

**Prof. Bruno Vallette**

**Title:** Homotopy Batalin-Vilkovisky algebras

**Abstract:** The notion of Batalin-Vilkovisky algebra plays a crucial role in mathematical physics (topological field theory, vertex operator algebras) and algebraic topology (string topology, cyclic Deligne conjecture). In these fields, a relaxed notion "up to homotopy" would be very useful. As a corollary to a generalized Koszul duality theory for operads, I will solve this problem and give an explicit definition of *homotopy Batalin-Vilkovisky algebras*. I will prove a Poincaré-Birkhoff-Witt theorem for the associated operad. This will allow to define and study the deformation theory and the homotopy theory for BV-algebras and homotopy BV-algebras as well. These methods give a proof of the following generalization of Lian-Zuckerman conjecture: the BV-algebra structure on the cohomology of a vertex algebra lifts to a homotopy BV-algebra on the algebra itself.