

# First Joint Meeting Brazil Italy of Mathematics

## Special Session: Geometric Topology and Dynamics

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**Title:** The theory of train tracks and the conjugacy problem for automorphisms of free groups

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**Abstract:** In this talk we will discuss the topological approach to the study of outer automorphisms of free groups given by the study of free homotopy classes of maps between graphs. The moduli space of marked graphs with fundamental group  $F_n$  is known as Culler-Vogtmann Outer Space, and the group of outer automorphisms of  $F_n$  acts by isometries on that space. We will show how the axis of  $\phi \in \text{Out}(F_n)$  — that is to say the points of the outer space that are minimally displaced by  $\phi$  — can be described in terms of train-track maps (introduced in this setting by Bestvina and Handel), and how train tracks are a powerful tool in studying automorphisms, with particular attention to the reducibility problem (solved by I. Kapovich) and the conjugacy problem in  $\text{Out}(F_n)$  (solved by J. Loss for irreducible automorphisms).