Titles and Abstracts

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Tomoyuki Arakawa
Kyoto University/Ningbo University

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Stable envelope for critical cohomology of symmetric quiver variety with potential

Yehao Zhou(周业浩)
Kavli IPMU, University of Tokyo

In this talk I will introduce a generalization of Maulik-Okounkov's stable envelope to equivariant critical cohomology of symmetric quiver (i.e. quiver with symmetric adjacency matrix) variety with potential, and its application to the study of geometric representation theory. In the case of a tripled quiver with standard cubic potential, this recovers MO's stable envelope for Nakajima quiver variety of the doubled quiver along the dimensional reduction.

Some results on representations of affine Lie algebras

Gurbir Dhillon
UCLA

We will discuss some completed results, ongoing results, expectations, and speculations on aspects of the representation theory of affine Lie algebras in characteristic zero and characteristic $p > 0$, including wild ramification. This is based on works in progress with Faergeman, Losev, and Yang.

The column filtration in geometric Langlands and applications to W-algebras

David Yang
MIT

The (conjectural) local geometric Langlands correspondence leads to many conjectures on the structure of representation categories of affine Lie algebra and W-algebras, some

of which have since been proven. After reviewing these, we will explain a new filtration in local geometric Langlands and discuss its implications for these representation categories.

Multiplicative vertex algebras and wall-crossing in equivariant K-theory

Henry Liu (刘华昕)
IPMU

I will give an overview of recent developments in wall-crossing for equivariant K-theoretic invariants of moduli spaces of objects in certain abelian categories, based on a new framework of Joyce. A multiplicative and equivariant version of vertex algebras appears naturally from the geometric wall-crossing setup, and plays a central role in the resulting wall-crossing formulas. I will discuss some direct applications to enumerative geometry, some connections to K-theoretic Hall algebras, and some possible directions for future work.

Orthosymplectic Modules of Cohomological Hall Algebras

Sam Dehority
Columbia University

Various flavors of affine-type quantum groups, including the Yangians and quantum affine algebras have a current presentation which deforms the current presentation related to affine vertex algebras. Geometrically the current presentation naturally arises in the geometric realization of quantum group actions using shuffle algebras, where the current variable is the generator of the cohomology of BG_m. We investigate modules for the shuffle algebra realization of the positive half of Yangians through the cohomology of moduli stacks of orthosymplectic quiver representations and discuss a partially conjectural relationship between orthosymplectic quiver moduli stacks, Joyce-Liu vertex coalgebra comodules and twisted Yangians. In the special case of the Jordan quiver we interpret the representation in terms of orthosymplectic perverse coherent sheaves.

Conjectural equivalences of derived categories of Higgs bundles

Tudor Padurariu
CNRS - Sorbonne Université, Chargé de recherche

I will report on joint work with Yukinobu Toda (partially in progress) about the derived category of coherent sheaves of semistable Higgs bundles on a curve.

These categories have semiorthogonal decompositions in certain categories analogous to the ``window categories" of Segal, Halpern-Leistner, Ballard-Favero-Katzarkov, Špenko-Van den Bergh. In the first part of the talk, I will discuss the general theory of ``window categories" through examples.

Next, I will focus on two conjectural dualitities. The first is between semistable Higgs bundles of degree zero and a "limit" category. This equivalence aims to make precise the proposal of Donagi-Pantev of considering the classical limit of the de Rham Langlands equivalence. The second is a primitive version of the first, and it relates categories of sheaves on moduli of semistable Higgs bundles (for various degrees). This equivalence may be regarded as a version of the D-equivalence conjecture / SYZ mirror symmetry. We can prove (partial) versions of these conjectures for topological K-theory of these categories. I will discuss the relation between these categories and BPS invariants, and between these dualities and the phenomenon of \chi-independence.
Time permitting, I will also discuss applications to the Hall algebra of Higgs sheaves on a curve, with a special focus on the case of the elliptic curve.

Vertex algebras and the homology of moduli stacks

Chenjing Bu (卜辰璟)
University of Oxford

We introduce Joyce's vertex algebra structure on the homology of linear moduli stacks. This structure can be used to define homological enumerative invariants, which are a generalization of virtual fundamental classes to Artin stacks, and to write down wall-crossing formulae relating the invariants for different stability conditions.

We then discuss applications and generalizations of this theory. For example, we give a neat new formula for the fundamental class of the moduli space of stable vector bundles on a Riemann surface, previously studied in the works of Witten, Jeffrey, Kirwan, and others. We also outline how to extend this theory of vertex algebra structures to general Artin stacks.

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Yalong Cao(曹亚龙)
Academy of Mathematics and Systems Sciences, Chinese Academy of Sciences

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Deformations of vertex algebras from wall-crossing

Arkadij Bojko
Institute of Mathematics, Academia Sinica

While working on the proof of wall-crossing for sheaves on Calabi-Yau fourfolds and developing its applications, I recovered the axioms of formal deformations of vertex algebras from the geometric set up. In fact, more can be said about the underlying algebraic structure which naturally leads to the definition of additive formal families of vertex algebras. In applications, these are used to replace Joyce's wall-crossing formulae dealing with full virtual fundamental classes by wall-crossing for concrete tautological invariants. This can be used to address existing conjectures akin to the famous DT/PT correspondence.