Algebra
Seminar

On the prime Selmer ranks of cyclic prime twist families of elliptic curves over global function fields

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Abstract: Fix a prime number p. Let $\mathbb{F}_q$ be a finite field of characteristic coprime to 2, 3, and p, which also contains the primitive p-th root of unity μ_p. Based on the works by Swinnerton-Dyer, Klagsbrun, Mazur, and Rubin, we prove that the probability distribution of the sizes of prime Selmer groups over a family of cyclic prime twists of non-isotrivial elliptic curves over $\mathbb{F}_q(t)$ satisfying a number of mild constraints conforms to the distribution conjectured by Bhargava, Kane, Lenstra, Poonen, and Rains with explicit error bounds. The key tools used in proving these results are the Riemann hypothesis over global function fields, the Erdös-Kac theorem, and the geometric ergodicity of Markov chains.

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Mathematics
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