Boğaziçi
MATH GRAD SEMINAR

A Glimpse of Noncommutative Motives

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Abstract:

The theory of motives was conceived as a universal cohomology theory for algebraic varieties. Today it is a vast subject systematically developed in many directions spanning algebraic geometry, arithmetic geometry, homotopy theory and higher category theory. Following ideas of Kontsevich, Tabuada and Robalo independently developed a theory of "noncommutative" motives for DG-categories (such as enhanced derived categories of schemes) which encompasses the classical theory of motives and helps assemble so-called additive invariants such as Algebraic K-Theory, Hochschild Homology and Topological Cyclic Homology into a motivic formalism in the very precise sense of the word. We will review the fundamental concepts at work, which will inevitably involve a foray into the formalism of enhanced and higher categories. We will then discuss Kontsevich's notion of a noncommutative space and introduce noncommutative motives as "universal additive invariants" of noncommutative spaces. We will conclude by offering a brief sketch of Robalo's construction of the noncommutative stable homotopy category, which is directly in the spirit of Voevodsky's original construction.

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