

Chapter 1

Chow Rings

It is time now to delve into the world of algebra, developing the notion of a Chow ring of a matroid. Much of section will be presenting results of Adiprasito-Huh-Katz that establish the link between the Chow ring and the characteristic polynomial.

This is going to be a section that will be challenging to parse without some background in abstract algebra. Even with a basic background, Chow rings are somewhat specialized, a development of intersection theory in algebraic geometry. Not something everyone has seen for sure. Luckily, we can exploit the structure of matroids to define a Chow ring without having to go the long way through intersection theory.

1.1 Defining a Chow Ring

A Chow ring is “a generalization of cohomology for algebraic geometry” **1.Introduce the Chow Ring of a matroid. From lattice of flats to quotient ring 2.Use our example matroid and construct its Chow Ring**

1.1.1 Properties of Chow Rings

3.Use words like *homogeneous polynomial*, *graded ring*, etc...

1.1.2 The Degree Map

4.How do I explain this? I guess I can at least say it's linear and sends terms of full degree to 1. Maybe I'll understand it this time around

1.2 Relationship with the Characteristic Polynomial

**5.Come up with a nice way of relating the reduced characteristic polynomial with our ring (and therefore fan)
6.Define α and β . Here or in a subsection? Or should it be up when we introduce the ring itself?**