



Joint Institute for Power and Nuclear Research – Sosny
B. I. Stepanov Institute of Physics
National Academy of Sciences of Belarus
Joint Institute for Nuclear Research Belarusian State University

**NONLINEAR PHENOMENA IN
COMPLEX SYSTEMS**
*Fractals, Chaos, Phase Transitions, Self-
organization*
Minsk, MAY 16 – 19, 2017
Belarus
XXIV Annual Seminar
Program
<http://npcs.j-npcs.org/>

Tuesday, May 16, 10.00-17.30

9.00 – 10.00 Registration

10.00 - Opening 5 min

Chairman: Kuzmin A.V.

10.05 - 11.30 Plenary Session

Chairman: Korbut T.N.

1. V.I. Kuvshinov, A.V. Kuzmin (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Chaos Assisted Tunneling. Instanton approach](#) (25 min)
2. M. Hnatic et al. (JINR, Dubna, Russia) [Field-theoretic models of developed turbulence and stochastic dynamics](#) (30 min)
3. S. Bondarenko, V.V. Burov (JINR, Dubna, Russia) [Relativistic properties of the few-body systems in the Bethe-Salpeter approach](#) (30 min)

11.30 - 12.00 Coffee-Break

12.00 - 13.30 Plenary Session

Chairman: Kuvshinov V.I.

1. O.V. Rogachevsky, A. Bychkov (JINR, Dubna, Russia) [Implementation of Higuchi method of fractal dimension measurement for multiparticle events](#) (30 min)

2. S. Sikorin, A. Kuzmin, S. Mandzik, T. Hryharovich (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Reevaluation and uncertainty analysis of criticality experiments on water-uranium assemblies of Rosa facility](#) (30 min)
3. Lev M. Tomilchik (Institute of Physics, NASB, Minsk, Belarus) [Quantum, classical and symmetry aspects of Max Born reciprocity](#) (30 min)

13.30 - 14.30 Lunch

14.30 - 16.30 Session: Quantum and Classical Electrodynamics

Chairman: Gilewsky V.V.

1. Alexander J. Silenko (Research Institute for Nuclear Problems, BSU, Minsk, Belarus) [Berry phases in an electric-dipole-moment experiment in an all-electric storage ring](#) (20 min)
2. Yu.D. Chernichenko, V.V. Kondratyuk (Gomel State Technical University, Gomel, Belarus) [Calculation of Masses Spectrum and Leptonic Widths of Mesons in the Relativistic Quasipotential Approach](#) (20 min)
3. V.I. Lashkevich, A.V. Sidorov, O.P. Solovtsova (Gomel State Technical University, Gomel, Belarus) [The effective contour in the inverse Mellin transform for the structure function F₃](#) (20 min)
4. Kuvshinov V. I. Kazitski E.E. (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [About of stability of quantum system in electrodynamic fields with using the fidelity criterion](#) (15 min)
5. A.V. Baran, V.V. Kudryashov (Institute of Physics, NASB, Minsk, Belarus) [Transmission through a smooth parabolic double barrier](#) (15 min)
6. S. Komarov, A. Gorbatsievich, A. Tarasenko (Belarusian State University, Minsk, Belarus) [Redshift from a binary that moves in gravitational field of a supermassive Schwarzschild black hole](#) (20 min)
7. N. Grinchik, V. Lazuk (Heat and Mass Transfer Institute, NASB, Minsk, Belarus) [Electrodynamics and Electrochemistry of Inhomogeneous \(Laminated, Angular\) Structures](#) (15 min)
8. (20 min)

16.30 - 16.50 Coffee-Break

16.50-17.30 Poster Session

Chairman: Babichev L.F.

1. Hidezumi Terazawa (Center of Asia and Oceania for Science, Tokyo, Japan) “Mass Spectrum of Quarks and Leptons in the Unified Composite Model”
2. Albert Samoilenka (BSU, Minsk, Belarus) “Gauged Baby Skyrme Model with and without Chern-Simons term”
3. Shershan I.A., Shishkina T.V. (BSU, Minsk, Belarus) The possibility of Standard Model test and it expansion on base of massive boson production in $e\gamma$ -interaction.
4. Khasenevich V.V., Shishkina T.V. (BSU, Minsk, Belarus) “Radiative effects in processes of electron-positron annihilation into lepton pairs”
5. L. Babichev (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus), S. Bakhnovich, G. Gromyko, A. Zherelo (IM, NASB, Minsk, Belarus) “Simulation of heat removal from fuel rods in a turbulent flow”

6. L. Babichev, A. Chruschinsky, S. Kuten, I. Rudenkov, K. Usheva (Research Institute for Nuclear Problems, BSU, Minsk, Belarus) “Calculation of few-group cross section library for the nodal reactor code DYN3D in the Serpent 2 Monte Carlo code”
7. N. Harbachova, N. Kulich, J. Korcheva (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) “On the model and inputs uncertainties options as applied to radiation safety analysis during a new type of nuclear fuel utilization at the AES-2006”
8. D. Strozik-Kotlorz and A. Kotlorz (OUTech Opole and BLTP JINR) “Truncated moments in analysis of deep-inelastic structure functions of the nucleon”
9. Kurochka K.S., Komrakov V.V., Masalitina N.N. (GSTU, Gomel, Belarus) “The automated classification system for lumbar spine anatomic elements”
10. Kiryl Viarenich; Victor Minenko; Arkady Khrutchinsky; Kristina Makarevich; Semen Kuten (Research Institute for Nuclear Problems, BSU, Minsk, Belarus) “Monte-Carlo model of radiation source of X-ray computed tomography apparatus”

Wednesday, May 17, 09.00-18.40

Plenary Session

Chairman: Rogachevsky O.V.

1. Alexander Shalyt-Margolin (Research Institute for Nuclear Problems, BSU, Minsk, Belarus) [Minimal quantities and measurability in quantum theory and thermodynamics. Some implications](#) (30 min)
2. Yuri N. Obukhov, Alexander J. Silenko, Oleg V. Teryaev (JINR, Dubna, Russia) [General classical and quantum description of electromagnetic interactions of spinning particles in Riemannian spacetimes](#) (25 min)
3. Svetlana Kurilkina, Nguyen Pham Quynh Anh (Institute of Physics, NASB, Minsk, Belarus) [Surface optical waves at the boundary of nonlinear hyperbolic metamaterial](#)(25 min)
4. A.P. Nizovtsev, A.L. Pushkarchuk, S.A. Kuten, V.A. Pushkarchuk, S.Ya. Kilin, A.V. Luzanov, O.A. Zhikol, I. Omelchenko (Center of Quantum Optics and Quantum Information, Institute of Physics of NAS, Minsk, Belarus) [Stable electronic-nuclear spin systems NV-¹³C in diamond for quantum technologies](#)(25 min)
5. Monich V.A., Sokolova K.A., Malinovskaya S.L. (Nizhny Novgorod State Medical Academy, Russia) [Non-linear effects of low-intensity physical agents on enzymatic reactions in biological objects](#)(25 min)

11.10 - 11.30 Coffee-Break

11.30 - 13.30 Plenary Session

Chairman: A. Shalyt-Margolin

1. Yu. Kurochkin, V. Otchik (Institute of Physics of NAS, Minsk, Belarus) [Nonrelativistic particle with spin 1/2 in the Coulomb field in the Lobachevsky space](#) (30 min)
2. M.L. Gutnyuk, V.A. Pletyukhov (Brest State University, Brest, Belarus) [On possibilities to describe neutrinos with different masses in the frames of relativistic wave equations theory](#) (30 min)
3. V.M. Red'kov (Institute of Physics, NAS of Belarus, Minsk, Belarus), V.V. Kisel, V.A. Pletjukhov, V.V. Gilevsky, E.V. Ovsyuk, [Spin 1/2 particle with two mass](#)

[states: general theory, interaction with electromagnetic and gravitational fields](#)
(30 min)

13.30 - 14.30 Lunch

14.30 - 16.30 Session: Particles

Chairman: Babichev L.F.

4. O.P. Solovtsova (Gomel State Technical University, Gomel, Belarus) [Nonperturbative calculations in the framework of variational perturbation theory in QCD](#) (20 min)
5. O.M. Boyarkin, G.G. Boyarkina, V.V. Makhnach (BSU, Minsk, Belarus) [Solar flares, solar neutrinos and \$\nu_e\$ -induced beta-decays](#) (20 min)
6. A.V. Tsytrinov, A.A. Pankov, V.A. Bednyakov, I.A. Serenkova (GSTU, Gomel, Belarus) [Determination of Z'-boson parameters with ATLAS diboson resonance production data at the 13 TeV LHC](#) (20 min)
7. Gennadii Volkov (St-Peterburg Nuclear Physics Institute, National Research Centre "Kurchatov Institute", Gatchina, Russia) [Tre-Neutrino Sull'Estensione Multidimensionale Del Continuum Spazio-Temporale Dell'Universo Visibile](#) (20 min)
8. I.S. Satsunkevich and V.V. Gilewsky (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [New neutrinos roles](#) (20 min)
9. Smurov S.V. (Institute of Engineering Physics, Serpukhov, Russia), Volkov G.G. (St-Peterburg Nuclear Physics Institute, National Research Centre "Kurchatov Institute", Gatchina, Russia), Monich V.A. (Nizhny Novgorod State Medical Academy, Russia) [Spin-electron and Nuclear Qubits in diamond NV-centers](#) (20 min)

16.30 - 17.00 Coffee-Break

17.00 - 18.40 Session: Chaos and Particles

Chairman: Gilewsky V.V.

10. A.P. Kuznetsov, A.V. Savin, D.V. Savin (Saratov State University, Russia) [The search for strange nonchaotic attractor in the systems with weak dissipation](#) (20 min)
11. Kravchenko M.O., Kuzmin A.V. (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Polynomial chaos based uncertainty analysis](#) (20 min)
12. E.Z. Avakyan, S.L. Avakyan (GSTU, Gomel, Belarus) [Modern Status of Scalar Meson](#) (20 min)
13. S.L. Avakyan, E.Z. Avakyan (GSTU, Gomel, Belarus) [Hardronic Decays of Kaons](#) (20 min)
14. V.V. Gilewsky, I.S. Satsunkevich and M.M. Sobolevsky (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Reactor antrineutrino spectra](#) (20 min)

Friday, May 19, 09.00-19.00

9:00 - 11:10 Plenary Session

Chairman: Kuvshinov V.I.

15. Svetlana Sytova (Research Institute for Nuclear Problems, BSU, Minsk, Belarus) [Milestones in development of vacuum electronic devices](#) (25 min)
16. L.N. Zhigunova, G.V. Nichipor, Makovskaya N.A. (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Quantitative model of radiation synthesis tryptophan in water-accokol alanine solution](#) (25 min)
17. B.I. Popov (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Problems of NPP integration into the Energy System of Belarus](#) (25 min)
18. V.V. Gilewsky and I.S. Satsunkevich (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Neutrino detector for Belarus NPP](#) (30 min)

11.10 - 11.30 Coffee-Break

11.30 - 13.50 Plenary Session

Chairman: Galynski M.V.

19. Valery Shaparau (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus), Gluon correlations at the nonperturbative QCD jet stage, (20 min)
20. E.G. Bagashov and V.I. Kuvshinov (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Quarks in the Stochastic Vacuum](#) (20 min)
21. E.A. Degtyareva, S.I. Timoshin (GSTU, Gomel, Belarus) [The semi-inclusive DIS the polarized leptons on the polarized nucleons](#) (20 min)
22. L.F. Babichev, Y.A. Rusak (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Event-by-event multiplicity fluctuations in Monte Carlo simulations of heavy ion collisions](#) (20 min)
23. Andrei Manko (Institute of Physics, Minsk, Belarus) and R.G. Shulyakovsky [The pomeron mechanism production particle at hadron colliders](#) (20 min)
24. Galynskii M.V. (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Possible Method for Measuring the Proton Sachs Form Factors in Processes with and without Proton Spin Flip](#) (20 min)
25. M.N. Sergeenko (GSMU, Gomel, Belarus) Complex Masses of Mesons and Resonances In Relativistic Quark Model, (20 min)

13.50 - 14.20 Lunch

14.20 - 16.00 Session: Media Modeling

Chairman: Gilewsky V.V.

26. A.L. Korban, S.V. Charapitsa, S.N. Sytova (Belarusian State University, Minsk, Belarus) [A numerical method for calculating the quantitative composition of complex water-ethanol mixtures](#) (20 min)
27. S.V. Anishchenko and V.G. Baryshevsky (Research Institute for Nuclear Problems, BSU, Minsk, Belarus) [Statistical Fluctuations of Cooperative Quasi-Cherenkov Radiation](#) (20 min)

28. E.A. Gurnevich and V.G. Baryshevsky (Research Institute for Nuclear Problems, BSU, Minsk, Belarus) [Parametric radiation of relativistic charged particles in two-dimensional photonic crystals at frequencies above the upper edge of the first passband](#) (20 min)
29. L.A. Yanovich, A. P. Khudyakov (Brest State University, Brest, Belarus) [Approximate formulas for the calculation of functionals of Gaussian random processes and numerical examples](#) (20 min)

16.00 - 16.20 Coffee-Break

16.20 - 18.20 Session: Nuclear Physics and NPP Modeling

Chairman: Trifonov A.G.

30. Ph.A. Speransky (Department for Nuclear and Radiation Safety of the Ministry of Emergencies of the Republic of Belarus, Minsk, Belarus), A.A. Хрущинский, С.А. Кутень (Research Institute for Nuclear Problems, BSU, Minsk, Belarus) [Modeling and optimization of a wide aperture high-resolution neutron Fourier diffractometer as a system of independent detectors](#) (20 min)
31. E.A. Dikumar, A.L.Pushkarchuk, T.V.Bezyazychnaya, V.I. Potkin, E.G. Kosandrovich, A.G. Soldatov, S.A. Kuten, S.G. Stepin, L.F. Babichev, A.P. Nizovtsev, S.Ya. Kilin (Research Institute for Nuclear Problems, BSU, Minsk, Belarus) [Quantum-Chemical Modeling of Methotrexate Fullerenol Radionuclide Agents of Cancer Therapy](#) (20 min)
32. Andrei Petrovsky, T.N. Korbut, E.A. Rudak (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Аналитические методы расчета удельных активностей в активной зоне реактора ВВЭР-1200](#) (20 min)
33. I.V.Rudziankou, L.F.Babicheu (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Upper boundary lattice cell assessment in terms of weight windows](#) (20 min)
34. V.I. Orlovskaya, A.G. Trifonov (Joint Institute for Power and Nuclear Research – Sosny, NASB, Minsk, Belarus) [Social-economic consequences assessment algorithm for accidents on NPP with WWER](#) (20 min)
35. (20 min)

18.20 - 19.00 Final Discussion: Problems, Perspectives, Philosophy

Chairman: Kuvshinov V.I.

19.00 Closing