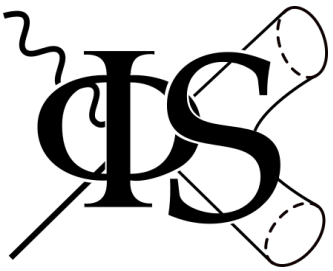

Fields&Strings'2024

Program

of the conference

	Mon 05.02	Tue 06.02	Wed 07.02	Thu 08.02	Fri 09.02	Sat 10.02
	Opening (9:30 - 10:00)					
10:00 - 10:55	Zotov	Magazev	Sfondrini (on-line)	Gahramanov	Ponomarev	
11:00 - 11:30	Coffee break | Poster session					
11:30 - 12:25	Romo	Popolitov	Suzuki	Galakhov	Ochirov	Zenkevich (on-line)
12:30 - 13:00	Nazarov	Novikov	Slepov	Kolganov	Didenko	Yagi (on-line)
13:05 - 13:35	Diakonov	Ageeva	Hajilou	Khiteev *Alkalaev*	Zaigraev	
13:35 - 15:30	Lunch					Alexandrov (on-line)
15:30 - 16:25	Litvinov	Morozov	Putrov	Sleptsov	Talalaev	
16:30 - 17:00	Pribytok	Sheykin	Maslov	Anokhina	Tselousov	
17:00 - 17:30	Coffee break | Poster session		Panel	Coffee break | Poster session		
17:30 - 18:00	Shatalova	Sadekov		Avetisyan	Ageev	
18:05 - 18:35		Sheikhahmadi		Sulimov	Alfimov	
			Dinner			

05.02. Monday

9:30 – 10:00 Opening (D. Bykov)

Chairman: E. Musaev

10:00 – 10:55 **Integrable systems and 1+1 field theories on elliptic curves and its degenerations**
Andrey Zotov (Steklov Mathematical Institute, RAS, Moscow)

We review the classification of elliptic integrable systems described by means of Lax equations and/or Zakharov-Shabat equations. In the finite-dimensional case the classification includes the Calogero-Ruijsenaars family of many-body systems, their spin generalizations, integrable tops, the Gaudin model/spin chain type systems and interacting integrable tops. These models can be extended to 1+1 field theories. Trigonometric and rational degenerations are included into consideration through the usage of R-matrix satisfying the associative Yang-Baxter equation. Interrelations between different type models are discussed as well.

11:00 – 11:30 Coffee break

11:30 – 12:25 **DT Invariants and Exponential Networks**
Mauricio Romo (Tsinghua University)

I will review how DT invariants of toric CY 3-folds/5d BPS states can be computed using exponential networks on the mirror conic bundle. This corresponds to a definition of DT as an appropriate counting of compact special Lagrangians. As time permits, I will comment on new developments such as the interpretation of exponential as critical leaves of foliations and the inclusion of noncompact objects.

12:30 – 13:00 **Skew Howe duality, limit shapes and matrix models**
Anton Nazarov (Saint Petersburg State University)

We review some results related to the limit shapes of random Young diagrams for skew Howe dualities of classical Lie groups and discuss the relations to the matrix models.

13:05 – 13:35 **Presymplectic BV-AKSZ and background fields**
Ivan Dneprov (Lebedev Physical Institute, RAS, Moscow)

The celebrated AKSZ construction provides a nice way to encode all the data about a gauge theory (namely it's Batalin–Vilkovisky lagrangian) in geometrical objects. There is a generalization of this construction which allows one to obtain AKSZ-like description of non-topological field theories by relaxing the invertibility of the symplectic form. In my talk I will explain how the common physical notion of background fields and symmetries related to them fit nicely into this geometrical picture by enriching the source manifold.

13:35 – 15:30 Lunch

Chairman: A. Ochirov

15:30 – 16:25 **YB deformations of sigma-models and integrable systems in CFT**
Alexey Litvinov (SkolTech, Skolkovo)

Integrable deformations of sigma-models provide new examples of integrable QFTs which are interesting on their own and also due to their applications to string theory. I will review a class of such models known as Yang-Baxter (YB) deformed sigma-models on symmetric spaces G/H. The undeformed versions of these models are renormalizable and integrable at quantum level provided that H is simple. It is known that YB deformation survives

both these properties. Remarkably it changes the UV behavior in a nice manner allowing to study the model by conformal perturbation theory. In my talk I will advertise a challenging problem of identifying the UV fixed point CFTs and the set of relevant operators that describe the vicinity of the fixed point.

16:30 – 17:00 **Supersymmetric CP^1 deformation and RG Flows**
Anton Pribytok (Padua University, INFN)

In the present paper we prove that the supersymmetric deformation of the CP^1 sigma model – the supersymmetric generalization of the Fateev-Onofri-Zamolodchikov model, can be given in the form of the generalised Gross-Neveu model. It appears natural to exploit this field-theoretic formalism to compute one- and two-loop beta-function and establish that in the UV the theory flows to the super-Thirring model. We explicitly show that the last is equivalent to a sigma model with "cylinder" target space by computing correlators of primaries on both sides. Moreover, we also discover other conformal limits that emerge from our superdeformed construction. A discussion on further generalizations to Non-Kahler targets and relation to (mirror) integrable hierarchies is provided.

17:00 – 17:30 Coffee break

17:30 – 18:00 **Is the Euclidean path integral always equal to the thermal partition function?**
Dmitrii Diakonov (Moscow Institute of Physics and Technology)

The Euclidean path integral is compared to the thermal (canonical) partition function in curved static space-times. It is shown that if spatial sections are non-compact and there is no Killing horizon, the logarithms of these two quantities differ only by a term proportional to the inverse temperature that arises from the vacuum energy. When spatial sections are bordered by Killing horizons the Euclidean path integral is not equal to the thermal partition function. It is shown that the expression for the Euclidean path integral depends on which integral is taken first: over coordinates or over momenta. In the first case the Euclidean path integral depends on the scattering phase shift of the mode and it is UV divergent. In the second case it is the total derivative and diverges on the horizon. Furthermore we demonstrate that there are three different definitions of the energy, and the derivative with respect to the inverse temperature of the Euclidean path integral does not give the value of any of these three types of energy. We also propose the new method of computation of the Euclidean path integral that gives the correct equality between the Euclidean path integral and thermal partition function for non-compact spaces with and without Killing horizon.

18:05 – 18:35 **Structure of renormalization constants in the MS-like schemes containing poles and logarithms**
Victoria Shatalova (Moscow State University)

In this talk I will be discussing a version of dimensional regularization in which the dimensionful regularization parameter Λ is different from the renormalization scale μ. I will present simple all-loop expressions for the renormalization constants in the MS-like schemes using this version of regularization.

06.02. Tuesday

Chairman: M. Romo

10:00 – 10:55 **Non-commutative integration method and its application to certain problems in QFT**
Alexey Magazev (Omsk State Technical University)

In this talk, I plan to review the so-called noncommutative integration method of linear PDEs, which is an alternative to the method of separation of variables. This method considerably uses non-commutative symmetry

algebras of PDEs and allows to construct more convenient bases of the respective solution spaces. In the first part of my talk, I give a brief introduction to the essence of the noncommutative integration method. In the second part, I expose a more advanced description of the method for left-invariant PDEs on Lie groups. In conclusion, I discuss the applications of the noncommutative integration method to some QFT problems: 1) constructing exact solutions of the Klein-Gordon equation in external electromagnetic fields; 2) vacuum polarization; 3) the evaluation of heat kernel on non-compact Lie groups.

11:00 – 11:30 Coffee break

11:30 – 12:25 **Towards non-perturbative frameworks for matrix models**
Alexander Popolitov (Moscow Institute of Physics and Technology)

I will review the recent developments in finite N approaches to a large class of matrix models, which are related to the peculiar notion of superintegrability, and highlight some new results, in particular, arXiv:2310.02639

12:30 – 13:00 **Top-down holographic model for the composite Higgs scenario**
Oleg Novikov (Saint Petersburg State University)

We study the means to geometrically engineer a top-down holographic model for the composite Higgs scenario. Our construction modifies the Sakai-Sugimoto model for the holographic AdS/QCD, namely its variation based on the D4 brane stack wrapped over the orientifold with the orthogonal stack of D8 branes. The difficult question is how to geometrically engineer elementary fermion fields in the specific representations that allow the composite fermionic operators to emerge, which can be coupled appropriately to the Standard model fermions. We present the possible solutions to this problem and review the properties of the resulting composite Higgs models.

13:05 – 13:35 **K-inflation: the legitimacy of classical treatment**
Yulia Ageeva (Institute for Nuclear Research, RAS, Moscow)

We consider general theory of k-inlation and find out, that it may be in strong coupling regime. We derive accurate conditions of classical description validity using unitarity bounds for this model. Next, we choose simple toy model of k-inflation and obtain the explicit condition, which guarantees that the generation of perturbations is performed in a controllable way, i.e the exit from effective horizon occurs in the weak coupling regime. However, for the same toy model the corresponding experimental bounds on a non-linear parameter fequilNL associated with non-Gaussianities of the curvature perturbation provide much stronger constraint than strong coupling absence condition. Nevertheless, for other known models of inflation this may not be the case. Generally, one should always check if classical description is legitimate for chosen models of inflation.

13:35 – 15:30 Lunch

Chairman: D. Ponomarev

15:30 – 16:25 **Knots, Racah matrices and Topological quantum computer**
Andrey Morozov (Institute for Information Transmission Problems, RAS, Moscow)

We will discuss applications of knots and quantum groups to the topological quantum computer. We will show which problems in knot theory and quantum groups arise from this connection. Also we will discuss how our knowledge in knot theory modifies our perception of the models of topological quantum computers.

16:30 – 17:00 **Yet another way from field theory to gravity**
Anton Sheykin (Saint Petersburg State University)

I will show a way to constrain a generic theory of a set of scalar fields in such a way that the dynamics of level sets of these fields would be governed by an analogue of Einstein-Hilbert lagrangian.

17:00 – 17:30 Coffee break

17:30 – 18:00 **Effective graviton mass in de Sitter space**
Damir Sadekov (Moscow Institute of Physics and Technology)

With the use of the non-stationary Keldysh-Schwinger diagrammatic technique, we find the one-loop effective action for graviton that interacts with the scalar field on the background of de Sitter space. We show that the graviton does not acquire mass for the most symmetric Bunch-Davies state in one-loop effective theory. However, we have shown that even in this case, there is a nontrivial modification of the theory at one loop in the scalar sector of gravity.

18:05 – 18:35 **Interacting quantum fields in de Sitter spacetime**
Haidar Sheikhahmadi (Institute for Research in Fundamental Sciences, Tehran)

We study the vacuum zero point energy associated to an interacting scalar field with an arbitrary mass and conformal coupling in a dS background. Employing a dimensional regularization scheme, we calculate the regularized zero point energy density, pressure and the trace of the energy momentum tensor. It is shown that the classical relation for the vacuum stress energy tensor receives anomalous quantum correction which depends on the mass and the conformal coupling does not hold. We calculate the density contrast associated to the vacuum zero point energy indicating an inhomogeneous and nonperturbative distribution of the zero point energy. Finally, we calculate the skewness associated to the distribution of the zero point energy and pressure and show that they are highly non-Gaussian.

07.02. Wednesday

Chairman: I. Gahramanov

10:00 – 10:55 **Exact results for the AdS3/CFT2 correspondence** *[online]*
Alessandro Sfondrini (University of Padova)

The AdS3/CFT2 correspondence is an intriguing instance of holography. Despite its long and rich history, only recently we have developed the techniques to obtain exact results for generic (non-protected) observables at generic points of the parameter space. In this talk I will overview this progress, describe the major stumbling blocks and how they have been overcome, and outline the remaining challenges for the field.

11:00 – 11:30 Coffee break

11:30 – 12:25 **Tensionless limit of pure-Ramond-Ramond AdS3/CFT2 superstring**
Ryo Suzuki (Southeast University, Nanjing)

The AdS3 x S3 x T4 spacetime with pure Ramond-Ramond flux, related to the D1-D5 system, is believed to be integrable as in AdS5 x S5. The integrability approaches to AdS3/CFT2 and the mirror TBA equations to study the

energy spectrum are reviewed. By solving the TBA for massless excited states at small coupling, we find that the leading-order contribution to the anomalous dimensions includes massless wrapping corrections, and behave as a sort of free particles. This talk is based on the works with Alberto Brollo, Dennis le Plat and Alessandro Sfondrini.

12:30 – 13:00 **Holographic Beta-Function for Quark-Gluon Plasma with Heavy/Light Quarks**
Pavel Slepov (Steklov Mathematical Institute, RAS, Moscow)

We consider coupling constant and beta-function in holographic models supported by Einstein-dilaton-Maxwell action for heavy and light quarks. The significant dependence of the coupling constant and beta function on chemical potential and temperature is obtained. Near the first-order phase transitions, the beta function undergoes junctions depending on temperature and chemical potential.

13:05 – 13:35 **Magnetic catalysis in holographic model with two types of anisotropy for heavy quarks**
Ali Hajilou (Steklov Mathematical Institute, RAS, Moscow)

In our previous research we have constructed a twice anisotropic five-dimensional holographic model supported by Einstein-dilaton-three-Maxwell action that reproduced some essential features of the “heavy quarks” model. However, that model did not describe the magnetic catalysis (MC) phenomena expected from lattice results for the QGP made up from heavy quarks. In this research we fill this gap and construct the model with typical properties of the heavy quarks phase diagram, and meanwhile possesses the MC. The deformation of previous model includes the modification of the heavy quarks "warp factor" and the coupling function for the Maxwell field providing the non-trivial chemical potential

13:35 – 15:30 Lunch

Chairman: A. Sleptsov

15:30 – 16:25 **Stokes phenomenon in Chern-Simons theory**
Pavel Putrov (ICTP, Trieste)

In my talk I will review the Stokes phenomenon of perturbative expansions of oscillatory integrals (from the perspective of Picard-Lefschetz theory) and the notion of analytically continued Chern-Simons theory. I will then tell how one can explicitly calculate Stokes constants in Chern-Simons theory on 3-manifolds of certain types. If time permits, I will also comment on categorification of the Stokes constants..

16:30 – 17:00 **Oscillons in weakly nonlinear scalar models**
Vasily Maslov (Institute for Nuclear Research, RAS, Moscow)

In this talk we will develop a precise analytic description of oscillons — long-lived quasiperiodic field lumps — in scalar field theories with nearly quadratic potentials. These oscillons are essentially nonperturbative due to large amplitudes, and they are known to achieve extreme longevities. The proposed method is based on a consistent expansion in both the inverse width of the oscillon and the anharmonicity of the potential at strong fields, which is made accurate by introducing a field-dependent “running mass".

17:05 – 18:30 Discussion session
Chairman: D. Bykov
Panel members: E. Akhmedov, I. Aref’eva, D. Fursaev

18:30 Conference dinner

08.02. Thursday

Chairman: M. Zotov

10:00 – 10:55 **The Bailey lemma and 3d mirror symmetry**
Ilmar Gahramanov (Bogazici University, Istanbul)

In this talk, we discuss the relationship between the integral Bailey lemma and mirror symmetry for three-dimensional supersymmetric gauge theories. Three-dimensional mirror symmetry relates infrared fixed points of a certain class of quiver gauge theories. The simplest example of such a duality is the equivalence of 3d N=2 supersymmetric quantum electrodynamics and the theory of three chiral multiplets X, Y, Z with a superpotential W=XYZ. One can check these dualities by computing supersymmetric partition functions. It happens that in some cases, starting with the partition function identity for a certain mirror duality one can construct a family of duality via the integral analog of the Bailey lemma.

11:00 – 11:30 Coffee break

11:30 – 12:25 **BPS Algebraic Structures Related to Toric Calabi-Yau Manifolds**
Dmitri Galakhov (Institute for Information Transmission Problems, RAS, Moscow)

Recent studies indicate that the canonical notion of a symmetry in physics as a group might acquire a revision towards some categorification: higher form, refined, hidden, categorical symmetries and other algebro-geometric structures classifying non-perturbative states, operators and defects. In this talk I would like to concentrate on algebraic structures governing BPS spectra in effective quiver field theories describing D-brane systems on toric Calabi-Yau manifolds. The resulting algebraic structure is similar to affine Yangians and generalizes this notion beyond the Dynkin diagram classification towards what is called a quiver Yangian (and respective generalizations to trigonometric, a.k.a. quantum toroidal, and elliptic algebras). I would review some basic elements of this construction as well as some currently open questions. If time permits we will mention relations to integrability problems, constructing stable envelopes, categorification in supersymmetric models, and some puzzles about fresh developments in the theory of toric Calabi-Yau 4-folds.

12:30 – 13:00 **Wilson networks in AdS and global conformal blocks**
Vladimir Khiteev, Konstantin Alkalaev (Lebedev Physical Institute, RAS, Moscow)

I will tell about Wilson networks in AdS_2 constructed from Wilson lines and cap states. Cap states regulate the boundary behaviour of Wilson line operators and by imposing right restrictions on cap states one can obtain the global conformal block at the boundary of the AdS_2. I will show how to find cap states and obtain dictionary relation between Wilson networks and global conformal blocks. Then I will tell about calculation of the n-point global conformal block in the comb channel.

13:05 – 13:35 **Nonequillibrium Green's functions and its analytic properties for mixed states**
Nikita Kolganov (Moscow Institute of Physics and Technology)

We develop Schwinger-Keldysh in-in formalism for generic nonequilibrium dynamical systems with mixed initial states. We construct the generating functional of in-in Green's functions and expectation values for a generic density matrix of the Gaussian type and show that the requirement of particle interpretation selects a distinguished set of positive/negative frequency basis functions of the wave operator of the theory, which is determined by the density matrix parameters. Then we consider a special case of the density matrix determined by the Euclidean path integral of the theory, which in the cosmological context can be considered as a generalization of the no-boundary pure state to the case of the microcanonical ensemble, and show that in view of a special

reflection symmetry its Wightman Green's functions satisfy Kubo-Martin-Schwinger periodicity conditions which hold despite the nonequilibrium nature of the physical setup.

13:30 – 15:30 Lunch

Chairman: P. Putrov

15:30 – 16:25 **Chern-Simons theory: duality, integrability and topology**
Alexei Sleptsov (Kurchatov Institute, ITEP, MIPT, IITP, Moscow)

I will talk about what interesting directions there are for research related to the Chern-Simons theory. First, Chern-Simons theory is one of the simplest three-dimensional quantum field theories that we can solve exactly using quantum algebra and the R-matrix. The question of searching for integrable structures in other gauge theories seems promising. Second, vacuum expectation values in Chern-Simons theory are invariants of knots (or links) in a given 3-dimensional manifold. Since the theory of knots and their invariants is far from its complete description, this question is of great interest. Third, there are two dualities with the Chern-Simons theory. One holographic duality between 3D Chern-Simons theory and 2D conformal WZW theory. The second duality arises from string theory and is a mirror symmetry between the A-model (Chern-Simons theory) and the B-model (Gromov-Witten theory). Due to the progress in the Chern-Simons theory, it is possible to investigate this duality in explicit terms.

16:30 – 17:00 **Towards Catastrophe theory for Khovanov-Rozansky homology**
Aleksandra Anokhina (Kurchatov Institute, ITEP, Moscow)

The Catastrophe theory is a powerful tool of mathematical physics to study complicated dynamical systems. It commonly operates with systems of differential equations, but is close in spirit to homological calculus in topology. A kind of hybrid of the two fields is known as a cohomological quantum field theory (CQFT). Such models seem to be very interesting and profound, and they might be useful in various applications as a new tool of the Catastrophe theory. Our goal is to use the knot homology calculus to develop a “Cohomological Catastrophe theory”, which would be associated with a family of constructively defined CQFT models related by a kind of evolution “regular” in the moduli space but special points of “catastrophes” in the knot homology. In the talk we summarize our current knowledge on the Catastrophes for explicitly studied CQFT models associated with the Khovanov--Rozansky homology of several knot families.

17:00 – 17:30 Coffee break

17:30 – 18:00 **Lie algebras and Geometrical Configurations of Points and Lines**
Mane Avetisyan (Yerevan Physics Institute)

I will be discussing a connection of configurations and simple Lie algebras which we observed during our investigation of the universal dimension formulae of the latter. In the framework of the universal approach (proposed by Vogel, Deligne, et al.), the parametrization of simple Lie algebras is based on the points in the projective plane P^2. Notably, certain important quantities of the simple Lie algebras are expressed as specific rational functions of homogeneous coordinates of P^2.Our focus is on the issue of uniqueness regarding these functions. We have discovered that this problem is equivalent to the existence of specific configurations of points and lines. In particular, we have found that valid configurations must be ”colorable” in a specific manner. I will explain how the colorable versions of (9_3) and (16_3, 12_4) configurations have partially resolved the uniqueness problem. Additionally, I will discuss a colorable (144_3, 36_12) configuration that has the potential to completely solve the problem.

18:05 – 18:35 **QM scattering amplitudes through the lens of homotopy transfer**
Tim Sulimov (PDMI, Saint Petersburg)

We consider the 1D quantum scattering problem for a Hamiltonian with symmetries. We show that proper treatment of symmetries in the spirit of homological algebra leads to new objects, generalizing the well-known T- and K-matrices. Homological treatment implies that old objects and new ones are to be combined in a differential. This differential arises from homotopy transfer of induced interaction and symmetries on solutions of free equations of motion. Therefore, old and new objects satisfy remarkable quadratic equations. We construct an explicit example in SUSY QM on a circle to demonstrate the nontriviality of the above relation.

09.02. Friday

Chairman: A. Magazev

10:00 – 10:55 **Higher-spin theories**
Dmitri Ponomarev (Institute for Theoretical and Mathematical Physics, MSU, Moscow)

I will make an overview of higher-spin theories starting from earlier no-go theories and ending with recent results and open directions.

11:00 – 11:30 Coffee break

11:30 – 12:25 **From massive higher spins to Kerr black holes**
Alexander Ochirov (ShanghaiTech U.)

I will review some recent developments in massive higher-spin theory, namely, Zinoviev's massive gauge symmetry and the new chiral approach, and discuss their applications to classical gravitational dynamics of rotating black holes.

12:30 – 13:00 **Breaking higher-spin symmetry**
Slava Didenko (Lebedev Physical Institute, RAS, Moscow)

I will present a surprisingly simple vacuum of the nonlinear higher-spin gauge theory in d+1 dimensions, which has leftover symmetry of the Poincaré algebra in d dimensions. Its structure is very simple: the space-time geometry is that of AdS, while the only nonzero field is scalar. The scalar extends along the Poincaré radial coordinate z and contains an arbitrary mixture of its two conformal branches. The obtained vacuum breaks the global higher-spin symmetry leading to a broken phase that lives in the Minkowski space-time.

13:05 – 13:35 **N=2 superconformal higher spin supermultiplets**
Nikita Zaigraev (Joint Institute for Nuclear Research, Dubna)

Using N=2 superconformal symmetry of hypermultiplet in harmonic superspace and requiring superconformal invariance of general cubic coupling one can deduce a minimal set of analytic superfields for describing higher-spin supermultiplet. I will present this set of these superfields and corresponding gauge freedom.

13:35 – 15:30 Lunch

Chairman: R. Suzuki

15:30 – 16:25 **Zamolodchikov tetrahedron equation: algebra, topology and mathematical physics**

Dmitry Talalaev (Moscow State University)

The report will focus on the Zamolodchikov tetrahedron equation, which is the next n-simplex equation after the Yang-Baxter one. I will talk about the most striking embodiments of this equation in my opinion: namely, its role in the theory of cluster varieties, the theory of 2-knot invariants, that is, classes of isotopes of embeddings of a two-dimensional surface into a 4-dimensional space, exactly solvable models of statistical physics in dimension 3 and integrable quantum mechanical models on two-dimensional lattices.

16:30 – 17:00 **Simplest quiver Yangians and family of Schur/Jack type polynomials**
Nikita Tselousov (Moscow Institute of Physics and Technology)

I will discuss how a family of Schur-Jack type polynomials naturally emerges as a representation space for infinite-dimensional quiver Yangian algebras. An initial example would be the affine Yangian of gl_1, in which the representation space is Jack polynomials (enumerated by Young diagrams) in time variables, and the generators of the algebra itself are generated by the cut-and-join operator. By analogy with the Cartan classification of Lie algebras, quiver Yangians are defined using a quiver and a superpotential. I will show how free-field representations of Fock-like representations are modified using the simplest examples, that is, how the set of "Young diagrams/time variables/Jack polynomials/cut-and-glue operator" generalizes for quivers beyond the gl_1 case.

17:00 – 17:30 Coffee break

17:30 – 18:00 **Boundary CFT, Information Paradox and Entanglement Islands**
Dmitri Ageev (Steklov Mathematical Institute, RAS, Moscow)

In this talk we consider applications of boundary conformal field theory methods to Page formulation of information paradox. We study how the introduction of a reflecting boundary surrounding the black hole affects the unitarity violation and the implications for replica wormholes/entanglement islands mechanism seemingly failing to keep unitary evolution in the presence of boundary.

18:05 – 18:35 **Checkerboard CFT**
Mikhail Alfimov (Higher School of Economics, Moscow)

The Checkerboard conformal field theory is an interesting representative of a large class of non-unitary, logarithmic Fishnet CFTs (FCFT) in arbitrary dimension which have been intensively studied in the last years. Its planar Feynman graphs have the structure of a regular square lattice with checkerboard coloring. Such graphs are integrable since each coloured cell of the lattice is equal to an R-matrix in the principal series representations of the conformal group. We compute perturbatively and numerically the anomalous dimension of the shortest single-trace operator in two reductions of the Checkerboard CFT: the first one corresponds to the fishnet limit of the twisted ABJM theory in 3D, whereas the spectrum in the second, 2D reduction contains the energy of the BFKL Pomeron. We derive an analytic expression for the Checkerboard analogues of Basso--Dixon 4-point functions, as well as for the class of Diamond-type 4-point graphs with disc topology. The properties of the latter are studied in terms of OPE for operators with open indices. We prove that the spectrum of the theory receives corrections only at even orders in the loop expansion and we conjecture such a modification of Checkerboard CFT where quantum corrections occur only with a given periodicity in the loop order.

10.02. Saturday

Chairman: D. Bykov

11:30 – 12:25 **Branes, quantum toroidal algebras and R-matrices** *[on-line]*

Yegor Zenkevich (University of California)

I will review the correspondence between configurations of branes of Type IIB string theory and representation theory of quantum toroidal algebras. In particular I will show that the R-matrices of these complicated algebras arise from brane crossings similarly to how R-matrices of finite quantum groups arise in Chern-Simons theory from crossings of the Wilson lines. Time permitting, I will also present some applications to supersymmetric gauge theories in various dimensions.

12:30 – 13:25 **Cluster algebras, 3D integrable systems and 3D gauge theories** *[on-line]*
Junya Yagi (Tsinghua University)

Solutions of Zamolodchikov's tetrahedron equation define integrable 3D lattice models in statistical mechanics, just as solutions of the Yang-Baxter equation define integrable 2D lattice models. I will explain how we can construct solutions of the tetrahedron equation using quantum cluster algebras and how they are related to 3D supersymmetric gauge theories. This is based on joint work with Xiao-yue Sun, Rei Inoue, Atsuo Kuniba and Yuji Terashima.

14:05 – 15:00 **BPS counting in string compactifications** *[on-line]*
Sergey Alexandrov (University of Montpellier)

I'll review the known results about BPS indices, which encode in particular the entropy of BPS black holes, appearing in string compactifications down to four dimensions with various number of supersymmetries. First, I'll recall the well-known results about BPS states in N=8 and N=4 compactifications, and then present what is known about them in the N=2 case. Depending on time, I hope to cover some recent advances where an important role was played by (mock) modular symmetry.

Poster session

1. **Defect CFT's by 3-vector deformations**
   Sergey Barakin (Moscow Institute of Physics and Technology)

2. **Backreaction issue for the black hole in de Sitter spacetime**
   Kirill Bazarov (Moscow Institute of Physics and Technology)

3. **Entanglement entropy in de Sitter: no pure states for conformal matter**
   Aleksandr Belokon (Steklov Mathematical Institute, RAS, Moscow)

4. **The divergences of effective action in 6D, N=(1,0) supersymmetric four-derivative gauge theory.**
   Alexandra Budekhina (TSPU, JINR)

5. **Calculation of the critical dimension of viscosity in the lambda-point vicinity**
   Diana Davletbaeva (Saint Petersburg State University)

6. **Dispersion relations in Kerr-AdS/CFT holography**
   Olesia Geitota (Joint Institute for Nuclear Research, Dubna)

7. **Properties of octupole nonlinear electrodynamics.**
   Dmitry Groshev (Kazan Federal University)

8. **Symplectic extension of the Haag-Araki axiomatics and its applications in the physics of causal geodesic structures**
   Evgeniy Gudkov (Dubna State University)

9. **Particle creation in expanding universe with flat start**
   Kirill Kazarnovskii (Moscow Institute of Physics and Technology)

10. **Closed 4-braids and the Jones unknot conjecture**
    Dmitriy Korzun (Moscow Institute of Physics and Technology)

11. **Classical and quantum aspects of particle dynamics on a flag manifold**
    Andrew Kuzovchikov (Saint Petersburg State University)

12. **Divergences in 6D N=(1,1) SYM**
    Boris Merzlikin (Tomsk Polytechnic University)

13. **Algebraic Structures Behind the Yang-Baxterization Process**
    Cansu Özdemir (Cayyolu Doga Science and Technology High School, Ankara)
    Damla Altunkaya (Bogazici University, Istanbul)

14. **Generating cosmological perturbations at Horndeski bounce**
    Pavel Petrov (Institute for Nuclear Research, RAS, Moscow)

15. **Trivector deformations on compact isometries**
    Timophey Petrov (Moscow Institute of Physics and Technology)

16. **XXX spin chain with local Hamiltonian and it's dualities**
    Rostislav Potapov (Moscow State University)

17. **On differential equations for banana Feynman integrals**
    Maxim Reva (Moscow Institute of Physics and Technology)

18. **Blinking island for a black hole in a cavity**
    Timofei Rusalev (Steklov Mathematical Institute, RAS, Moscow)

19. **The limit shape for bc-type correlation kernel from skew howe duality**
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