

**Georgian Mathematical Union**  
**Batumi Shota Rustaveli State University**  
**Ministry of Education, Culture and Sport of Adjara Autonomous**  
**Republic**  
**Shota Rustaveli National Science Foundation of Georgia**  
**International Mathematical Union – Commission for Developing**  
**Countries**

**XIII INTERNATIONAL CONFERENCE**  
**OF THE GEORGIAN MATHEMATICAL UNION**

**PROGRAM**

**Batumi, September 4 - 9**

**2023**

## **Organizing Committee**

Chair - Meskhi Alexander, Deputy Chairs – Jangveladze Temur and Turmanidze Lela, Conference Secretary - Davitashvili Tinatin, Members - Baladze Vladimer, Beriashvili Mariam, Beridze Anzor, Bokelavadze Tengiz, Gagoshidze Mikheil, Natelashvili Lazare, Gogishvili Guram, Imerlishvili Giorgi, Kereselidze Nugzar, Makharadze Dali, Rukhaia Mikheil, Vashakidze Zurab.

## **Scientific Committee**

Co-Chairs - Natroshvili David, Beridze Anzor, Members - Amaglobeli Mikheil, Bakuradze Malkhaz, Baladze Vladimer, Chilachava Temur, Chkadua Otar, Davitashvili Teimuraz, Duduchava Roland, Dundua Besik, Ephremidze Lasha, Getsadze Rostom, Gogishvili Guram, Grafakos Loukas, Jaiani George, Jangveladze Temur, Kadeishvili Tornike, Kapanadze David, Khachidze Manana, Kharazishvili Alexander, Khimshiashvili George, Khmaladze Emzar, Kiguradze Tariel, Kirtadze Aleks, Kvaratskhelia Vakhtang, Kvatadze Ramaz, Kvinikhidze Alexander, Massimo Lanza de Cristoforis, Meladze Hamlet, Mikhailov Sergey, Mitrea Marius, Nadaraia Elizbar, Omanadze Roland, Oniani Giorgi, Pirashvili Teimuraz, Pkhakadze Konstantine, Purtukhia Omar, Rukhaia Mikheil, Shargorodsky Eugene, Shavlakadze Nugzar, Spitkovsky Ilia, Tarieladze Vaja, Tephnadze George, Tetunashvili Shakro, Vepkhvadze Teimuraz.

## Conference Thematic Sessions and Organizers

- **Algebra and Number Theory** (Khmaladze Emzar, Pirashvili Teimuraz)
- **Applied Mathematics, Informatics and Computing in Environmental Sciences** (Davitashvili Teimuraz, Khachidze Manana, Kvatadze Ramaz)
- **Differential Equations and Applications** (Chkadua Otar, Duduchava Roland, Shavlakadze Nugzar)
- **Geometry and Topology** (Bakuradze Malkhaz, Baladze Vladimer, Khimshiashvili Giorgi)
- **Logic, Language, Artificial Intelligence** (Dundua Besik, Pkhakadze Konstantine, Rukhaia Mikheil)
- **Mathematical Education and History** (Gogishvili Guram, Vepkhvadze Teimuraz)
- **Mathematical Logic and Discrete Mathematics** (Kharazishvili Alexander, Kirtadze Aleks, Omanadze Roland)
- **Mathematical Modeling and Numerical Analysis** (Chilachava Temur, Jangveladze Temur, Meladze Hamlet)
- **Mathematical Physics** (Kvinikhidze Alexander)
- **Probability Theory and Statistics, Financial Mathematics** (Kvaratskhelia Vakhtang, Purtukhia Omar, Tarieladze Vaja)
- **Real and Complex Analysis** (Ephremidze Lasha, Oniani Giorgi, Tephnadze George)

**Editors:** Gogishvili Guram, Davitashvili Tinatin

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## Rooms

Section	Room number	Mo	Tu	We	Th	Fr	Sa
Plenary Session	Plenary Room						
					Onl		
Algebra and Number Theory	1						
Applied Mathematics, Informatics and Computing in ...	2						
Differential Equations and Applications	3						
Geometry and Topology	4						
Logic, Language, Artif. Intelligence	5						
Mathematical Education and History	6						
Mathematical Logic and Discrete Mathem.	7						
Mathematical Modeling and Numerical Anal.	8						
Mathematical Physics	5						
Probability Theory and Statistics, Financial Mathem.	9						
Real and Complex Analysis	Plenary Room						

## Schedule of the Conference

**September 3, Sunday (Arrival Day to Batumi)**

**September 4, Monday**

9<sup>00</sup> : 9<sup>30</sup>            **Registration**

9<sup>30</sup> : 10<sup>00</sup>           **Opening of the Conference**

**Plenary Room    Chairman: Natroshvili David**

10<sup>00</sup> : 10<sup>50</sup>           **Gwinner Joachim**, Frictional unilateral contact problems in continuum mechanics – analytical and numerical treatment

10<sup>50</sup> : 11<sup>20</sup>           **Coffee break**

11<sup>20</sup> : 12<sup>10</sup>           **Kühn Thomas**, High-dimensional approximation in periodic function spaces

12<sup>10</sup> : 13<sup>00</sup>           **Massimo Lanza de Cristoforis**, Nonlinear composition operators in Grand Lebesgue spaces

13<sup>00</sup> : 15<sup>00</sup>           **Lunch**

15<sup>00</sup> : 16<sup>15</sup>           Parallel Sessions (3 talks)

16<sup>15</sup> : 16<sup>45</sup>           **Coffee break**

16<sup>45</sup> : 18<sup>00</sup>           Parallel Sessions (3 talks)

**September 5, Tuesday**

**Plenary Room    Chairman: Beridze Anzor**

10<sup>00</sup> : 10<sup>50</sup>           **Neumann Frank**, Weil Conjectures, Moduli of Bundles and Homotopy Types

10<sup>50</sup> : 11<sup>20</sup>           **Coffee break**

11<sup>20</sup> : 12<sup>10</sup>           **Janelidze Zurab**, The mystery of binary matrix properties of categories

12<sup>10</sup> : 13<sup>00</sup>           **Patchkoria Irakli**, Morava K-theory of infinite groups and Euler characteristic

13<sup>00</sup> : 15<sup>00</sup>      **Lunch**  
15<sup>00</sup> : 16<sup>15</sup>      Parallel Sessions (3 talks)  
16<sup>15</sup> : 16<sup>45</sup>      **Coffee break**  
16<sup>45</sup> : 18<sup>00</sup>      Parallel Sessions (3 talks)

### September 6, Wednesday

**Plenary Room**    **Chairman: Meskhi Alexander**  
10<sup>00</sup> : 10<sup>50</sup>      **Ragusa Maria Alessandra**, Investigation of local and nonlocal problems  
10<sup>50</sup> : 11<sup>20</sup>      **Coffee break**  
11<sup>20</sup> : 12<sup>10</sup>      **Jain Pankaj**, Duality and extrapolation in function spaces of Lebesgue type  
12<sup>10</sup> : 13<sup>00</sup>      **Rafeiro Humberto**, Grand Lebesgue spaces: old and new

**Plenary Room**    **The Invited Lecture**  
13<sup>00</sup> : 13<sup>30</sup>      **Shanidze Revaz**, Hadron center of Kutaisi International University

**The evening**      **Banquet**

### September 7, Thursday

**Plenary Room**    **Chairman: Dundua Besik**  
10<sup>00</sup> : 10<sup>50</sup>      **Garanina Natalia, Gorlatch Sergei**, Knowledge acquisition in multi-agent systems: A formalisation of the Eleusis Card Game  
10<sup>50</sup> : 11<sup>20</sup>      **Coffee break**  
11<sup>20</sup> : 12<sup>10</sup>      **Leucker Martin**, Verification of neural networks?  
12<sup>10</sup> : 13<sup>00</sup>      **Estrada Felipe J. Llanes**, The torsion of stellar streams due to a nonspherical dark matter halo

13<sup>00</sup> : 15<sup>00</sup>      **Lunch**  
15<sup>00</sup> : 16<sup>15</sup>      Parallel Sessions (3 talks)  
16<sup>15</sup> : 16<sup>45</sup>      **Coffee break**  
16<sup>45</sup> : 18<sup>00</sup>      Parallel Sessions (3 talks)

**Online**              **Chairman: Oniani Giorgi**

19<sup>20</sup> : 20<sup>10</sup>      **Kovtunen Victor**, Poroelastic problem of a non-penetrating crack with cohesive contact for fluid-driven fracture  
20<sup>10</sup> : 21<sup>00</sup>      **Stokolos Alexander**, Differentiation of integrals and multiple Fourier series

### **September 8, Friday**

**Plenary Room**      **Chairman: Jangveladze Temur**

10<sup>00</sup> : 10<sup>50</sup>      **Ölveczky Peter Csaba**, Rewriting logic and some of its applications to distributed and real-time systems  
10<sup>50</sup> : 11<sup>20</sup>      **Coffee break**  
11<sup>20</sup> : 12<sup>10</sup>      **Yafaev Andrei**, o-minimality and arithmetic geometry  
12<sup>10</sup> : 13<sup>00</sup>      **Buchheit Andreas**, Exact continuum representation of long-range interacting systems and emerging exotic phases in unconventional superconductors  
13<sup>00</sup> : 13<sup>10</sup>      **Closing Ceremony of the Conference**  
13<sup>10</sup> : 15<sup>00</sup>      **Lunch**  
15<sup>00</sup> : 16<sup>15</sup>      Parallel Sessions (3 talks)  
16<sup>15</sup> : 16<sup>45</sup>      **Coffee break**  
16<sup>45</sup> : 18<sup>00</sup>      Parallel Sessions (3 talks)

### **September 9, Saturday**

10<sup>00</sup> : 11<sup>15</sup>      Parallel Sessions (3 talks)  
11<sup>15</sup> : 11<sup>45</sup>      **Coffee break**  
11<sup>45</sup> : 13<sup>00</sup>      Parallel Sessions (3 talks)

## Thematic sessions

### Section: Algebra and Number Theory

#### September 4, Monday

##### Room 1

**Chairman: Pirashvili Teimuraz**

15<sup>00</sup> : 15<sup>25</sup>

**Martsinkovsky Alex**, Additive functors and control theory

15<sup>25</sup> : 15<sup>50</sup>

**Lomadze Vakhtang**, On the topology of linear differential systems

15<sup>50</sup> : 16<sup>15</sup>

**Neuhauser Markus**, Bounds on the zeros of recursively defined polynomials

16<sup>15</sup> : 16<sup>45</sup>

**Coffee break**

16<sup>45</sup> : 17<sup>10</sup>

**Bunina Elena**, Algebraic and logical properties of Chevalley groups

17<sup>10</sup> : 17<sup>35</sup>

**Nebiyev Celil, Ökten Hasan Hüseyn**, A Generalization of oplus-cofinitely supplemented modules

17<sup>35</sup> : 18<sup>00</sup>

**Tsinaridze Ruslan**, A non-abelian group of congruent numbers

#### September 5, Tuesday

##### Room 1

**Chairman: Khmaladze Emzar**

15<sup>00</sup> : 15<sup>25</sup>

**Amaglobeli Mikheil, Miasnikov Alexei**, Varieties of exponential R-groups

15<sup>25</sup> : 15<sup>50</sup>

**Sabinina Liudmila**, On the theory of binary Lie algebras

15<sup>50</sup> : 16<sup>15</sup>

**Gvozdevsky Pavel**, On countable isotypic structures

- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Bokelavadze Tengiz**, Lattice isomorphisms of 2-nilpotent W-power Hall groups and Lie algebras
- 17<sup>10</sup> : 17<sup>35</sup> **Kemoklidze Tariel**, To the problem of full transitivity of a group
- 17<sup>35</sup> : 18<sup>00</sup> **Khashan Hani**, A new generalization of (m,n)-closed ideals

**September 7, Thursday**

**Room 1**      **Chairman: Lomadze Vakhtang**

- 15<sup>00</sup> : 15<sup>25</sup> **Mesabliashvili Bachuki**, Hilbert's theorem 90 in monoidal categories
- 15<sup>25</sup> : 15<sup>50</sup> **Patchkoria Alex, Martins-Ferreira Nelson, Montoli Andrea, Sobral Manuela**, On the classification of Schreier extensions of monoids with non-abelian kernel
- 15<sup>50</sup> : 16<sup>15</sup> **Khmaladze Emzar**, Cohomology and crossed extensions of algebras with bracket
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Armandnejad Ali**, The structure of upside-down linear preservers of majorization
- 17<sup>10</sup> : 17<sup>35</sup> **Ahmed Mamoon**, The C\*-dynamical system of amenable quasi-lattice ordered groups and positive element

## September 8, Friday

**Room 1**      **Chairman: Mesablihvili Bachuki**

15<sup>00</sup> : 15<sup>25</sup>      **Dzhumadil'daev Askar**, Weak Leibniz algebras

15<sup>25</sup> : 15<sup>50</sup>      **Shlossberg Menachem**, The Addition theorem for two-step nilpotent torsion groups

15<sup>50</sup> : 16<sup>15</sup>      **Goy Taras**, On new Fibonacci identities involving multinomial coefficients

16<sup>15</sup> : 16<sup>45</sup>      **Coffee break**

16<sup>45</sup> : 17<sup>10</sup>      **Samsonadze Eteri**, The sufficient conditions for insolvability of some Diophantine equations of higher degrees

17<sup>10</sup> : 17<sup>35</sup>      **Rojas Rina Roxana Paucar, Schoemann Claudia**, On the kernel of the Gysin homomorphism on Chow groups

17<sup>35</sup> : 18<sup>00</sup>      **Aliyev Yagub**, Powers of 2 in ternary numeral system

## Section: Applied Mathematics, Informatics and Computing in Environmental Sciences

### September 5, Tuesday

**Room 2**      **Chairman: Davitashvili Teimuraz**

15<sup>00</sup> : 15<sup>25</sup>      **Kvatadze Ramaz**, e-Infrastructure and services for research and education in Eastern Partnership countries EaPConnect

15<sup>25</sup> : 15<sup>50</sup>      **Rupp Florian**, Taking over Maritime Ecosystems: modelling Fish-Jellyfish deterministic & randomized dynamics

- 15<sup>50</sup> : 16<sup>15</sup> **Kereev Victor, Shalabaeva Bakyt, Jaichibekov Nurbolat**, Mathematical and numerical model of electric field strength near a drop.
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Petrauskas Edmundas, Rupšys Petras**, Understanding relationships for multivariate data using copulas and stochastic differential equations
- 17<sup>10</sup> : 17<sup>35</sup> **Davitashvili Teimuraz, Samkharadze Inga, Rukhaia Giorgi**, Exploring the development of hydrogen energy in Georgia in the face of climate change.

## September 7, Thursday

- Room 2**      **Chairman: Tsintsadze Magda**
- 15<sup>00</sup> : 15<sup>25</sup> **Tsintsadze Magda, Archuadze Maia**, REST and event-driven approaches in microservices architecture
- 15<sup>25</sup> : 15<sup>50</sup> **Chikashua Ana, Archuadze Maia, Tsintsadze Magda**. Yolov8 Platform-Based OCR tool for Georgian handwritten text recognition
- 15<sup>50</sup> : 16<sup>15</sup> **Lemonjava Givi**, Three-statement financial models.
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Odishelidze Nana**, Construction of equistable holes in the case of an axisymmetric problem
- 17<sup>10</sup> : 17<sup>35</sup> **Khachidze Manana, Shvelidze Ana**, The Task of summarization in Georgian language documents

## September 8, Friday

Room 2

Chairman: Kvatadze Ramaz

15<sup>00</sup> : 15<sup>25</sup>

**Lemonjava Givi, Pkhovelishvili Merab, Archvadze Natela**, Using parallel data in forecasting the currency exchange rate

15<sup>25</sup> : 15<sup>50</sup>

**Shalamberidze Merab, Sokhadze Zaza**, Designing of orthopedic insoles for children with cerebral palsy

15<sup>50</sup> : 16<sup>15</sup>

**Asabashvili Elisabed, Demetradze David**, Challenges of media digitization in Georgia

16<sup>15</sup> : 16<sup>45</sup>

**Coffee break**

16<sup>45</sup> : 17<sup>10</sup>

**Georgi Mikuchadze, Elizbarashvili Mariam**, Various schemes of cumulus convection in RegCM for the mountainous Caucasus region

17<sup>10</sup> : 17<sup>35</sup>

**Akhobadze Merab, Kurtskhalia Elguja**, Applying percolation and Q-analysis methods to design sustainable urban systems

## Section: Differential Equations and Applications

Dedicated to the 120th Anniversary of Academician Viktor Kupradze

## September 4, Monday

Room 3

Chairman: Duduchava Roland

15<sup>00</sup> : 15<sup>25</sup>

**Mikhailov Sergey**, About Maximum Principles for weak solutions of some parabolic systems

15<sup>25</sup> : 15<sup>50</sup>

**Natroshvili David**, An alternative potential method for mixed steady state elastic oscillation problems

15<sup>50</sup> : 16<sup>15</sup>

**Gol'dshtein Vladimir**, Remarks about isospectrality

- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Filipkovska Maria**, Qualitative analysis of nonregular differential-algebraic equations and applications in the gas dynamics
- 17<sup>10</sup> : 17<sup>35</sup> **Adams Daniel**, Boundedness Results for Solutions of Certain Second Order Non-Autonomous Ordinary Differential Equations

**September 5, Tuesday**

- Room 3**      **Chairman: Natroshvili David**
- 15<sup>00</sup> : 15<sup>25</sup> **Shavlakadze Nugzar, Pachulia Bachuki, Jamaspishvili Tsiala**, The boundary-contact problem of the dynamical viscoelasticity
- 15<sup>25</sup> : 15<sup>50</sup> **Jokhadze Otar, Kharibegashvili Sergo**, On a periodic problem in an infinite strip for second-order hyperbolic equations
- 15<sup>50</sup> : 16<sup>15</sup> **Verma Shikha, Jha Navnit**, Multiquadric RBFs combined with compact discretization for non-linear elliptic PDEs
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Kabdrakhova Symbat, Kadirbayeva Zhazira**, Solution of a family of boundary value problems for nonlinear loaded hyperbolic equations
- 17<sup>10</sup> : 17<sup>35</sup> **Kheiri Hossein, Haghighatdoost Gorbanali**, A new mathematical model for HIV infectious

## September 7, Thursday

- Room 3**      **Chairman: Gol'dshtein Vladimir**
- 15<sup>00</sup> : 15<sup>25</sup>    **Duduchava Roland**, Generic Bessel potential spaces on Lie groups and their applications
- 15<sup>25</sup> : 15<sup>50</sup>    **Lyandres Vladimir**, Stochastic differential equations. Synthesis and applications
- 15<sup>50</sup> : 16<sup>15</sup>    **Gachechiladze Avtandil, Gachechiladze Roland**, Boundary-contact problems with regard to friction of couple-stress viscoelasticity for inhomogeneous anisotropic bodies (quasi-static cases)
- 16<sup>15</sup> : 16<sup>45</sup>    **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup>    **Duduchava Roland, Tsaava Medea, Tutberidze Margarita**, Dirichlet and Neumann boundary value problems for the Helmholtz equation in a double angle
- 17<sup>10</sup> : 17<sup>35</sup>    **Kritika, Jha Navnit**, A hybrid fuzzy component technique with exponential basis for convection-diffusion equation

## September 8, Friday

- Room 3**      **Chairman: Shavlakadze Nugzar**
- 15<sup>00</sup> : 15<sup>25</sup>    **David Kapanadze, Zurab Vashakidze**, Propagation of Waves in a Triangular Grid with Discrete Sources Positioned Along Line Segments
- 15<sup>25</sup> : 15<sup>50</sup>    **Boumasmoud Soufiane, Ezzinbi Khalil**, Optimal control of bilinear equations with delay
- 15<sup>50</sup> : 16<sup>15</sup>    **Bekbauova Altyntshash, Kurmangaliyev Yergali**, Periodic on part of variables solution of a system of equations in the broad sense
- 16<sup>15</sup> : 16<sup>45</sup>    **Coffee break**

**September 9, Saturday (Online Session)**

**Room 3      Chairman: Chkadua Otar**

12<sup>00</sup> : 12<sup>25</sup>      **David Kapanadze, Pesetskaya Ekaterina**, Wave diffraction by a crack in triangular and hexagonal lattices

12<sup>25</sup> : 12<sup>50</sup>      **Ayele Tsegaye, Demissie Bizuneh, Mikhailov Sergey**, Boundary-domain integral equations for Dirichlet BVP for variable-coefficient Helmholtz equation in 2D.

12<sup>50</sup> : 13<sup>15</sup>      **Ayele Tsegaye, Demissie Bizuneh, Mikhailov Sergey**, Boundary-domain integral equations to the mixed BVP for variable-coefficient Helmholtz Equation in 2D

13<sup>15</sup> : 13<sup>30</sup>      **Break**

13<sup>30</sup> : 13<sup>55</sup>      **Beghersa Nor-El-Houda, Benabdallah Mehdi**, A note on controlled degenerate systems in Hilbert spaces

13<sup>55</sup> : 14<sup>20</sup>      **Rakviashvili Giorgi, Muladze Vitali**, Lyapunov dimension formula of n-generalized Henon map.

14<sup>20</sup> : 14<sup>45</sup>      **Siddiqui Sami Muhammad**, Approximation methods for the Euler's elastica ring model and its stability analysis

14<sup>45</sup> : 15<sup>10</sup>      **Chkadua Otar, Toloraia Anika**, Mixed type dynamical transmission problems with interior cracks of the thermo-piezo-electricity theory without energy dissipation

## Section: Geometry and Topology

### September 4, Monday

- Room 4**      **Chairman: Bakuradze Malkhaz**
- 15<sup>00</sup> : 15<sup>50</sup>    **Aliashvili Teimuraz, Kapanadze Gvantsa**, Counting complex points of two-dimensional surfaces
- 15<sup>50</sup> : 16<sup>15</sup>    **Kuznetsov Evgeny**, Esakia duality for Étale Heyting algebras
- 16<sup>15</sup> : 16<sup>45</sup>    **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup>    **Sazandrishvili Natia**, Isochrones Method and Feynman's Lifeguard Problem
- 17<sup>10</sup> : 17<sup>35</sup>    **Ahmad Al-omari**, Primal Closure function Spaces
- 17<sup>35</sup> : 18<sup>00</sup>    **Aybala Sevde Özkapu, Özlem Acar**, Some results for fixed point theory on ultrametric space
- 18<sup>00</sup> : 18<sup>25</sup>    **Gurbanova Narmina, Salimov Arif**, Lifting of endomorphism fields

### September 5, Tuesday

- Room 4**      **Chairman: Aliashvili Teimuraz**
- 15<sup>00</sup> : 15<sup>50</sup>    **Pirashvili Teimuraz**, Cohomology with coefficients in stacks
- 15<sup>50</sup> : 16<sup>15</sup>    **Diakvnishvili Ana**, On bicentric configurations of pentagon linkage
- 16<sup>15</sup> : 16<sup>45</sup>    **Coffee break**
- 16<sup>45</sup> : 17<sup>35</sup>    **Bakuradze Malkhaz**, Complex cobordism modulo  $c_1$ -spherical cobordism and related genera
- 17<sup>35</sup>-18<sup>25</sup>    **Beridze Anzor**, On axiomatic homology theory of general topological spaces

## Section: Logic, Language, Artificial Intelligence

### September 4, Monday

- Room 5**      **Chairman: Rukhaia Mikheil**
- 15<sup>00</sup> : 15<sup>25</sup>      **Kurtanidze Lia**, Logical interpretation of probability
- 15<sup>25</sup> : 15<sup>50</sup>      **Hazem Anwar Labib Bishara Merihan**, Different approaches in inductive logic programming
- 15<sup>50</sup> : 16<sup>15</sup>      **Hazem Anwar Labib Bishara Merium**, Probability quantifiers in  $\sigma$ -additive frameworks
- 16<sup>15</sup> : 16<sup>45</sup>      **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup>      **Tibua Lali**, Sequent calculus for unranked probabilistic logic
- 17<sup>10</sup> : 17<sup>35</sup>      **Jintcharadze Elza, Kartsivadze Tornike**, Realization of hybrid cryptosystem based on AES and Vigenere encryption algorithms
- 17<sup>35</sup> : 18<sup>00</sup>      **Abuladze Inga, Vachnadze Saba, Maglakelidze Nana**, The role of the electronic library in the post-pandemic period

### September 5, Tuesday

- Room 5**      **Chairman: Kurtanidze Lia**
- 15<sup>00</sup> : 15<sup>25</sup>      **Kutsia Temur, Marin Mircea, Rukhaia Mikheil**, Similarity-based Set Matching
- 15<sup>25</sup> : 15<sup>50</sup>      **Dundua Besik**, CLP(MS): Programming Using Multiple Similarity Constraints
- 15<sup>50</sup> : 16<sup>15</sup>      **Kutsia Temur**, Variants of Fuzzy Anti-Unification and Generalization

- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Chutkerashvili Anna, Lortkipanidze Liana, Javashvili Nino, Verb markers for Georgian-English automatic dictionary**
- 17<sup>10</sup> : 17<sup>35</sup> **Amirezashvili Nino, Lortkipanidze Liana, Samsonadze Liana, Generating matches between Georgian and English nouns and adjectives in a grammatical dictionary software application**
- 17<sup>35</sup> : 18<sup>00</sup> **Pkhakadze Konstantine, The Aims of Constructing Technological Alphabets of Georgian and Abkhazian Languages and the Action Plan to Establish Studying Program "Digital Humanities and Computational Linguistics" at the Georgian Technical University**

## Section: Mathematical Education and History

September 4, Monday

**Room 6**      **Chairman: Gogishvili Guram**

- 15<sup>00</sup> : 15<sup>25</sup> **Gogishvili Guram**, On one notable method of developmental teaching in mathematics
- 15<sup>25</sup> : 15<sup>50</sup> **Khvoles Aben**, Some problems of teaching financial mathematics
- 15<sup>50</sup> : 16<sup>15</sup> **Descalço Luís**, Calculus with Bayesian user model and GeoGebra in assessment
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Manukyan Vardan, Nikoghosyan Gagik**, On popularization of some questions of continuum mechanics
- 17<sup>10</sup> : 17<sup>35</sup> **Martínez-Aroza José**, A mathematician visits The Alhambra -- A universal dialogue

## September 5, Tuesday

**Room 6**      **Chairman: Vepkhvadze Teimuraz**

15<sup>00</sup> : 15<sup>25</sup>      **Vepkhvadze Teimuraz**, Logic in school mathematical education

15<sup>25</sup> : 15<sup>50</sup>      **Kirtadze Shalva, Deisadze Manana**, The role of developmental evaluation in mathematics classes on the entrance level

15<sup>50</sup> : 16<sup>15</sup>      **Deisadze Manana, Kirtadze Shalva**, Development of critical thinking in mathematics classes

16<sup>15</sup> : 16<sup>45</sup>      **Coffee break**

16<sup>45</sup> : 17<sup>10</sup>      **Adeishvili Vladimer, Gokadze Ivane**, Jensen's inequality in mathematics Olympiad problems

17<sup>10</sup> : 17<sup>35</sup>      **Giorgadze Teimuraz, Butchukhishvili Mamuli**, On the histogram of relative frequencies

17<sup>35</sup> : 18<sup>00</sup>      **Berdzulishvili Giorgi**, On teaching the solution of a non-standard functional equation of one type in the secondary school

18<sup>00</sup> : 18<sup>25</sup>      **Bakuradze Bakur, Bregadze Giorgi**, Solving various types of functional equations

## September 7, Thursday

**Room 6**      **Chairman: Gogishvili Guram**

15<sup>00</sup> : 15<sup>25</sup>      **Sulakvelidze Levan**, On the teaching of Taylor's formula in higher education

15<sup>25</sup> : 15<sup>50</sup>      **Nakaidze Roin**, Mathematical experiments in the process of studying probability and statistics

15<sup>50</sup> : 16<sup>15</sup>      **Tavartkiladze Lasha**, Representation of the sides of a right triangle in terms of the radius of the circle inscribed in the triangle

- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Meskhia Rusudan**, On teaching problems of constructing the graph of the function
- 17<sup>10</sup> : 17<sup>35</sup> **Samsonadze Guram**, On the joint course of linear algebra and analytic geometry
- 17<sup>35</sup> : 18<sup>00</sup> **Zivzivadze Manana**, The teaching-learning process based on the principles of constructivism in mathematics class

### Section: Mathematical Logic and Discrete Mathematics

September 5, Tuesday

- Room 7**      **Chairman: Beriashvili Mariam**
- 15<sup>00</sup> : 15<sup>25</sup> **Grigolia Revaz, Liparteliani Ramaz**, Perfect generalized 3-valued Post algebras.
- 15<sup>25</sup> : 15<sup>50</sup> **Yeshkeyev Aibat, Tungushbayeva Indira**, Small models of a Jonsson spectrum (Online)
- 15<sup>50</sup> : 16<sup>15</sup> **Basheyeva Ainur, Lutsak Svetlana**, On the bases of quasivarieties generated by certain finite lattices
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Kulpeshov Beibut, Akimbekova Gulnaz**, The countable spectrum of weakly o-minimal theories
- 17<sup>10</sup> : 17<sup>35</sup> **Kutkhashvili Ketevan**, On a mathematical model of a single dynamic problem of discrete optimization

September 7, Thursday

- Room 7**      **Chairman: Grigolia Revaz**
- 15<sup>00</sup> : 15<sup>25</sup> **Kirtadze Aleks**, Independent family of sets and their applications

- 15<sup>25</sup> : 15<sup>50</sup> **Beriashvili Mariam, Kubis Wieslaw**, On absolutely negligible uniform sets
- 15<sup>50</sup> : 16<sup>15</sup> **Plotkin Eugene**, Elementary equivalence of Kac-Moody and Chevalley groups
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Oboudi Mohammad Reza**, Energy of matrices associated to graphs
- 17<sup>10</sup> : 17<sup>35</sup> **Khachidze Marika**, On an existence of an almost non-invariant set

### September 8, Friday

- Room 7**      **Chairman: Kirtadze Aleks**
- 15<sup>00</sup> : 15<sup>25</sup> **Beriashvili Shalva**, On some definitions of isosceles simplexes
- 15<sup>25</sup> : 15<sup>50</sup> **Beraia Lika**, On some paradoxical point sets in the Euclidean plane
- 15<sup>50</sup> : 16<sup>15</sup> **Kasrashvili Tamar**, On one example of the existence of a non-measurable set on the real line  $\mathbb{R}$
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**

### Section: Mathematical Modeling and Numerical Analysis

Dedicated to the 90th Anniversary of Professor Jemal Sanikidze

### September 4, Monday

- Room 8**      **Chairman: Meladze Hamlet**
- 15<sup>00</sup> : 15<sup>25</sup> **Meladze Hamlet, Davitashvili Tinatin, Tsiramua Sergo**, Difference schemes of increased order of accuracy for systems of elliptic and parabolic equations with constant coefficients

- 15<sup>25</sup> : 15<sup>50</sup> **Tsiramua Sergo, Meladze Hamlet, Davitashvili Tinatin**, Reconfigurable systems based on multifunctional elements
- 15<sup>50</sup> : 16<sup>15</sup> **Jemal Rogava, Zurab Vashakidze**, Convergence and numerical experiments of a three-layer semi-discretization approach for the nonlinear Kirchhoff-type dynamic string equation with time-varying coefficients
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Akhobadze Merab, Kurtskhalia Elguja**, Mathematical model and algorithm for technical diagnostics and rehabilitation of building structures
- 17<sup>10</sup> : 17<sup>35</sup> **Kachakhidze Nikoloz**, On the use of one numerical method for solving the nonlinear beam equation
- 17<sup>35</sup> : 18<sup>00</sup> **Ananiashvili Natela**, About the genetic algorithm for solving the traveling salesman problem
- 18<sup>00</sup> : 18<sup>25</sup> **Vashakmadze Tamaz**, The development of complex analysis method for essentially non-linear systems of DE and about its numerical analogies

## September 5, Tuesday

### Room 1

**Chairman: Chilachava Temur**

- 15<sup>00</sup> : 15<sup>25</sup> **Chilachava Temur, Kvashilava Gia, Pochkhua George**, Mathematical model describing the transformation of the Proto-Kartvelian population
- 15<sup>25</sup> : 15<sup>50</sup> **Kereselidze Nugzar**, The Issue of manageability of the task of optimal fight against disinformation
- 15<sup>50</sup> : 16<sup>15</sup> **Baghaturia Giorgi, Menteshashvili Marina**, On an Algorithm for numerical solution of non-linear Goursat problem

- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Zakradze Mamuli, Tabagari Zaza, Mirianashvili Manana, Koblshvili Nana, Davitashvili Tinatin**, The Method of probabilistic solution for the Dirichlet generalized harmonic problem in irregular pyramidal domains
- 17<sup>10</sup> : 17<sup>35</sup> **Ugulava Duglas, Zarnadze David**, Strongly best approximation and Moore–Penrose generalized solution
- 17<sup>35</sup> : 18<sup>00</sup> **Kublashvili Murman, Kublashvili Mirian**, On numerical solutions of crack problems
- 18<sup>00</sup> : 18<sup>25</sup> **Mnatsakaniani Miranda**, Optimal control in the models similar to neural networks

## September 7, Thursday

**Room 1**      **Chairman: Jangveladze Temur**

- 15<sup>00</sup> : 15<sup>25</sup> **Gagoshidze Mikheil, Jangveladze Temur, Kiguradze Zurab**, Some properties and numerical solution of initial-boundary value problem for one system of nonlinear partial differential equations
- 15<sup>25</sup> : 15<sup>50</sup> **Gagoshidze Mikheil, Jangveladze Temur, Kiguradze Zurab, Tabatadze Besiki**, Numerical solution of one two-dimensional system of nonlinear partial differential equations
- 15<sup>50</sup> : 16<sup>15</sup> **Chkhikvadze Teimuraz, Gagoshidze Mikheil, Jangveladze Temur, Kiguradze Zurab**, On one nonlinear parabolic integro-differential model
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**

- 16<sup>45</sup> : 17<sup>10</sup> **Nino Khatiashvili**, On the stokes flows
- 17<sup>10</sup> : 17<sup>35</sup> **Papukashvili Archil, Papukashvili Giorgi, Peradze Jemal, Sharikadze Meri**, On the approximation of the solution for a Kirchhoff's-type equation describing the dynamic behavior of a string
- 17<sup>35</sup> : 18<sup>00</sup> **Peradze Jemal**, The total error of a numerical algorithm for a Timoshenko plate system
- 18<sup>00</sup> : 18<sup>25</sup> **Tsiklauri Zviad**, About Solution of a nonlinear integro-differential Timoshenko dynamic beam equation

### September 8, Friday

**Room 1**      **Chairman: Davitashvili Tinatin**

- 15<sup>00</sup> : 15<sup>25</sup> **Jha Navnit**, Numerical solution of nonlinear singularly perturbed fractal boundary value problems by finite-difference method on scattered mesh network
- 15<sup>25</sup> : 15<sup>50</sup> **Jagdish Chand Bansal**, Revisiting Population based Optimization Algorithms
- 15<sup>50</sup> : 16<sup>15</sup> **Jafarzadeh Yousef**, Hat basis functions for solving systems of linear and nonlinear Fredholm integral equations
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Saroj Kumar Sahani**, A Delayed model for lysogenic and lytic cycle of bacteria-bacteriophage interaction
- 17<sup>10</sup> : 17<sup>35</sup> **Emmanuel O. Adeyefa** Development of a block method for solving multiple order odes
- 17<sup>35</sup> : 18<sup>00</sup> **Benitho A. Ngwu, Godwin C.E. Mbah, Isienyi Sunday U**, Geometric singular perturbation approach to glass networks

## Section: Mathematical Physics

September 7, Thursday

Room 5

Chairman: **Kvinikhidze Alexander**

- 15<sup>00</sup> : 15<sup>25</sup> **Tsutskiridze Badri, Tsutskiridze Mariam**, Developed MHD flows in channels at existence of pointed geometry external magnetic field
- 15<sup>25</sup> : 15<sup>50</sup> **Zarnadze David, Ugulava Duglas**, Orbitization of quantum mechanics and interpretation of its notions
- 15<sup>50</sup> : 16<sup>15</sup> **Ghorbanali Haghghatdoost, Rezvaneh Ayoubi, Hossein Kheiri**, Some structures on Lie groupoids
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Kvinikhidze Alexander**, Analog of quantum mechanical perturbation theory in the parameter dependent homogenous equations
- 17<sup>10</sup> : 17<sup>35</sup> **Sergeev Armen**, On mathematical aspects of the theory of topological insulators (online)
- 17<sup>35</sup> : 18<sup>00</sup> **Młynik Tomasz, Osaka Hiroyuki and Marciniak Marcin**, Indecomposable k-positive maps on operator algebras (online)
- 18<sup>00</sup> : 18<sup>25</sup> **Ojbag Jafar**, Integrability analysis of the natural Hamiltonian system on Helicoidal surfaces (online)

## Section: Probability Theory and Statistics, Financial Mathematics

September 4, Monday

- Room 9**      **Chairman: Purtukhia Omar**
- 15<sup>00</sup> : 15<sup>25</sup>      **Kachiashvili Kartlos, Kachiashvili Joseph, Kalandadze Raphael, Kvaratskhelia Vakhtang**, Automatic diagnosis of lung disease on the basis of an X-ray images of a patient with given reliability.
- 15<sup>25</sup> : 15<sup>50</sup>      **Hâncu Boris**, Approaches for solving informational extended games.
- 15<sup>50</sup> : 16<sup>15</sup>      **Mmaduakor Chika**, Development of almost unbiased modified ratio estimators for population mean using unknown population parameter(s).
- 16<sup>15</sup> : 16<sup>45</sup>      **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup>      **Zerakidze Zurab, Aleksidze Lela, Eliauri Laura**, Consistent criteria for hypothesis testing for Haar's statistical structures.

September 5, Tuesday

- Room 9**      **Chairman: Kvaratskhelia Vakhtang**
- 15<sup>00</sup> : 15<sup>25</sup>      **Mushunje Leonard**, High dimensional functional data analysis via algebraic geometry.
- 15<sup>25</sup> : 15<sup>50</sup>      **Burić Tomislav, Mihoković Lenka**, Expectations of large data power means.
- 15<sup>50</sup> : 16<sup>15</sup>      **Tarieladze Vaja**, On Shangua's SLLN.
- 16<sup>15</sup> : 16<sup>45</sup>      **Coffee break**

## September 7, Thursday

**Room 9**      **Chairman: Tarieladze Vaja**

15<sup>00</sup> : 15<sup>25</sup>    **Namgalauri Ekaterine, Purtukhia Omar, Jokhadze Valeriane**, On martingale representations of non-smooth Brownian functionals.

15<sup>25</sup> : 15<sup>50</sup>    **Giorgobiani George, Kvaratskhelia Vakhtang, Tarieladze Vaja**, Subgaussian random elements in infinite dimensional spaces.

15<sup>50</sup> : 16<sup>15</sup>    **Kvatadze Zurab, Parjiani Beqnu, Kvatadze Tsiala**, Weather forecast model using Markov chain.

16<sup>15</sup> : 16<sup>45</sup>    **Coffee break**

16<sup>45</sup> : 17<sup>10</sup>    **Babilua Petre, Nadaraia Elizbar**, About hypothesis testing of equality of two Bernoulli regression functions. (Online session)

17<sup>10</sup> : 17<sup>35</sup>    **Mnatsakanov Robert**, Estimation of discrete distribution and discontinuous function via moments. (Online session)

17<sup>35</sup> : 18<sup>00</sup>    **Giorgadze Vazha, Kakubava Revaz, Buadze Tristan**, Nuclear evaluation type statistical challenges of probability distribution. (Online session)

## Section: Real and Complex Analysis

Dedicated to the 85th Anniversary of Academician Vakhtang Kokilashvili

### September 4, Monday

Plenary Room Ephremidze Lasha

15<sup>00</sup> : 15<sup>25</sup> **Bakuridze Mzevinar, Chobanyan Sergei, Tarieladze Vaja**, On a problem of Kolmogorov (Dedicated to the 120th anniversary of Kolmogorov),

15<sup>25</sup> : 15<sup>50</sup> **Ephremidze Lasha, Mishuris Gennady, Spitkovsky Ilya**, New algorithm for spectral factorization of rational matrix functions with applications to paraunitary filter banks

15<sup>50</sup> : 16<sup>15</sup> **Turgay Metin**, Recent results on approximation by fractional integral type sampling series

16<sup>15</sup> : 16<sup>45</sup> **Coffee break**

16<sup>45</sup> : 17<sup>10</sup> **Acar Tuncer**, Approximation by generalized sampling type series: recent results,

17<sup>10</sup> : 17<sup>35</sup> **Acar Ozlem**, Some recent results on orthogonal metric space

17<sup>35</sup> : 18<sup>00</sup> **Acar Tuncer, Dilek Ozer, Turgay Metin**, Approximation properties of sampling type operators in Orlic spaces

### September 5, Tuesday

Plenary Room Meskhi Alexander

15<sup>00</sup> : 15<sup>25</sup> **Meskhi Alexander, Natelashvili Lazare**, Two-weight criteria for multiple fractional integrals in mixed-normed Lebesgue spaces

- 15<sup>25</sup> : 15<sup>50</sup> **Özsaraç Fırat**, On the Mellin-Gauss-Weierstrass operators in the weighted Lebesgue spaces
- 15<sup>50</sup> : 16<sup>15</sup> **Gonçalves Helena**, Embeddings of smoothness Morrey spaces on domains
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Makharadze Dali, Meskhi Alexander**, Embeddings and regularity of potentials in Grand Variable exponent function space
- 17<sup>10</sup> : 17<sup>35</sup> **Imerlishvili Giorgi, Meskhi Alexander**, One-sided potentials in weighted central Morrey spaces
- 17<sup>35</sup> : 18<sup>00</sup> **Krnic Mario, Moradi Hamid Reza, Sababheh Mohammad**, Logarithmically superquadratic functions
- 18<sup>00</sup> : 18<sup>25</sup> **Kursun Sadettin**, Different forms of exponential sampling Kantorovich series and their approximation results

### September 7, Thursday

- Plenary Room** **Oniani Giorgi**
- 15<sup>00</sup> : 15<sup>25</sup> **Oniani Giorgi**, Almost everywhere convergence of nets of operators and weak type maximal inequalities
- 15<sup>25</sup> : 15<sup>50</sup> **Mihoković Lenka**, Asymptotic expansions of stable, stabilizable and stabilized means
- 15<sup>50</sup> : 16<sup>15</sup> **Bandaliyev Rovshan, Aliyeva Dunya**, On characterization of two-weight norm inequalities for multi-dimensional Hausdorff operators on Lebesgue space
- 16<sup>15</sup> : 16<sup>45</sup> **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup> **Chubinidze Kakha, Oniani Giorgi**, On the differentiation of random measures with respect to homothety invariant convex bases

- 17<sup>10</sup> : 17<sup>35</sup>     **Japaridze Irakli, Oniani Giorgi**, On the integrability of multi-dimensional rare maximal functions
- 17<sup>35</sup> : 18<sup>00</sup>     **Bakherad Mojtaba**, Recent operator norm inequalities involving sectorial matrices

### September 8, Friday

Plenary Room     **Tepnadze George**

- 15<sup>00</sup> : 15<sup>25</sup>     **Persson Lars-Erik, Samko Natasha, Tepnadze George**, Sharpness of some Hardy-type inequalities
- 15<sup>25</sup> : 15<sup>50</sup>     **Areshidze Nika, Tepnadze George**, Approximation by Nörlund means with respect to Walsh system in Lebesgue spaces
- 15<sup>50</sup> : 16<sup>15</sup>     **Baramidze Lasha, Goginava Ushangi**, Summability of Tkebuchava's means of one and two-dimensional trigonometric Fourier series
- 16<sup>15</sup> : 16<sup>45</sup>     **Coffee break**
- 16<sup>45</sup> : 17<sup>10</sup>     **Tutberidze Giorgi, Tsagareishvili Vakhtang**, Some properties of the sequence of linear functionals on the space  $V$
- 17<sup>10</sup> : 17<sup>35</sup>     **Baramidze Davit, Persson Lars-Erik, Tepnadze George**, Maximal operators of partial sums of Walsh-Fourier series in the martingale Hardy spaces
- 17<sup>35</sup> : 18<sup>00</sup>     **Sharma Aakriti**, Linear sum of weighted composition differentiation operator

## September 9, Saturday (Online Session)

### Plenary Room **Ephremidze Lasha**

- $10^{00} : 10^{25}$  **Xue Qingying**, The composition of rough singular integral operators on function spaces
- $10^{25} : 10^{50}$  **Israfilov Daniyal**, Maximal Simultaneous Approximation by Faber Series
- $10^{50} : 11^{15}$  **Katz David**, Riemann boundary value problem on spirals and generalized Cauchy-type integral
- $11^{15} : 11^{45}$  **Break**
- $11^{45} : 12^{10}$  **Jafarzadeh Yousef**, Some results regarding to new triple Laplace transform
- $12^{10} : 12^{35}$  **Jafarzadeh Yousef**, Convex functions of Hermite-Hadamard
- $12^{35} : 13^{00}$  **Curbera Guillermo, Ricker Werner J., Okada Susumu**, The finite Hilbert transform on  $(-1, 1)$
- $13^{00} : 13^{25}$  **Aplakovi Aleksandre**, On the absolute convergence of the multiple series of Fourier-Haar coefficients
- $13^{25} : 18^{30}$  **Break**
- $18^{30} : 18^{55}$  **Getsadze Rostom**, On Subsequences of Lebesgue Functions of General Uniformly Bounded ONS
- $18^{55} : 19^{20}$  **Dutkay Dorin**, Orthonormal bases and Parseval frames generated by Cuntz algebras and row co-isometries
- $19^{20} : 19^{45}$  **Jafari Farhad**, Convexity, moments and applications to tomography
- $19^{45} : 20^{10}$  **Fonseca Oscar**, Sobolev meets Riesz: an alternative characterization of weighted Sobolev spaces via weighted Riesz bounded variation spaces

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