

# On the first Hochschild cohomology

*Wednesday, 20 September 2023 16:00 (1 hour)*

Let  $A$  be an associative algebra. The Hochschild cohomology of  $A$  has a rich structure: it is a Gerstenhaber algebra. In particular, its first degree component, denoted by  $\mathrm{HH}^1(A)$  is a Lie algebra. In positive characteristic  $\mathrm{HH}^1(A)$  is a restricted Lie algebra.

In the first part of this talk, I will show the invariance, as a restricted Lie algebra, of the first Hochschild cohomology under derived equivalences and under stable equivalences of Morita type for symmetric algebras.

In the second part, I will focus on the relation between the fundamental groups associated to presentations of  $A$  and the maximal tori in  $\mathrm{HH}^1(A)$ . As an application, I will show that if two finite dimensional monomial algebras are derived equivalent, then their Gabriel quivers contain the same number of arrows. For gentle algebras, this was proven by Avella-Alaminos and Geiss.

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