

SEMINARIO DI GEOMETRIA

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Politecnico di Torino,
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Higher structures and cyclic operads

Results of various authors using different approaches imply that the Hochschild cohomology of certain associative algebras (e.g., Frobenius or Calabi-Yau algebras) carries a higher structure in the form of a BV algebra structure. In order to give a sufficient criterion when this happens, we will discuss from a general viewpoint the notion of noncommutative differential calculus introduced by Nest, Tamarkin, and Tsygan, which in particular asks for a general algebraic notion of Lie derivative and cap product, along with a cyclic differential in the sense of Connes and the structure of a Gerstenhaber algebra: examples include the well-known calculi from differential geometry given by Lie derivative, contraction, and the de Rham differential, and in algebra on the aforementioned Hochschild cohomology groups.

In particular, we dedicate our attention to so-called opposite modules over operads with multiplication (in $/k/-\text{mod}$) and the ingredients required to obtain on them the structure of a cyclic module and how the underlying simplicial homology gives rise to a Batalin-Vilkovisky module over the cohomology of the operad. A for our purposes interesting application consists in considering the case of a cyclic operad as an opposite module over itself by which one obtains a homotopy formula for the bracket of a BV algebra, which allows to re-prove Menichi's result on BV algebra structures on the simplicial cohomology of a cyclic operad with multiplication.