

Multiplicity of the special fiber of blowups and Sally modules

Alberto Corso
University of Kentucky

Given an R -ideal I , the special fiber ring $F(I)$ encodes asymptotic information about the ideal I : for instance, its Hilbert function gives the minimal number of generators of the powers of I , while its Krull dimension coincides with the minimal number of generators of any minimal reduction of I . Special fiber rings also find an application in related areas such as Number Theory (eg., Mazur's theory of evolutions) and Algebraic Geometry (special fiber rings yield homogeneous coordinate rings of Gauss images and of secant varieties, whereas $\text{Proj}(F(I))$ corresponds to the fiber over the closed point of the blowup of the variety $\text{Spec}(R)$ along the subvariety $V(I)$).

In this talk, we will discuss how sharp bounds on the multiplicity of the special fiber ring $F(I)$ reflect on good structural properties of $F(I)$. Our results are based on a good understanding of the structure of a related graded object: the Sally module. This is joint work with C. Polini and W.V. Vasconcelos.