Cohomology of moduli stacks of vector bundles on algebraic curves

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This is joint work in progress with U. Stuhler (Goettingen)

After giving an introduction into moduli problems and moduli stacks, I will describe the l-adic cohomology algebra of the moduli stack of vector bundles on a give algebraic curve in positive characteristic and will describe the action of the various geometric and arithmetic Frobenius morphisms. It turns out that using the higher categorical language of stacks instead of geometric invariant theory this becomes surprisingly easy and topological in flavour. Using the Lefschetz trace formula for algebraic stacks due to Behrend I will discuss the analogues of the Weil Conjectures for this moduli stack and will determine how many isomorphism classes of vector bundles on an algebraic curve in positive characteristic there are.