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Hypergraphical polytope and antipode for hypergraphs

We provide a definition of hypergraph orientations which allow us to better understand the antipode formula for the Hopf Monoid of Hypergraphs. We then show that this formula relate directly to a sum over the faces of a certain polytope; the hypergraphical polytope of the given hypergraph. (Joint with C. Benedetti and J. Machacek)