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Cohomological invariants of algebraic stacks

Cohomological invariants are arithmetic analogues of characteristic classes in topology, in which singular cohomology is replaced with Galois cohomology, and topological spaces with spectra of fields. Given an affine algebraic group G , a cohomological invariant for G is a way to functorially assign to each principal G -bundle over the spectrum of a field k an element of the Galois cohomology of k . These invariants form a graded ring, which has been computed for many classes of algebraic groups by several authors, including Rost, Serre, Merkurjev and many others.

In my talk I will show how to extend the classical theory to a theory of cohomological invariants for Deligne-Mumford stacks and in particular for the stacks of smooth genus g curves. The concept of general cohomological invariants turns out to be closely tied to the theory of unramified cohomology, which was introduced by Saltman, Ojanguren and Colliot-Thélène and is widely used to study rationality problems.

I will also show how to compute the additive structure of the ring of cohomological invariants for the algebraic stacks of hyperelliptic curves of all even genera and genus three.