

ASSOCIATIVITY OF COSMASH PRODUCTS IN ALGEBRA

The promise of this talk is to convince you that, for an infinite field \mathbb{K} , we can use category theory to characterize the variety of commutative and associative \mathbb{K} -algebras. In fact, *cosmash associativity* is the categorical condition needed.

In order to present things in an understandable way, we will first introduce the notion of *binary cosmash product*. We see how it naturally leads to a suitable definition of binary commutators by looking at some classical examples. We then try to extend these notions the ternary case, and even to the n -ary case for some natural number n . From this point, what *cosmash associativity* means can be explained essentially without effort. In the end, we discuss the main result and, if time allows it, the techniques used to prove it.

Joint work with Ülo Reimaa and Tim Van der Linden.

REFERENCES

- [1] A. Carboni, G. Janelidze (2003,) *Smash product of pointed objects in lextensive categories*, Journal of Pure and Applied Algebra 183.
- [2] M. Hartl, T. Van der Linden (2013), *The ternary commutator obstruction for internal crossed modules*, Adv. Math 232, no. 1, 571-607.
- [3] S. Mantovani, G. Metere (2010), *Normalities and Commutators*, J. Algebra 324, no. 9, 2568-2588.
- [4] Ü. Reimaa, T. Van der Linden, C. Vienne (2022), *Associativity and the Cosmash Product in Operadic Varieties of Algebras*, in preparation.