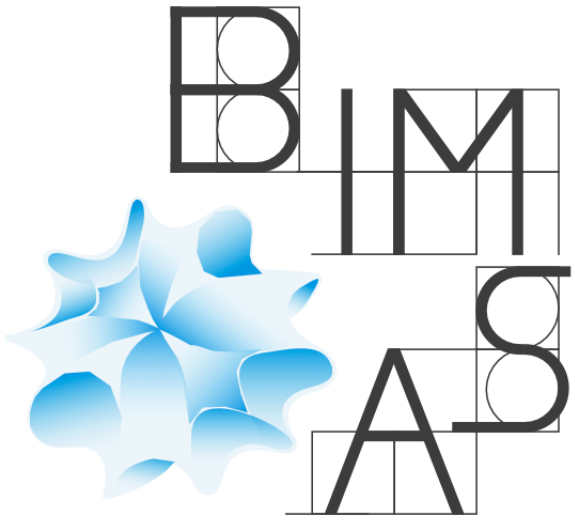

北京雁栖湖
应用数学研究院
Beijing Institute
of Mathematical
Sciences and Applications

RTISART–2024

Representation Theory, Integrable Systems and Related Topics
Satellite conference for ICBS-2024

Conference program

BIMSA, Huairou, Beijing, China
July 8 – July 12, 2024

Organizing committee
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Schedule (Beijing Time, UTC+8)

Monday, July 8

9:00–9:30	Welcome, registration and coffee	
9:35–9:45	*Shing-Tung YAU*	**Opening address**
9:50–10:40	*Ivan CHEREDNIK*	**Kac-Moody algebras and beyond via DAHA**
10:50–11:40	*Janos BALOG*	**Instantons and renormalons in the 2-dimensional sigma model: the full resurgent transseries**
11:50	Group photo	
12:00–13:30	Lunch	
14:00–14:50	*Andrea APPEL*	**Towards a theory of boundary q-characters**
14:55–15:20	Coffee break	
15:20–15:45	*Weinan ZHANG*	**Drinfeld type presentation for twisted Yangians**
15:50–16:40	*Huanchen BAO*	**Symmetric pairs and symmetric spaces**
16:45	End of session	
17:00-18:45	Reception	

Tuesday, July 9

9:15–10:05	*Hongmei HU*	**The centre of the modular super Yangian $Y_{m\|n}$**
10:10–10:35	Coffee break	
10:35–11:00	*Ivan SECHIN*	**Ruijsenaars duality for B, C, D Toda chains**
11:05–11:55	*Anatol KIRILLOV*	**Quadratic algebras, Dunkl elements and quantum cohomology**
12:00–13:30	Lunch	
14:00–14:50	*Anton KHOROSHKIN*	**Contracting a subgraph in a simple graph**
14:55–15:20	Coffee break	
15:20–16:10	*Gleb NENASHEV*	**Schubert calculus and bosonic operators**
16:20–17:10	*Evgeny SMIRNOV*	**Polytopes and K-theory of toric and flag varieties**
17:15	End of session	

Wednesday, July 10

9:15–10:05	*Robert BUCKINGHAM*	**On asymptotics of Painlevé functions**
10:10–10:35	*Irina BOBROVA*	**Affine Weyl groups and non-abelian discrete systems**
10:40–11:05	Coffee break	
11:05–11:55	*Yang SHI*	**Translations and quasi-translations in affine Weyl groups and their applications in discrete integrable systems**
12:00–12:25	*Tomoyuki TAKENAWA*	**Space of initial values and symmetries of four dimensional Painlevé systems**
12:30–13:30	Lunch	
	Free afternoon / sightseeing	

Thursday, July 11

9:15–10:05	*Jiahao CHENG*	**The deformation formula of quantum dynamical Yang–Baxter equations over a non-abelian base**
10:10–10:35	Coffee break	
10:35–11:00	*Roman GONIN*	**Vertex operators of affine quantum groups vs. toroidal $\mathfrak{gl}_1$ algebra**
11:05–11:55	*Naoki GENRA*	**Reduction by stages on W-algebras**
12:00–13:30	Lunch	
14:00–14:50	*Nikolai BOBENKO*	**Dimers and M-curves: limit shapes from Riemann surfaces**
14:55–15:20	Coffee break	
15:20–16:10	*Ryo OHKAWA*	**K-theoretic wall-crossing formulas and multiple basic hypergeometric series**
16:20–17:10	*Igor MAKHLIN*	**Governing polytopes in Lie theory**
17:15	End of session	
18:30-21:00	Banquet	

Friday, July 12

9:15–10:05	*Yu QIU*	**Moduli spaces of quadratic differentials: Abel-Jacobi map and deformation**
10:10–10:35	Coffee break	
10:35–11:00	*Pei SUN*	**Exact surface energy of the Hubbard model with unparallel boundary magnetic fields**
11:05–11:55	*Dmytro VOLIN*	**Analytic Bethe Ansatz ++**
12:00–13:30	Lunch	
14:00–14:25	*Zhuoke YANG*	**Universal polynomial $\mathfrak{so}$ and $\mathfrak{q}$ weight system**
14:30–14:55	*Xing LI*	**The Lamé functions and elliptic soliton solutions: bilinear approach**
15:00–15:25	Coffee break	
15:25–16:15	*Andy HONE*	**New cluster algebras from old: deformations of finite type**
16:20	End of conference	

Abstracts

Andrea APPEL (University of Parma, Italy)

Title: Towards a theory of boundary q-characters

Abstract: In recent years, there have been several new developments in the theory of quantum affine symmetric pairs, establishing a compelling parallel with the well known theory of quantum affine algebras. In a joint work with Bart Vlaar, we introduced a "boundary operator" on finite-dimensional representations, called a tensor K-matrix, which satisfies Cherednik's generalized reflection equation. In this talk, I will provide an overview of our results, and explain how this can be interpreted as a first step towards a theory of q-characters for (quasi-split) quantum affine symmetric pairs.

Janos BALOG (Wigner Research Centre, Budapest, Hungary)

Title: Instantons and renormalons in the 2-dimensional sigma model: the full resurgent transseries

Abstract: We analyse a family of generalized energy densities in the 2-dimensional sigma model. By using the Wiener–Hopf technique to solve the linear thermodynamic Bethe ansatz equations we derive the full analytic trans-series for these observables and give their complete resurgence structure. We demonstrate that the physical value of the energy density is obtained by the median resummation of the perturbative series.

Huanchen BAO (National University of Singapore, Singapore)

Title: Symmetric pairs and symmetric spaces

Abstract: Let G be a connected reductive group over an algebraically closed field. Such groups are classified via root data and can be parametrized via Chevalley group schemes over integers. Let θ be an involution of G, and denote the fixed point subgroup by K. In this talk, we shall discuss the construction of integral models of the symmetric pair (G, K) and the symmetric space G/K. Time permitting, we shall further discuss applications of our new constructions, e.g., Frobenius splittings, good filtrations, (dual) canonical bases, etc.

This is based on several joint works with Jinfeng Song (NUS).

Nikolai BOBENKO (University of Geneva, Switzerland)

Title: Dimers and M-curves: limit shapes from Riemann surfaces

Abstract: We present a general scheme for the study of dimer models via integrable systems techniques. This results in dimer models with quasi periodic weights. Putting an M-curve at the center of the construction allows one to define weights and algebraic objects describing the behavior of the corresponding dimer model. We obtain explicit formulas for the limit shapes of these models for certain boundary conditions. Furthermore everything in this approach can be computed numerically and the results match simulation. This talk is based on joint work with A. I. Bobenko and Y. B. Suris.

Irina BOBROVA (UMPI MiS, Leipzig, Germany)

Title: Affine Weyl groups and non-abelian discrete systems

Abstract: It is well-known that, starting from the affine Weyl groups (or their extension), one can define a discrete dynamic, by using translation operators (see the paper by M. Noumi and Y. Yamada, CMP, 1998). In fact, a proper extension of a birational representation of the affine Weyl group acting on a parameter space leads to a discrete system for some dynamical variables. We will introduce a generalization of this construction to a non-abelian case. Moreover, regarding the Painlevé equations, such birational representations naturally arise from the Bäcklund transformations. Since the latter have non-commutative analogs, we will also discuss an application of the affine Weyl groups for deriving non-abelian versions of the discrete Painlevé equations with additive dynamics. This talk is based on the paper "Affine Weyl groups and non-abelian discrete systems: an application to d-Painlevé equations", (arXiv:2403.18463).

Robert BUCKINGHAM (University of Cincinnati, USA)

Title: On asymptotics of Painlevé functions

Abstract: The Painlevé equations are a family of ordinary differential equations with a wide range of applications and a remarkably rich mathematical structure. There are many well-known infinite sequences of Painlevé solutions that are both useful in applications and also exhibit interesting large-index asymptotic behavior. We study the asymptotic behavior of two such sequences. We start by determining asymptotic behavior of the generalized Hastings–McLeod solutions to the inhomogeneous Painlevé-II equation, functions that arise in a variety of random matrix and interacting particle system problems. We then analyse the asymptotics of the Umemura rational solutions of the Painlevé-V equation, which have applications to multiple-input multiple-output (MIMO) antenna arrays. Both families are investigated via Riemann–Hilbert representations. This is joint work with Kurt Schmidt and Matthew Satter.

Jiahao CHENG (Nanchang Hangkong University, China)

Title: The deformation formula of quantum dynamical Yang–Baxter equations over a nonabelian base

Abstract: In the 1980s, Drinfel'd introduced the concept of using symmetries for deformation quantizations. This approach involves considering a manifold M with an action of a Lie algebra $\mathfrak{g}$. Drinfel'd twists, denoted as $J \in U(\mathfrak{g}) \otimes U(\mathfrak{g})[[\hbar]]$, play a crucial role in this method. These twists provide a solution $R = J_{21}^{-1} J$ to the quantum Yang–Baxter equation, which subsequently defines a star product on $C^\infty(M)$. This star product is determined through a universal deformation formula: $f \star g := m\big(J \cdot (f \otimes g)\big), \forall f, g \in C^\infty(M)$. In 1999, Xu extended this concept by constructing quantum groupoids based on solutions of the quantum dynamical Yang–Baxter equation (QDYBE) over an abelian base, also recognized as the Gervais–Neveu–Felder equation. Xu's work further encompasses Lie algebra pairs $\mathfrak{h} \subset \mathfrak{g}$, where $\mathfrak{h}$ may not necessarily be an abelian Lie subalgebra of $\mathfrak{g}$. Xu proposed a variation of the QDYBE over the nonabelian base $\mathfrak{h}^*$. Solutions to this variant adopt the form $R(\lambda) : \mathfrak{h}^* \to U(\mathfrak{g}) \otimes U(\mathfrak{g})[[\hbar]]$. Within this framework, dynamical twists $J(\lambda)$ give rise to solutions $R(\lambda) = J_{21}^{-1}(\lambda) J(\lambda)$.

In this talk, we first construct a quantum groupoid $\mathcal{H}$ from any solution of a Quantum Dynamical Yang–Baxter Equation (QDYBE) associated with a Lie algebra pair $\mathfrak{h} \subset \mathfrak{g}$, where $\mathfrak{h}$ is not necessarily abelian. This construction sets the stage for extending Drinfel'd's idea to a more general context encompassing quantum groupoids. In essence, when considering a manifold M with an action of a Lie algebra $\mathfrak{g}$, we derive a star product on $\mathfrak{h}^* \times M$ for the dynamical twist $F(\lambda)$ responsible for defining $\mathcal{H}$. This derivation is achieved through the utilization of a generalized universal deformation formula. Central to our method are two intricate maps: (1) an isomorphism that links two distinct types of twisting of brace algebras within a Hopf algebroid; and (2) a fundamental morphism of brace algebras denoted as $\mathcal{H}_{\mathrm{poly}} \to \mathcal{D}_{\mathrm{poly}}(\mathfrak{h}^* \times M)$.

Ivan CHEREDNIK (University of North Carolina, USA)

Title: Kac–Moody algebras and beyond via DAHA

Abstract: Almost by design, DAHA serve refined theories (with q, t, a), toroidal and elliptic algebras. The passage to Kac–Moody algebras is generally for $t \to 0, \infty$ or via Verlinde algebras, which can be nonsymmetric and non-semisimple in the DAHA theory. The usual ones are for $t = q$, $q^N = 1$ and upon the symmetrization. Examples of nonsymmetric applications of DAHA: level-1 Demazure characters and boundary-level Kac–Wakimoto representations. We will mostly focus on the refined Rogers–Ramanujan series; they are governed by 2d TQFT with levels. They satisfy the superduality, a recent theorem, and can be viewed as invariants of some lens spaces.

Naoki GENRA (University of Tokyo, Japan)

Title: Reduction by stages on W-algebras

Abstract: Let X be a Poisson variety with a Hamiltonian G-action and H be a normal subgroup of G. Then $X//G$ is obtained by a (Hamiltonian) reduction of $X//H$ by the induced G/H-action under suitable assumptions, called reduction by stages. We apply for the Slodowy slices and show that the Slodowy slice associated with $(\mathfrak{g}, O)$ is obtained by a reduction of the Slodowy slice associated with $(\mathfrak{g}, O')$ for a simple Lie algebra $\mathfrak{g}$ and nilpotent orbits O, O' such that $O > O'$ with some conditions. The quantum cases imply that the finite/affine W-algebras associated with $(\mathfrak{g}, O)$ are obtained by W-algebras associated with $(\mathfrak{g}, O')$, which proves a conjecture of Morgan in finite cases and gives a conjectural generalization of results of Madsen and Ragoucy in affine cases. This is joint work with Thibault Juillard.

Roman GONIN (Cardiff University, UK)

Title: Vertex operators of affine quantum groups vs toroidal $\mathfrak{gl}_1$ algebra

Abstract: Both the action of quantum affine $\mathfrak{gl}_n$ and quantum toroidal $\mathfrak{gl}_1$ naturally appear on the same vector space. This situation can be considered as a version of $(\mathfrak{gl}_n, \mathfrak{gl}_m)$ duality. In this talk, I will discuss the role which vertex operators (i.e. intertwiners) of quantum affine $\mathfrak{gl}_n$ play for toroidal $\mathfrak{gl}_1$.

Andy HONE (University of Kent, UK)

Title: New cluster algebras from old: deformations of finite type

Abstract: The periodic Y-systems discovered by Zamolodchikov in the context of perturbed conformal field theories provided one of the original motivations for Fomin & Zelevinsky's theory of cluster algebras. One of the first main results in the theory was the classification of finite type cluster algebras, whose seeds were shown to be in one-to-one correspondence with the finite Dynkin types (up to mutation equivalence). Here we describe how deformations of the finite type case produce discrete dynamical systems that, while no longer completely periodic, are completely integrable in the Liouville sense. By lifting the dynamics to higher dimensional maps with the Laurent property ("Laurentification") we find new families of cluster algebras with mutation periodicity. This is based on joint work we began with Kouloukas, and have continued with Grabowski, Kim and Mase.

Hongmei HU (Suzhou University of Science and Technology, China)

Title: The centre of the modular super Yangian $Y_{m|n}$

Abstract: $Y_{m|n}$ is the super Yangian of the general linear Lie superalgebra $\mathfrak{gl}_{m|n}$. We extend Drinfeld-type presentations of $Y_{m|n}$ and the special super Yangian $SY_{m|n}$ to positive characteristic. Moreover, the centre $Z(Y_{m|n})$ of $Y_{m|n}$ is described: it is generated by its Harish–Chandra centre together with a large p-centre. We also study the p-centre of $SY_{m|n}$ and provide another description of the p-centre of $Y_{m|n}$ in terms of the RTT generators. This is a joint work with Chang Hao.

Anton KHOROSHKIN (University of Haifa, Israel)

Title: Contracting a subgraph in a simple graph

Abstract: I will introduce a novel algebraic structure called "contractad," derived from the contraction of connected subgraphs within a graph. I will provide several examples originating from topology, algebra, combinatorics, and geometry. Furthermore, I will demonstrate how the homological algebra of this new structure offers elegant formulas for the generating series associated with various enumeration data of complete multipartite graphs. These data include the number of acyclic orientations, the number of Hamiltonian paths, chromatic polynomials, and the homology of wonderful compactifications of the generalized configuration spaces associated with this graph.

The talk is based on joint work with D.Lyskov.

Anatol KIRILLOV (BIMSA, China)

Title: Quadratic Algebras, Dunkl Elements and Quantum Cohomology

Abstract: According to the celebrated results of C. Dunkl and E. Opdam, the truncated Dunkl operators associated with a complex reflection group (W, S) mutually commute and generate a coinvariant algebra of the complex reflection group in question. In my talk, I plan to introduce and study the algebras generated by equivariant, K-theoretic, and elliptic analogues of truncated Dunkl elements, and their possible and small quantum version for classical reflection group (e.g. A, B, C, D, G_2) with the corresponding objects associated with the flag variety associated with reflection group in question. I will illustrate my constructions in the case of type A (general linear group). Part of these results have been obtained in collaboration with S. Fomin and T. Maeno.

Xing LI (Jiangsu Normal University, China)

Title: The Lamé functions and elliptic soliton solutions: bilinear approach

Abstract: The Lamé function can be used to construct plane wave factors and solutions to the Korteweg–de Vries (KdV) and Kadomtsev–Petviashvili (KP) hierarchy. In this talk, first, we will review some properties of elliptic soliton solutions related to Lamé function, including Hirota bilinear method, expressions of tau functions and the generating vertex operators. Then, for the discrete potential KdV and KP equations, we will give their bilinear forms, derive tau functions of elliptic solitons, and show that they share the same vertex operators with the KdV hierarchy and the KP hierarchy, respectively.

Igor MAKHLIN (Technische Universität Berlin, Germany)

Title: Governing polytopes in Lie theory

Abstract: In a situation somewhat typically observed in Lie theory a lattice polytope provides (or governs) several algebro-combinatorial constructions from the following list: a basis in an irreducible representation, a toric degeneration of the flag variety, a Newton–Okounkov body of said variety and/or a standard monomial theory in its coordinate ring. Perhaps the best known examples are given by Gelfand–Tseltin polytopes, other examples include string polytopes, essential polytopes, matching field polytopes and FFLV polytopes. Despite a fair amount of literature in this vein, explicit recipes which would provide such a polytope for a given simple Lie algebra are scarce even in type A. I will discuss an explicitly defined family of such governing polytopes and the respective Lie-theoretic objects, this construction stems from order theory and makes use of pipe dream combinatorics.

Gleb NENASHEV (Saint Petersburg State University, Russia)

Title: Schubert calculus and bosonic operators

Abstract: In this talk I will present a new point of view on Schubert polynomials via bosonic operators. In particular, we extend the definition of bosonic operators from the case of Schur polynomials to Schubert polynomials. More precisely, we work with back-stable Schubert polynomials and our operators act on the left weak Bruhat order (divided difference and Monk's rule use the right action on permutations in my notations). Furthermore, these operators with an extra condition give sufficiently many linear equations for the structure of the cohomology ring of flag varieties. This approach provides a purely combinatorial method to work with Schur and Schubert polynomials without "polynomials".

Ryo OHKAWA (Osaka Metropolitan University, Japan)

Title: K-theoretic wall-crossing formulas and multiple basic hypergeometric series

Abstract: We study K-theoretic integrals over famed quiver moduli via wall-crossing phenomena. We study the chainsaw quiver varieties, and consider generating functions defined by two types of K-theoretic classes. In particular, we focus on integrals over the handsaw quiver varieties of type A_1, and get functional equations for each of them. We also give explicit formulas for these partition functions. In particular, we obtain geometric interpretation of transformation formulas for multiple basic hypergeometric series including the Kajihara transformation formula, and the one studied by Langer–Schlosser–Warnaar and Hallnäs–Langman–Noumi–Rosengren.

Yu QIU (YMSC, Tsinghua University and BIMSA, China)

Title: Moduli spaces of quadratic differentials: Abel–Jacobi map and deformation

Abstract: We study the moduli space of quadratic differentials with simple zeros and prescribed polar type. We prove the fundamental group of which equals the kernel of Abel–Jacobi map. Then we discuss the partial compactification (with orbifolding) and categorification.

Ivan SECHIN (BIMSA, China)

Title: Ruijsenaars duality for B, C, D Toda chains

Abstract: We use the Hamiltonian reduction method to construct the Ruijsenaars dual systems to generalized Toda chains associated with the classical Lie algebras of types B, C, D. The dual systems turn out to be the B, C and D analogues of the rational Goldfish model, which is, as in the type A case, the strong coupling limit of rational Ruijsenaars systems. We explain how both types of systems emerge in the reduction of the cotangent bundle of a Lie group and provide the formulae for dual Hamiltonians. We compute explicitly the higher Hamiltonians of Goldfish models using the Cauchy–Binet theorem. Joint work with Mikhail Vasilev, arXiv:2405.08620.

Yang SHI (Flinders University, Australia)

Title: Translations and quasi-translations in affine Weyl groups and their applications in discrete integrable systems

Abstract: We study some second-order nonlinear discrete integrable systems (Shi, arXiv:2210.13736) whose symmetry groups do not appear explicitly in Sakai's classification of discrete Painlevé equations. We show that their symmetries arise as the normalizers of certain parabolic subgroups of the affine Weyl groups using the normalizer theory of Coxeter groups developed in (Howlett, 80) and (Brink and Howlett, 00).

Evgeny SMIRNOV (Guangdong Technion Israel Institute of Technology, China)

Title: Polytopes and K-theory of toric and flag varieties

Abstract: In 1992 Askold Khovanskii and Alexander Pukhlikov proposed a description of the cohomology ring for a smooth toric variety as the quotient of the ring of differential operators with constant coefficients modulo the annihilator of the volume polynomial for the moment polytope of this variety. Later Kiumars Kaveh observed that the cohomology ring of a full flag variety can be obtained by applying the same construction to Gelfand–Zetlin polytope. I will speak about our work with Leonid Monin generalizing these results for the case of K-theory. Namely, we describe algebras with a Gorenstein duality pairing as quotients of the ring generated by shift operators. Then we apply this construction to describe the Grothendieck ring of a smooth toric variety; for this we consider shift operators modulo the annihilator of the Ehrhart polynomial of the moment polytope (this substitutes the volume polynomial). Finally, this construction can be generalized to the case of full flag varieties of type A. This description allows us to make computations in the Grothendieck ring of a full flag variety by intersecting faces of Gelfand–Zetlin polytopes; this generalizes our result with Valentina Kiritchenko and Vladlen Timorin.

Pei SUN (Northwest University, Xi'an, China)

Title: Exact surface energy of the Hubbard model with unparallel boundary magnetic fields

Abstract: We explore the precise physical quantities in the thermodynamic limit of the one-dimensional Hubbard model with nonparallel boundary magnetic fields based on the off-diagonal Bethe ansatz solution. A particular emphasis is placed on the half-filling condition to investigate the distinct patterns of Bethe roots in the reduced Bethe ansatz equations for different boundary parameters. The ground state of the system can be divided into five regions according to the distribution of Bethe roots. By analyzing these patterns, we calculate the densities of states, ground state energy density, and surface energy. The results reveal the existence of stable boundary bound states, which are dependent on specific constraints regarding the boundary magnetic fields.

Tomoyuki TAKENAWA (Tokyo University of Marine Science and Technology, Japan)

Title: Space of initial values and symmetries of four dimensional Painlevé systems

Abstract: The discrete Painlevé equations are two-dimensional non-autonomous dynamical systems obtained by deautonomizing difference equations on elliptic surfaces preserving a singular fiber in the space of their initial values. Even in the four-dimensional case, the discrete Painlevé systems can be obtained from dynamical systems with two conserved quantities by deautnomizing them preserving the effectiveness of an anticanonical divisor in the space of initial values. The space of initial values and symmetries of the four-dimensional Garnier system are also shown.

Dmytro VOLIN (Uppsala University, Sweden)

Title: Analytic Bethe Ansatz ++

Abstract: Algebra of commuting charges satisfies a family of functional relations which has a beautiful geometrical interpretation of fusion relations between maps from spectral parameter space E to flag manifold G/B. Think about G/B as "kinematics" due to the global symmetry and fusion as "dynamics" due to integrability. ABA++ is the requirement about what E is, and what analyticity class the maps belong to. Imposing this condition uniquely fixes the spectrum of the system. We shall focus mostly on ADE but also give some remarks about other (twisted affine) Lie algebras and their supersymmetric generalization.

Keywords: Bethe Algebra, Yangian, ODE/IM, Coxeter, Galois group, opers, fused flag.

Zhuoke YANG (BIMSA, China)

Title: Universal polynomial $\mathfrak{so}$ and $\mathfrak{q}$ weight system

Abstract: We introduce two universal weight systems (a function on chord diagrams satisfying the 4-term relation) taking values in the ring of polynomials in infinitely many variables whose particular specializations are weight systems associated with the Lie algebras $\mathfrak{so}(N)$, $\mathfrak{sp}(2M)$ Lie superalgebras $\mathfrak{osp}(N|2M)$, as well as Lie superalgebras $\mathfrak{q}(N)$. We extend this weight system to permutations and provide an efficient recursion for its computation. The construction for this weight system extends a similar construction for the universal polynomial weight system responsible for the Lie algebras $\mathfrak{gl}(N)$ and superalgebras $\mathfrak{gl}(N|M)$ introduced earlier. This is based on joint works with Maxim Kazarian.

Weinan ZHANG (The University of Hong Kong, Hong Kong)

Title: Drinfeld type presentation for twisted Yangians

Abstract: Yangians, introduced by Drinfeld, are deformations of current algebras. It is well-known that Yangians admit two presentations: the R-matrix presentation and the Drinfeld presentation. Twisted Yangians are certain coideal subalgebras of Yangians, and they are closely related to the theory of symmetric pairs. Twisted Yangians were originally introduced via an R-matrix presentation, and finding a Drinfeld type presentation for twisted Yangians has been an open problem for a long time. In this talk, I will present our recent construction for the Drinfeld type presentation for twisted Yangians of type AI using the Gauss decomposition. We also show that the twisted Yangians can be viewed as a degenerate version of the affine $\imath$-quantum groups, which are coideal subalgebras of affine quantum groups arising from quantum symmetric pairs. This is joint with Kang Lu and Weiqiang Wang.