



RTISART-2026

Representation Theory, Integrable Systems and Related Topics
Satellite conference for ICBS-2026

Conference program

BIMSA, Huairou, Beijing, China
Monday June 1 – Friday June 5, 2026

2026 Organizing Committee

Semeon ARTHAMONOV (BIMSA)
Anton DZHAMAY (BIMSA)
Peter KOROTEEV (BIMSA)
Andrii LIASHYK (BIMSA)
Yevhen MAKEDONSKYI (BIMSA)
Pavel NIKITIN (BIMSA)
Nicolai RESHETIKHIN (BIMSA & YMSC)
Ivan SECHIN (BIMSA)
Bart VLAAR (BIMSA)
Ruijie XU (BIMSA)

Administrative support

Guangqiang TIE (BIMSA)

Schedule

(Beijing Time, UTC+8)

Monday, June 1

9:30–9:45	Opening address	
9:45–10:45	<i>Andrei MIRONOV</i>	Integrable geodesic flows on cones over Riemannian manifolds
10:45–11:15	Coffee break	
11:15–12:15	<i>Oleg LISOVYI</i>	Connection problem for Painlevé-II tau function
12:15–12:30	Conference Photo	
12:30–14:00	Lunch	
14:00–15:00	<i>Bin GUI</i>	Conformal blocks and associative algebras in logarithmic conformal field theory
15:00–15:30	Coffee break	
15:30–16:30	<i>Xiang-ke CHANG</i>	Hyperelliptic curves, continued fractions and Somos–Gale–Robinson recurrences
16:30–18:45	Wine reception and poster session	

Tuesday, June 2

9:00–10:00	<i>Karol KOZLOWSKI</i>	Free energy of the classical Toda chain in a generalised Gibbs ensemble
10:00–10:30	Coffee break	
10:30–11:30	<i>Cesar CUENCA</i>	N-particle ensembles at high temperature via Dunkl and Cherednik operators
11:30–12:30	<i>Trung VU</i>	Rank recursion for q-Whittaker and Macdonald operator
12:30–14:00	Lunch	
14:00–15:00	<i>Evgeny FEIGIN</i>	Type A algebraic coherence conjecture
15:00–15:30	Coffee break	
15:30–16:30	<i>Hajime NAGOYA</i>	On quantum Sasano systems of type $D_{2n+2}^{(1)}$
16:30–17:30	<i>Oksana YAKIMOVA</i>	Near-derivations and their applications to Lie algebras

Wednesday, June 3

9:00–10:00	<i>Kang LU</i>	Drinfeld presentations of twisted Yangians and their applications
10:00–10:30	Coffee break	
10:30–11:30	<i>Leonid RYBNIKOV</i>	Bethe subalgebras in Yangians and wonderful models for toric arrangements
11:30–12:30	<i>Andrey SMIRNOV</i>	Quantum K-theory of Grassmannians and 5-vertex models
12:30–14:00	Lunch	
14:00–18:00	Excursion / free afternoon	

Thursday, June 4

9:00–10:00	<i>Mikhail BERSHTEIN</i>	Cyclically shifted $U_q(\widehat{\mathfrak{sl}}_N)$ algebra and cluster realizations
10:00–10:30	Coffee break	
10:30–11:30	<i>Changjian SU</i>	Geometric realizations of quantum symmetric pairs
11:30–12:30	<i>Tomasz PRZEZDZIECKI</i>	q-character theory for quantum symmetric pairs
12:30–14:00	Lunch	
14:00–15:00	<i>Gleb NENASHEV</i>	Algebras generated by the Bott–Chern forms on flag varieties and graphs
15:00–15:30	Coffee break	
15:30–16:30	<i>Jianrong LI</i>	Tropical symmetries of cluster algebras
16:30–17:30	<i>Satoshi NAWATA</i>	Branes and representations of DAHA $C^\vee C_1$: affine braid group action on category
18:15–21:00	Banquet	

Friday, June 5

9:00–10:00	<i>Qing Ping LIU</i>	Bäcklund transformation approach to the modified Camassa–Holm equation
10:00–10:30	Coffee break	
10:30–11:30	<i>Babak HAGHIGHAT</i>	Quantum flat connections, KZ equations, and integrability
11:30–12:30	<i>Rinat KEDEM</i>	Affine Laumon functions and Q-system quivers
12:30–14:00	Lunch	
	Free afternoon	

Abstracts

Mikhail BERSHTEIN (SISSA, Trieste, Italy)

Title: Cyclically shifted $U_q(\widehat{\mathfrak{sl}}_N)$ algebra and cluster realizations

Abstract: Cyclically shifted $U_q(\widehat{\mathfrak{sl}}_N)$ algebras were introduced by Bourgine and Jeong in the context of gauge theories with surface defects. It turns out that they can also be used to study the standard, non-shifted algebras; in particular, they lead to explicit formulas for q -Heisenberg realizations, R -matrices, and quantum evolution operators. The main source of these formulas is a cluster realization of the algebra. This is based on joint work with Bourgine and Shiraishi.

Xiang-Ke CHANG (Chinese Academy of Sciences, Beijing, China)

Title: Hyperelliptic curves, continued fractions and Somos–Gale–Robinson recurrences

Abstract: Somos-4 and Somos-5 are bilinear recurrence relations that can be obtained as reductions of the discrete KP equation. They exhibit interesting integrality, behind which is the Laurent phenomenon appearing as a key property of cluster variables in Fomin and Zelevinsky's cluster algebras. In this talk, we present how to derive explicit solutions of Somos-4 and Somos-5 in terms of Hankel determinants based on elliptic curves and continued fractions, from which the Laurent properties straightforwardly follow. Moreover, we also talk about some recent results on a unified approach for solving initial value problems for a class of three-term Gale–Robinson recurrences, including Somos-4 and Somos-5, based on their Lax pairs.

Cesar CUENCA (Ohio State University, Columbus, OH, USA)

Title: N -particle ensembles at high temperature via Dunkl and Cherednik operators

Abstract: Following a discussion of the continuous Gaussian beta ensemble and the classical Law of Large Numbers (LLN), we switch to the setting of discrete-space particle systems. By using Fourier transforms based on Jack symmetric polynomials, we study discrete N -particle ensembles in the regime where the inverse temperature parameter tends to zero, simultaneously as the number of particles in the system tends to infinity. We prove the LLN and characterize the limiting measure in terms of a moment problem. For fixed-time distributions of the discrete beta-Dyson Brownian motion, we calculate the densities of the limiting measures and express them in terms of the zeroes of certain entire functions or the eigenvalues of certain Jacobi operators. This talk is based on joint works with Florent Benaych-Georges, Vadim Gorin and Maciej Dolega.

Evgeny FEIGIN (Tel Aviv University, Tel Aviv, Israel)

Title: Type A algebraic coherence conjecture

Abstract: The coherence conjecture of Pappas–Rapoport, proved by Zhu, states that the dimensions of spaces of sections of certain line bundles coincide. The two sides of the equality correspond to line bundles on spherical Schubert varieties in affine Grassmannians and to line bundles on unions of Schubert varieties in affine flag varieties. We will formulate an algebraic version of the geometric construction relating certain Demazure modules on one side to sums of Demazure modules on the other side. Our construction works only in type A , but it is applicable to a much wider class of representations than those popping up in the geometric coherence conjecture. It also leads to a more general conjecture for representations of finite $\mathfrak{sl}(n)$, which we will discuss in detail.

Bin GUI (YMSC, Tsinghua University, Beijing, China)

Title: Conformal blocks and associative algebras in logarithmic conformal field theory

Abstract: A main theme in the development of the theory of vertex operator algebras (VOAs) is the factorization property. If V is a C_2 -cofinite rational VOA (which corresponds to the chiral algebra of a rational CFT in physics), the factorization property—saying roughly that higher genus conformal blocks can be decomposed into lower genus ones—was recently completely proved. Its low genus special cases (such as Zhu’s modular invariance theorem in 1996 and Huang’s associativity theorem for intertwining operators in 2005) are crucial to the understanding of the representation theory of V .

This talk focuses on C_2 -cofinite VOAs that are not necessarily rational. Such VOAs correspond to chiral algebras of finite-type logarithmic CFTs. Since their representation categories are not necessarily semisimple, the study of their conformal blocks differ significantly from the rational case. In this talk, I will present my recent joint work with Hao Zhang on the complete proof of the factorization property for conformal blocks of such VOAs. We will also discuss the natural associative algebras in log CFT that play the role of Zhu’s algebra in rational CFT. In particular, we show that the 0-th order Hochschild cohomology of that algebra is isomorphic to the space of torus conformal blocks. This is based on our works arXiv:2503.23995 and arXiv:2508.04532.

Babak HAGHIGHAT (YMSC, Tsinghua University, and BIMS, Beijing, China)

Title: Quantum flat connections, KZ equations, and integrability

Abstract: $N = 2$ supersymmetric Yang–Mills theories are described in terms of a Hitchin system over a Riemann surface C . Focusing on strongly coupled Argyres–Douglas theories, we show that the corresponding flat bundle over C can be quantized such that the resulting quantum flat connection is integrable. For \mathfrak{sl}_2 , the quantum connection takes values in $\mathfrak{gl}_2(A)$ where A is an associative algebra which we explicitly describe for the cases of Painlevé I, II and IV. Moreover, we find that the quantum connection is equivalent to irregular versions of Knizhnik–Zamolodchikov (KZ) connections. Utilizing a suitable gauge transformation, one can show that the corresponding KZ equations give rise to BPZ equations.

Rinat KEDEM (University of Illinois at Urbana-Champaign, Urbana, IL, USA)

Title: Affine Laumon functions and Q -system quivers

Abstract: We discuss some new constructions of Toda and affine Laumon functions using affine versions of the Q -system quantum cluster algebras. This is based on work with Bershtein, Bourgin, Di Francesco, Pasquier and Shiraishi.

Karol KOZLOWSKI (École Normale Supérieure de Lyon, Lyon, France)

Title: Free energy of the classical Toda chain in a generalised Gibbs ensemble

Abstract: Classical integrable systems exhibit a tower of conserved quantities having local densities built out of traces of powers of the model's Lax matrix. It is argued that this local structure, absent in general models, leads to peculiar thermalisation properties of integrable systems. In particular, their equilibrium properties are expected to be grasped by so-called Generalised Gibbs measures. The study of Generalised Gibbs ensembles' partition functions was initiated by Spohn. He focused on the N -particle Toda chain and managed to describe the $N \rightarrow +\infty$ limiting distribution of the Eigenvalues of the model's Lax matrix under a Generalised Gibbs distribution. He was also able to conjecture an expression for the associated free energy. A thorougher description of the Gibbs measure, in the form of a large deviation principle with an explicit rate function, was later conjectured by Doyon and, independently, Spohn.

In this talk, after reviewing the various motivations for the study of the problem, I will explain how one can establish, on rigorous grounds, the explicit form of the Generalised Gibbs ensemble Toda chain rate function and free energy by using the separated variables representation of the model's partition function. This result constitutes the first step towards studying the thermodynamic limit of the model's dynamical correlation functions in such a setting. This is a joint work with T. Grava, A. Guionnet and A. Little.

Jianrong LI (University of Vienna, Vienna, Austria)

Title: Tropical symmetries of cluster algebras

Abstract: In this talk, I will present joint work with James Drummond and Ömer Gürdoğan on tropicalizations of quasi-automorphisms of cluster algebras.

We study tropicalizations of quasi-automorphisms of cluster algebras and show that their induced action on g -vectors can be realized by tropicalizing their action on the homogeneous X -variables (\hat{y} -variables) of a chosen initial cluster. This perspective allows us to interpret the action on g -vectors as a change of coordinates in the tropical setting.

Focusing on Grassmannian cluster algebras, we analyze tropicalizations of quasi-automorphisms in detail. In particular, we derive tropical analogues of the braid group action and the twist map, both on g -vectors and on tableaux. We also introduce the notions of unstable and stable fixed points for quasi-automorphisms.

As an application, we show that the number of prime non-real tableaux with a fixed number of columns in $\text{SSYT}(3, [9])$ and $\text{SSYT}(4, [8])$, arising from the braid group action on stable fixed points, is governed by Euler's totient function. Furthermore, we apply our results to scattering amplitudes in physics, providing a new interpretation of the square root appearing in the four-mass box integral in terms of stable fixed points of quasi-automorphisms of the Grassmannian cluster algebra $C[\text{Gr}(4, 8)]$.

Oleg LISOVYI (Université de Tours, Tours, France)

Title: Connection problem for Painlevé-II tau function

Abstract: I will start by describing the monodromy manifold associated with the general (inhomogeneous) Painlevé-II equation and recalling Kapaev's description of the asymptotics of generic Painlevé-II transcendents in terms of Stokes data. I will then present a conjectural solution of the corresponding connection problem for the generic Painlevé-II tau function and discuss possible approaches to its proof.

***Qing Ping LIU* (China University of Mining and Technology, Beijing, China)**

Title: Bäcklund transformation approach to the Modified Camassa–Holm equation

Abstract: The Modified Camassa–Holm (MCH) equation, an integrable equation with peakon solutions, has been the subject of extensive research from both the community of partial differential equations and the community of integrable systems. In this presentation, a Bäcklund transformation will be constructed, which involves the alteration of both dependent and independent variables for the MCH equation. In addition, the corresponding nonlinear superposition formula and Darboux transformation for this equation will be discussed. The applications of these results will be considered.

***Kang LU* (SUSTech, Shenzhen, China)**

Title: Drinfeld presentations of twisted Yangians and their applications

Abstract: In recent joint work with Weiqiang Wang and Weinan Zhang, we established Drinfeld-type current presentations for twisted Yangians of type AI and beyond. These presentations are realized via Gauss decomposition and the degeneration of affine quantum groups. In this talk, I will discuss recent progress in the study of these twisted Yangians (also known as i Yangians) and explore their applications. Key topics will include their coideal structure, shifted generalizations, and connections to finite W -algebras of classical types, as well as affine Grassmannian slices (time permitting). This talk is based on joint works with Yung-Ning Peng, Lukas Tappeiner, Lewis Topley, Weiqiang Wang, Alex Weekes, and Weinan Zhang.

***Andrei MIRONOV* (Sobolev Institute of Mathematics and Novosibirsk State University, Novosibirsk, Russia)**

Title: Integrable geodesic flows on cones over Riemannian manifolds

Abstract: We study the behavior of geodesics on cones over arbitrary C^3 -smooth closed Riemannian manifolds. We show that the geodesic flow on such cones admits first integrals whose values uniquely determine almost all geodesics except for cone generatrices. We also prove that the geodesic flow restricted to the open dense subset of the cotangent bundle corresponding to all non-radial trajectories is completely integrable. This investigation is inspired by our recent results on billiards inside cones over manifolds where similar results hold true. The talk is based on a joint work with Siyao Yin.

Hajime NAGOYA (Kanazawa University, Kanazawa, Japan)

Title: On quantum Sasano systems of type $D_{2n+2}^{(1)}$

Abstract: In this talk, we propose a quantum Hamiltonian for the higher-order Painlevé system of type $D_{2n+2}^{(1)}$, also known as the Sasano system, which reduces to the sixth Painlevé equation for $n = 1$. We establish the invariance of this quantum Hamiltonian under the action of the affine Weyl group $W(D_{2n+2}^{(1)})$.

Furthermore, we investigate the time-dependent, non-stationary Schrödinger equation associated with this quantum system. We establish the realization of the Bäcklund transformations on the wave functions utilizing fractional calculus, incorporating spatial gauge transformations and Riemann–Liouville fractional integrals. We identify the exact parameter conditions required for the existence of polynomial solutions. Finally, we demonstrate that shift operators yield an infinite number of solutions to the quantum Sasano system.

Satoshi NAWATA (Fudan University, Shanghai, China)

Title: Commutant and construction of polynomial algebras

Abstract: We study the representation theory of the spherical double affine Hecke algebra (DAHA) of $C^\vee C_1$, using brane quantization. By showing a one-to-one correspondence between Lagrangian A -branes with compact support and finite-dimensional representations of the spherical DAHA, we provide evidence of derived equivalence between the A -brane category of $SL(2, \mathbb{C})$ -character variety of a four-punctured sphere and the representation category of DAHA of $C^\vee C_1$. The D_4 root system plays an essential role in understanding both the geometry and representation theory. In particular, this A -model approach reveals the action of an affine braid group of type D_4 on the category. As a by-product, our geometric investigation offers detailed information about the low-energy effective dynamics of the $SU(2)$ $N_f = 4$ Seiberg–Witten theory.

Gleb NENASHEV (Saint Petersburg State University, Saint Petersburg, Russia)

Title: Algebras generated by the Bott–Chern forms on flag varieties and graphs

Abstract: We introduce the algebra generated by the Bott–Chern forms of an arbitrary flag variety. For the case of complete flag varieties these algebras were introduced by V.I. Arnold and later they were generalized to the algebras which are now known as graphical Zonotopal algebras. We also define a promising family of algebras that generalizes both classes. These algebras are indexed by pairs, a flag variety and a graph. Some open questions will be presented.

Tomasz PRZEZDZIECKI (University of Vienna, Vienna, Austria)

Title: q -character theory for quantum symmetric pairs

Abstract: It is well known that quantum affine algebras admit three distinct presentations (Kac–Moody, new Drinfeld and RTT). Relatively recently, the same has been shown to hold for a broad family of quantum affine symmetric pairs. In particular, a Drinfeld-type presentation, due to (among others) Lu and Wang, is a new and exciting development. The focus of my talk will be the relationship between the usual Drinfeld presentation of quantum affine algebras and the Lu–Wang presentation of their coideal subalgebras. Remarkably, both Drinfeld presentations exhibit large commutative subalgebras, which are of particular interest to representation theory and integrable systems. More specifically, I will present several results concerning the properties of the generators of these commutative subalgebras, including their behaviour under inclusion and coproduct, as well as their spectra on finite-dimensional representations. These results will then be used to construct an analogue of q -character theory for quantum symmetric pairs. Finally, I will discuss q -character formulae for evaluation modules of type AI quantum symmetric pairs.

Leonid RYBNIKOV (University of Montreal, Montreal, QB, Canada)

Title: Bethe subalgebras in Yangians and wonderful models for toric arrangements

Abstract: Bethe subalgebras in Yangians are commutative subalgebras responsible for the higher Hamiltonians of the XXX Heisenberg spin chain and its generalizations (related to any semisimple Lie algebra \mathfrak{g}). A natural question is how these commutative subalgebras depend on their parameters, and what their degenerations are. The parameter space of these Bethe subalgebras is the complement of a toric arrangement corresponding to the root system of \mathfrak{g} . I will explain how this family extends regularly to the minimal wonderful model of this arrangement, in the sense of De Concini and Gaiffi. The subalgebras corresponding to boundary points of the compactification can be explicitly described in terms of Bethe subalgebras in smaller Yangians and shift-of-argument subalgebras (or, quantized Mishchenko–Fomenko subalgebras) in universal enveloping algebras. This is a joint work with Aleksei Ilin.

Andrei SMIRNOV (University of North Carolina, Chapel Hill, NC, USA)

Title: Quantum K -theory of Grassmannians and 5-vertex models

Abstract: In this talk, I discuss the equivalence between the Bethe algebra of the trigonometric 5-vertex model and the quantum K -theory of Grassmannians. The identification is based on the analysis of solutions to the quantum q -difference equations for these spaces and their asymptotics at $q = 1$.

Changjian SU (YMSC, Tsinghua University, Beijing, China)

Title: Geometric realizations of quantum symmetric pairs

Abstract: Geometric realizations of quantum algebras serve as important tools for studying their representations. In this talk, I will survey some recent developments in the geometric study of quantum symmetric pairs, from both the Higgs branch and the Coulomb branch perspectives.

Trung VU (YMSC, Tsinghua University, Beijing, China)

Title: Rank recursion for q -Whittaker and Macdonald operator

Abstract: In this talk, we introduce and prove a set of rank recurrence relations for q -Whittaker and Macdonald operators. We also show an explicit expression for the k -th power q -Whittaker operator in terms of q -deformed binomial probability distribution. These rank recurrence relations once found can be used to explore a family of expectations called “ q -moments” of the q -deformed Totally Asymmetric Simple Exclusion Process (q -TASEP).

Oksana YAKIMOVA (University of Jena, Jena, Germany)

Title: Near-derivations and their applications to Lie algebras

Abstract: We extend E.B. Vinberg’s theory of quasi-derivations of algebras to a broader framework of near-derivations. This deepens connections between Poisson geometry and Lie theory. While basic results apply to arbitrary algebras, our main focus lies on the Poisson algebra $(S(\mathfrak{q}), \{, \})$ associated to a Lie algebra \mathfrak{q} . It will be shown that a near-derivation D of $(S(\mathfrak{q}), \{, \})$ naturally gives rise to a pencil of compatible Poisson structures on the dual of \mathfrak{q} . Moreover, using D one may naturally construct a Poisson-commutative subalgebra of $S(\mathfrak{q})$.

Special emphasis is placed on near-derivations arising from \mathfrak{q} itself, which lead to both classical and novel families of compatible Poisson brackets. At the end of the talk, we will compare properties of near-derivations of \mathfrak{q} with Nijenhuis operators in $\mathfrak{gl}(\mathfrak{q})$, highlighting parallels between these two frameworks.

Posters

Jiakang BAO (University of Tokyo, Tokyo, Japan): *Quiver (BPS) Algebras and Crystal Representations*

Nikita BELOUSOV (BIMSA, Beijing, China): *Eigenfunctions of BC Toda chain*

Siqi CHEN (Qilu University of Technology, Jinan, China): *Painlevé transcendents and recurrence relations for orthogonal polynomials with discontinuous Gaussian-type weights*

Andrei GRIGOREV (NRU HSE, Moscow, Russia): *Monodromy-free Shrodinger operators and master functions for affine \mathfrak{sl}_2 .*

Yuan MIAO (Kavli IPMU, University of Tokyo, Tokyo, Japan): *Hidden Onsager symmetry in XXZ model at root of unity \mathfrak{sl}_2 .*

Maria ONUFRIENKO (Lomonosov Moscow State University, Moscow, Russia): *Semiglobal classification of corank-1 singularities in integrable Hamiltonian systems with three degrees of freedom*

Rahul SINGH (YMSC, Tsinghua University, Beijing, China): *q -opers and Bethe Ansatz for open spin chains*

Jinfeng SONG (The Hong Kong University of Science and Technology, Hong Kong, China): *Braid group symmetries on Poisson homogeneous spaces*

Pengyu SUN (Shanghai University, Shanghai, China): *Soliton solutions of the cross-ratio equation on the half-plane*

Xiaolu YUE (City University of Hong Kong, Hong Kong, China): *$(1, m)$ -type biorthogonal polynomials and discrete Painlevé-type equations*

Siyao YIN (Sobolev Institute of Mathematics, Novosibirsk, Russia): *Integrable Birkhoff Billiards inside Cones*

Weinan ZHANG (The Hong Kong University, Hong Kong, China): *Quantum symmetric pairs at roots of unity*

Useful information

Conference venue

BIMSA A6, Jinyu Xingfa Science and Technology Park
No. 544 Hefangkou Village, Huairou, Beijing
北京市怀柔区河防口村544号
金隅兴发科技园北京应用数学研究院A6

Conference website

<https://www.bimsa.cn/rtisart/index.html>

Zoom details

Zoom ID: 637 734 0280
Password: BIMSA

Conference building

Restaurant



Conference hotel

Aloft Hotel, Building 3, Yard 9, Yongle North Second Street, Huairou, Beijing
北京怀柔雅乐轩酒店北京市怀柔区永乐北二街9号院3号楼

Shuttle bus morning schedule (daily)

Yanqi International Community (8:25) – Aloft Hotel (8:40) – BIMSA A6 (8:55)

Shuttle bus afternoon/evening schedule

Mon. BIMSA A6 (19:00) – Aloft Hotel (19:15) – Yanqi International Community (19:30)

Tue. BIMSA A6 (17:45) – Aloft Hotel (18:00) – Yanqi International Community (18:15)

Wed. BIMSA A6 (12:30) – Aloft Hotel (12:45 – 14:00) – HEPS (14:15)

Laser Accelerator (15:15) – Yanqi Island (16:15) – Shuanghesheng brewery (17:15)

Aloft Hotel (18:15) – Yanqi International Community (18:25)

Thu. BIMSA A6 (17:45) – Meizhou Dongpo restaurant (18:00)

Fri. BIMSA A6 (14:00) – Aloft Hotel (14:15) – Yanqi International Community (14:30)