Minisymposium 12 - Representation Theory of Algebras

Relative Calabi-Yau duality (joint work with Bernhard Keller)

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Triangulated categories of Calabi-Yau dimension 2 have turned out to be important in connection with cluster algebras, since for example the cluster categories and the stable categories of preprojective algebras of Dynkin diagrams have this property. In these examples, the triangulated categories contain cluster-tilting objects (i.e. maximal exceptional objects) and are closely related to the module category of the endomorphism algebra of each cluster-tilting object. We call such endomorphism algebras 2-Calabi-Yau tilted (and cluster-tilted if they arise from cluster categories). We show that they are Gorenstein of dimension at most one and that their stable categories of Cohen-Macaulay modules are Calabi-Yau of dimension 3. Often, a 2-Calabi-Yau tilted algebra naturally arises as a quotient of an algebra of finite global dimension. This algebra then satisfies a relative 3-Calabi-Yau property, as first shown by Geiss-Leclerc-Schroer in the context of modules over preprojective algebras. In contrast to its "absolute" variant, this relative Calabi-Yau property generalizes to higher dimensions.