FRAUKE BLEHER, University of Iowa
Automorphisms of Katz-Gabber covers

This is joint work with Ted Chinburg, Bjorn Poonen and Peter Symonds. Let k be an algebraically closed field of characteristic $p > 0$, and let G be a finite group of order divisible by p. This talk has to do with the possible isomorphism classes of G-sets T which can arise as the ramification locus of a faithful action of G on a smooth projective curve X over k. One says this action defines a Katz-Gabber G-cover if X/G has genus 0, T^G is one point, and G acts tamely and transitively on $T - T^G$. Our goal is to study the automorphism group $\mathrm{Aut}_k(X)$ of X over k. This group contains G by virtue of the Katz-Gabber construction.

We consider the case when $X \to X/\mathrm{Aut}_k(X)$ is not a Katz-Gabber cover for the group $\mathrm{Aut}_k(X)$, so that $\mathrm{Aut}_k(X)$ is strictly larger than G. We show that then either X belongs to an exceptional family of curves of genus 0 or 1, or the action of $\mathrm{Aut}_k(X)$ on X mixes the tame and totally ramified orbits. The exceptional case in which X has genus 1 is of particular interest because it leads to some new explicit formulas for power series $\sigma(t) = \sum_{i=1}^{\infty} a_i t^i$ which define automorphisms of $k[[t]]$ of order p^2 when $p = 2$.