Weak bimonads and weak Hopf monads

Gabriella Böhm (Research Institute for Particle and Nuclear Physics, Budapest, Hungary)
bgabr@rmki.kfki.hu

An algebra over a commutative ring is known to be a bialgebra if and only if its category of (left or right) modules is monoidal such that the forgetful functor is strong monoidal. By analogy, a monad can be called a "bimonad" whenever its Eilenberg-Moore category is monoidal such that the forgetful functor is strong monoidal. A bimonad in this sense was proved to be the same as an opmonoidal monad, see recent works by Moerdijk, Mc Crudden and others.

More generally, an algebra over a commutative ring is known to be a weak bialgebra if and only if its category of (left or right) modules is monoidal such that the forgetful functor possesses a so-called separable Frobenius monoidal structure. By analogy, we define a "weak bimonad" as a monad with additional structures that are equivalent to the monoidality of its Eilenberg-Moore category such that the forgetful functor is separable Frobenius monoidal. Whenever in the base category idempotent morphisms split, a simple set of axioms is provided, that characterizes the monoidal structure of the Eilenberg-Moore category as a weak lifting of the monoidal structure of the base category. The relation to bimonads, and the relation to weak bialgebras in a braided monoidal category are revealed. We also discuss antipodes, obtaining the notion of weak Hopf monad.

The talk is based on the paper [G. Böhm, S. Lack and R. Street, *Weak bimonads and weak Hopf monads.* J. Algebra **328** (2011), 1-30.]