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On split extensions of bialgebras

Inspired by the discovery in [3] that the category of cocommutative Hopf algebras over an algebraically closed field is semi-abelian, in the article [2] we prove a universal characterisation of Hopf algebras amongst cocommutative bialgebras. It is of the style of the characterisations of groups amongst monoids obtained in [4, 1]: a cocommutative bialgebra is a Hopf algebra precisely when every split extension over it admits a join decomposition.

The aim of this talk is to give an account of some obstructions that occur when extending these results to bialgebras which are no longer cocommutative.

References

[1] X. García-Martínez, *A new characterisation of groups amongst monoids*, Appl. Categ. Structures **25** (2017), no. 4, 659–661.

[2] X. García-Martínez and T. Van der Linden, *A note on split extensions of bialgebras*, Forum Math. (2018), in press.

[3] M. Gran, G. Kadjo, and J. Vercruysse, *A torsion theory in the category of cocommutative Hopf algebras*, Appl. Categ. Structures **24** (2016), no. 3, 269–282.

[4] A. Montoli, D. Rodelo, and T. Van der Linden, *Two characterisations of groups amongst monoids*, J. Pure Appl. Algebra **222** (2018), 747–777.

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[*]Joint work with Xabier García Martínez.