devoted to a review of large scale geometry of mapping class groups.

Alexander Dranishnikov: Dimension local and global

We compare definitions of the classical covering dimension and the asymptotic dimension. Then we give give estimates of the asymptotic dimension for some classes of metric spaces and groups. In particular we prove the inequality

$$asdm(A *_C B) \leq \max\{asdimA, asdimB, asdimC + 1\}$$

for the asymptotic dimension of the amalgamated product.

Talks

Alexander Dranishnikov: On macroscopic dimension

We prove that if the universal cover X of an n-dimensional manifold is not spin, then its macroscopic dimension is never equal to $n - 1$. From this we deduce the Gromov PSC conjecture for some classes of totally non-spin manifolds.

Steve Ferry: An infinite-dimensional phenomenon in finite-dimensional topology.

We show that there are homotopy equivalences $h : N \to M$ between closed manifolds which are induced by cell-like maps $p : N \to X$ and $q : M \to X$ but which are not homotopic to homeomorphisms. The phenomenon is based on construction of cell-like maps that kill certain $\mathbb{L}$-classes. The image space in these constructions is necessarily infinite-dimensional. In dimension > 6 we classify all such homotopy equivalences. As an application, we show that such homotopy equivalences are realized by deformations of Riemannian manifolds in Gromov-Hausdorff space preserving a contractibility function.

Daniel Kasprowski: On the K-theory of groups with finite decomposition complexity

We will show that for every ring R the assembly map in algebraic K-theory

$$H_n^G(\underline{E}G; \mathbb{K}_R) \to K_n(R[G])$$

is split injective for certain groups with finite decomposition complexity. In particular, for every subgroup G of a linear group which admits a finite-dimensional model for the classifying space $\underline{E}G$ for proper actions. The concept of finite decomposition complexity was first introduced by Guentner, Tessera, and Yu. It is a coarse invariant of metric spaces and generalizes the notion of finite asymptotic dimension.

Daniel Ramras: Straight finite decomposition complexity

I will survey some recent work on Dranishnikov and Zarichnyi's notion of straight finite decomposition complexity ($sFDC$), which generalizes finite decomposition complexity. I'll discuss some of the metric properties of $sFDC$, and its connections to algebra and K-theory.

Žiga Virk: Coarsely n-to-1 maps

In this talk I will present an overview of results on coarsely n-to-1 maps, which are analogues of classical n-to-1 maps. I will mostly focus on their role in coarse versions of the dimension raising theorems. The initial coarse version of the dimension raising theorem was proved in 2013 along with the classification of the asymptotic dimension by coarsely n-to-1 maps (joint with T. Miyata). The obtained upper bound was soon improved for the case of hyperbolic geodesic spaces using Gromov boundary, and it was proved that coarsely n-to-1 maps preserve a number of properties related to Property A (joint with J. Dydak). We recently managed to obtain the optimal bound for the coarse dimension raising theorem using Higson compactification. (joint with K. Austin)