

Speaker: David Zywina

Title: Elliptic surfaces and the Inverse Galois Problem

Abstract: The *Inverse Galois Problem* asks whether every finite group G occurs as the Galois group of some extension of \mathbb{Q} , i.e., whether there is a Galois extension K/\mathbb{Q} such that $\text{Gal}(K/\mathbb{Q})$ is isomorphic to G . This problem is still wide open, even in the special case of simple groups.

By studying the Galois action on the étale cohomology of some well-chosen elliptic surfaces, we will prove many new cases of the Inverse Galois Problem. In particular, we will explain why the simple groups $\text{PSL}_2(\mathbb{F}_p)$ and $\text{PSp}_4(\mathbb{F}_p)$ both occur as Galois extensions of \mathbb{Q} for all sufficiently large primes p . An important role will be played by the L -functions of certain elliptic curves defined over global function fields.