

# Jacobian varieties of genus 3 and the inverse Galois problem

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**Abstract:** The inverse Galois problem, first addressed by D. Hilbert in 1892, asks which finite groups occur as the Galois group of a finite Galois extension  $K/\mathbb{Q}$ . This question is encompassed in the general problem of understanding the structure of the absolute Galois group  $G_{\mathbb{Q}}$  of the rational numbers.

A deep fact in arithmetic geometry is that one can attach compatible systems of Galois representations of  $G_{\mathbb{Q}}$  to certain arithmetic-geometric objects, (e.g. abelian varieties). These representations can be used to realise classical linear groups as Galois groups over  $\mathbb{Q}$ .

In this talk we will discuss the case of Galois representations attached to Jacobian varieties of genus  $n$  curves. For  $n = 3$ , we provide an explicit construction of curves  $C$  defined over  $\mathbb{Q}$  such that the action of  $G_{\mathbb{Q}}$  on the group of  $\ell$ -torsion points of the Jacobian of  $C$  provides a Galois realisation of  $\mathrm{GSp}_6(\mathbb{F}_{\ell})$  for a prefixed prime  $\ell$ . This construction is a joint work with Cécile Armana, Valentijn Karemaker, Marusia Rebolledo, Lara Thomas and Núria Vila, and was initiated as a working group in the Conference *Women in Numbers Europe* (CIRM, 2013).

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