Speaker: Lozano-Robledo Alvaro

Title: A probabilistic model for the distribution of ranks of elliptic curves

Abstract: In these talks, we will discuss the possible structures of the Mordell-Weil group of rational points on an elliptic curve as we vary the (naive) height of the curve. The torsion subgroups over the rationals are well understood: Mazur's theorem settles what groups are possible, the parametrization of the corresponding modular curves are known, and we know the distribution of elliptic curves by height with a prescribed torsion subgroup. However, the distribution of ranks of elliptic curves is largely unknown. Several conjectures can be found in the literature, and also some heuristic models, but the basic questions about the distribution of the ranks remain unanswered.

In the RTG talk, we will review the theory of Selmer and Tate-Shafarevich groups, and will give an overview of the known results on the distribution of torsion subgroups, Selmer groups, and the average rank of elliptic curves.

In the main talk, we will propose a probabilistic model for the distribution of ranks of elliptic curves in families of fixed Selmer rank, and we will compare the predictions with previous results, and with the databases of curves over the rationals that we have at our disposal.