Quotient singularities, higher hereditary algebras, and non-commutative regular algebras

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We study the relationship of representation theories of three different types of rings: (1) commutative Gorenstein rings R, (2) finite dimensional algebras A, and (3) non-commutative regular algebras Γ (or Artin-Schelter regular algebras). We do so by looking at triangulated categories naturally associated to each of them: the singularity category of R, the derived category of A, and the derived category of the non-commutative projective scheme of Γ. Given a certain class of commutative Gorenstein ring R, we construct a tilting object in its graded singularity category, whose endomorphism ring A turns out to be higher representation infinite. It consequently yields a non-commutative regular algebra Γ. The construction from A to Γ can be explained as a certain variation of the Calabi-Yau completion.

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