

SCMS Conference

TWO-DAY WORKSHOP ON REPRESENTATION THEORY

October 22 -23, 2022

Tencent Meeting ID: 496 787 90442, Password: 021022

Speakers

Jiarui Fei (Shanghai Jiao Tong University)

Boming Jia (Yau Mathematical Sciences Center , Tsinghua University)

Changzheng Li (Sun Yat-sen University)

Yiqiang Li (University at Buffalo, SUNY)

Xiaomeng Xu (Peking University)

Hu Zhao (Sichuan University)

Organizers

Kei Yuen Chan (Fudan University)

Shilin Yu (Xiamen University)

Two-day Workshop on Representation Theory

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Jiarui Fei (Shanghai Jiao Tong University)

Title: Tensor Product Multiplicity via Upper Cluster Algebras

Abstract: By tensor product multiplicity we mean the multiplicities in the tensor product of any two finite-dimensional irreducible representations of a simple Lie algebra. The problem asks to express the multiplicity as the number of lattice points in some convex polytope.

In this talk, I will explain how to use upper cluster algebras, an interesting class of commutative algebras introduced by Berenstein-Fomin-Zelevinsky, to discover new polyhedral models for all Dynkin types. Those new models improve the ones of Berenstein-Zelevinsky's, or in some sense generalize Knutson-Tao's hive model.

Boming Jia (Yau Mathematical Sciences Center , Tsinghua University)

Title: The Geometry of the Affine Closure of $T^*(G/U)$

Abstract: The affine closure of $T^*(G/U)$ has been expected to have symplectic singularities in the sense of Beauville. We prove this conjecture for the special case $G=SL_n$. When $n=3$, this affine closure is isomorphic to the closure of the minimal nilpotent orbit O_{\min} in $so(8, \mathbb{C})$. Moreover, in this case, the quasi-classical Gelfand-Graev action of the Weyl group $W=S_3$ on $(T^*(SL_3/U))^{\text{aff}}$ can be identified as the restriction of Cartan's triality S_3 -action on $so(8)$ to the closure of the minimal orbit O_{\min} . We will also discuss about Kostant's theorem on highest weight varieties, and we will see that in the case of minimal nilpotent orbit closure in $so(2m)$, there is an interpretation (and proof) of this theorem via Hamiltonian reduction.

Changzheng Li (Sun Yat-sen University)

Title: On Seidel representation in the quantum K-theory of complex Grassmannians

Abstract: In this talk, we will show Seidel representation in the quantum K-theory $QK(\text{Gr}(k; n))$ by studying projected Gromov-Witten varieties concretely. We will also discuss some of its applications, including an alternative proof of the K-theoretic quantum Pieri rule by Buch and Mihalcea and a quantum Littlewood-Richardson rule for $QK(\text{Gr}(3; n))$. This is based on the joint work with Zhaoyang Liu, Jiayu Song and Mingzhi Yang.

Yiqiang Li (University at Buffalo, SUNY)

Title: Quasi-split symmetric pairs of \mathfrak{sl}_n and Steinberg varieties of classical type

Abstract: We provide a Lagrangian construction for the fixed-point sub algebra in a quasi-split symmetric pair of type A. This is obtained inside the limit of a projective system of Borel-Moore homologies of the Steinberg varieties of n-step isotropic flag varieties.

Xiaomeng Xu (Peking University)

Title: Representations of quantum groups arising from the Stokes phenomenon

Abstract: This talk proves that the Stokes matrices, of certain universal meromorphic linear system of ordinary differential equations, give rise to a family of representations of quantum group $U_q(\mathfrak{gl}_n)$. It then applies the representation theory of quantum groups to study some open analysis problems.

Hu Zhao (Sichuan University)

Title: Commutativity of quantization and reduction for quiver representations

Abstract: Given a finite quiver, its double may be viewed as its non-commutative “cotangent” space, and hence is a non-commutative symplectic space. Crawley-Boevey, Etingof and Ginzburg constructed the non-commutative reduction of this space while Schedler constructed its quantization. We show that the non-commutative quantization and reduction commute with each other. Via the quantum and classical trace maps, such a commutativity induces the commutativity of the quantization and reduction on the space of quiver representations.