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Monoidal categories arising from representations of finite dimensional algebras, and their representation rings.

For a monoidal abelian category \mathcal{C} , its Grothendieck or representation rings represent interesting invariants; in the other direction, given a ring R , finding a monoidal category whose Grothendieck or representation ring is isomorphic to R is a question of active interest and the main problem of Categorification. This becomes especially relevant when the category \mathcal{C} is small, and in particular, when \mathcal{C} has finitely many objects. We survey existing results and present new ones on Hopf algebras having (locally) finitely many indecomposable representations; these include interesting classes of quantum groups, such as Hopf algebras whose category of comodules is equivalent to those of chain complexes and whose representation ring categorifies generalized Fibonacci polynomials. At the same time, we show that many important classes of finite dimensional algebras which have some finiteness in representation type, that is, that have only finitely many representations of a certain type (including algebras of finite representation type), admit weak bialgebra structures and give rise to monoidal categories which have representation rings that categorify various types of semigroup algebras. This is based partly on joint separate works G. Koffi and K. Gerstle. (Received September 20, 2016)