Algebra Seminar

The generalized Sato-Tate conjecture

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Abstract: The Sato-Tate conjecture is concerned with the statistical distribution of the number of points on the reduction modulo primes of a fixed elliptic curve defined over the rational numbers. It predicts that this distribution can be explained in terms of a random matrix model, using the Haar measure on the special unitary group SU(2). Thanks to recent work by Richard Taylor and others, this conjecture is now a theorem.

The Sato-Tate conjecture generalizes naturally to abelian varieties of dimension g, where it associates to each such abelian variety a compact subgroup of the unitary symplectic group USp(2g), the Sato-Tate group, whose Haar measure governs the distribution of certain arithmetic data attached to the abelian variety. While the Sato-Tate conjecture remains open for all g¿1, I will present recent work that has culminated in a complete classification of the Sato-Tate groups that can arise when g=2 (and proofs of the Sato-Tate conjecture in some special cases), and highlight some of the ongoing work in dimension 3. I will also present numerical computations that support the conjecture, along with animated visualizations of this data.

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

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