Pivotality, twisted centres, and the anti-double of a Hopf monad

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Abstract.

Finite-dimensional Hopf algebras admit a correspondence between so-called pairs in involution, one-dimensional anti-Yetter–Drinfeld modules, and algebra isomorphisms between the Drinfeld and anti-Drinfeld double. From the perspective of representation theory, Hopf algebras are in one-to-one correspondence with rigid monoidal categories. This fact may be "categorified", passing from Hopf algebras to Hopf monads as defined by Bruguiéres and Virelizier [1]. Further, as studied by Aguiar and Chase [2], a Hopf monad may admit a comodule monad over it; this generalises the notion of a comodule algebra over a Hopf algebra, which representation theoretically expresses itself as a module category over the (rigid) monoidal base category.

In this talk, we will explore the classical theorem from this perspective, and extend it to comodule monads over Hopf monads. Hereto we construct the anti-Drinfeld double of a Hopf monad, which—analogously to the Hopf algebraic case—is a comodule over its double; the latter was studied in [3]. As it turns out the interplay between double and anti-double characterises when a rigid monoidal category is pivotal—i.e., the double dualising functor is (isomorphic to) the identity.

This talk is based on [4].

References

[1] A. Bruguières and A. Virelizier, *Hopf monads*, Adv. Math. 215, No. 2, 2007, 679–733.

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[3] A. Bruguiéres and A. Virelizier, *Quantum double of Hopf monads and categorical centers*, Trans. Am. Math. Soc. 364, No. 3, 2012, 1225–1279.

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