

Erwin Schrödinger Lecture

Pierre Vanhove

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Modular invariance and duality symmetries in Quantum Field Theory and String Theory

Wednesday, March 4, 2015 at 5 p.m.

ESI, Boltzmann Lecture Hall - Boltzmannngasse 9, Vienna

Abstract:

An apocryphal quote (sometime attributed to Martin Eichler) says that “There are five elementary arithmetical operations: addition, subtraction, multiplication, division, and . . . modular forms.” Modular and automorphic forms play prominent role in the understanding of the fundamental properties of quantum field theory and string theory. They are consequences of fundamental duality symmetries connecting weakly coupled and strongly coupled regimes of the theory. In this talk we will describe the appearance of modular and automorphic forms in string theory in connection to fundamental properties of black hole. We will explain how physically motivated questions connect to deep properties of automorphic representation. We will as well report on the recent progress in perturbative computations in QCD and quantum gravity, and the role of modular forms in the evaluation of Feynman integrals.

The Erwin Schrödinger Lectures are directed towards a general audience of mathematicians and physicists. In particular it is an intention of these lectures to inform non-specialists and graduate students about recent developments and results in some area of mathematics or mathematical physics.

The lecture will be followed by an informal reception.

Joachim Schwermer
Director