

## Ecole Doctorale des Sciences Fondamentales

### Title of the thesis: Hopf algebras of small cohomological dimension

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**Summary :** This thesis project aims at providing progress in the understanding of the structure of Hopf algebras of small cohomological dimension. The following questions will be studied.

- (1) What are the Hopf algebras of cohomological dimension 1? This is an ambitious question, whose answer would generalize a deep theorem of Dunwoody in the case of group algebras. Several more accessible sub-questions will be studied first: the case of Hopf algebras having homological duality, the case of free Hopf algebras generated by simple coalgebras...
- (2) Are there "non-trivial" Hopf algebras of cohomological dimension 2?
- (3) Several important examples have cohomological dimension 3, such as the "free" Hopf algebras associated to categories of partitions. Can this be generalized without the freeness assumption?

Analogues of these questions will also be studied in the context of Gerstenhaber-Schack cohomological dimension.

**Background: very good knowledge in homological algebra and Hopf algebras.**