Title: Closed Reconstruction

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Abstract: Starting with a commutative ring R, it is well-known that monoidal structures on the category of H-modules, for an R-algebra H, that are compatible with the canonical forgetful functor are in bijection with bialgebra structures on H. If H is even Hopf, then one can also lift the closed structure from R-mod to H-mod.
However, in some cases one might be interested in first lifting just the closed structure, without any assumption of monoidal compatibility. This talk will focus on reconstruction of this kind, more closely studying the question from the monadic point of view. While in the monoidal case, oplax monoidal monads are the right notion, in the closed world, lax closed monads are inadequate for reconstruction purposes. The right notion turns out to be that of a gabi-monad, first outlined by Berger–Saracco–Vercruysse. While in the algebraic world, lifting the closed structure in this way already implies that one started with a Hopf algebra, this is not the case for monads: we give examples of gabi-monads that are not Hopf.
The talk is based on joint work in progress with Sebastian Halbig and Paolo Saracco.