Speaker: Lleonard Rubio (University of Verona)

Title: Maximal tori in $HH^1$ and the homotopy theory of bound quivers

Abstract: Hochschild cohomology is a fascinating invariant of an associative algebra which possesses a rich structure. In particular, the first Hochschild cohomology group $HH^1(A)$ of an algebra $A$ is a Lie algebra, which is a derived invariant and, among self-injective algebras, an invariant under stable equivalences of Morita type. This establishes a bridge between finite dimensional algebras and Lie algebras, however, aside from few exceptions, fine Lie theoretic properties of $HH^1(A)$ are not often used.

In this talk, I will show some results in this direction. More precisely, I will explain how maximal tori of $HH^1(A)$, together with fundamental groups associated with presentations of $A$, can be used to deduce information about the shape of the Gabriel quiver of $A$. In particular, I will show that every maximal torus in $HH^1(A)$ arises as the dual of some fundamental group of $A$. By combining this, with known invariance results for Hochschild cohomology, I will deduce that (in rough terms) the largest rank of a fundamental group of $A$ is a derived invariant quantity, and among self-injective algebras, an invariant under stable equivalences of Morita type. Time permitting, I will also provide various applications to semimonomial and simply connected algebras.

This is joint work with Benjamin Briggs.