ABSTRACTS

VALERY GRITSENKO

Exceptional Arnold singularities and their automorphic discriminants.

The semi-universal deformations of exceptional Arnold singularities can be presented as modular varieties of orthogonal type of the dimensions from 8 till 12.
We construct their automorphic discriminants, i.e., reflective modular forms with respect to orthogonal groups, and we show that three of them determine Lorentzian Kac-Moody Lie algebras.
We consider also two types of generalized automorphic forms on the full space of deformations (a non-classical homogeneous domain defined by E. Looijenga and K. Saito).
At the end we formulate open research questions in this area.

PIERRE VANHOVE (IHES)

Automorphic representations of small nilpotent orbits and BPS states.

In supersymmetric theories, they are special states, so-called BPS, preserving a certain amount of supersymmetries. In a maximally supersymmetric theories of gravity with 32 supercharges, one can have 1/2-BPS states preserving 16 supercharges, 1/4-BPS states preserving 8 supercharges, and 1/8-BPS states preserving 4 supercharges.
The supersymmetry conditions gives that the BPS states solutions are described by nilpotent orbits. These BPS states enter as the non-perturbative contribution to physical scattering amplitude. The amplitudes are automorphic forms the maximally split real form of En groups (n>=8).
In this talk we will give a description of the non-perturbative sector of these amplitudes, which amount to evaluate the Fourier expansion of these automorphic forms in various (maximal) parabolic subgroups.
We will explain that the wavefront sets of these automorphic forms are supported on only certain coadjoint nilpotent orbits - just the minimal and trivial orbits in the 1/2-BPS case, and just the next-to-minimal, minimal and trivial orbits in the 1/4-BPS case. Thus the next-to-minimal representations occur automorphically for E6, E7, and E8, and hence the first two nontrivial low energy coefficients in scattering amplitudes can be thought of as exotic θ-functions for these groups.

This is based on the work done with Michael B Green and Stephen D Miller [arXiv:1111.2983]