# Abstracts of QP34 Conference

| Author | Title of the talk | Abstract |
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| Accardi Luigi<br>Centro Volterra, Universita degli Studi di Roma Tor Vergata, Italy | d-Dimensional orthogonal polynomials, the quantum decomposition of a classical random variable and symmetric interacting Fock spaces over $C^d$ | The notion of interacting Fock spaces (IFS) was introduced by Accardi, Lu and Volovich in the paper [1] which was, in its turn, motivated by the stochastic limit of quantum electrodynamics.<br>In 1998 Accardi and Bozeiko proved the identification of the theory of orthogonal polynomials in one variable with the theory of one-mode IFS [2].<br>The problem of developing a satisfactory theory of multi-dimensional orthogonal polynomials is much more difficult and has remained open for several decades. In fact, already in the 1953 monograph [3] the authors complain that "…There does not seem to be an extensive general theory of orthogonal polynomials in several variables …" The root of this problem is related to the fact that the multi-dimensional extensions of Favard's theorem existing, up to now, in the literature were not satisfactory for several reasons that will be discussed in the talk.<br>In a recent joint paper with A. Barhoumi and A. Dhahri we have proved that the theory of orthogonal polynomials in *d* variables (*d*\in *N*) can be canonically identified to the theory of symmetric interacting Fock spaces over $C^d$. An essential tool for the proof is the notion of *quantum decomposition of a vector valued random variable* which is nothing but the interpretation of the tri-diagonal Jacobi relations in terms of creation, preservation and annihilation operators.<br>In this identification the commutativity of the coordinates imposes non trivial commutation relations, between the creation, preservation and annihilation operators, which are uniquely determined by the generalized principal Jacobi sequence.<br>In the case of the Gaussian (or of the Poisson distribution, which has the same principal Jacobi sequence) one recovers the usual Heisenberg commutation relations.<br>*Thus quantum mechanics emerges not as a generalization of classical probability but as its natural prolongation.*<br>[1] L. Accardi, Y. G. Lu, I. Volovich, "The QED Hilbert module and Interacting Fock spaces", *IIAS reports 1997-008*, Publications of IIAS, Kyoto, 1997.<br>[2] L. Accardi L., M. Bozejko, "Interacting Fock spaces and Gaussianization of probability measures", *Infin. Dimens. Anal. Quantum Probab. Relat. Top.*, **01**:4 (1998), 663–670 *Volterra Preprint*, 1998, 321.<br>[3] A. Erdely, W. Magnus, F. Oberhettinger, F. Tricomi, *Higher transcendental functions*, v. 2, McGraw–Hill, 1953. |
| Amosov Grigori,<br>Steklov Mathematical Institute, Russia | On estimating from below for the output entropy of a tensor product of two quantum channels | The notion of a phase-damping channel in infinite dimensional Hilbert space is introduced. It is shown that the decreasing property of the quantum relative entropy allows to estimate from below the output entropy of a tensor product of the phase-damping channel and an arbitrary channel. The connection with the strong superadditivity property for quantum channels is discussed. |
| Aref'eva Irina,<br>Steklov Mathematical Institute, Russia | Holographic description of strongly interacting quantum systems | |
| Argonov Viktor,<br>Pacific Oceanological Institute, Russia | Coherent cooling of atoms in a frequency-modulated standing laser wave: wave function and stochastic trajectory approaches | We propose a novel method of coherent laser cooling of atoms in a standing light wave. We simulate quantum evolution of cold atomic wave packets in a near-resonant standing light wave. We show that the wave function of a moderately cold atom in a stationary field delocalizes very fast due to wave packet splitting. However, frequency modulation of field may suppress packet splitting for some atoms having specific velocities in a narrow range. These atoms remain localized in a small space for a long time. We propose that in a real experiment with cold atomic gas this effect may decrease the velocity distribution of atoms (the field traps the atoms with such specific velocities while all other atoms leave the field). These results are studied numerically and theoretically in the framework of two approaches: (1) quantum model, (2) stochastic trajectory model. We compare their results |

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| | | and methodological aspects. |
| Asai Nobuhiro,<br>Aichi University of Education, Japan | The Boas-Buck generating functions and non-classical convolutions | In this talk, I will give you quick review on the class of orthogonal polynomials (OP) and the Jacobi-Szego parameters derived from the Boas-Buck generating functions. As interesting connections, relationships between non-clasical convolution products and OP's. |
| Barhoumi Abdessatar,<br>Carthage University, Tunisia | Euler's theorem for homogeneous white noise operators | In this talk we introduce a new notion of $\lambda$−order homogeneous operators on the nuclear algebra of white noise operators. Then, their explicite Fock expansion in terms of quantum white noise fields enables us to prove Euler's theorem in quantum white noise setting. This new result opens a new area in non commutative harmonic analysis. |
| Belavkin Roman,<br>Middlesex University, UK | Pythagorean theorem for Shannon capacity of a quantum channel | Pythagorean theorem is one of the most famous results in geometry, and there exist its information-theoretic counterpart, including a more general law of cosines. Here we shall consider a particular case where the vertexes of a triangle are defined by a compound (or `joint') state on a product algebra. It is shown that such a triangle is always right, and the Pythagorean theorem gives a new, geometric interpretation of Shannon capacity of a quantum channel, defined by the compound state. In particular, the catheti of the triangle represent Shannon mutual information and divergence between the reduced (or marginal) states. We discuss applications of this Shannon-Pythagorean theorem to optimisation of dynamical systems with constraints on information divergence between states and channel capacity of the operation transforming the states. |
| Beschastniy Ivan,<br>Pereslavl University, Russia | Sub-Riemannian problems on SU(2) and SO(3) | Left-Invariant contact structures on three dimensional Lie groups are the basic examples of sub-Riemannian manifolds. A full classification of such structures with respect to local isometries has appeared recently in an article of A.A. Agrachev and D. Barilari [1]. In the talk we will discuss the geodesic structure of a family of sub-Riemannian problems on SU(2) and SO(3) which have applications to control of driftless two-level systems.<br>A full parametrisation of sub-Riemannian geodesics will be presented in the talk. A description of the symmetries and Maxwell points, i.e. points where to different geodesics with the same length meet, will be provided. |
| Bhat Rajarama,<br>Indian Statistical Institute, India | Nilpotent completely positive maps | We study the structure of nilpotent completely positive maps. |
| Bikchentaev Airat,<br>Kazan Federal University, Russia | States on symmetric logics: conditional probability and independence | We continue the first author's study begun in [1] and study the notions of conditional probabilities, independence and $\varepsilon$-inde\-pen\-den\-ce for states on symmetric logics [2]. We prove that a non-atomic state on the logic with the Lyapunov's property is determined by its specification of independent events. We present the examples of 1) $\Delta$-subadditive but is not subadditive and 2) two-valued non $\Delta$-subadditive states on symmetric logic. We investigate the independence relation transitivity for a $\Delta$-subadditive state.<br>We also study continuity properties of conditional probabilities and $\varepsilon$-indepen\-den\-ce relation with respect to natural pseudometric for $\Delta$-subadditive state. We prove that in this pseudometric space any ``triangle'' possesses a ``perimeter'' less than or equal to $2$.<br>Finally, we pose two open problems.<br>1. Bikchentaev A.M.: States on symmetric logics: conditional probability and independence. Lobachevskii J. Math. 30 (2), 101--106 (2009).<br>2. Bikchentaev A.M., Yakushev R.S.: States on symmetric logics: conditional probability and independence. II. Inter. J. Theor. Physics (in print). |
| Bondal Aleksei, | Mutually unbiased | We will show how one of the basic problems of quantum information theory, the classification of unbiased bases, |

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| Steklov Mathematical Institute, Moscow, Russia | bases and representation theory of Temperley-Lieb homotopes | is related to harmonic analysis on graphs and representation theory of reduced Temperley-Lieb algebras of graphs. We interpret these algebras as homotopes of Poincare groupoids of graphs constructed via discrete Laplace operators. We analyse the<br>representation theory of homotopes via derived categories and outline a relation to perverse sheaves on singular Riemann surfaces. |
| Boukas Andreas, National Technical University of Athens, Greece (with Luigi Accardi) | Contractions and central extensions of quantum white noise Lie algebras | We show that the Renormalized Powers of Quantum White Noise Lie algebra $RPQW N_*$, with the convolution type renormalization $\delta^n(t-s)=\delta(s)\delta(t-s)$ of the $n \geq 2$ powers of the Dirac delta function, can be obtained through a contraction of the Renormalized Powers of Quantum White Noise Lie algebra $RPQW N_c$, with the renormalization $\delta^n(t) = c^{n-1}\delta(t)$, $c > 0$. Using this renormalization, we also obtain a Lie algebra $W_\infty(c)$ which contains the $w_\infty$ infinite dimensional Lie algebra of Bakas and the Witt algebra as contractions. Motivated by the $W_\infty$ algebra of Pope, Romans and Shen, we show that $W_\infty(c)$ can also be centrally extended in a non-trivial fashion. In the case of the Witt subalgebra of $W_\infty$, the central extension coincides with that of the Virasoro algebra. |
| Chebotarev, Alexander (with T.V. Tlyachev, A.E. Teretenkov, V.Belokurov) Moscow State University, Russia | On the normal form of multimode squeezings | We describe the solution of algebraic equations for the coefficients of the normal factorization<br>$$<br>U_t=e^{i\widehat H t}= e^{s_t}e^{-\frac{1}{2} (\ak,R_t\ak)-(g_t,\ak)}\,e^{ (\ak,C_t a)}\,<br>e^{\frac{1}{2} (a,\overline\rho_t a)+(\overline f_t,a)}<br>$$<br>of the unitary group $U_t$ with Hamiltonian<br>$$<br>\widehat H= \frac{i}{2}\bigl((\ak,A\ak)-(a,\overline A a)\bigr)+(\ak,B a)+i(\ak,h)-i(a,\overline h)<br>$$<br>in terms of the matrices $\Phi_t$, $\Psi_t$ which define the canonical transformation of the creation-annihilation operators. Such a decomposition defines the normal symbol of squeezing and the inner products of squeezed states which are necessary for constructing a basis in a linear hull generated by a finite set of squeezed states. A new class of solvable quantum problems is related to Hamiltonians with $A$ and $B$ such that $[A\overline A,B]=0$ and ${\rm rank\,} A\overline A\ge {\rm rank\,} B$. In this case, the solution is expressed in terms of the eigenvalues of the Hermitian matrix $A\overline A-B^2$. |
| Das Pradip, Indian Statistical Institute, India | Optimal control of a spin system with weighted energy cost functional | Optimal control of quantum mechanical system with weighted energy cost function has been derived by representing the unitary operator in terms of the projection operators of the Hamiltonian of the control system. The admissible Hilbert space of controllers of the system is expressed as the direct sum of the Hilbert spaces corresponding to the weights of the controllers of the quantum mechanical system. The optimal control which steers the initial state to a target state, minimizing the weighted energy, is formulated in terms of the controllability operator of the system. As an example, the weighted optimal control problem of the time evolution of a quantum spin system subjected to an external field with the minimum energy function is formulated in terms of the quantum spin up and spin down states of the Pauli two-level system. |
| Efimov Gariy, Joint Institute for Nuclear Research, Russia | Quantum particle in a stochastic potential | Green function of quantum particle in a stochastic potential is calculated by path integral method. |
| Fagnola Franco, Politecnico di Milano, | Decoherence free subspaces of a quantum | |

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| Italy | Markov semigroup | |
| Fedorov Aleksey,<br>BC "Ural", Skolkovo, Russia | Feynman integral and perturbation theory in quantum tomography | A definition for tomographic Feynman path integral as representation for quantum tomograms via Feynman path integral in phase space is discussed. Proposed relation for tomographic Feynman path integral mostly based on the principles of the Faddeev-Popov ghost. The proposed representation is the potential basis for investigation of Path Integral Monte Carlo numerical methods with quantum tomograms. The perturbation theory for quantum tomograms is constructed. |
| Hibino Yuji,<br>Saga University, Japan | Asymptotic spectral distributions of distance-k graphs of cartesian product graphs | Let $G$ be a finite connected graph on two or more vertices and $G^{[N,k]}$ the distance-$k$ graph of the $N$-fold cartesian power of $G$. For a fixed $k\ge1$, we obtain explicitly the large $N$ limit of the spectral distribution (the eigenvalue distribution of the adjacency matrix) of $G^{[N,k]}$. The limit distribution is described in terms of the Hermite polynomials. |
| Holevo Alexander,<br>Steklov Mathematical Institute, Moscow, Russia | The entropy gain of infinite-dimensional quantum evolutions | We study the entropy gain for infinite-dimensional dynamical maps (channels). We show that unlike finite-dimensional case where the minimal entropy gain is always nonpositive, there is a plenty of channels with positive minimal entropy gain. We obtain the new lower bound and compute the minimal entropy gain for a broad class of Bosonic Gaussian channels by proving that the infimum is attained on the Gaussian states. |
| Ilyn Nikolay,<br>Steklov Mathematical Institute, Moscow, Russia | Trap - free manipulation in the Landau-Zener system | In this talk we presented our theorem for the absence of traps in the Landau-Zener system, discuss the limitations associated with the noise and constrains in the controls and provide an overview of previous results for the analysis of traps |
| Iriyama Satoshi,<br>Tokyo University of Science, Japan | Quantum algorithm and its application described by the GKSL master equation | We introduce a quantum algorithm and its amplification process using a logistic map. The amplification process can be described by the GKSL master equantin, and we discuss the conditions to realize an efficient quantum algorithm, namely polynomial time algorithm. Moreover, we show its application for some difficult problems. |
| Ivanov Mikhail,<br>Moscow Institute of Physics and Technology, Russia | Nonunitary gauge transformations and wave functions of complex variables | Nonunitary generalization of U(1) gauge transformations is considered.<br>Family of Fock-like representations of quantum state space is generated.<br>Regular wave functions appear to be a degenerate case. It allows to complixify wave function arguments. |
| Kamalov Timur,<br>Moscow State Open University, Russia | Particles in tremoring reference frames and quantum theory | The actual time-space is almost without exception non-inertial, as it is almost without exception that there exist (at least weak) fields, waves, or forces perturbing an ideal inertial reference frames. Then every reference frame is tremoring due to the influence of random gravitational _fields and waves so that every free particle appears to be oscillating. One of the most generalized ways of descriptions this case (known as the higher derivatives formalism) consists in taking into account the infinite number of the higher temporal derivatives of the coordinates in the Lagrange function. Such formalism describing physical objects in the infinite dimensions space does not contradict to the quantum mechanics and infinite dimensions Hilbert space. |
| Khrennikov Andrei,<br>Linaneus University, Sweden | Kolmogorov probability model for violation of Bell's inequality by taking into account random choice of measurement settings | We show that quantum probabilities for joint detections of polarizations of entangled photons can be treated as classical conditional probabilities with respect to Kolmogorov probability model taking into account random choice of measurement settings. |
| Konno Fumito (poster presentation), | On construction of CCNOT gate based on | A construction of quantum logical gates (Not and Controlled - Note gates) was studied by using ESR (Electron Spin Resonance). In this paper, we will discuss a mathematical formulation of Controlled-Controlled- |

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| Tokyo University of Science, Japan | ESR (by Fumito Konno, Kenichiro Mayuzumi, Noboru Watanabe and Igor Volovich) | NOT(CCNOT) gate for one and two dimensional (triangular lattice model) Ising models based on ESR. |
| Kozyrev Sergei, Steklov Mathematical Institute, Russia | Three level atom in the stochastic limit | |
| Mayburov Sergey, Lebedev Institute of Physics, Russia | Partial ordering, fuzzy geometry and quantization | Dodson-Zeeman fuzzy geometry (FG) is considered as possible geometric formalism of particles and fields quantization. In 1-dimensional case the fundamental set of FG elements (points) S is Poset, so that its elements (points) beside standard ordering relation b ЎЬ c, can obey also to incomparability relation: b ~ c, . To detalize it, the normalized fuzzy weight w(b,c) >0 is introduced. If X={x} is continuous ordered S subset, then b coordinate relative to X can be principally uncertain and w(b,x) characterizes its spread. It supposed that such fuzzy point b(t) describes the evolving particle m, its state ¦X(t) characterized by normalized density w(x,t) and w flow velocity v(x,t), as the result ¦X(x,t) can be expressed as Dirac vector (ray)of complex Hilbert space. Other quantum-mechanical axioms are also derived from geometric premises. Particle's interactions on fuzzy manifold are studied and shown to be gauge invariant. |
| Morzhin Oleg, Trushkova Ekaterina, Trapeznikov Institute of Control Sciences, Russia | Methods for nonlocal Improvements of controls in quantum systems | |
| Mukhamedov Farrukh, International Islamic University, Malaysia | One pure quasi quantum quadratic operators | In the literature on quantum information and communication systems, such a map is called a channel. Note that the concept of state in a physical system is a powerful weapon to study the dynamical behavior of that system. One of the important class of channels is so-called pure ones, which map pure states to pure ones. Therefore, it would be interesting characterize such kind of maps (or channels). In the present work we are going to describe pure quasi quantum quadratic operators. |
| Ohya Masanori, Tokyo University of Science, Japan | A mathematical realization of von Neumann's measurement scheme | We solve the von Neumann reduction process in quantum measurement in terms of the lifting theory. That is, we constructed the unitary dynamics giving the above reduction. |
| Paszkiewicz Adam, University of Lodz, Poland | Projections in von Neumann algebras (with S. Goldstein, A. Komisarski, T. Sobieszek) | A number of classical problems (as Amemiya-Ando conjecture, S. Kwapien conjecture, Waatters-Parthasarathy problem) are connected with projections in a Hilbert space, of finite or infinite dimension. We present some ultimate solutions obtained by the authors. We also present some important and natural generalizations for any von Neumann factor. |
| Pechen Alexander, Steklov Mathematical Institute, Russia | Recent progress in quantum control landscapes | We will overview some directions in modern theory of quantum control---control of atomic and molecular scale systems obeying quantum dynamics. High interest to this topic is motivated by numerous existing and prospective applications ranging from quantum information and computing to laser control of chemical reactions and laser-assisted accelerators. We will start from the mathematical description of the dynamics of closed and open quantum systems, formulate various objectives, and outline recent progress in the analysis of local extrema (traps) in quantum control landscapes.<br>[1] A.N. Pechen, D.J. Tannor, Are there traps in quantum control landscapes? Phys. Rev. Lett., 106, 120402 |

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| | | (2011).<br>[2] K.W. Moore, A. Pechen, X.J. Feng, J. Dominy, V.J. Beltrani, H. Rabitz, Why is chemical synthesis and property optimization easier than expected? Physical Chemistry Chemical Physics, 13, 10048 (2011).<br>[3] A. Pechen, N. Ilyn, Trap-free manipulation in the Landau-Zener system, Phys. Rev. A, 86, 052117 (2012). |
| Sakbaev Vsevolod, Moscow Institute of Physics and Technology, Russia | Dynamical and variational properties of random quantum dynamical semigroups | The random processes with values in the set of semigroups in the space of states of quantum system are studied. The mean value of such a process is the family of mean transformation which is not semigruop. The trajectories of the mean transformation family is described by 1) the pseudomeasures on the space of maps of time intervale into the coordinate space; 2) the varitional problem for the functional on the space of maps of time intervale into the space of quantum states. |
| Schott Rene, Universite de Lorraine, France | On the rough-paths approach to non-commutative stochastic calculus | We study different possibilities to apply the principles of rough-paths theory in a non-commutative probability setting. First, we extend previous results obtained by Capitaine, Donati-Martin and Victoir in Lyons' original formulation of rough-paths theory. Then we settle the bases of an alternative non-commutative integration procedure, in the spirit of Gubinelli's controlled paths theory, and which allows us to revisit the constructions of Biane and Speicher in the free Brownian case. New approximation results are also derived from the strategy. |
| Shamarov Nikolay, Moscow State University, Russia | Non-Gaussian operator Feynman--Kac formulae | |
| Shirokov Maksim, Steklov Mathematical Institute, Russia | On reversibility of quantum channel | We consider conditions for reversibility of a quantum channel with respect to families of states (pure states for the most part) and their applications in quantum information theory. |
| Shiryaev Albert, Steklov Mathematical Institute, Russia | Stochastic differential equations: weak and strong solutions | |
| Si Si, Aichi Prefectural University, Japan | Graded rings of homogeneous chaos generated by polynomials in noises depending on time and space parameters, respectively | We take two kinds of noises; one is Gaussian noise and the other is that depending on the intensities which are determined by the law of small probabilities. As for the Gaussian case, the polynomials are continuous versions of those in finitely many $\dot B(t)$'s, where $B(t)$ is a Brownian motion. We may compare those polynomials with generalized white noise functionals (Hida distributions) of finite degree. As for the other case, polynomials are formed by idealized elemental random variables parametrized by the intensity, so that we need different technique from Gaussian case in order to discuss the analysis on polynomials in question. |
| Smolyanov Oleg, Steklov Mathematical Institute, Russia | Hamilton, Feynman and Wigner structures in the theory of open quantum systems | |
| Spring William, University of Hertfordshire, UK | Multiple stochastic integrals | We explore quantum stochastic integrals for weakly adapted processes and their properties. |
| Sverdlov Roman, IISER Mohali, India | How can many body QM as well as Fock space QFT emerge out | One of the key difficulties in the interpretation of quantum mechanics is the fact that "probability amplitude" is complex valued, while the "probabilities" we know from classical physics are positive and real. However, if we think of wave function as an analogue of classical "classical field" AS OPPOSED TO probability amplitude, then there would no longer be a conceptual problem: after all it doesn't contradict our intuition that classical |

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| | of first quantization with one extra coordinate | electromagnetic field can have both signs, nor does its interference contradict our intuition either. One of the commonly cited obstacles in comparing wave function to classical field is the fact that we don't understand its collase. However, there are some collapse models (Bohmian mechanics, GRW, etc). Nor is superluminal signaling a problem either: we can claim that we have quasi-relativity as opposed to true relativity, meaning that there is preferred frame we just don't see one. What I believe to be far bigger obstacle in viewing wave function as classical field is the fact that classical field lives in R^4, whereas wave function in configuration space lives in R^{3n+1}, where $n$ is the number of particles. This also gives us additional reason to compare wave function to "probability" since classical probability also lives in R^{3n+1}; and like stated earlier the comparison to classical probability (as opposed to classical field) is what ultimately creates a problem.<br>Now, since 3*1+1=4, in single particle case the "probability" and "field" is indistinguishable. It is strictly where the number of particles is more than one where we have a problem. Therefore, my task is to reduce many body QM to single particle one. I do that by introducing one single extra dimension, y=x^5 and then picturing strings that are stretched out in $x^5$. Intersection of these strings with $x^5= const$ hyperplane would produce particle configuration. I then make shapes of the strings sophisticated enough to make sure that any configuration we have in mind can be approximated by at least one hyperplane (in reality, more than one). In other words, $x^5$ acts like "space filling curve" in a sense that each y=const hyperplane corresponds to particle configuration. Thus, we can replace wave function in configuration space with a wave function in $x^5$. For the purposes of "realism" we will also make sure said wave function varies in $x^1$, $x^2$ and $x^3$, but we will integrate it away when we define probability amplitudes. Finally, if I have time, I will also sketch how to extend this principle from many body QM to second quantization. The material of this talk is described in more detail in arXiv:1309.3287 |
| Tanaka Yoshiharu, Tokyo University of Science, Japan | Rigorous study of double-slit experiment and adaptive dynamics | In the famous double-slit experiment in quantum mechanics, probability distribution for a photon on the screen should be studied. We have calculated this probability rigorously, and we could show the dependence on the distance between the two-slits, and on the distance between the slits and the screen. We further discuss the double-slit experiment by means of adaptive dynamics, and then we observed a new additional term and its effect. |
| Trushechkin Anton, Steklov Mathematical Institute, Russia | Semiclassical description of collapses and revivals of quantum wave packets in bounded domains | We study various large time semiclassical limits of quantum evolution on a circle and in a box (infinite potential well with hard walls) as the Planck constant tends to zero and time tends to infinity. The results give detailed information about all stages of evolution of quantum wave packets: semiclassical motion, collapses, revivals, as well as intermediate stages. In particular, we rigorously justify the fact that the spatial distribution of a wave packet is most of the time close to uniform. This fact was previously known only from numerical calculations. |
| Vladimirova Yulia (with V.N. Zadkov and V.M.Pastukhov), International Laser Center, Moscow State University, Russia | Quantum optics of a hybrid molecules composed of an atom and a metallic nanoparticle | |
| Volkov Boris, Moscow State University, Russia | Some nonclassical Levy laplacians and quantum stochastic processes | One considers the family of Levy laplacians introduced by L.Accardi and O.G. Smolyanov. This family includes both the classical Levy Laplacian and the so-called Exotic Levy laplacians. Some of those operators naturally connected with the Yang-Mills theory. Moreover, in the frame of white noise analysis one obtains, for some Levy laplacians, a representation by quadratic functions of quantum stochastic processes. |
| Volovich Igor, Steklov Mathematical | Entangled photons in waveguides | Distance dependence of detecting of entangled photons in waveguides is investigated.<br>Joint work with A.Khrennikov, B.Nilsson and S. Nordebo. |

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| Institute, Russia | | |
| Waldenfels Wilhelm, Heidelberg University, Germany | Approximation of the Hudson-Parthasarathy equation by coloured noise | We approximate the usual Hudson Parthasarathy equation by coloured noise using the weak coupling limit. The formulae for the Hamiltonian show up in a natural way, |
| Watanabe Noburu, Tokyo University of Science, Japan | Note on entropy type complexity for transmission Process | The quantum entropy was introduced by von Neumann around 1932, which describes the amount of information of the quantum state itself. It was extended by Ohya for C*-systems before CNT entropy. The quantum relative entropy was first defined by Umegaki for σ-finite von Neumann algebras, which was extended by Araki and Uhlmann for general von Neumann algebras and *-algebras, respectively. By introducing a new notion, the so-called compound state, in 1983 Ohya succeeded to formulate the mutual entropy in a complete quantum mechanical system (i.e., input state, output state and channel are all quantum mechanical) describing the amount of information correctly transmitted through the quantum channel. In this talk, we briefly review the entropic complexities for classical and quantum systems. We introduce some complexities by means of entropy functionals in order to treat the transmission processes consistently. |
| Zelenov Evgeniy, Steklov Mathematical Institute, Russia | p-Adic model of quantum mechanics and quantum channels | |