

# RESOLUTION OF SINGULARITIES BY $p$ -ALTERATIONS

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ABSTRACT. De Jong proved that any variety  $X$  can be desingularized by an alteration  $f : Y \rightarrow X$ , i.e. a proper surjective generically finite morphism. This was strengthened by Gabber as follows:  $f$  can be chosen of degree prime to a fixed prime  $l$  invertible on  $X$ .

In this talk, I will tell about the most recent progress on the subject: if  $X$  is of finite type over a quasi-excellent threefold then one can desingularize  $X$  by an alteration whose degree is only divisible by primes non-invertible on  $X$ . We will also discuss finer results that deal with divisors and desingularize morphisms in the sense of semistable reduction.