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Sparse determinantal ideals: Groebner bases and Rees algebras

In this talk, I will introduce and discuss sparse determinantal ideals. Sparse determinantal ideals were first studied by Giusti and Merle. They are ideals of minors of a sparse generic matrix, i.e. a matrix whose entries are either zero or distinct variables. In his doctoral thesis, Adam Boocher studied their Groebner bases and initial ideals, proving that the maximal minors of a sparse generic matrix are a universal Groebner basis of the ideal that they generate. Together with A. Conca and E. De Negri, we computed the generic initial ideals of sparse determinantal ideals with respect to two different natural multigradings and proved that each of them is the only Borel-fixed point in the Hilbert scheme to which they belong. In a recent joint work with E. Celikbas, E. Dufresne, L. Fouli, K.-N. Lin, C. Polini, and I. Swanson, we leveraged the Groebner bases results to study the Rees algebras of determinantal ideals of 2xn sparse generic matrices and of their initial ideals. Our main tools are Groebner bases and SAGBI bases.