

# International Workshop

In the frame of the grant FR-21.4713 of Shota Rustaveli National Science Foundation  
of Georgia

## “Algebraic Geometry and Model Theory of Groups II”

August 25<sup>th</sup>–September 3<sup>rd</sup>, 2024

at

Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia  
[1 Ilia Chavchavadze Avenue,](#)

Zoom link for online participants:

<https://us02web.zoom.us/j/3427801909>

### Program

#### August 25<sup>th</sup>

Arrival and registration of participants

#### August 26<sup>th</sup>

1. 10.15–11.15 **Eugene Plotkin** “Algebraic Groups and Model Theory”
2. 11.30–12.30 **Alexei Miasnikov** “Tensor Completion of Groups”
3. 12.30–13.30 Discussion
4. 13.30–14.30 Lunch
5. 14.30–15.30 **Alexandre Borovik** “Lecture I”
6. 15.45–16.45 **Evelina Daniyarova** “Theory of Interpretations and Its Applications” (joint work with A. Miasnikov)

#### August 27<sup>th</sup>

1. 10.15–11.15 **Evelina Daniyarova** “Bi-interpretations with  $\mathbf{Z}$ ” (joint work with A. Miasnikov)
2. 11.30–12.30 **Elena Bunina** “Isotypicity of Abelian Groups”
3. 12.30–13.30 Discussion
4. 13.30–14.30 Lunch
5. 14.30–15.30 **Alexandre Borovik** “Lecture II”
6. 16.00–20.00 Hiking

### **August 28<sup>th</sup>**

1. 9.00–10.00 **Alexei Miasnikov** “Abstract Isomorphisms of Algebraic Groups”
2. 10.15–11.15 **Andrey Nikolaev** “Non-standard Group Theory”
3. 11.30–12.30 **Elena Bunina** “Interpretability of full second order logic in automorphism groups/endomorphism rings of modules”
4. 12.30–13.30 Discussion
5. 13.30–14.30 Lunch
6. 14.30–15.30 **Alexandre Borovik** “Lecture III”
7. 15.45–16.45 **Olga Kharlampovich** “Equations and first-order sentences in random groups” (joint work with R. Sklinos)

### **August 29<sup>th</sup>**

1. 9.00–10.00 **Pavel Gvozdevsky** “Width of Words in Linear Groups”
2. 10.15–11.15 **Tengiz Bokelavadze** “On some properties of  $k$ -groups”
3. 11.30–12.30 **Ivan Buchinskiy** “Equational Noethericity of Graphs, Graph Groups and Predicate Structures”
4. 12.30–13.30 Discussion
5. 13.30–14.30 Lunch
6. 14.30–15.30 **Agatha Atkarskaya** “Towards general approach for Burnside-type problems”
7. 15.45–16.45 **Mahmood Sohrabi** “TBA”

### **August 30<sup>th</sup>**

1. 10.15–11.15 **Nikolay Romanovskiy** “Morley Rank of Rigid Divisible Groups”
2. 11.30–12.30 **Mikheil Amaglobeli** “Free 2-Nilpotent R-Groups”
3. 12.30–13.30 Discussion
4. 13.30–14.30 Lunch
5. 14.30–15.30 **Alexander Treyer** “Definable Subgroups of Nilpotent Groups”
6. 15.45–16.45 **Pavel Gvozdevsky** “TBA 2”

### **August 31<sup>st</sup>**

Excursion Day

### **September 1<sup>st</sup>**

9.00–14.00 Scientific Discussion on Exponential Groups

### **September 2<sup>nd</sup>**

9.00–14.00 Scientific Discussion on Model Theory of Groups

### **September 3<sup>rd</sup>**

9.00–14.00 Scientific Discussion on Algebraic Geometry of Groups

**Organizing committee:**

1. M. Amaglobeli
2. T. Bokelavadze
3. O. Kharlampovich
4. A. Miasnikov
5. E. Plotkin

## **Alexandre Borovik's Lecture Mini-Course**

*“Black Box Algebra: Conceptual Framework and Model-Theoretic Connections”*

**Abstract:** In three talks of this mini-course, I will try to give a compact survey of recent results in probabilistic methods of computational algebra concerned with categories of explicitly defined finite algebraic structures (groups, rings, fields, projective spaces, Heyting algebras, etc.) and efficiently computable homomorphisms between them. The motivation for some results comes from cryptography, for others from needs of practical computations. This is an intriguing world where most natural morphisms are likely to be non-invertible, and where we still do not know whether finite fields of given prime order (for very big primes) are unique up to (efficiently computable both ways!) isomorphisms. However, it is a surprisingly rich and beautiful theory with unexpected links with some classical areas of mathematics, and some less classical -- for example, it is useful to look at all that stuff from the Internal Set Theory viewpoint. Links with cryptography (including homomorphic encryption and the use of quantum computers in cryptanalysis), and model theory (where similar questions can be asked about infinite algebraic structures) will be emphasised.

This area of research contains a surprising number of fresh problems.

(Joint work with Sukru Yalcinkaya)

## Participants

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