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Triangulated categories of ADE-matrix-factorizations by Kajiura – Saito – Takahashi

Classification problems of type ADE have a long history and (from the mathematical viewpoint) even some pre-history. Several good questions have been motivated by physicists.

Here the *triangulated category* $\mathrm{HMF}_R^{gr}(f)$ *of a weighted polynomial* $f \in C[X,Y,Z] =: R$ over the complex numbers is discussed, where f defines a simple singularity. It is equivalent to categories which enjoy some recent interest in string-theory. Orlov's category of *graded D-branes of type B* gives access to a version which is well adapted for using tools of algebraic geometry.

Let $\overrightarrow{\Delta}$ denote a (directed) Dynkin-quiver associated to the given singularity of the surface $V(f)$ and $(\mathbf{mod} - C\overrightarrow{\Delta})$ the category of right-modules over the associated path-algebra $C\overrightarrow{\Delta}$. Its derived category $\mathcal{C} := \mathrm{D}^b(\mathbf{mod} - C\overrightarrow{\Delta})$ is a Krull-Remak-Schmidt-category. The theorem of Kajiura – Saito – Takahashi gives an equivalence $\mathrm{HMF}_R^{gr}(f) \cong \mathcal{C}$ of triangulated categories.