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Arithmetic curves of type $K(\pi, 1)$ and higher Massey products

If k is a number field, p an odd prime number and S a finite set of primes of k containing the set S_p of primes above p , the arithmetic curve $\text{Spec}(\mathcal{O}_k \setminus S)$ is a $K(\pi, 1)$ for p , i.e. the pro- p -completion of its étale homotopy type is weakly equivalent to the Eilenberg-MacLane space of $\pi_1^{et}(\text{Spec}(\mathcal{O}_k \setminus S)(p))$, the Galois group of the maximal pro- p -extension of k unramified outside S . We discuss arithmetic consequences of the $K(\pi, 1)$ -property in the more difficult tame case (i.e. $S \cap S_p = \emptyset$) due to A. Schmidt and show how the first explicit examples have been obtained by J. Labute using the theory of mild pro- p -groups. We investigate how these groups can be constructed using higher cohomological Massey products and give an arithmetic interpretation for $k = \mathbb{Q}$ in terms of certain analogues of p -th power symbols.