

Words of Welcome

Dear colleagues and fellow scientists,

On behalf of the Local Scientific Committee, it is my pleasure to welcome you to V International Conference "Advances in Applied Mathematics of Classical and Quantum Systems" (**AMCQS-V**) during December 28-30, 2021 in Odessa (Ukraine). The organizer of the conference is the Odessa State Environmental University under one roof.

We have set up an exciting program covering a wide variety of cutting edge research topics ranging from method developments to applications pushing the limits of modern Applied Mathematics of Classical and Quantum Systems.

Even though we are sure that the many excellent lectures will make it difficult to decide which of the sessions to select, we hope you will enjoy **ANLOS-V** 2021 in Odessa.

Sergey Stepanenko	Rector of Odessa State Environmental University, Professor
Olga Khetselius	Professor of Department of Higher and Applied Mathematics
Alexander Glushkov	Head of Department of Higher and Applied Mathematics, Professor

Local Organizing Committee

Stepanenko S.M., Hab.Dr., Prof., Rector of University (*Honorary Chair*)

Khetselius O.Yu., Hab.Dr., Prof., Prof., Prof. of Department of Higher and Applied Mathematics (*Chair*)

Glushkov A.V., Hab.Dr., Prof., Prof., Head. of Department of Higher and Applied Mathematics (*Co-Chair*)

Svinarenko A.A., Hab.Dr., Prof., Prof. of Department of Higher and Applied Mathematics (*Scien. Secretary*)

Ignatenko G.V., PhD Dr., Assoc.-Prof. of Department of Higher and Applied Mathematics

Buyadzhi V.V., PhD Dr., Assoc.-Prof. of Department of Higher and Applied Mathematics

Dubrovskaya Yu.V., PhD Dr., Assoc.-Prof. of Department of Higher and Applied Mathematics

Florko T.A., PhD Dr., Assoc.-Prof. of Department of Higher and Applied Mathematics

Serga I.N., PhD Dr., Assoc.-Prof. of Department of Higher and Applied Mathematics

Локальная рабочая группа:

Хецелиус О.Ю., д.ф.-м.н., проф., проф. кафедри вищої та прикладної математики,

Глушков А.В., д.ф.-м.н., проф., зав. кафедри вищої та прикладної математики,

Свинаренко А.А., д.ф.-м.н., проф., проф. кафедри вищої та прикладної математики,

Игнатенко А.В., к.ф.-м.н., доц. кафедри вищої та прикладної математики,

Буяджи В.В., к.ф.-м.н., доц. кафедри вищої та прикладної математики

Дубровская Ю.В., к.ф.-м.н., доц. кафедри вищої та прикладної математики,

Флорко Т.А., к.ф.-м.н., доц. кафедри вищої та прикладної математики

Серга И.Н., к.ф.-м.н., доц. кафедри вищої та прикладної математики,

**Contact: 65016, Odessa, Odessa State Environmental University,
Department of Higher and Applied Mathematics L'vovskaya str. 15,
bld 1, room 408**

E-mail: odeku.intsci@gmail.com

Phone: +380-48-2326739

TOPICS:

- **Mathematical physics of classical and quantum systems**
- **Computational methods of dynamics of classical and quantum systems**
- **Fractal Geometry and Chaos Theory (Satellite Symposium)**
- **Theory of generalized coherent states and their application**
- **Selected sections of probability theory, stochastic processes and statistics**
- **Quantum statistics of charged particle systems**
- **Quantum Geometry and Dynamics of Resonances (Satellite Symposium)**
- **Computational foundations of theoretical mechanics of classical systems**
- **Selected sections of computational hydrodynamics**
- **Mathematical modeling of natural processes (selected sections)**
- **Systems theory and methods of optimal control theory**
- **Mathematical and physical models of quantum and neural networks (Satellite Symposium)**
- **Mathematical foundations of quantum computing**
- **Mathematical programming (selected sections)**

PROGRAM OF THE CONFERENCE

Conference meetings will be held remotely, in the form of a Zoom conference. The time and details of access to the conference will be sent by e-mail later.

December 27 (Sunday):

- 15:00 – Registration of participants of the conference
Регістрація учасників конференції

December 28 (Tuesday):

- 10:00 – Opening Ceremony. Congratulations of Chairs O. Khetselius , A. Glushkov
Церемонія відкриття конференції Голови оргкомітету конференції
O. Khetselius “*Advances in Quantum Geometry and Mathematical
Theory of Electroweak Interaction*”
- 11.00 – A. Glushkov “*Advances in Relativistic Quantum theory: Mathematical
Basis of Energy Formalism*”
- 11.45 – L. Mammino “*Advances in Computational Chemistry and Mathematics*”
- 12.30 A. Svinarenko, “*New methods and algorithms of a chaos and
dynamical systems theory*”
- 13:00 – Dinner / Dinner / Обід
- 14.00 – A. Ignatenko “*Quantum resonances in spectra of some complex atomic
systems in laser field*”
- 14.45 – J. Karwowski “*New mathematical methods to exactly-solvable
problems in quantum mechanics*”
- 15.30 – N. Bykowszczenko “*Advances in Methods of optimal control theory*””

December 29 (Wednesday):

- 10:00 – I. Ivanova, “*Chaos-geometric approach to the analysis and modeling of
neural network systems*”
- 10:20 – T. Koval “*The Green’s function of relativistic bispinor Dirac equation*”
- 10:40 – O. Dubrovsky “*Chaos – geometric approach in study of quantum-
generator system*”
- 11:00 – A. Vitavetsky, O. Khetselius, “*S-matrix formalism in quantum
mechanics and geometry: New algorithms*”
- 11:20 – A. Glushkov, D. Shelingovsky (Stud.), “*A New Mathematical Approach
to Modeling The Evolution Of Complex Dynamic Systems on basis of
Integrated Equations And Theory Of Complex Substance*”
- 11:40 – O. Khetselius, E. Shevchenko (Stud) “*A complex of new applied
mathematical models for modeling and forecasting the evolution of
atmospheric-hydrodynamic systems*”
- 12:00 – Yu. Dubrovskaya “*New numerical algorithm for computing Fermi-
function in a theory of beta decay*”

- 12:20 - A. Nesterenko, A Svinarenko, “*New numerical approach to computing matrix elements of complex interaction potential for multielectron systems*”
- 12:40 – A. Mykhailov, A. Glushkov, “*Optimized relativistic one-quasiparticle representation in theory of multibody quantum systems*”
- 13:00 – Dinner / Dinner / Обід
- 14:00 – M. Smischenko, O Khetselius, “*Relativistic theory of calculating the characteristics of radiation transitions in the spectra of Ne-shaped ions*”
- 14:20 – E. Efimova, A. Glushkov, “*Relativistic theory of calculation of Auger characteristics and autoionization states in complex atoms*”
- 14:40 – A. Tsudik, A. Glushkov, “*Operator perturbation theory to complex atomic systems in the electric field*”
- 15:00 – I. Bilan, A. Svinarenko, *An Advanced Computational Approach To Solving the Focker-Plank evolutionary equation*”.
- 15:20 – A. Vitavetsky, O. Khetselius, “*S-matrix formalism in quantum mechanics and geometry: New algorithms*”
- 15:40 – T. Florko, A. Glushkov, “*Mathematical models of atomic spectra identification*”
- 16.00 – A. Filenko (Stud.), A. Svinarenko, “*A new mathematical method of construction of Sturm developments for accounting states of continuous spectrum in autonionization spectroscopics*”

December 30 (Thursday):

- 10:00 – A. Glushkov, A. Makarova, “*New numerical algorithms in classical and quantum algebra*”
- 10:45 – O. Khetselius , “*New computational energy approach to heavy finite Fermi-systems: Advanced Approach*”
- 12:30 – A. Ignatenko “*New computational algorithms in linear algebra*”
- 13:00 – Dinner / Dinner / Обід
- 14:00 - E. Brandas “*A Universe in our brain: Carnot’s engine and Maxwell’s demon*”
- 14:45 – J Maruani “*Structural waves in biopolymers and pathways of biological evolutions*”
- 15:30 – Yu. Lopatkin “*Overview of Computational methods in quantum*
- *Geometry and Algebra*
- 16:00 – P.A. Kondratenko, “*New computational algorithms in dynamics of molecular systems*”
- 16:45 – Closing Session (O. Khetselius, A. Svinarenko, A. Glushkov)

MASTER-CLASS (for BrD, MsD, PhD Students and PostDocs)

Applied Mathematics of Classical and Quantum Systems

**Lecturers: Prof. O.Y. Khetselius Prof. A. Glushkov; Prof. A. Svinarenko;
Assoc.-Prof. A. Ignatenko; Assoc.-Prof. Yu. Dubrovskaya,
Assoc.-Prof. Florko T.A.**

December , 27 2021 TOPICS (Chapters):

- Mathematical physics of classical and quantum systems
- Computational methods of dynamics of classical and quantum systems
- Fractal Geometry and Chaos Theory
- Theory of generalized coherent states and their application
- Selected sections of probability theory, stochastic processes and statistics
- Quantum statistics of charged particle systems
- Quantum Geometry and Dynamics of Resonances
- Computational foundations of theoretical mechanics of classical systems
- Selected sections of computational hydrodynamics
- Mathematical modeling of natural processes (selected sections)
- Systems theory and methods of optimal control theory
- Mathematical and physical models of quantum and neural networks
- Mathematical foundations of quantum computing
- Mathematical programming