

Building manifolds from right-angled polytopes

Speaker: Leonardo Ferrari

Abstract: Manifold covers of right-angled polytopes were first introduced by Davis and Januszkiewicz in 1991 as a simple, combinatorial method to build manifolds by gluing copies of a right-angled polytope along its facets. Since then a number of techniques have been added to their initial work, allowing for a better understanding of the geometry and topology of such manifolds, and many important, recent examples of hyperbolic 3-, 4- and 5-manifolds have arisen from this setting. In this seminar, I will introduce the notion of right-angled polytopes, present the basic construction of manifold covers and give an overview of some additional tools developed in recent years, as well as combinatorial and topological obstructions to the techniques. I will conclude the seminar with the construction of the first example of a hyperbolic, arithmetic, rational homology 3-sphere that bounds geometrically.

Obs: no previous knowledge of hyperbolic or arithmetic geometry is required to follow this seminar, but some familiarity with base notions of algebraic topology is advised.