12TH MATH COLLOQUIUM BCAM-UPV/EHU

We are glad to announce that the 12th Math Colloquium BCAM-UPV/EHU will take place on **Wednesday**, **March 30, at 12:00 (CET)** at **0.25 room** at Mathematics Department at UPV/EHU in Leioa. The talk will be streamed **online** through video conferencing tool Webex:

https://ehu.webex.com/ehu-en/j.php?MTID=m97ce5ee85ff7c3dd2c17cdb8631f3dbd

12:00-13:00 | Francisco Santos: Classification and width of (hollow) lattice polytopes

Hollow polytopes (that is, polytopes with no interior lattice points) are important both in algebraic geometry and integer optimization. One of their most important invariants is their lattice width which, by the "flatness theorem", is bounded in fixed dimension. We will review several recent results related to the width of lattice polytopes. Among them:

- we look at how to construct hollow polytopes of width larger than their dimension, trying to improve lower bounds on the flatness constant.
- we show how width can be used as a tool to classify lattice polytopes, and their algebraic counter-parts. Eg: In dimension four, we have completely classified empty 4-simplices (equivalently, terminal quotient singularities of dimension four), completing a partial classification by Mori, Morrison and Morrison (1988).
- we show how finiteness results on hollow simplices answer in the positive a question of Chaucer Birkar (2018) about blowups with only epsilon-canonical singularities.

13:00-14:00 | Serge Cantat: The Tits Alternative

The Tits alternative, initially proven by Jacques Tits around 1972, concerns the structure of groups of matrices, more precisely of subgroups of GL(V) for any finite dimensional vector space V. As we shall see, there are three interacting perspectives in the Tits alternative, coming from algebra, geometry, and dynamics. What is the precise statement and the meaning of this alternative? How is it proven? Does it hold in other groups, for instance in groups of diffeomorphisms of compact manifolds, or in groups of algebraic transformations? I will discuss these questions at an elementary level, with a focus on explicit examples and an emphasis on the dynamical systems viewpoint.

About the speakers:

Francisco Santos is a Spanish mathematician, Professor of Geometry and Topology at the University of Cantabria. He works in discrete and computational geometry, especially on aspects of polytope theory. In 2010 he disproved a conjecture posed by W.M. Hirsch in 1957, a problem on polytope combinatorics but related to the complexity of the simplex algorithm in linear programming. He has received the Premio Joven de Ciencia y Tecnología de la Fundación Complutense in 2003, the Humboldt Research Award in 2013, and was awarded the Fulkerson Prize in 2015 for finding a counterexample to the Hirsch conjecture in polyhedral combinatorics.

Serge Cantat is a French mathematician, specializing in geometry and dynamical systems. He is a directeur de recherche of CNRS at the Institut de recherches mathématiques de Rennes (University of Rennes). His research deals with complex dynamics and dynamics of automorphisms of algebraic surfaces. He examined the algebraic structure of Cremona groups and showed with Stéphane Lamy that for an algebraically closed field "k" and for dimension n=2 the Cremona group is not a simple group. In 2012 he received the Prix Paul Doistau–Émile Blutet for his work on dynamic systems and award with the Prix La Recherche.