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Representation–infinite Algebras from Geometry

This is a report on joint work with Lutz Hille on the recent notion of higher preprojective algebras as introduced by Iyama and his collaborators. We show that a tilting object on a smooth projective variety X of dimension d has an endomorphism ring that is representation-infinite if, and only if, it pulls back to a tilting object on the affine canonical bundle over X if, and only if, that endomorphism algebra has minimal global dimension, equal to d, and no extensions in negative degrees against twists with negative powers of the canonical bundle.

The endomorphism ring of the pullback then yields the corresponding higher preprojective algebra. This proves, for example, that any foundation of a helix on a Fano variety gives rise to such a pair of a d-representation-infinite algebra and its accompanying higher $(d+1)$-preprojective algebra.