SEMINARI RICERCA E FORMAZIONE

Venerdì 13 Febbraio 2026 - Aula 204

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ore 14:30-15:00

Physics on Quantum Spacetime: Noncommutative field theory and noncommutative gravity

A long-standing challenge in theoretical physics is the construction of a consistent quantum theory of gravity. Several theoretical arguments suggest that at extremely small distances the classical picture of spacetime as a smooth continuum may break down. Instead, spacetime itself may acquire a quantum structure.

Noncommutative geometry provides a mathematical framework for exploring this possibility by replacing classical coordinates with non-commuting operators, leading to a natural generalization of geometry and field theory. In this non technical talk we introduce the basic ideas of noncommutative spacetime and discuss how they arise in different research areas of modern theoretical physics. We then present some recent results in noncommutative field theory and noncommutative gravity, and outline how such models may shed light on open questions in fundamental physics.

ore 15:00-15:30

L-infinity algebras in Quantum Field Theory and gravity

In this talk we review the recently developed braided L_∞-algebra approach to the construction of noncommutative field theories and gravity. We describe four-dimensional braided Einstein–Cartan gravity and comment on the physical implications of this model. We then introduce an algebraic method for the quantization of noncommutative (NC) field theories based on the Batalin–Vilkovisky (BV) formalism. As an example, we discuss results for a noncommutative scalar quantum field theory on the Moyal space in two different quantization schemes: the standard and the braided BV quantization. The standard BV quantization is based on the underlying (undeformed) L_∞-algebra of the theory; both planar and non-planar diagrams appear and the UV/IR mixing is recovered. In contrast, the braided BV quantization relies on the underlying braided (deformed) L_∞-algebra structure of the theory; in this case non-planar diagrams do not appear and the UV/IR mixing is absent.

I seminari sono promossi dal Prof. Paolo Aschieri