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Weighted Veronese Rings

For a standard-graded polynomial ring R, the d-Veronese subring is generated as a k-algebra by degree d monomials, is Koszul, and its defining ideal is quadratic, binomial, and determinantal. In this talk, I will discuss what happens when we start instead with a non-standard graded polynomial ring.

In joint work with A. Seceleanu, L. Fiorindo, B. Chase, T. de Holleben, S. Singh, T. Nguyen, S. Bisui, we show that in the two-variable case, these weighted Veronese rings preserve many of these properties: they are Cohen–Macaulay, Koszul, and have a determinantal presentation. Moreover, their Hilbert function and Betti numbers depend only on the number and degrees of the generators. In contrast, in three or more variables, these properties no longer hold in general.