abstract

Joint IAS/PU Number Theory Seminar
Topic:

Speaker:

Affiliation:

Date:

Time/Room:

For an abelian surface A over a number field k, we study the limiting distribution of the normalized Euler factors of the L-function of A. Under the generalized Sato-Tate conjecture, this is equal to the distribution of characteristic polynomials of random matrices in a closed subgroup ST(A) of USp(4). The Sato-Tate group ST(A) may be defined in terms of the Galois action on any Tate module of A, and must satisfy a certain set of constraints (the Sato-Tate axioms). Up to conjugacy, we find that there are exactly 55 subgroups of USp(4) that satisfy these axioms. By analyzing the possible Galois-module structures on the R-algebra generated by the endomorphisms of A (the Galois type), we are able to establish a matching with Sato-Tate groups, proving that at most 52 of the 55 subgroups of USp(4) that satisfy the Sato-Tate axioms can actually arise for some A and k, of which at most 34 can occur when k = Q. After a large-scale numerical search, we are able to exhibit explicit examples, as Jacobians of hyperelliptic curves, that realize all 52 of the possible Sato-Tate groups of an abelian surface.

I will give an overview of these results, including graphic animations of several examples. Time permitting, I will also discuss a recent computational breakthrough by David Harvey that may greatly facilitate extensions of this work to genus 3.

This is joint work with Francesc Fite, Victor Rotger, and Kiran Kedlaya, and also with David Harvey.