Adam Mickiewicz University
Faculty of Mathematics and Computer Science

Geometry and Topology Seminar

1:45 PM, Tuesday, March 13, 2018
B1-37, Collegium Mathematicum

Speaker: David Recio-Mitter (University of Aberdeen)

Title: Motion planning on surfaces

Abstract:

One of the main problems in robotics is that of motion planning. It consists of finding an algorithm which takes pairs of positions as an input and outputs a path between them. It is not always possible to find such an algorithm which depends continuously on the inputs. Studying this problem from a topological perspective, in 2003 Michael Farber introduced the topological complexity of a space, which measures the minimal (unavoidable) discontinuity of all motion planners on a given topological space. The topological complexity $\mathrm{TC}(X)$ turns out to be a homotopy invariant of the space X.

The nth unordered configuration space of a topological space X is the space of all n-point subsets of X. In this talk we will determine (or narrow down to a few values in some cases) the topological complexity of the unordered configuration spaces of aspherical surfaces (including surfaces with boundary and non-orientable surfaces). In particular we will see an explicit motion planner. Perhaps surprisingly, the disc turns out to be the hardest case.

This is joint work with Andrea Bianchi.