Abstract

Building lots of big indecomposable modules

Roger Wiegand
University of Nebraska

The Brauer-Thrall conjectures (now theorems) in the representation theory of finite-dimensional algebras can be transplanted from their original context to commutative algebra: Brauer-Thrall 1 should say something like this: If $(R, \mathfrak{m}, k)$ is a local Cohen-Macaulay (CM) ring with infinite CM type (i.e., there are infinitely many non-isomorphic indecomposable maximal CM R-modules), then there are indecomposable maximal CM R-modules of arbitrarily large multiplicity. Brauer-Thrall 2 should sharpen this by saying that if k is infinite then there are infinitely many n for which there are infinitely many non-isomorphic indecomposables of multiplicity n.

In dimension one, pretty much everything is known: There are essentially three counterexamples to Brauer-Thrall 1; and if R is analytically unramified then Brauer-Thrall 2 is true. In this talk I will talk about these results, survey what is known in higher dimensions, and also give some indication of how one builds the requisite indecomposable modules of large rank.