Philadelphia Area Number Theory Seminar

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Serre curves relative to obstruction modulo 2

Abstract: Let E be an elliptic curve defined over $\mathbb{Q}$. Fix an algebraic closure $\overline{\mathbb{Q}}$ of $\mathbb{Q}$. We get a Galois representation

$$\rho_E \colon \operatorname{Gal}(\overline{\mathbb{Q}}/\mathbb{Q}) \to \operatorname{GL}_2(\hat{\mathbb{Z}})$$

associated to E by choosing compatible bases for the N-torsion subgroups of $E(\overline{\mathbb{Q}})$. In this talk, I will discuss my recent work joint with Jacob Mayle where we consider elliptic curves E defined over $\mathbb{Q}$ for which the image of the adelic Galois representation ρ_E is as large as possible given a constraint on the image modulo 2. For such curves, we give a characterization in terms of their ℓ-adic images, compute all examples of conductor at most 500,000, precisely describe the image of ρ_E, and offer an application to the cyclicity problem. In this way, we generalize some foundational results on Serre curves.

Wednesday, January 25, 2023
2:00–4:00 PM

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Informal refreshments at 2:00PM – Talk at 2:30PM