

ONLINE SEMINAR

ARITHMETIC ALGEBRAIC GEOMETRY

(organizers: Grzegorz Banaszak, Piotr Krasoń)

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An effective version of Serre's open image theorem

Abstract: Consider a non-CM elliptic curve E/\mathbb{Q} . The natural Galois action on the torsion points of $E(\overline{\mathbb{Q}})$ can be encoded by a Galois representation $\rho_E : \text{Gal}(\overline{\mathbb{Q}}/\mathbb{Q}) \rightarrow GL_2(\hat{\mathbb{Z}})$. A famous theorem of Serre says that the image of ρ_E is an open, and hence finite index, subgroup of $GL_2(\hat{\mathbb{Z}})$.

The image of ρ_E is an important invariant for studying the arithmetic of E . We shall describe recent results that allow us to actually compute the image of ρ_E for any non-CM E/\mathbb{Q} . One of the important ingredients is a new method for computing models of modular curves.