

26.11.2004, Stéphane Félix: Constructing compact 3-dimensional closed complexes with curvature bounded above

The general question of finding new examples of high-dimensional compact spaces with curvature bounded above is of both geometric and group-theoretic interest. The motivating problem treated in this talk comes in fact from the theory of semi-dispersing billiards (articles of D. Burago, S. Ferleger, A. Kononenko). One tries to build such spaces from given pieces (in our case, arbitrary polytopes).

The first part of the talk is an introduction to the geometry of metric spaces and complexes. One gives the basic definitions, curvature in metric spaces, complexes, as well as fundamental classical results: local-global theorems for upper curvature bound (Cartan-Hadamard and related), characterisations of upper curvature bound in the case of complexes. Then, one discusses the proposed problem.

In the second part, the theory of complexes of groups is introduced, and an important theorem about developability of complex of groups is discussed. Consequences of this theorem for the main problem is given, and a residual finiteness result for a class of complexes of groups is proven. One sets these ingredients together to give a complete solution in dimension 3, and a partial solution in dimension n .