Titles and abstracts of talks

Name	Title of the talk	Abstract of the talk
Accardi Luigi (Rome)	New features of quantum theory emerging from classical probability.	
Aref'eva Irina Yaroslavna (Moscow)	On the SYK model in real time.	Nonperturbative formulation of the Sachdev-Ye-Kitaev (SYK) model in real time is discussed. We note that the generating functional of the SYK model in real time is well defined after the transformation to the bilocal fields and it can be used for nonperturbative investigations of its properties. The results of study of SYK model in zero dimensions at large N expansion in particular, phase structure will be presented. Based on paper by I. Aref'eva and I.Volovich, ТМФ, 197:2(2018), 296–310, arXiv: 1801.08118
Bikulov Albert Khakimovich (Moscow)	Application of p-adic analysis methods in describing Markov processes on ultrametric spaces isometrically embeddable into Qp.	We propose a method for describing stationary Markov processes on the class of ultrametric spaces~$\mathbb{U}$ isometrically embeddable in the field $\mathbb{Q}_{p}$ of p-adic numbers. This method is capable of reducing the study of such processes to the investigation of processes on~$\mathbb{Q}_{p}$. Thereby the traditional machinery of p-adic mathematical physics can be applied to calculate the characteristics of stationary Markov processes on such spaces. The Cauchy problem for the Kolmogorov--Feller equation of a~stationary Markov process on such spaces is shown as being reducible to the Cauchy problem for a~pseudo-differential equation on~$\mathbb{Q}_{p}$ with non-translation-invariant measure $m\left(x\right)d_{p}x$. The spectrum of the pseudo-differential operator of the Kolmogorov--Feller equation on $\mathbb{Q}_{p}$ with measure $m\left(x\right)d_{p}x$ is found. An orthonormal basis for $L^{2}\left(\mathbb{Q}_{p}, m\left(x\right)d_{p}x\right)$ is constructed from the eigenfunctions of this operator.
Dobrokhotov Sergey Yurievich (Moscow)	Lagrangian manifolds connected with asymptotics of Hermitian polynomials.	
Dragovich Branko (Belgrade)	Cosmological Solutions of Some Nonlocal Gravity Models.	Despite of some significant phenomenological successes and many nice theoretical properties, General relativity (GR) is not complete theory of gravity. Hence, there are many attempts to modify GR. One of promising modern approaches towards more complete theory of gravity is nonlocal modification of GR. Our nonlocal gravity model is given by the action (without matter) $S = \frac{1}{16 \pi G}\int \sqrt{-g} (R - 2\Lambda + P(R) \mathcal{F}(\Box) Q(R)) d^4x ,$ where R is scalar curvature and Λ -- cosmological constant. $P(R)$ and $Q(R)$ are some differentiable functions of R. $\mathcal{F}(\Box) = \sum_{n=0}^\infty f_n \Box^n$ is an analytic function of the dAlambertian $\Box .$ We present a brief review of some general properties, and cosmological solutions for some concrete functions $P(R)$ and $Q(R)$
Dubravina Viktoryia Andreevna (Moscow)	Schrodinger semigroups for functional spaces on ramified Riemannian manifolds.	One discusses the Feynman approximations for some Schrodinger semigroups, generated by extensions of differential operators (in particular, by self-adjoint extensions) in spaces of functions on ramified Riemannian manifolds. Such semigroups represent the solutions to heat-type evolution equations for corresponding differential operators. Each extension of differential operator is defined by proper boundary and matching conditions. The Feynman formulas are the representations of some objects, related to differential or pseudodifferential operators,

		(usually the solutions to some evolution equations) by the limit of integrals over Cartesian powers of come space when the power tends to infinity. The integrals over Cartesian powers from Feynman formula are called the Feynman approximations to corresponding object.
Gushchin Anatoly Konstantinovich (Moscow)	On boundary values of solutions of an elliptic equation.	Исследуется поведение вблизи выделенного куска границы решений эллиптического уравнения второго порядка, удовлетворяющих на остальную часть границы однородным условиям Дирихле. При довольно слабых условиях на ту часть границы, на которой решение обращается в ноль, устанавливается критерий существования граничного значения в L_p, p > 1, на остальной части границы. При выполнении условий этой теоремы рассматриваемое решение принадлежит пространству $(n-1)$-мерно непрерывных функций; тем самым граничное значение принимается в значительно более сильном смысле. Кроме того, для такого решения задачи Дирихле справедливы оценки некасательной максимальной функции и интеграла площадей Лузина.
Holevo Alexander Semenovich (Moscow)	Quantum Markovian master equations and non-Lindbladian generators.	We describe an approach to strongly continuous quantum dynamical semigroups via completely positive perturbations of their (in general, unbounded) generators. The semigroup is standard if its generator is "of Lindblad's type", i.e. it is obtained by a completely positive perturbation of a "no-event" generator. Then we consider two cases of dynamical semigroups obtained by singular perturbations of a standard generator. First, we describe an example which gives a positive answer to a conjecture of Arveson concerning possible triviality of the domain algebra. Second, we consider an improved and simplified construction of a nonstandard dynamical semigroup which gives answer to the question on existence of dynamical semigroups with non-Linbladian generators.
Inozemcev Oleg (Moscow)	Exploration of the entropy quantities for a 3-party system using holography.	We study the dynamics of composite open quantum systems strongly coupled to the environment after a quantum perturbation accompanied by non-equilibrium heating. Entanglement entropy quantities for a composite quantum system are considered, namely mutual information, tripartite information, total correlation and secrecy monotone. A holographic approach is used to calculate the time evolution of entanglement entropy during the non-equilibrium heating. We have found that the time dependence of these four quantities has specific behavior. Based on the joint work with I. Aref'eva and I. Volovich.
Iriyama Satoshi (Noda city)	Transmission efficiency in photosynthetic process with quantum noise.	Transmission efficiency in photosynthetic process with quantum noise Photosynthesis changes the energy from the sun into chemical energy, and its factory in cell consists from two complex of molecula which are antenna and reaction center. The absorption cross section is small. Thus, the emaining chlorophylls in the photosystem and antenna pigment protein complexes associated with the photosystems all cooperatively absorb and funnel light energy. The transfer of the excitation energy by antenna complex towards the reaction center occurs with a near unity quantum yield. We study the efficiency of the excitation energy transfer by antenna complex in photosynthesis by using the master equation for the density matrix. In this talk we show the conditions to increase the efficiency of energy transfer supposing dephasing and dissipative noise.
Kamizawa Takeo (Noda city)	On some Computational Methods for the Analysis of Open Quantum Systems.	In this presentation, we will study an effective criterion for the existence of a decoherence-free subspace (i.e. free from the noise) in an open quantum system. In addition, in some cases one can exactly solve the master equation of an open system. We will study an algorithmic method to obtain an operator sum representation (Kraus representation) of the solution.
Katanaev Mikhail	The 't Hooft-Polyakov monopole and	

Orionovich (Moscow)	disclinations in the geometric theory of defects.	
Khachatryan Khachatur Aghavardovich and Khachatryan Aghavard Khachaturovich (Yerevan)	On solvability of some classes convolution type nonlinear multidimensional integral equations.	The report is devoted to the problem of the solvability of certain classes of non-linear convolution type multidimensional integral equations . These classes of equations have direct applications in the theory of the geographical spread of the epidemic, in p-adic string theory. We prove constructive theorems for the existence of non-trivial and bounded solutions. The asymptotic behavior of the solutions is investigated. Specific examples of the equations in the above applications are given.
Khramtsov Mikhail (Moscow)	Replica-nondiagonal solutions in the SYK model	We study the Sachdev-Ye-Kitaev (SYK) model in the large N limit beyond the replica-diagonal approximation. We obtain the exact replica-nondiagonal solutions in the quadratic version of the model, and the numerical solutions in the quartic interacting model. The defining feature of these solutions in both quadratic and quartic interaction cases is singular behavior in the limit of zero replica number. We also study replica-nondiagonal solutions of the SYK model in the strong coupling limit. We construct them analytically using the Parisi ansatz for arbitrary replica number. Based on paper by I. Aref'eva, M. Khramtsov, M. Tikhanovskaya and I. Volovich, "Replica-nondiagonal solutions in the SYK model"
Koroleva Yulia Olegovna (Moscow)	On equations modeling blood flow in thin vessels.	Рассматриваются модели Кессона и Хершеля-Бакли, позволяющие описать течение крови по сосудам со сложной геометрической структурой. Обсуждаются вопросы влияния геометрических особенностей на характеристики потока крови.
Kozlov Valery Vasil'evich (Moscow)	Hydrodynamics and electromagnetism: differential-geometric aspects and analogies.	
Kozyrev Sergey Vladimirovich (Moscow)	Model of vibrones in quantum photosynthesis as an analog of model of laser.	Mechanism of vibronic amplification of transport of excitons was discussed in relation to quantum photosynthesis. Vibrones (some modes of vibrations of molecules) are observed experimentally in photosynthetic systems. In the present paper we discuss a model of vibronic amplification of quantum transfer where generation of vibrones as a coherent vibrational mode is described by an analog of semiclassical theory of laser. We consider two models --- a model of nonequilibrium three level system with vibronic mode, and some variant of a model of laser without inversion. We conjecture that dark states discussed in relation to quantum photosynthesis might be related to mechanism of vibronic laser without inversion which amplifies the transfer of excitons. We prove that in presence of vibronic mode transfer rate of excitons increases and compute dependence of the transfer rate on parameters of the model.
Kurianovich Edward Anatolyevich (Moscow)	Exact solutions of the Cauchy problem for the Friedmann equation.	The cosmological Friedmann equation for the universe filled with a scalar field is reduced to a system of two equations of the first order, one of which is an equation with separable variables. For the second equation the exact solutions are given in closed form for potentials as constants and exponents. For the same equation exact solutions for quadratic potential are written in the form of a series in the attractor and spiral areas (inflation stage and the late-time acceleration of the universe respectively). Also exact solutions for very arbitrary potentials are given in the neighborhood of endpoint and infinity. The existence and uniqueness of classical solutions of the Cauchy problem for the Friedman equation in some cases and the presence of exactly two solutions in other cases is

		proved.
Mayburov Sergey Nikolaevich (Moscow)	Nucleus Decay Anomalies and Nonlinear Quantum Dynamics.	Nucleus radioactivity law is one of fundamental laws of modern physics; in accordance with it, decay parameters for any particular nuclei are constant and independent of environment. Recently, several experiments reported temporary decay rate variations for alpha and beta-decay of some heavy nuclei of the order $.05 \%$ [1,2]. Beside well-established exponential time dependence of nuclei decay rate, authors found additional periodic terms corresponding to annual and daily decay rate oscillations. Obtained data suppose that decay rate variation can be related to variation of Sun gravitation potential U in the lab., due to elliptic form of Earth orbit and its daily rotation [1]. We argue that such effects can be explained by the presence of additional nonlinear terms in the interaction of quantum systems with external fields, proposed first by Kibble [3]. In our approach, modified Doebner-Goldin nonlinear quantum formalism [4] is used for description of gravitation field influence on decay rate. As the result, such nonlinear Hamiltonian induces sizable annual and daily decay rate variations for Gamow α-decay theory. Its shown that the best fit to experimental data for nucleus α-decay gives nonlinear Hamiltonian term proportional to $\mathbf{U}$ time derivative.
Mikhaylov Andrey Igorevich (Moscow)	Some aspects of the functional integral approach to relativistic Brownian motion.	The report investigates the possibility of describing the transition probability of relativistic Brownian motion by means of a functional integral in the configuration space. It is shown that the sequence of finite-time integrals corresponding to the functional integral with the action of a free relativistic particle converges to the delta function in the space of generalized functions. This result is extended to functional integrals of general position with bounded wandering rate. Thus, the description of the relativistic Brownian motion by a functional integral in the configuration space is untenable, but such a description is possible in the phase space. A regularization method for the functional integral with the action of relativistic particle is considered and estimates for the limit are obtained. The report is based on joint work with I.V. Volivich and E.A. Kurianovich.
Missarov Mukadas Dmuhtasibovich (Kazan)	On some properties of renormalization group transformation in the Euclidean models.	Exact solution of the hierarchical fermionic model generates list of conjectures for the renormalization group (RG) properties in the Euclidean models. Here we discuss two of them. Let us consider fields in the unit ball of the d-dimensional Euclidean space given by the Hamiltonians of the type H(a) + H. Here H(a) is the Gaussian part of the Hamiltonian which is invariant under Wilsons renormalization group transformation with parameter a. Let R(a) denote the renormalization group transformation and let F denote the functional Fourier transformation in the space of non-Gaussian Hamiltonians H. We prove that FR(a)=R(2d-a)F in terms of formal functional integrals and discuss some consequences of this commutation relation. If we consider lattice 2N-component bosonic and fermionic fields given with Hamiltonians of the type H(a) + H, where Gaussian Hamiltonians H(a) are invariant under block-spin RG transformation with parameter a and the non-Gaussian parts H are sums of the O(2N)-invariant polynomials with given sets of coupling constants. Then RG transformation R(a;N) in the coupling constants space of fermionic model formally is equal to the RG transformation R(a;-N) in the coupling constants space of (-2N)-component bosonic model.
Morozov Andrey (Moscow)	Knot polynomial and Chern-Simons theory: Modern status.	We briefly discuss modern problems and status in evaluating knot polynomials and interrelations with Chern-Simons theory
Mukminov Farit Khamzaevich (Ufa)	The existence of a renormalized solution of anisotropic parabolic problem for equation with diffuse	We consider the first mixed problem for a certain class anisotropic parabolic equations with variable exponents of nonlinearity and a diffuse measure on the right-hand side in a cylindrical domain $ (0, T) \times \Omega $. The domain $ \Omega $ is bounded. The existence of renormalized solution is proved.

	measure.	
Neznamov Vasily Petrovich (Саров)	Stationary solutions of the second-order equation for fermions in the external Coulomb field.	Self-conjugate second-order equations with spinor wave functions were examined for fermions moving in the external Coulomb field. For stationary states, the equations are characterized by separated states with positive and negative energies. This leads to the possibility of probability interpretation. For the Coulomb field of attraction, the energy spectrum of the second-order equation coincides with the spectrum of the Dirac equation while the probability densities being somewhat different. For the Coulomb field of repulsion, there exists an impenetrable potential barrier whose radius depends on the classical radius of an electron and on the electron energy. Existence of the impenetrable barrier is consistent with the experimental results on studying the internal electron structure and has no effect on the cross-section of the Coulomb electron scattering in the lower order of the perturbation theory. Availability of the impenetrable barrier can lead to confinement of positrons in supercritical nuclei with Z >= 170 when spontaneous emission of vacuum electron-positron pairs occurs.
Novikov Sergey Yakovlevich (Samara)	Equiangular tight Frames in digital processing of sparse signals.	Compressed sensing is a new way of compressing information. When it is realized, an important role is played by the restricted isometry property (RIP) of a rectangular matrix. On the other hand, rectangular matrices are matrices of frame synthesis operators. The extremal properties of the equiangular tight frames are shown in this circle of questions.
Pavlenko Viktor Alexandrovich (Ufa)	Quantization of the Hamiltonian of one system Kimura.	The report considers two joint linear equations with times, which depend on only two spatial variables. These equations are analogues of the schrodinger equations, which are determined by the Hamiltonians of Kimura. Installed, that solutions of a Hamiltonian system Kimura explicitly specify joint solutions Nakamura.
Rassadin Alexander Eduardovich (Nizhny Novgorod)	Application of quasi-Feynman formulae to a number of physical problems.	In the report for one-dimensional diffusion equation with constant diffusion coefficient n-th power of the Chernoff function has been calculated explicitly. Interconnection of solutions of this equation obtained by means both quasi-Feynman formula and Green's function has been demonstrated. Behaviour of these solutions under stochastic initial condition has been discussed. The case of nongaussian initial condition has been considered too.
Rivasseau Vincent (Paris)	Holographic Tensors.	
Sakbaev Vsevolod Zhanovich (Moscow)	Diffusion in Hilbert space endowing with traslationary rotationary invariant measure.	A measures on real separable Hilbert space which is invariant with respect to the shift on any vector and to any orthogonal mapping are studied. The mean values of operator of a shift on random vector with Gaussian distributions are investigated. It had been proved that the family of mean values of random shift operators is the semigroup of self-adjoint contractions which is not strongly continuous. The structure of general semigroup of self-adjoint contractions in Hilbert space without the strong continuity property had been described.
Sergeev Armen Glebovich (Moscow)	Quantum Calculus and Ideals of Compact Operators.	One of the goals of noncommutative geometry is the translation of basic notions of analysis into the language of Banach algebras. This translation is done using the quantization procedure. The arising operator calculus is called, following Connes, the quantum calculus. In this paper we shall give several assertions from this calculus concerning the interpretation of Schatten ideals of compact operators in a Hilbert space in terms of function theory. The main attention is paid to the case of Hilbert--Schmidt operators.
Shafarevich Andrey	Laplacians and wave equations on	We describe certain properties of Laplace operators and wave equations on 2D polyhedral surfaces. In particular,

Igorevich (Moscow)	two-dimensional polyhedra.	we discuss the structure of the space of harmonic functions, trace formulas and asymptotical wave fronts for the solutions of wave equations.
Shamarov Nikolaj Nikolaevich (Moscow)	Kolmogorov integral, infinite dimensional pseudo-differential operators and the Weyl secondary quantization.	Using the notion of the indefinite Kolmogorov integral we define pseudo-differential operators with the Weyl symbols (PDOW) acting in a space of smooth enough countably-additive complex-valued Borel measures on the infinite-dimensional Hilbert space Q, and also PDOW acting in a space of smooth enough functions on the same Q. We introduce and prove the symmetric property of these PDOs with real symbols.
Shirokov Dmitry (Moscow)	On some solutions of Yang-Mills equations with SU(2) gauge symmetry.	We present all constant solutions of the Yang-Mills equations with SU(2) gauge symmetry for an arbitrary constant non-Abelian current in Euclidean space of arbitrary finite dimension. We use the singular value decomposition method and the method of two-sheeted covering of orthogonal groups by spin groups to do this. Nonconstant solutions are considered in the form of series of perturbation theory.
Skubachevskii Alexander Leonidovich (Moscow)	Some Properties of Characteristics for the Vlasov-Poisson System with External Magnetic Field.	We consider the Vlasov-Poisson system of equations with external magnetic field in a half-space and in an infinite cylinder with the Dirichlet boundary condition for electric potential. The Vlasov-Poisson system describes evolution of electric potential and distribution functions for densities of charged particles in high-temperature rarefied plasma. The cylindrical shape of domain corresponds to thermonuclear reactor that is called "mirror trap". We obtain sufficient condition for external magnetic field under which characteristics of the Vlasov-Poisson system do not reach a boundary. There-fore we can study classical solutions with supports of distribution functions strictly inside domain. Such solutions are modelling plasma confinement. We obtain explicite relations providing existence and uniqueness of such solutions in H\"{o}lder spaces.
Smolyanov Oleg Georgievich (Moscow)	Derivatives of generalized measures and quantum anomalies.	One sais that a quantum anomaly occurs if after a quantization of a classical Lagrangian (or Hamiltonian) system, whos action is invariant with respect to a transformation, one get a quantum system which is no longer invariant with respect to the transformation. Relatively resently the following two books were published: "Path Integrals and Quantum Anomalies" (Oxford Univ. Press, 2004) by K.Fujikawa and H.Suzuki, and "Functional Integration: Action and Symmetries" (Cambridge Univ. Press, 2007) by P.Cartier and C.DeWitt-Morette. The explanations of the quantum anomalies given in these books contradict to each other. In the talk one suggest a new method of describing of origin of this phenomenon based on using the logarithmic derivatives of generalized measures. The obtained results imply that the point of view of Fujikawa and Suzuki is correct.
Soloviev Michael Alexandrovich (Moscow)	Deformation quantization and the spaces of type S.	We study properties of the Gelfand-Shilov spaces of type S in the context of deformation quantization, considering them as topological algebras under the twisted convolution and under star products induced by the Weyl correspondence and other quantization maps. We define their associated algebras of multipliers and prove the inclusion relations between these multiplier algebras and the duals of the spaces of ordinary multipliers and convolutors. We also consider Hilbert space representations of the multiplier algebras and describe their properties. The obtained results extend the Weyl symbol calculus beyond the traditional framework of tempered distributions. A key role in our analysis is played by a theorem characterizing those spaces of type S for which the function exp(iQ(x)) is a pointwise multiplier for any real quadratic form Q.
Teretenkov Alexander Evgenevich (Moscow)	Pseudomode method and deformation approach to quantum non-Markovian evolution.	The formulation of the pseudomode method in terms of Gorini–Kossakowski–Sudarshan–Lindblad equation for a density matrix in a finite-dimensional Hilbert space is suggested. The connection of this method with solutions for the Friedrichs model and zero-temperature Jaynes–Cummings model with dissipation is discussed. The

		deformation approach to generalization of the pseudomode method for finite temperatures is suggested. The obtained results are applied to describe the non-Markovian phenomena in Fenna-Matthews-Olson complexes.
Treschev Dmitrii Valer'evich (Moscow)	On a quantum heavy particle.	
Trushechkin Anton Sergeevich (Moscow)	Properties of the functional of the entropy production for Markovian open quantum systems.	
Vasilyev Vladimir Borisovich (Belgorod)	Wave factorization of elliptic symbols: ideas and problems.	In this report we talk on a special factorization for symbols of elliptic pseudo-differential operators; its existence permits to suggest a certain variant of boundary value problems on manifolds with a non-smooth boundary.
Volkov Boris Olegovich (Moscow)	Levy Laplacian and instantons on manifold.	One of the main causes for the interest in the Levy Laplacian is its connection with the gauge fields. We introduce the Levy Laplacian parameterized by the curve in $SO(4)$. This operator acts on the space of sections of the fiber bundle over the space of paths in a 4-dimensional Riemannian manifold. The connection of the Laplace equation for this Laplacian with the instantons on the 4- dimensional Riemannian manifold is studied. Such a relationship was previously considered by the author in the flat case.
Volovich Igor Vasil'evich (Moscow)	Maxwell's Equations on Manifolds, Magnetic Monopole, and Hodge Theory	A generalization of Maxwell's equations with magnetic monopoles on pseudo-Riemannian manifolds of arbitrary dimensions is considered. It is shown that the equations can be reduced to the d'Alembert - Hodge equation. Particular solutions of the equations are presented. The talk is based on a joint work with V.V. Kozlov.
Watanabe Noboru (Noda City)	On Entropies for Quantum Dynamical Systems.	We briefly review the entropic complexities for classical and quantum dynamical systems. We introduce some complexities by means of entropy functionals in order to treat the transmission processes consistently. We apply the general frames of quantum entropy for quantum dynamical systems. Finally, we discuss about a construction of compound states including quantum correlations.
Yengibaryan Norayr Bagratovich (Yerevan)	The inverse problem of diffuse transmission in transport theory.	We consider a linear problem of transfer of radiation or elementary particles in a homogeneous plane layer, in the absence of internal energy sources. Let the medium on the side of one (conditionally-left) boundary be stationary illuminated by radiation of intensity $ J_0 $. Then the radiation of intensity $ J_1 = TJ_0 $ emerges from the right boundary. Some methods for constructing a linear transmission operator $ T $ are described. The existence and effective construction of the inverse operator $ T ^ {- 1} $ are considered. Knowing $ T ^ {- 1} $ allows to restore $ J_0 $ using the results from the measurement $ J_1 $. This inverse problem adjoins \cite{1}. Its solution has various applications.
Zelenov Evgeny Igorevich (Moscow)	Recurrence theorem for p-adic quantum systems.	