

Research project **BLGCSSC**

Birational lifting of Galois cover of semi-stable curves

Supervisor 1 Qing Liu

E-mail Qing.Liu@math.u-bordeaux1.fr

Institution Université Bordeaux 1

Supervisor 2 Marco Garuti

E-mail mgaruti@math.unipd.it

Institution Università degli Studi di Padova

Research project short description:

Let R be a complete discrete valuation ring with algebraically closed field k . Let C be a projective semi-stable curve over k endowed with the action of a finite group G such that the quotient map $C \rightarrow D = C/G$ is generically étale. The purpose of the thesis is to prove that, after extending R , $C \rightarrow D$ can be lifted birationally to a Galois cover $X \rightarrow Y$ of semi-stable curves over R of Galois group G , such that $Y_k = D$ and X_k is homeomorphic to C . The case when C is smooth is proved by M. Garuti in 1996. The generalization to semi-stable curves is natural because Deligne-Mumford theorem implies that every Galois cover of projective smooth curves over $\text{Frac}(R)$ reduces to a finite cover of semi-stable curves over k , after extending R if necessary. Our starting situation correspond to the case where the resulting cover over k is generically étale.