

## 8/14 [Louis-Philippe Thibault ] Tilting objects in singularity categories and levelled mutations

In 1989, Reiten and Van den Bergh showed that for every finite subgroup  $G$  of  $SL(2, k)$ , the skew-group algebra  $k[x, y] \# G$  is Morita equivalent to the preprojective algebra over the extended Coxeter-Dynkin quiver associated to  $G$  via the McKay correspondence, thus providing another bridge between Kleinian singularities and representation theory. In the context of Iyama's higher Auslander-Reiten theory, it is natural to ask whether the same holds true for finite subgroups of  $SL(n, k)$  and higher preprojective algebras. In the first part of this talk, I will give a class of subgroups for which the skew-group algebra is not Morita equivalent to a higher preprojective algebra.

We will then move on to study the graded singularity category over the invariant ring  $k[x_1, \dots, x_n]^G$ . When the skew-group algebra is endowed with a grading giving it the structure of a preprojective algebra, Amiot, Iyama and Reiten showed that this category admits a tilting object. In the second part of this talk, we will be motivated by the case where the skew-group algebra does not admit such grading structure. We will explain that, in certain situations, one can use levelled mutations to obtain tilting objects in the graded singularity category.