

# Generalized Jouanolou duality, weakly Gorenstein rings, and the implicitization problem

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This talk is concerned with a classical problem in elimination theory, the determination of the implicit equations defining the graphs and images of rational maps between projective varieties. The problem amounts to identifying the torsion in the symmetric algebra of an ideal, and one technique to achieve this is based on a duality statement due to Jouanolou that expresses the torsion of a graded algebra in terms of a graded dual of this algebra. Unfortunately, Jouanolou duality requires the algebra to be Gorenstein, a rather restrictive hypothesis for symmetric algebras. In this talk, I will introduce a generalized notion of Gorensteinness, which we call weakly Gorenstein, and explain how Jouanolou duality can be extended to this larger class of algebras. The generalized duality leads to the solution of the implicitization problem for new classes of rational maps, and can be used in some cases to relate the implicitization problem for an ideal to the implicitization problem for one of its Fitting ideals. The talk is based on joint work with Yairon Cid-Ruiz, Claudia Polini, and Matthew Weaver.