

# Mathematical Modeling and Computational Physics

MMCP 2015

Stará Lesná, High Tatra Mountains, Slovakia

July 13–17, 2015

## Programme

Monday, July 13

8:00–8:50 Breakfast

8:20–9:10 Registration

9:10–9:20 Opening Session

### Plenary Lectures

9:20–10:00 Lazarov R.: *Numerical Upscaling and Preconditioning of Flows in Highly Heterogeneous Porous Media*

10:00–10:40 Hansmann U. H. E.: *Multi-Scale Modeling of Protein Systems with Complex Landscapes*

10:40–11:10 Coffee Break

11:10–11:50 Lakhno V. D.: *Energy and Charge Transfer by Nonlinear Excitations in DNA*

11:50–12:30 Ustinin M.: *Functional Tomography of the Human Nervous System Based on Multichannel Magnetic Measurements*

12:30–13:30 Lunch

### Parallel Session A

14:00–14:20 Nazipova N.: *Modeling Living Cell Base Processes Using Mathematical Cell Models Collection*

14:20–14:40 Rykunov S.: *Methods for Encephalography Data Analysis in MathBrain Cloud Service*

14:40–15:00 Nemnes G. A.: *Ab Initio Investigations of Spin Transport and Thermoelectric Effects in Graphene – Boron Nitride Nanoribbons*

15:00–15:20 Smotlacha J.: *Green Function Approach of the Spin-Orbital Interaction in the Graphitic Nanocone*

15:20–15:40 Coffee Break

15:40–16:00 Zlokazov V. B.: *Mathematical Method for the Analysis of Polycrystal Phase Evolution*

16:00–16:20 Zhabitskaya E.: *The Asynchronous Differential Evolution Method with MPI as a Tool to Analyze the Experimental Data on Synchrotron Scattering from Vesicular Solutions*

16:20–16:40 Zhabitsky M.: *Minimization of Ridge Functions by the Asynchronous Differential Evolution Algorithm*

16:40–17:00 Borovský M.: *GPU-Accelerated Population Annealing Algorithm: Frustrated Ising Antiferromagnet on the Stacked Triangular Lattice*

17:00–17:20 Ma W.-J.: *Properties of Correlation Matrix of Direction of Motion and Stability of a Non equilibrium System of Polymer Chains*

### Parallel Session B

14:00–14:20 Kirienko Yu. V.: *High-Dimensional Limit  $d \rightarrow \infty$  in the Theory of Developed Turbulence as Analogue of Critical Dimension  $d_c = 4$  in the Wilson's Theory of Phase Transitions*

14:20–14:40 Gulitskiy N. M.: *Anisotropic Advection of a Passive Vector Field by the Turbulent Velocity Flow with Finite Correlation Time*

14:40–15:00 Kakin P. I.: *Effects of Random Environment of Self-Organized Critical System: Renormalization Group Analysis of a Continuous Model*

15:00–15:20 Mižišin L.: *Calculation of Master Parameters Governing Critical Properties of the Percolation Process by the Renormalization Group Approach*

**15:20–15:40 Coffee Break**

**15:40–16:00** Dančo M.: *Multi-Loop Calculations of Anomalous Exponents in the Models of Critical Dynamics*

**16:00–16:20** Korolkova A.: *Operator Approach to the One-Step Process Master Equation*

**16:20–16:40** Remecký R.: *Turbulent Prandtl Number in a Model of Passive Vector Advection*

**16:40–17:00** Lisý V.: *An Efficient Method to Study Nondiffusive Motion of Brownian Particles*

**17:00–17:20** Tóthová J.: *Statistical Properties of Thermal Noise Driving the Brownian Particles in Fluids*

**18:00–23:59 Gala Dinner**

**Tuesday, July 14**

**8:00–8:50 Breakfast**

**Plenary Lectures**

**8:50–9:30** Barreiro Megino F. H.: *PanDA: Exascale Federation of Resources for the ATLAS Experiment at the LHC*

**9:30–10:10** Mashinistov R.: *Accelerating Science Impact through Big Data Workflow Management and Leadership Computing*

**10:10–10:40 Coffee Break**

**10:40–11:20** Rogachevsky O.V.: *Simulation and Analysis Framework for the NICA Experiments*

**11:20–12:00** Bogdanov A.V.: *New Approach to the Simulation of Complex Systems*

**12:00–12:30** Hu Ch.-K.: *Exact Partition Functions of Interacting Self-Avoiding Walks on Lattices*

**12:35–13:35 Lunch**

**Parallel Session A**

**14:00–14:20** Degtyarev A.: *Coordinate Systems, Numerical Objects and Algorithmic Operations of Computational Experiment in Fluid Mechanics*

**14:20–14:40** Khramushin V.N.: *Tensor Arithmetic, Geometry and Mathematical Principles of Fluid Mechanics in the Implementation of Direct Computational Experiments*

**14:40–15:00** Bogdanov A.V.: *Numerical Simulation of Perturbed KdVB Equation*

**15:00–15:20** Burikova I.: *Mathematical Model of Psychology-Political Classification of Political Parties*

**15:20–15:40 Coffee Break**

**15:40–16:10** Ososkov G.: *New Algorithms of Seed Finding for Track Reconstruction*

**16:10–16:30** Zuev M.I.: *Research of Acceleration of Calculation on Coprocessors in Solving Scientific Problems on the Heterogeneous Cluster HybriLIT*

**16:30–16:50** Hnatič S.: *Methods of Professional Software Engineering in the Development of Industrial Grade High-Tech Products*

**16:50–17:10** Iakushkin O.: *Case study: Combining the Functionalities of Message Passing and Scaling Control*

**17:10–17:30** Gostev I.V.: *About Identification Methods of the Objects Shape Invariant to Projective Transformations*

## Parallel Session B

**14:00–14:20** Tsyganov Yu. S.: *Reaction  $natYb+48Ca\rightarrow 217Th+3n$ : Auto Calibration Process for DSSSD Detector Application (Particular Case)*

**14:20–14:40** Voytishin N. N.: *The New Segment Building Algorithm for the Cathode Strip Chambers in the CMS Experiment*

**14:40–15:00** Fedorišin J.: *Drift Chambers Simulations in BMN Experiment*

**15:00–15:20** Nikonov E. G.: *Computer Simulation of Xenon Nanocluster Generation*

**15:20–15:40 Coffee Break**

**15:40–16:00** Puzyrkov D.: *Super-Computer Simulation and the Visualization of Thermodynamic Equilibrium in the Gas-Metal Microsystems*

**16:00–16:20** Nechaevskiy A.: *The JINR Tier1 Site Simulation for Research and Development Purposes*

**16:20–16:40** Gertsenberger K. V.: *Event Display for the Fixed Target Experiment BMN*

**16:40–17:00** Tsogtsaikhan Ts.: *Prediction of Liquid Sodium Flow Rate Through the Core of the IBR-2M Reactor Using Autoregressive Neural Networks*

**17:00–17:20** Anghel D.-V.: *Gibbs vs Boltzmann Statistics and the Controversy about Negative Temperatures*

**18:00–19:00 Dinner**

## Wednesday, July 15

**8:00–9:00 Breakfast**

### Plenary Lectures

**9:10–9:50** Friese V.: *Dealing with Complexity at High Rates: the Online Data Processing Concept of the CBM Experiment*

**9:50–10:30** Kisel I.: *New Approaches for Data Reconstruction and Analysis in the CBM Experiment*

**10:40 Group Photo**

**11:00–12:00 Lunch**

**12:30–17:30 Trip**

**18:00–20:00 Dinner**

Thursday, July 16

8:00–8:50 Breakfast

**Plenary Lectures**

9:00–9:40 Melezhik V. S.: *Mathematical Modeling of Ultracold Few-Body Processes in Atomic Traps*

9:40–10:20 Fritzsche S.: *A Computer-Algebraic Approach to Quantum Information: Classification and Characterization of Multi-Qubit Systems*

10:20–10:50 Coffee Break

10:50–11:30 Shapeev V. P.: *Method of Collocation with Least Residuals and Its Applications*

11:30–12:10 Safouhi H.: *The Double Exponential Sinc Collocation Method for Solving Quantum Mechanical Problems*

12:30–13:30 Lunch

**Parallel Session A**

14:00–14:20 Shukrinov Yu. M.: *Modeling of Intrinsic Josephson Junctions in High Temperature Superconductors*

14:20–14:40 Rahmonov I. R.: *Numerical Study of System of Long Josephson Junctions*

14:40–15:00 Kolkovska N.: *Numerical Evaluation of 2D Ground States*

15:00–15:20 Sedova O.: *A New Model for Mechanochemical Corrosion of Thin Spherical Shells*

15:20–15:40 Coffee Break

15:40–16:00 Dimova S.: *WENO Schemes for Singular in Space and Time Solutions of Nonlinear Degenerate Reaction-Diffusion Problems*

16:00–16:20 Adam S.: *Summation Paths in Clenshaw-Curtis Quadrature*

16:20–16:40 Adam Gh.: *Length Scales in Bayesian Automatic Adaptive Quadrature*

16:40–17:00 Calborean A.: *Electrical and Quantum Chemical Investigation of Hybrid Molecular/Si Systems with Redox-Active Ferrocene Acting as Storage Media*

17:00–17:20 Gusev A. A.: *Symbolic-Numeric Solution of the Boundary-Value Problems Using the Finite Element Method with Hermite Interpolation Polynomials*

**Parallel Session B**

14:00–14:20 Ayryan E. A.: *Synthesis of the Thickness Profile of the Waveguide Layer of the Thin Film Generalized Waveguide Luneburg Lens*

14:20–14:40 Kulyabov D. S.: *Spinor-Like Hamiltonian for Maxwellian Optics*

14:40–15:00 Sevastianov A.: *Scalar Product in the Space of Waveguide Modes of an Open Planar Waveguide*

15:00–15:20 Sevastianov L.: *Modeling of an Open Transition of the “Horn” Type between Open Planar Waveguides*

15:20–15:40 Coffee Break

15:40–16:00 Altaisky M. V.: *Decoherence and Entanglement Simulation in a Model of Quantum Neural Network Based on Quantum Dots*

16:00–16:20 Kaputkina N., E.: *Spontaneous Coherence Effects in the Quantum Dot and the Quantum Well Systems in Microcavity*

16:20–16:40 Yarevsky E.: *Scattering Problem and Resonances for Three-Body Coulomb Quantum Systems: Parallel Calculations*

16:40–17:00 Reity O. K.: *Quasiclassical Approximation in the Non-Relativistic and Relativistic Problems of Tunnel Ionization of H-Like Atom by the Uniform Electric Field*

17:00–17:20 Khmara V. M.: *Quasiclassical Study of the Quantum Mechanical Two-Coulomb-Centre Problem*

18:00–23:59 Banquet

**Friday, July 17**

**8:00–8:50 Breakfast**

**Plenary Lectures**

**8:50–9:30** Gerdt V. P.: *Lagrangian Constraints and Differential Thomas Decomposition*

**9:30–10:10** Korniyak V. V.: *A Combinatorial Approach to Modeling Quantum Systems*

**10:10–10:40 Coffee Break**

**Parallel Session A**

**10:40–11:00** Grigorian H.: *Algorithm for Simulations of Magnetized Neutron Star Cooling*

**11:00–11:20** Ayriyan A.: *Solution of Optimal Control Problem for Optimization of Temperature Distribution on Special Plate*

**11:20–11:40** Ismagilov T.Z.: *Second Order Finite Volume Scheme on Tetrahedral Meshes for Three-Dimensional Maxwell's Equations with Discontinuous Electromagnetic Properties*

**11:40–12:00** Bondarenko S.: *Few-Nucleon Systems in the Bethe-Salpeter Approach*

**Parallel Session B**

**10:40–11:00** Ospina Trujillo C.F.: *Finite Difference Method Applied to Modeling and Simulation of Band Structure in Simple Cubic Lattice*

**11:00–11:20** Rodríguez-Restrepo L.V.: *Importance of System Thinking in Business Leadership: Using Systemic Thinking*

**11:20–11:40** Litavcová E.: *Exact Solution of System of Mass Transfer Which Includes Air, Water, and Vapor*

**11:40–12:00** Buša J.: *Numerical Solution of a Nonlinear Integro-Differential Equation*

**12:00–12:20 Closing Session**

**12:30–13:30 Lunch**