

COLLOQUIUM

The average rank of elliptic curves

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Abstract: A *rational elliptic curve* may be viewed as the set of solutions to an equation of the form $y^2 = x^3 + Ax + B$, where A and B are rational numbers. It is known that the rational points on this curve possess a natural abelian group structure, and the Mordell-Weil theorem states that this group is always finitely generated. The *rank* of a rational elliptic curve measures *how many* rational points are needed to generate all the rational points on the curve.

There is a standard conjecture—originating in work of Goldfeld and Katz-Sarnak—that states that the *average* rank of all elliptic curves should be $1/2$; however, it has not previously been known that the average rank is even finite! In this lecture, we describe recent work that shows that the average rank is finite (in fact, we show that the average rank is bounded by 1.5).

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