

## **Segre-Driven Algorithms to Test Ideal Membership and Compute Algebraic Multiplicity**

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In this talk we discuss new effective methods to test pairwise containment of arbitrary (possibly singular) subvarieties of any smooth projective toric variety and to determine algebraic multiplicity without working in local rings. These methods may be implemented without using Gröbner bases; in particular any algorithm to compute the number of solutions of a zero-dimensional polynomial system may be used. The methods arise from techniques developed to compute the Segre class  $s(X, Y)$  of  $X$  in  $Y$  for  $X$  and  $Y$  arbitrary subschemes of some smooth projective toric variety  $T$ . In particular, this work also gives an explicit method to compute these Segre classes and other associated objects such as the Fulton-MacPherson intersection product of projective varieties. These algorithms are implemented in Macaulay2 and have been found to be effective on a variety of examples. This is joint work with Corey Harris (MPI MiS Leipzig).