

No-liftability of automorphism groups of a K3 surface in positive characteristic

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For a K3 surface in characteristic $p \geq 3$, there is a projective model $X_R \rightarrow \text{Spec } R$ in characteristic 0 with Picard number 1 over a geometric generic point. In particular, this model essentially kills all automorphisms. There is a supersingular K3 surface in characteristic 3, with an automorphism of positive entropy, the logarithm of a Salem number of degree 22, which does not lift to characteristic 0 at all. We construct elliptic K3 surfaces in characteristic $p \geq 3$ such that the automorphism group of any lifting to characteristic 0 does not hit the whole automorphism subgroup of the Mordell-Weil group of the elliptic fibrations and some automorphisms of positive entropy. (Joint work with K. Oguiso.)