

INTERACTIONS BETWEEN HOPF ALGEBRAS AND CALABI-YAU ALGEBRAS

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ABSTRACT. The Calabi-Yau (CY) algebras were defined by Ginzburg in 2006. They are differential graded algebras satisfying some duality which, in the case of a \mathbb{C} -algebra, is the Van den Bergh duality with trivial dualizing module. In the last few years, CY algebras have been studied intensively and many connections to various areas of mathematics have been found. In particular, the so-called Ginzburg algebras defined by quiver and potential are used in representation theory to construct categorifications of cluster algebras.

This talk shall present recent results by various people on the interactions between Hopf algebras and CY algebras. The underlying question of these works is the following. If a Hopf algebra H acts on an (ordinary or dg) algebra A , then the crossed product algebra $A\sharp H$ is the object encoding both A , H and the action; is it true that $A\sharp H$ is CY if A is CY? For example, if H is the group algebra over \mathbb{C} of a finite group G , then $A\sharp H$ is a “smooth refinement” of the algebra of invariants of A under the action of G ; if H is the enveloping algebra of the one dimensional Lie algebra, then $A\sharp H$ is an Ore extension of A . A positive answer to that question (under reasonable hypotheses) would provide new examples of CY algebras (which, still, are far from being well-understood).

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