

# Hopf algebras and the geometry of real hyperplane arrangements

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The starting point for our considerations is the notion of graded Hopf algebra, particularly those graded over the nonnegative integers. When the latter are replaced by finite sets, one arrives at the notion of Hopf monoid in Joyal's category of species.

The goal of this talk is to go one step further, replacing finite sets by finite real hyperplane arrangements. Geometric considerations allow us to define a generalized notion of "Hopf algebra" in this setting. The key ingredient in this construction is furnished by the projection maps of Tits. Algebraically, we construct a monad and a comonad linked by a mixed distributive law in the sense of Beck.

We will discuss these ideas without assuming familiarity with hyperplane arrangements or distributive laws. The case of finite sets (Hopf monoids in species) is recovered by restricting to braid arrangements. This will be used to illustrate the constructions.

This is joint work in progress with Swapneel Mahajan.