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Nagel, Uwe, Universität-Gesamthochschule Paderborn, Germany

Characterization of projective subschemes by locally free resolutions

A locally free resolution of a subscheme is an exact sequence consisting of locally free sheaves (apart from the ideal sheaf of the subscheme) which has uniqueness properties like a free resolution. Such resolutions do exist. We use them in order to characterize certain locally Cohen-Macaulay subschemes. Firstly, we achieve this for arithmetically Buchsbaum subschemes. This leads to the notion of an Ω-resolution and extends the main result of Chang in [1]. Secondly, we characterize quasi-Buchsbaum subschemes by means of weak Ω-resolutions. Finally, we describe the weak Ω-resolutions which belong to arithmetically Buchsbaum surfaces in $\mathbb{P}^4$.

Reference: [1] M. Chang, *Characterization of arithmetically Buchsbaum subschemes of codimension* 2 *in* $\mathbb{P}^n$, J. Differential Geom. **31** (1990), 323–341.