

## Liftings of projective schemes

## FRANCESCA CIOFFI

Università di Napoli Federico II

A classical approach to investigate a closed projective scheme X consists in considering a general hyperplane section of X, because many properties of X are inherited by a general hyperplane section and can be easier recognized in subschemes of lower dimension. The inverse problem that consists in finding a scheme X starting from a possible hyperplane section is called a *lifting problem* and investigations in this topic can produce methods to obtain affine or projective schemes with specific properties.

Let K be an infinite field, A a Noetherian K-algebra and  $\mathbb{P}^n_A$  the n-dimensional projective space over A. In this talk, we consider the following lifting problem: given a closed subscheme  $Y \subset \mathcal{H} \simeq \mathbb{P}^{n-1}_K$ , where  $\mathcal{H}$  is an hyperplane of  $\mathbb{P}^n_K$ , describe all closed subschemes  $W \subset \mathbb{P}^n_A$  such that Y is a general hyperplane section of W, up to an extension of scalars. Every such scheme W is called a *lifting* of Y over A and the saturated defining ideal I of W is called a *lifting* of the saturated defining ideal I' of Y.

We describe all the liftings of Y with a given Hilbert polynomial by means of a parameter scheme which is obtained by gluing suitable affine subschemes of a Hilbert scheme and represents a functor of points. Both constructive and classical techniques are used. The constructive methods are borrowed from Gröbner and marked bases theory.

This is a joint work with Cristina Bertone (Università di Torino) and Davide Franco (Università di Napoli).