

TARDE CIM

Lectures on

Galois covers of the moduli space of curves

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The moduli space M_g of Riemann surfaces, or equivalently of smooth projective algebraic curves, is the oldest moduli space that has been ever considered: Riemann was the first one to study it around 1850. Since then, the moduli space of Riemann surfaces has been one of the central objects of study in many areas of mathematics, including algebraic geometry, complex analysis, algebraic topology, complex geometry, geometric topology, arithmetic geometry, and geometric group theory. More recently, the moduli space of curves has found a spectacular application to theoretical physics, and more precisely to string theory, where it played a crucial role in the definition of Gromov-Witten invariants and of mirror symmetry.

One of the most powerful tools in the study of M_g is the so-called Teichmüller theory. This theory allows the construction of a complex manifold, called the Teichmüller space, which turns out to be the orbifold (or stacky) universal cover of M_g . The orbifold fundamental group of M_g is an extremely interesting group, called the mapping class group, which therefore acts properly discontinuous on the Teichmüller space. The study of the finite Galois covers of M_g , which is therefore equivalent to the study of finite-index normal subgroups of the mapping class group, turned out to be a very rich and interesting aspect of the theory, which is nowadays a very active area of research.