Topological complexity of configuration spaces

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Topological complexity is a numerical homotopy invariant whose definition (due to M. Farber) was inspired by the motion planning problem in Robotics. It has enjoyed much recent attention from homotopy theorists, partly due to its potential applicability, and partly due to its close resemblance to another more classical invariant, the Lusternik-Schnirelmann category.

Classical configuration spaces (whose points are tuples of pairwise distinct points in some manifold, either ordered or unordered) are a natural class of spaces to consider, from either the homotopy theory or the Robotics point of view. We will survey some known results about their topological complexity, some of which were obtained in recent joint work with D. Recio-Mitter. The bounds we employ depend only on the fundamental group, allowing appealing geometric arguments using braids.

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