IVANE JAVAKHISHVILI TBILISI STATE UNIVERSITY

# SCIENCE

# RECTOR'S ADDRESS

Ivane Javakhishvili Tbilisi State University marks its 100th anniversary this year. During the century the University remained the flagship of higher education system in the country. Together with other higher education institutions or scientific centers that sprang up within it, the University has created the 20th century Georgian science and education and entered upon the second century of its remarkable history with new goals and hopes.

We are proud that the TSU remains a leading research university in Georgia and the Caucasus region. It is the only university in the region that makes into 2% of best world universities (N359, /The U.S. News&World Report - Best Global Universities Ranking/; 2017), and top 1000 universities by Times ranking (Times Higher Education World University Rankings, N 801+ ; (2016), and falls within the 151-200 range in physics by Shanghai ranking of academic subjects (2017).

The research base of the TSU comprises seven faculties and 16 scientific-research institutes. Over 200 research projects are implemented and 500 research papers of University scholars published in impact factor journalist annually.

Ivane Javakhishvili Tbilisi State University is engaged in international partnership with more than 180 universities of around 50 countries; participation in international scientific collaborations is a top priority of the university. TSU scientists are involved in large international projects such as ATLAS Experiment at the CERN Large Hadron Collider, Jülich Electric Dipole moment Investigations collaboration (JEDI) at Jülich Research Center in Germany and the COMET experiment at Japan Proton Accelerator Research Complex (J-PARC).

In 2017, the TSU joined the international KM3NeT collaboration which involves 15 member countries in total and with neutrino detectors conducts studies in particle physics and astrophysics as well as sea sciences in the Mediterranean Sea.

This international collaboration has resulted in the establishment of high-level scientific laboratories in the TSU, including SMART|Lab, SMART|AtmoSim-Lab, as well as chemistry and electrical engineering labs which were modernized by San Diego State University.

The hundredth anniversary of TSU is marked with significant novelties too. The scientific research hub of the European Academy, the first ever in a non-EU member state, is about to open in the Tbilisi State University. The aim of the hub is to support the development of science and research in the Caucasus region. In parallel with the hub, a young scientists' academy will also be opened, where young researchers will be able to engage in international research projects and obtain grant funding.  TSU will also become a member of European cooperation in science and technologies (COST).

Achievements of TSU students are also remarkable: the project "Innovative Aviation and Cosmic Technologies" which was developed by Giorgi Kachlishvili, a student of the Faculty of Exact and Natural Sciences, and concerns alternative ways of travelling to Mars, has already attracted the interest of international science centers; projects of the students of same faculty, Vache Gundishvili and Endi Chelidze, won the innovative Makeathon competition organized by Mayor's Office; Saba Tavdgiridze, Giorgi Grigolia and Gela Patashuri were awarded medals at the International Physics Olympiad (IPHo).

The above is just a fragment of scientific life and aims of the university. Sustaining traditions and further advancing achievements are what the TSU cares for today. Integration of education process with scientific-research activity, involvement of students in research and scientific work are top priorities of the university to enable students to hone their skills and ensure the generation of new ideas.

George Sharvashidze,
Rector of Ivane Javakhishvili Tbilisi State University

# RESEARCH AT THE UNIVERSITY

At Ivane Javakhishvili Tbilisi State University (TSU) reserach is conducted on the basis of seven faculties and 16 research institutes. During 2017, TSU obtained 102 research grants, including eight international grants.

TSU is a leading scientific and research center in the region

Academic Ranking of World Universities (ARWU) by Academic Subjects, TSU Physics Department is ranked No. 151-200. (2017)

Over 500 articles are published per year in highly ranked journals and in journals with high impact factor

Over 200 research projects are implemented annually

The only university in the Caucasus ranked among the top 2 percent of universities worldwide in the U.S. News & World Report. (2017)
Times Higher Education World University Ranking – N801+ (2016)

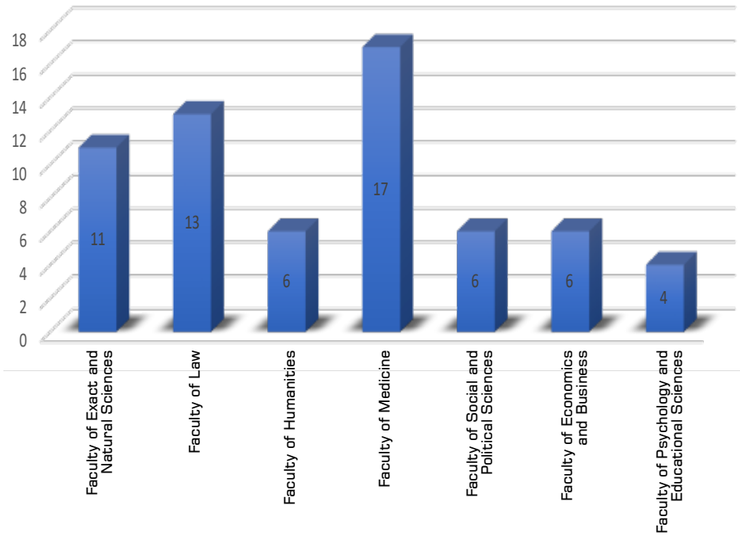
TSU scientists are involved in large international projects such as ATLAS Experiment at the CERN Large Hadron Collider, Jülich Electric Dipole moment Investigations collaboration (JEDI) at Jülich Research Center in Germany and the COMET experiment at Japan Proton Accelerator Research Complex (J-PARC).

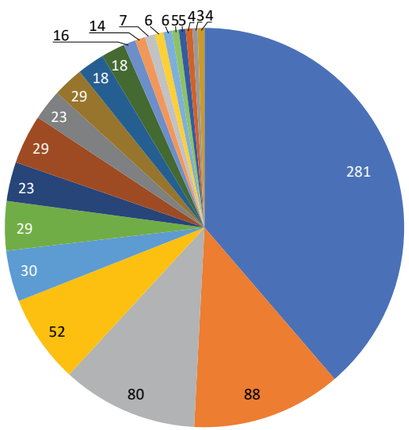
# RESEARCH AT THE UNIVERSITY

TSU leads with the number of its implemented projects, winning competitions announced by the Shota Rustaveli National Science Foundation in 2017:

- Basic research grants – 45% (out of funded projects);
- MA research scholarships – 50%;
- Rustaveli/DAAD – 61%;
- PhD scholarships – 35%;
- Research internships for young scientists – 26%;
- Georgian Studies Program - Oxford University – 1 out of 2, - 50%;
- CNR (foundation/Italy) – 3 out of 4, – 75%;
- Rustaveli Foundation/ VolkswagenStiftung – 2 out of 4, - 50%.

63 PhD theses were defended in 2017




According to Elsevier Scopus database, 501 publications authored by TSU employees were published in the following directions:

- Physics and Astronomy
- Mathematics
- Engineering
- Multidisciplinary
- Medicine
- Materials Science
- Biochemistry, Genetics and Molecular Biology
- Computer Science
- Earth Science
- Environmental Protection
- Social Sciences
- Chemistry
- Pharmacology, Toxicology and Pharmaceutics
- Agricultural and Biological Sciences
- Neurological Sciences
- Chemical Engineering
- Psychology
- Humanities
- Economics, Econometrics and Finance
- Energy
- Business, Management and Accounting
- Other

# MODERN LABS AT TSU

# SMART LABS AT TSU

Two SMART labs were opened at Ivane Javakhishvili Tbilisi State University (TSU) in 2016 and 2017 as part of collaboration with Jülich Research Centre (Forschungszentrum Jülich). TSU students of all three levels have access to SMART|EDM and SMART AtmoSim labs.

TSU SMART AtmoSim lab is a unique center specialized in atmospheric analysis involving chemical analysis of the atmosphere, as well as mathematical processing of the results and creation of an atmospheric model.

Students, who work at the laboratory, are directly involved in a wide range of activities, among them taking air samples, analysis and mathematical simulation. Besides air quality assessments, detailed atmospheric analysis and modeling are being conducted; in addition, new methods and techniques of analysis are being developed, including creation of unmanned aerial vehicles for air quality measurements.

TSU AtmoSim lab represents an analog to IEK-8 (Jülich Laboratory). Like IEK-8, TSU AtmoSim lab enables students to define atmospheric pollutants, such as nitric oxide, carbon dioxide, carbon monoxide, methane and other vaporizable substances, as well as ozone and microparticles.

The lab was opened in 2017 as part of collaboration between Troposphere Lab (FZJ IEK-8) at the Institute of Energy and Climate Research of Jülich Research Centre and the TSU Faculty of Exact and Natural Sciences.

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The first laboratory was opened in 2016 as part of collaboration between Jülich Research Centre and Tbilisi State University. SMART|EDM Lab is a leading research laboratory in the directions of exact and natural sciences, medicine, applied research and technology. The lab gives TSU students a unique opportunity to take part in Jülich Research Centre's research activities in Tbilisi.

The purpose of SMART|EDM Lab is to promote the development of international standards for research and future technology. For this purpose, both international and local scientists have been involved in the projects for a period of two years.

Participation in the activities carried out at SMART|EDM Lab helps students develop their skills in modern experimental physics. They study electronics, programming, computers, mechanical and software engineering, statistical data analysis, physical process modeling, etc.

TSU students are taking part in a number of research activities carried out at Jülich Research Centre, among others studying the development of the universe from the so called 'big-bang' to now. Following the big-bang, in the process of evolution, one out of ten billion particles survived the process of antimatter annihilation. The today's universe has just emerged from those survived particles. The purpose of the research is to clarify why it happened. Similar research activities using polarized deuteron flow have already been launched on COSY accelerator at Jülich Research Centre and the Georgian group is actively involved in it.



# LABS MODERNIZED BY SAN DIEGO STATE UNIVERSITY

## CHEMISTRY LABS:

SDSU-Georgia chemistry labs are equipped with modern technology. Students have an opportunity to acquire theoretical and practical knowledge in general, analytical, organic, physical chemistry and biochemistry; to gain lab experience. The general chemistry lab helps first-semester and second-semester students familiarize themselves with methods for separating mixtures, calorimetry (they learn how to use a calorimeter - enthalpy and entropy), calculating mass and density, titration, oxidation – restoration, qualitative analysis. By using a spectrometer, students can determine solution concentration; pH Meter helps them determine solution area and concentration, chemical kinetics; they also work on gas chromatography and learn how to determine chloride ions, calcium, sulphates, iron ions and so on in water or a mixture. In Organic Chemistry, students learn the methods of synthesis, crystallization and separation on a chromatography column. They also learn how to use infrared spectrophotometer and nuclear magnetic resonance spectrometer for determining the structure of a substance.

## ELECTRICAL ENGINEERING LAB:

Analog Circuits Lab is equipped with modern measurement and working tools. Students have an opportunity to observe electrical processes changing in time through using an oscilloscope, as well as to study amplifier parameters and then generate various forms of impulses through the generators existing at the lab. The lab also offers high accuracy digital measurement devices, enabling to determine and evaluate the parameters of half wave rectifier circuit. All electrical components necessary for building a scheme and creating a working prototype are available at the lab.

# SCIENTIST

## VAKHTANG LICHELI:

# "THE DISCOVERIES MADE AT GRAKLIANI HILL ARE COMPLETELY ENOUGH FOR THE LIFE OF ONE ARCHAEOLOGIST; HOWEVER, PROBABLY EACH PERSON HAS A PERMANENT DESIRE TO STRIVE FOR SOMETHING NEW"

*The discovery made at Grakliani Hill, an archaeological site located in Kartli, near the villages of Igoeti and Samtavisi, has taken an important place in the achievements of Georgian archaeology of the 21st century. Besides Georgia, this discovery has added new scientific details to the history of the Near East and necessitated the revision of old theories. The Tbilisi State University's field base camp, where students gain their first archaeological experience under the guidance of Professor Vakhtang Licheli, has acquired the status of a national cultural monument of Georgia. An open-air museum will be opened there soon. Prof. Vakhtang Licheli, director of the Institute of Archaeology at the TSU Faculty of Humanities, speaks about the significance of the discovery and brings a number of examples about achievements of TSU archaeologists.*

## Grakliani Hill – Unique Archaeological Monument

Grakliani Hill is a special archaeological monument. Here, we have the remains of eleven various periods of human development. Dmanisi synchronous remains, i.e. primitive tools dated to 2 000 000 – 1 800 000 years, are the oldest. It is no secret that Georgia is the richest country in terms of archaeological monuments; you can find a monument of any period in any part of the country. You will hardly find an archaeological monument not only in Georgia, but throughout the entire Caucasus, where so many long stages of human development are systematized in a consistent manner.

Although diggings were launched at Grakliani Hill quite recently, it has appeared in the focus of scientific attention already twice: first, when the buildings dated to the 5th-4th centuries were discovered on the 2nd, 3rd and 4th terraces. It was an important discovery, because no such buildings were discovered in eastern Georgia, Iberia before. This fact enabled us to look into the rule of life of the society of that period. It turned out that instead of an opinion, according to which the population was disparaged in Kartli of that period (that was completely natural opinion due to lack of relevant scientific materials), actually it was ascertained that our ancestors lived a very active life – 2500 years ago they had broad economic and cultural contacts with all those parts of adjacent regions (and not only), where at least small signs of civilization were found.

Grakliani Hill appeared in the focus of attention for the second time when unique inscriptions were found there. In August 2015, we started investigations in the area of a temple located on the 3rd terrace. The discovered building was very small – 6 meters wide and 3 meters long, but this small building turned over the history of both Georgian and Near East intellectual development. I would like to emphasize it because the highest peak of human development is the use of writing and two different systems of writing were discovered at Grakliani Hill. The first is placed on the western altar. These are three different letters, which has analogues on the territory of the Near East and in my opinion, it belongs to the North-West Semitic writing. The second inscription is placed in the central part of the temple, on the altar pedestal and graphically it very much resembles the Aramaic alphabet.

Let me explain here that in the ancient world, the Aramaic alphabet was used by the peoples of various nationalities and cultures, like Latin is used today (in Italian, French, German, Spanish and other writings). The Arameans themselves were people, who lived in Mesopotamia and who managed to create relatively simple writing on the basis of existing ones. So, a question arises – why is this discovery of Grakliani Hill so important?

One of the main scientific novelties is that the Aramaic inscriptions are 100 years later on the territory, where they were made, than those at Grakliani Hill. It is a scientific paradox, at a glance, but it is confirmed by an archaeological fact. Just similar "paradoxes", unexpected discoveries create the necessity for developing new theories and provide the ground for developing science. I will again speak about the significance of Grakliani inscriptions below.

Because of such unordinary nature of this fact, just upon the discovery of the inscriptions, I sent the samples to the U.S.-based BETA Laboratory of Miami for radiocarbon dating. We received the dates from Miami, according to which the inscriptions date back to the 11th-10th centuries BC. So, they are very old. In order to dispel all doubts related to dating, I asked my colleagues to take the samples and send them to the laboratories chosen by them. It happened twice: the Germans chose Zurich Laboratory, which sent the same answer – the 10th century BC. To finally dispel the doubts I asked our Italian partners to do the same. We received the same answer from the Groningen Laboratory selected by them – 10th century BC. So, the inscription dating causes no doubts – it is a 3 000-old inscription made on a stationary, firm pedestal, which could not be moved from one place to another. As for the inscription content, it is early to talk about it. I would like to note that as soon as I discovered the inscription, I made it open to broad public to enable all interested persons to work on it. Frederick Mario Fales, Professor at the University of Udine and one of the greatest researchers in this direction, proved most successful. I met with him during my visit to Venice and handed over all materials related to Grakliani Hill and the inscription for analysis. Two months later he wrote to me that he already had the first results and that they were very important. In particular, he ascertained that this inscription had been made by a person, who had already made inscriptions before. It means that it had been made by a professional. Mario says that he read all the letters, but since each grapheme has several phonetic meanings, he says that "it is not simple to bind the content."

The task is further complicated by the fact that first of all – as it happens in all other cases - it should be ascertained in which language we should read the inscription. Recently I returned from Austria, where I participated in the international meeting of Assyriologists with the participation of script specialists. I delivered papers and nobody doubted that this is a real inscription. However, they were astonished at a historical casus that the oldest Aramaic script was used in the Caucasus, on the territory of Georgia – thousands of kilometers away from the territory, where this script was created. But even this surprise can be easily explained – it is necessary to reject outdated theories and opinions and look for new scientific facts.

The existence of these inscriptions on the territory of Georgia gave us a lot of information. First, intellectual development of the population living on the territory of Iberia in Georgia reached the highest level of

civilization 3 000 years ago.

The inscription is not an occasional discovery – it has a relevant archaeological context. I mean that other achievements, for example in such a difficult sphere as metrology, also point at a high level of development of the population living on the territory of Iberia. The research of items discovered at Grakliani Hill and its satellite monuments has ascertained that certain measurement units were used there 3 000 years ago to ensure high level of production and trade. Let me remind you that science recognizes that the introduction of the metrology system is a special step of intellectual development of the society, because a person starts counting, using figures and respectively, the primary foundation is laid for science. It also means that an administrative structure existed and trading was carried out according to the established rules and weight. Before discovering the scales at Grakliani Hill, it was known that only one type of scales existed on the territory of Armenia. Now, six various types of scales have been discovered at Grakliani Hill. And what is most important, they have a local unit of weight – 363 grams. All scales are equal to this weight. Considering that a lot of seals were also discovered at Grakliani Hill that confirms the existence of private property, we should make sure that the Iberian society reached the highest level of development 3 000 years ago.

## Archaeological research at TSU yesterday and today...

Archaeology has been introduced at the Tbilisi State University by a great Georgian scientist, Ekvtime Takaishvili. It was him who developed the first textbook in archaeology for the university. It can be said that all subsequent generations have undergone that course of lectures. Naturally, there were other famous scientists who also worked at the university, among them Giorgi Nioradze, Otar Japaridze and many others. Some famous and respected archaeologists are still successfully working at the university. It is enough to name Professors Guram Grigolia and Guram Lortkipanidze, who have made an immeasurable contribution not only to successful research activities, but also to educating young archaeologists. Professors Z. Kvitsiani, M. Puturidze and K. Pitskhelauri are doing a great job in this field. I would also like to recollect visiting professors, archeologists A. Apakidze and O. Lortkipanidze. They have made a huge contribution to the establishment, development and preservation of Georgian archaeology at an international level.

I am proud to note that young archaeologists who are studying at TSU today are the leaders of this generation. They carry out diggings in Georgia and beyond. This is the first case in the history of TSU student archaeologists. They conduct scientific research not only in Georgia but outside the country as well – in Azerbaijan, Oman, Iran and Cyprus. Our students, among them PhD students, participate in the field programs of Aarhus, Oxford, Edinburgh, Innsbruck and Ca' Foscari universities.

The Vardzia International Conference, which is held annually with the support and funding of our University, is the face of young Georgian archaeologists. Here, our archaeologists present the results of individual research and these results are discussed in the presence of professors from famous universities, among others the Universities of Oxford, Jena, Ca' Foscari and Bordeaux. Traditionally, the Vardzia Conference is held with the participation of representatives from the best universities of Europe, America and Australia. I would like to emphasize that the participation in the Vardzia Conference helped our students improve their skills and now they frequently prevail over their foreign peers, who have better conditions for scientific research considering the fact that they have much more opportunities to work at libraries. Our students mainly use electronic libraries. However, it should be noted that with the help of Erasmus + program, Georgian student archaeologists regularly study and work at various European universities, among them Ca' Foscari University of Venice and University of Jena.

Our students study archaeological monuments of all stages of human development; they are involved in the expeditions and programs implemented by the Georgian National Museum and the National Agency for Cultural Heritage Preservation of Georgia. They research various regions of Georgia. For example, I can name the research of archaeologically important region, Svaneti, where the works of huge scientific value are carried our systematically, under the guidance of Professor Z. Kvitsiani. Our students also work over the unique monuments of Kakheti, under the guidance of Associate Professor K. Pitskhelauri. Students are doing great work in the areas of large scale constructions with Visiting Professor G. Rcheulishvili also involved in the work. For example, I can name the highway rehabilitation area in Kareli district, where about 300 graves belonging to the Bronze Age were investigated. The research on localization of the city of Phasis is especially important. 2 600 years ago, Phasis was the most developed Greek colony in western Georgia, both economically and culturally. It still remains unstudied, because its location is unknown. Our students play a huge role in this research, which we carry our methodically. Besides Colchis, they also work in Javakheti mountainous region. Our students, together with our Italian partners, have discovered over 70 previously unknown archaeological monuments in this region.

Finally, I would say that the archaeology program offered by our university is most interdisciplinary not only in Georgia but throughout the Caucasus, as well as according to the parameters of the most multi-profile European universities.

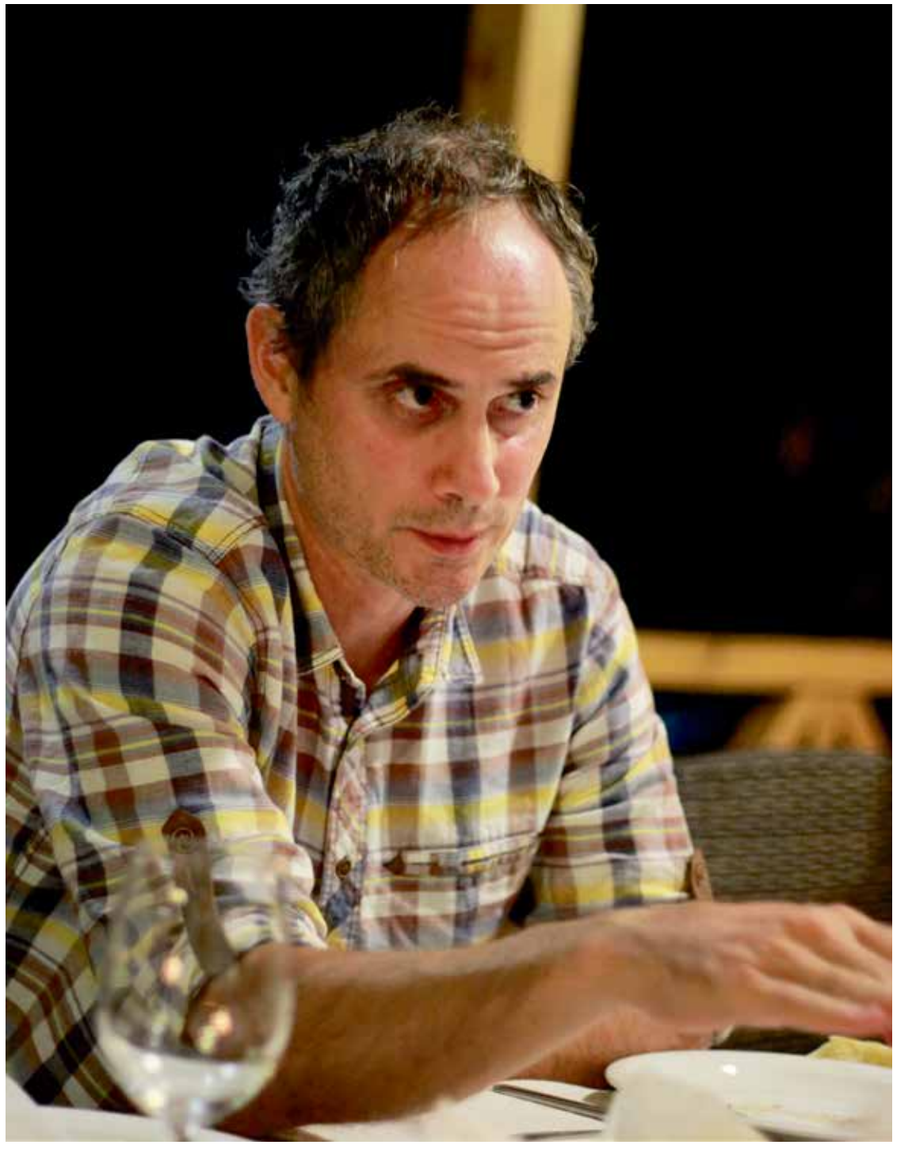
Thus, university archaeology is alive and I hope that it will maintain its viability for a long time.

## Discovery you can only dream about

Although the discoveries made at Grakliani Hill are completely enough for the life of one archaeologist, probably each person has a permanent desire to strive for something new and discover something new. If technical, financial and all other means were available, I would intensify the works at Grakliani Hill and its adjacent monuments ten-fold, because Grakliani Hill is surrounded by satellite monuments with religious functions, where absolutely unique materials are discovered, but remain conserved due to absence of funds.

In case of relevant funding, I would gladly work with Prof. G. Grigolia and my students on the issue of localization of the city of Phasis. Based on new seismological, geomorphological and hydrological data, I have established an opinion, which absolutely differs from already existing twelve opinions about the location of this city. However, it should be noted that all the twelve opinions have scientific grounds and all scientists are equally sure of the validity of their versions. My opinion is ranked 13th in this list, but it does not frighten me – I have a good experience with the number 13.

# LEVAN GIGINEISHVILI: “SUCH A BURNING DESIRE IS A SIGN, AND UNINTENTIONALLY REVEALS, THAT WE ARE NOT EUROPE AND WE ARE WORRIED ABOUT BEING FAR FROM IT. THERE IS SOMETHING ROMANTIC IN THIS ASPIRATION”



*“Philology, like any field of science, seeks regularities in speech, texts of different genres, various languages, their structure and interrelation. Philology, like any field of science, provides infinite space for research.” This is how Levan Gigineishvili, PhD in Philology, Professor at Ivane Javakhishvili Tbilisi State University, explains his interest in philology. The scope of his research is similarly “infinite.” It is not limited to a single field of science and along with philology encompasses philosophy, theology, everything that disposes us towards reasoning. Therefore, the first question of our interview with him was about infinitude:*

– “There is such a Greek phrase “possession to infinity”. When I undertook studies in classical philology at the university, I had a feeling of dealing with something that is really infinite. If anything, there are so many interesting texts that one life, no matter how long, is not enough to read all of them. As the famous phrase goes, “life is short but art lives forever.” The same holds true for science – science is limitless, the more you learn, the more interesting and challenging questions arise. Science always means touching such areas that we are ignorant of. It is a sort of the feeling when you know that you know nothing. In reality, you know, of course, because you understand that there is much more that you do not know. In such a case, humbleness should not be feigned, it must stem from impartial appreciation of your knowledge and the knowledge of others. Sometimes, there are moments when we boast of our knowledge, but even a single attendance of international conference to listen to foreign professors and researchers would suffice to understand how far we have lagged behind and how other professors have long grown bored of the topics which made us feel proud and satisfied, and instead have worked on the topics which we could hardly imagine. Attending international conferences is very useful as you always learn about new ideas and in this contest of ideas, gradually find your place. The magic works when you are in the process of searching and can transmit impulse. The area of my research is the intersection of philosophy and theology, two attitudes towards the reality. One is the Biblical tradition and texts of accepted truths while another is the Greek philosophical tradition. I study those authors who encompass these two traditions. I explore Christian philosophy, the medieval philosophy, Platonism, how the philosophy of Neoplatonists influenced the Christian reasoning, how they tried to reconcile these notions and understandings. What drives us towards knowledge is infinite. We carry something frightening in us.”

**– You study works of Ioane Petritsi; what should society at large, not only scientific circles, know about him?**

– “Ioane Petritsi tries to seek truth in various cultures. He does not say that a particular culture or a intellectual tradition holds monopoly on truth. Truth is so broad that one can discover its grains and manifestations in various intellectual or religious cultures. Ioane Petritsi believes that all this was revealed fully in Christian culture and Greek philosophy. This logos, as grains of truth, can be found in the entire humankind. This is eternal wisdom, a reflection of eternal order in various cultures. Petritsi’s idea is that a philosopher must be open to other cultures. This openness is necessary to enable him to discover valuable, true in them. Petritsi is a supporter of universal human wisdom. He is well-versed in Platonism, familiar with Neoplatonist authors and tries to reconcile the Bible with Platonism. He tries to interpret the Bible against the light of Plato’s metaphysics.

“I very much enjoyed Petritsi’s opinions about and attitudes towards truth and word. I saw that he was a very honest and sincere scholar in handling words. He wrote that it was difficult for him to translate from Greek into Georgian because he feared to mistranslate any of Greek words. He said that he was not able to find a corresponding Georgian word and that if he translated different notions with the same term he would be responsible for this error to eternity. Thus, this kind of attitude towards texts is extremely scientific and honest. This is what I like about Petritsi’s works.

“Now I am in the process of preparing a publication in English - I translated works by Ioane Petritsi into English, but it requires much editing to polish the English and much work to compare Georgian and Greek texts. I have been checking and double checking it over and over again so as to make sure that it is a publication of European standard and thousands of people read it.”

**– You once said that came to realize that philosophy was not to merely read books but to dare to be alone. Can one say that you ruminate on your thoughts?**

– “It is impossible to force yourself out of three-thousand-year-old tradition of literature and philosophy; however, this does not mean repeating those ideas like a parrot. The life of each individual is unique and those books and knowledge which we have should influence our life. We do not read books, philosophers, writers to merely show off ourselves in intellectual conversations and appear intelligent; it serves an absolutely different aim. It is necessary to nurture our spirit and to self-realize. If we read with this aim in mind, we will look at acquired knowledge in a different way. We are alone in our interaction with texts. But this solitude must not be understood as a type of oriental solitude where oriental meditation technique is used for thoughts to cease. I do not have a slightest idea of these methods; in reality, solitude is what makes us dwell on great ideas, what enables us to compare them with the experience of life. At such times it is necessary to continue our thinking without stopping thoughts and arrive at concrete result through conclusions, consistently following logical necessities. We must dare to think about something in order to escape enslavement by ready-made conclusions, we must ourselves gain insights, must resist the discomfort posed by reality which we cannot yet understand.”

**– In one of your TV lecture you talk to students about Pericles’ words in which he discusses benefits of democracy and Plato’s rather pessimistic views about it. What is your take on democracy?**

– “Democracy is the most precious gift of Greeks in the history of mankind. You cannot escape democracy and you must not try to do so. When criticizing democracy Plato, as Athenian, pursues the only aim of making his democratic city even better democracy. Plato’s philosophical school is democratic in a sense that everyone is free to express their opinions. Plato does not reject debates, he accepts that even his devoted

pupils may oppose him. Aristotle, who spent 20 years in Plato's school, said 'Plato is my friend, but truth is a better friend' and I believe that the inspiration of these words was Plato who always shunned prophetic preaching and constant held himself and his pupils in the state of tense live dialogue. Thus, Plato was a supporter of continuous dialogue. The Heraclitean tradition repeats the same – 'listening not to me, but the logos, it is wise to agree that all things are one,' you may follow this debate more courageously than I. No one personally carries truth (except for Jesus) but we have a chance to arrive at it through debate. As Petritsi says, dialogue, debate is a "word between us." It belongs neither to me nor to you, it relates to some objectivity and we participate in it. I believe that we cannot escape the culture of democracy. However, it is a different thing when the freedom of thought becomes irresponsible and does not serve the real truth.

"It is my a priori belief that the state order must necessarily be democratic. When I undertook studies in philosophy in Leuven I had a feeling that philosophers talked too much and that everything was crystal clear only in religion and Christianity as there were so many ideas contradicting one another. Then it transpired that everything was not clear in theology either and it was part of such everlasting dialogue too.

"You can't escape debate and philosophy, you are doomed to debating in every sphere and hence, to freedom."

**– When talking about European tradition you say that this is a tradition of solitude, that in the tradition of Enlightenment an individual dares to be alone and to crystallize his/her own thoughts in this solitude. This is primarily a will to have your own will. What does the Georgian tradition look like? Is it different from the European tradition?**

– "Georgian tradition consists of numerous components. Any national character is unique. They differ from one another even by gestures, pitch of voice and accent. Consequently they see the reality in a way as others may not see. No one other than Georgian can say "shemomechama" [when you are eating and are really full and you are enjoying what you are eating so much that you cannot stop but just continue eating - literally meaning I accidentally ate the whole thing]. A great number of culturally significant developments occured in Georgia: we adopted Christianity, fought for the preservation of our identity over many centuries, then we felt a desire to come close to Europe.

"Such a burning desire is a sign, and unintentionally reveals, that we are not Europe and we are worried about being far from it. There is something romantic in this aspiration.

"Rustaveli was a phenomenon of huge importance. 'The Knight in the Panther's Skin' became an all-Georgian epos and the text which shaped the national ethos; the spirit of Rustavi is still seen in Georgians. There is a deep-rooted motive in Georgians that freedom is not worth anything if you do not fill it with great kindness. This issue crystallized in the ideas of Ilia Chavchavadze and his contemporary Georgian intellectuals, the Tergdaleulebi. It is this kind of Europeanism that they introduced into Georgia – I need freedom to create something valuable, to find a model of dignified life. This is quite a wide spectrum and cannot be expressed in a simple way.

With the time passing we have been moving towards greater individualism, which is not bad. I always tell my students to not memorize materials and large texts which they study, but rather to let them pass through their spirits and to turn them into a life experience.

# KETEVAN KHUTSISHVILI: "IT IS JUST THE PROCESS OF TRANSFORMATION THAT IS SO INTERESTING - HOW IT INFLUENCES THE PERCEPTIONS, VALUES AND SOCIAL STRUCTURE OF GEORGIAN SOCIETY"

***Have you ever thought about how our dreams influence our life, our behavior; how the emergence of supermarkets changed the market culture and usual everyday relations between citizens; how the presence of German migrants in Georgia influenced their hosts; how migrant waves influence traditional cultures; how religious values are combined with other values. These topics represent only one part of those issues, which are studied by Doctor of Historical Sciences, Professor Ketevan Khutsishvili. Presently, she leads the newly established Dissertation Board at TSU. At the beginning of the interview, she shares her personal experience on how to make research interesting for international scientific community.***

## Internationalization opportunities for science

There may be some differences by fields, but I cannot really say about the direction of ethnology-anthropology that there are any difficulties and barriers for internationalization. The only difficulty that may exist is our personal attitude, whether we want or not to be part of international scientific community. We are researching society, culture. Research in this direction is extremely important in all aspects. In this view, the interests of our, Georgian ethnologists and anthropologists are in line with the research interests of the international scientific community to study migration processes as well as the influence of these processes on everyday being, values and their combination; ethno-cultural and social conflicts, ecology-related issues, urban and post-socialist transformations. Analysis of any example related to these issues is interesting and important for everyone. The research in ethnology and anthropology is conducted just in this direction.

Moreover, our research involves comparison of cultures of people living in similar geographical environment or having similar ethno-cultural history. Georgia was part of the Soviet space. This factor allows us to compare it with the countries that were parts of the same space. We have international projects, the majority of which are being implemented with the participation of our MA and PhD students. Today, our new generation almost faces no problem of internationalization. They know languages and have an opportunity to participate in exchange programs or attend the lectures delivered by foreign professors at TSU.

## Religious studies

This is the sphere which I got interested in when I was a student. My sphere of interests involve religious studies, relationship between religious values and other values, manifestation of religious belief, internal and external conflicts of the group, issues of secularism. I am the author and participant of several completed and ongoing projects. One of the research directions is relationship of religion and secularism, problems of their research and teaching. Just in frames of these topics we may discuss the issue on how to teach religion at school and university. The issue has long been put on the agenda. There are different approaches and strategies.

One of the main characteristics of our country is the fact that it has never been mono-ethnic or mono-cultural. In this particular geopolitical environment, Georgia played the role of (cultural, economic and at some periods even political) leader that made Georgian culture very flexible towards the influence of external factors, their cultural filtering and incorporation. A certain system of coexistence has been established in heterogenic society over the centuries. In ethnology, we call it "the systems of peaceful coexistence." Strange as it may seem, religion has also joined this system, especially as the groups of various religion lived in Georgia and beyond its borders.

The ongoing research titled Shared Sacred Sites, which is about Christian-Muslim relations, is very interesting in this respect. Since the middle ages, it was a usual development especially on those territories and borderlines, where mixed population and various ethnic groups were living and communicating. This knowledge is still preserved in live memory and, in a number cases, the practice of shared sacred sites is still in place.

For example, in Kvemo Kartli there are places, where Georgian Orthodox parish, Georgian and Azerbaijani Muslims, the parish of Armenian Apostolic Church are coexisting. Syncretization and hybridization of their everyday practice is the result of their long coexistence. Let me bring an example of the Bolnisi Municipality, particularly the villages of Khatisopeli and Vanati. They are divided by one road. Khatisopeli is populated by Georgians, including Adjarian eco-migrants, and Vanati is an Azerbaijani village. These two villages had a shared sacred site - the 17th – 18th century church, which still exists. It is a small, single-naved church. Until now, on November 22 the Azerbaijani Muslims go there for praying and on November 23 the same is done by the Georgian Orthodox parish. They hold a ritual slaughter and invite each other. There are some cases of creating mixed families. The

Caucasus and Georgia are famous for not having any confrontation on religious grounds with the exception of some cases. A traditional system of peaceful coexistence had existed, but the Russian Empire started to demolish it and then the Soviet Union ultimately destructed it.

It is confirmed that the involvement and participation of young people in shared religious practice is gradually decreasing. It is not caused by the reduction of tolerance or respect towards each other. It is the result of other processes, which are generally linked to normativization of religion, religious systems and organizations and have a global nature.

## Deficiency of open discussion, threat of fundamentalization

The Soviet period had a serious impact on our society and science. Fundamentalization of visions took place in the society.

Georgia is a secular country, and religious and secular are not frequently separated. We also come across a number of violations, but we close our eyes on them, citing the so called traditions. However, this is not the key problem. Vision and values represent the main problem in modern life. We frequently come across non-acceptance of dissenting opinions. I regret saying it, but this is a reality.

We also face a threat of fundamentalization in education. I suppose that the main reason is the low level of public education. Positive thinking about received knowledge takes place rarely and discussion mainly moves to an emotional level. First of all, it is a teacher, who leads the discussion to an emotional level. Stereotype visions represent yet another problem. Besides stereotypes, the problem is that scientific terms are used in the most common manner. For example, the word "sect" has a negative connotation and it is linked to darkness, whereas a scientific meaning of this word is absolutely neutral and it means the unity with particular characteristics. I would like to say that in

terms of perception, it is frequently easier to communicate with students rather than with teachers. A child is open and does not have stamped thinking; they can discuss various issues neutrally. We deliver lectures for schoolchildren as well. I also gave lectures to our students studying on "1+4" program. I think that speaking with them about a number of issues, such as diversity, tolerance and ethno-cultural differences are interesting and important for them. I hope that during this academic year we will add a new subject to our curriculum – "Diversity and Tolerance." It is a BA degree level subject not only for our students, but also for the students of all other specializations. Students will be able to select this subject from spring and we hope that they will show interest in it.

## Dream in the Traditional Georgian Being

It was my research topic as a PhD candidate. My senior colleagues found it difficult then to share my interests. It was not only my idea to research this issue. I worked under the guidance of Professor Tamar Dragadze, British anthropologist of Georgian origin. Just upon her recommendations, I got interested in the issue. The key aspect of my research was to analyze the influence of dream (imaginary) on the construction of social interaction. Anyway, dream is important in traditional society, because people communicate with each other through them.

In such societies, dream is perceived as a means, which links people with the past, future and other persons within their environment in the present. I was interested in finding out how this imaginary phenomenon is used in building relations and why sometimes this phenomenon is a higher quality argument than other more material evidence. It is interesting for ethnology how an individual behaves. For example, an individual saw a dream and went to a shrine to perform a ritual – so, he/she behaved according to the model of behavior shared by the group. The research has shown that the actions taken based on a dream always aim at strengthening social interaction and unites the group. People have various explanations about their dreams. For example, after having a dream, people frequently visit their friends and do not start doing what they had planned, for example, building a house. There are various practices of "cancelling" bad dreams. After you see a dream, a certain scheme is put in operation and it can be perceived as the situation of processing. At this moment, presentative symbols of a dream are seen, perceived and remembered, and their explanation and interpretation starts from the moment of awakening that, in turn, prepares the ground for certain actions, which can be revealed in usual, everyday reactions (for example, lighting a candle after seeing a deceased relative in a dream, going to a cemetery, telling a dream, and so on). So, it was interesting for me to find out how an individual perceives a dream as an argument of behavior.

In this case, the authenticity-truth of seeing a dream is of no importance. It is possible to push forward the interests of a social group by bringing the example of this case (for example, reconciliation of hostile families, clans, etc.). What is more important, they do not question the understanding about the means of vertical and horizontal communication. For example, in Khevsureti there is a habit of giving "the name of a soul" when a newborn was named after a deceased person and this name was chosen according to a dream. And this was not all – most important was internal relations of the group. Certain obligations were imposed on the family members of the deceased person towards this newborn that clearly intensified internal links. A lot of similar examples can be brought.

## Market Culture

This is the issue that interests the society and science, and simultaneously there is certain skepticism about this issue. So, questions arise – what is so interesting about this issue that may attract the attention of an ethnologist/anthropologist? It should be noted that economic relations are the sphere on which the being is built. It is interesting how these relations are regulated. There are differences between cities and regions. Urban population is larger and diverse; ethnic, cultural and social relations are established differently.

Georgia is situated on the crossroads of the East and the West, the North and the South and therefore, the country and especially its capital, Tbilisi had always been the venue of meeting of various cultures. What is the key characteristic of a market? Contact, trade, communication; how do formal and informal parts of relations look like? All these have been transformed by modern being. My goal was to observe these processes, how markets influence values and cultures in urban space. Today, so called Eastern bazaars no longer exist in Tbilisi in terms of both infrastructure and relations. They were transformed or even replaced by supermarkets, under the pretext of Europeanization. Naturally, the form of social interaction has also changed. Old markets were very convenient, as they existed almost in all districts. There were social links that raised the quality of confidence between a buyer and a seller. If you ask your grandparents, they will tell you that they constantly bought food from one and the same people. Such relations increased social links as well as the quality of trust. The situation has changed today and such forms of relations are driven by age, social and other reasons.

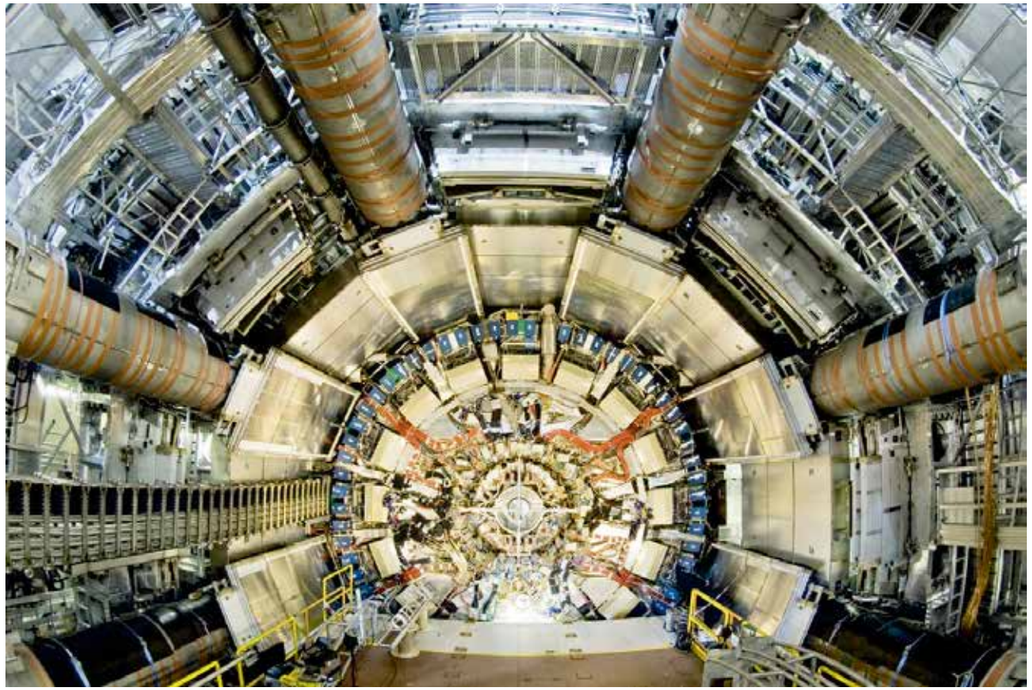
Market economy demanded a new model of everyday behavior; however, the process of transformation has not completed yet. It is just the process of transformation that is so interesting - how it influences the perceptions, values and social structure of Georgian society.

## University Board

The purpose of the University Board is to promote the development of scientific activities and the growth of its quality. Since the day of its foundation, the Tbilisi State University has been a leading scientific-educational institution not only in Georgia. The world famous scientists were working here, bringing up new generations. Our university used to create a highly scientific product. We want to continue these traditions and further increase the standards. I am deeply confident that this will be the case. Our goal is to make the quality of dissertations high so that they meet international scientific standards; it is vital and essential for the country and the university like ours. If we are not competitive, we will gradually lose our function.



# THE ROAD OF GEORGIAN PHYSICISTS TO CERN, JÜLICH, IMPORTANT INTERNATIONAL COLLABORATIONS



*Large Hadron Collider (LHC), CERN, Switzerland*

It was 1992. Georgia broke away from the Soviet Union and regained independence just a year before. The country had already gone through the civil war; experienced hyperinflation - 746% rise in prices on products within a year; the country failed to pay for supplied electricity and natural gas and energy crisis began with electricity scheduled for only 1-2 hours a day and total interruption of natural gas supply; kerosene heaters and wood stoves became a necessity.

Georgian physicists involved as scientists of Soviet Union in high-energy physics experiments at the Joint Institute for Nuclear Research in Dubna (Moscow District, Russia) became representatives of a new state – Georgia.

With the disintegration of the Soviet Union, the iron curtain, dividing Georgian (Soviet) scientists from Western ones, was torn down too. 1992 saw the establishment of bilateral relationship between Georgian scientists and scientists of the European Organization for Nuclear Research (CERN, in Geneva, Switzerland). Young researchers from the High Energy Physics Institute (Yuri Baghaturia, Davit Mzhavia, Vakhtang Kartvelishvili, Ramaz Kvatadze, Evgeni Chikovani, Tariel Sakhelashvili, Revaz Shanidze) engaged in a planned CMS experiment on Large Hadron Collider at CERN. In the same years, the government of Georgia signed contracts with the administrations of Dubna, first, and then, CERN.

In 1995, when power blackout was an ordinary phenomenon in Georgia, computers and the Internet were the rarity, quite a number of talented people abandoned science, a team of four Georgian physicians, all women (Leila Chikovani, Leila Gabunia, Maia Mosidze and Tamar Jobava), began to cooperate with an important ATLAS experiment at CERN's Large Hadron Collider. The team received a qualifying task from ATLAS experiment to measure ATLAS experiment sensitivity to the Higgs boson observation to four-lepton decays (one of the channels, where Higgs boson was thereafter discovered) on the basis of modeling. In parallel with the Georgian team the same task was performed by teams of various European countries. Results of the Georgian team got high assessment from the ATLAS collaboration. That was the beginning of the story of Georgian physicists, which prepared the ground for the involvement of High Energy Physics Institute at the Tbilisi State University (TSU HEPI) in the ATLAS experiment and current cooperation with CERN.

Tamar Djobava, Doctor of Sciences and senior researcher at HEPI TSU, was a member of that very team. She recalled that period:

"Intellect of Georgian scientists proved decisive in starting the cooperation with CERN in the 1990s. In 1995, when we engaged in cooperation with ATLAS experiment, we were assigned a qualification task. The results obtained by us were acceptable for them. We were so unexperienced that did not even realize the complexity of the task. Peter Jenni, the spokesperson of ATLAS experiment, wanted to meet us.

"In 1996, the CERN delegation arrived in Georgia to inspect the existing infrastructure. It is an accepted practice that when involving a team from a country in the experiment (collaboration), they, after undertaking formal procedures, arrive in that country to examine the capacity of the team and the potential in terms of infrastructure. The delegation included the spokesperson of ATLAS experiment, Professor Peter Jenni."

Today, Georgia is engaged in ATLAS experiment at CERN, with up to 30 Georgian researchers from various institutes participating in it. The ATLAS experiment involves around 200 universities and research institutes, approximately 3,000 physicists, engineers and technicians, as well as 1,000 - 1,500 students (PhD, MA and Bachelor programs students) from 40 countries around the world.

*Mikheil Nioradze*

*Tamar Jobava*

*Jemal Khubua*

*Giorgi Macharashvili*

*Gela Devidze*

*Revaz Shanidze*

To talk about the cooperation with CERN and other scientific collaborations we visited the TSU HEPI to meet with the Director of the Institute, PhD in Physics and Mathematics, Professor Mikheil Nioradze; researchers and PhDs in Physics and Mathematics Tamar Jobava, Revaz Shanidze, Giorgi Macharashvili, Gela Devidze, Jemal Khubua (leader of the Atlas team from 1994 to 2017); they tried to familiarize us with researches in high energy physics.

Director of HEPI, Prof., Dr. Mikheil Nioradze stressed that the Joint Institute for Nuclear Research in Dubna and those scientists, who started to work in Switzerland as early as in the 1960s, played the role in cooperation of Georgian scientists with CERN.

Mikheil Nioradze: "A close relationship with the Joint Institute for Nuclear Research in Dubna greatly contributed to the qualification of Georgian physicians; that facilitated the involvement of our institute in international programs. Since early 1990s, our institute has successfully cooperated with CERN and Jülich Research Centre (Forschungszentrum Jülich) in experiments on COSY accelerators. In addition, it has been a year that the institute has participated in the international scientific project in neutrino physics and astrophysics implemented in the Mediterranean Sea.

"The relations of Georgian physicists with CERN traces back to the 1960s. The first physicists invited to CERN was Gogi Chikovani of the Institute of Physics. At first, he was a member of Professor Maglich group, but then, upon Maglich's recommendation, he became the leader of experiment. Soon thereafter another physicist from the Institute of Physics, Vladimer Roinishvili, was invited to CERN.

"Early 1990s proved very interesting for HEPI. The Large Hadron Collider project and its experimental program were finalized at CERN at that time. The engagement of the institute in scientific programs of CERN, which was preceded by multiple visits of young researchers from the Institute to Geneva, happened quite quickly and without excessive formalities.

"As regards the cooperation of our Institute with the Nuclear Physics Institute of Jülich Research Centre, it started in 1992. In early 1990s, the accelerator was built in Jülich to receive high intensity beams of polarized protons and deuterons. Given the knowledge and experience obtained in polarization experiments on the accelerator in Dubna, a team from our institute, which worked in relativistic nuclear physics (Mikheil Nioradze, Andro Kacharava, Zurab Menteshashvili), decided to participate in the international ANKE experiment planned on this accelerator. To this end, we proposed to the collaboration that we would create a new type of Cherenkov detector working on the principle of total internal reflection. This idea belonged to Giorgi Macharashvili and drew on the results of modelling which were obtained by Macharashvili himself and Andro Kacharava. That was a material contribution of the institute to this experiment, which led to our participation in researches on ANKE Magnetic Spectrometer.

"The relationship which we started with Jülich Research Center expended, both in terms of geography and content, as a result of the concept of Georgian-German Science Bridge proposed by German partners in 2004. At present, in addition to TSU, this relationship involves Technical University, Ilia University and Agrarian University too.

"Last year, scientific topics of the Institute extended to include researches in particle astrophysics, as the institute has become a member of the international KM3NeT collaboration in neutrino physics and astrophysics."

## Cooperation with CERN

The Hadron Tile Calorimeter, the sub-detector of ATLAS experiment, was built in Dubna and Georgian scientists made a significant contribution to its creation. Jemal Khubua left for Dubna to work on this project and became the head of the division. Yet another Georgian scientist, Irakli Minashvili, worked in Dubna at that time; now he leads the Georgian team of ATLAS experiment.

Tamar Djobava explained details of the work performed by Georgian scientists in ATLAS experiment today:

"Representatives of our Institute are involved in several directions of the experiment. They participate in analyzing of the experimental data, modeling/simulation of physical processes, processing and analyzing test beam data obtained as a result of the irradiation of Tile Calorimeter modules of ATLAS detector with various energy particles, assessment of Tile Calorimeter data quality, technical-engineering maintenance and modernization/upgrade of Tile Calorimeter, which requires hard work, huge knowledge and experience.

"Members of the Georgian team (Leila Chikovani, Maia Mosidze and Tamar Djobava) engaged in the activity of top quark physics group a of ATLAS experiment since 1998. In particular, they started to study a possibility of observation of flavor changing neutral current (FCNC) rare decays of the top quark in ATLAS experiment. We did not understand back than that that task we were taking on was so difficult, but the topic aroused interest in us. The probability (branching ratios) of such processes in the standard model is very small and hence, any observation of such decays would signal physics beyond the standard model.

Our group continues the study of rare decays of the top quark to date. Young scientists are also involved in this research, for example, our PhD student of the Institute, Archil Durglishvili, who prepared his master's thesis at our institute. He made a huge leap within five years and today, he is a full-fledged member of the ATLAS collaboration. He successfully performed a qualification task and obtained the right to be co-author ATLAS experiment publications.

"Our Institute and team is a clear example that high level scientific researches can be performed in Tbilisi. Experimental data are processed via the Internet by using CERN computing infrastructure, the so-called Grid. Archil Durglishvili is actively engaged in processing the data as well as every stage of analysis. He made a significant contribution to searching a rare decay of top quark to Z boson and at 13 TeV energy and set observed (expected) upper limits on the branching ratio of this process. He became one of the leaders of the group searching for FCNC top quark decays. In this group he worked with Portuguese and Swedish researchers.

"Our Institute is also involved in studying of the process of associated production of heavy vector quarkonium together with top anti-top quark pairs in proton–proton collisions on ATLAS experiment; this is a pioneering research on ATLAS detector. This research is conducted under the leadership of Vakhtang Kartvelishvili, a former researcher of our institute and current Professor at Lancaster University (Great Britain) and in addition to me, two students from our Institute, Tamar Zakareishvili (PhD student) and a Bakar Chargeishvili (master's), participate in it.

"We (T. Djobava and M. Mosidze) participate in the on-line shifts at ATLAS experiment control room as well as the so-called off-line shifts which implies studying, analyzing and assessing the data quality of ATLAS experiment Tile Calorimeter data; also, we are experts of Tile Calorimeter detector control system and experimental data acquisition and trigger system. Participation in the second level shifts is performed from Tbilisi via the Internet.

"One of the aims of our activity is to share the knowledge and experience of well-established scientists with young scientists and students. Working with such scientists within the scope of large international collaboration enables students to deepen their knowledge in the theory and experiment of particle physics."

## Cooperation with Jülich Research Center

CERN may be the largest but not the only important scientific center which TSU HEPI cooperates with.

The cooperation with Jülich Research Center of Germany is also one of the long-standing and important activities of HEPI TSU. Giorgi Macharashvili, PhD in Physics and Mathematics, senior researcher of HEPI TSU, told about this cooperation:

"Jülich Research Center (Forschungszentrum-Juelich) is a national institute of Germany which includes scientific institutes of various profiles. In addition to a team from our institute, three universities of Tbilisi - Technical, Agrarian and Ilia universities, have been involved in the cooperation since 2005. As of now, we cooperate with the Jülich Research Center's institutes of Nuclear Physics (IKP), Neuroscience and Medicine, Engineering, Atmosphere and Electronics.

"The cooperation with Jülich is very productive and important not only for our institute but the country too. The cooperation with Jülich Research Center enabled 10 Georgian students to prepare their Master's theses and additional five students (mainly from HEPI TSU) to prepare their PhD theses at Jülich IKP. Two of them, Zara Bagdasarian and Malkhaz Jabua have got two PhD diplomas – one Georgian and another German.

"Since 2004, at the initiative of HEPI TSU and Jülich Research Center, a biennial conference in fundamental sciences, known as Georgian-German Science Bridge, is held with the active involvement of students. Several scientists from Jülich Research Center were conferred a status of TSU Honorary Doctor. Let me single out Professor Otto Schult and Professor Hans Stroeher among them.

"In 2015, at the initiative of the HEPI TSU and German side and with the support from the government of Georgia, a special program was developed to facilitate the employment of returning Georgian scientists from foreign countries. So-called Smart|Labs fit with advanced equipment and measurement devices were set up for them. The first such Smart|EDM_Lab was created for PhD Davit Mchedlishvili who prepared his doctorate thesis at Jülich IKP and returned to Tbilisi. In the Smart|EDM_Lab he mentors one PhD student, while another his student has successfully defended his master's thesis. Several students from Georgian Agrarian University also work there. At present TSU already has the SmartLab of atmospheric researches and plans to create a SmartLab of medicine in the foreseeable future.

"As I have said, the cooperation with the Jülich IKP started in 1992, after the first meeting between Professor Mikheil Nioradze and Director of IKP, Professor Otto Schult, where both sides expressed their readiness to cooperate. After that, our team (PhD Andro Kacharava and I) engaged in this cooperation under the leadership of Prof. Nioradze. Our first task was to measure rare processes at medium energies, to explore production of particles in conditions where measurements are difficult to conduct. Initially, our three-member team worked on the design and creation of two autonomous detectors. In 1998, we began to conduct test measurements with these detectors while from 2000, we started physical measurement on IKP-COSY accelerator. It will take too long to explain details of these experiments and therefore, I will only note that the exploration of various processes produced large amount of high quality results. By 2015, more than 100 research papers were published in top rating journals.

"Our team was involved in collecting and analyzing data, creating simulation and analysis codes. Especially worth mentioning are those results which were obtained in high-precision polarization experiments. Let me explain that the polarization implies that the orientation of elementary particles is controlled in the experiment, which affects characteristics of an interaction. It should also be noted that our team initiated several directions of research and was responsible for simulation and data analysis as well as preparation of papers, reports and projects. That experience played a huge role in the development of our cooperation and setting long-term objectives for future.

"After the completion of this cycle of experiments in 2015, a question arose as to which direction to choose for our future researches. ATLAS and CMS experiments at CERN were conducted searches simultaneously in almost the similar scientific direction. The main objective – to discover Higgs boson – was successfully accomplished. One may say that the discovery of this particle ended the experimental verification of the Standard Model. In parallel with that, the exploration has been underway for the last 10-15 years of such phenomena that do not require high energy accelerators, however, on the other hand, it can be said that exploration of these processes is the second strategic direction in fundamental sciences. A clear example of this is the discovery of neutrino oscillation, the mechanism of which is not described by the Standard Model. Neutrino oscillation, which was discovered in Japan, is the breakthrough. I think this is the discovery of a larger-scale than the confirmation of the existence of Higgs boson.

"Such processes are called rare, beyond-the-standard-model processes. Searching them does not require ultra-high energy accelerator. Extreme precision of measurements is decisive here. Such rare processes, that upset perceptions of the Standard Model, are associated with cosmology too. For example, the matter–antimatter asymmetry in the Universe may be connected to the existence of electric dipole moment (EDM) of elementary particles. It was the direction that

we chose for our future research. Today, the HEPI TSU team works with Jülich IKP in this field within the framework of the JEDI Collaboration. srEDM project which pursues a long-term goal of discovering the electric dipole moment, which is a phenomenon forbidden in the Standard Model, comprises of two main directions. The first is the creation of a dedicated accelerator which will be focused on accurate control of particle spin and the creation of a device measuring spin orientation, a polarimeter. Such polarimeter must continuously measure the polarization of accelerator's beam at the degree of yet unprecedented precision. The HEPI TSU team is responsible for the design, creation and then application of such polarimeter in the JEDI Collaboration which unites more than 150 scientists. The team has already been working successfully in this direction and has gained international recognition and respect.

PhDs Andro Kacharava and Irakli Keshelashvili are at Jülich Institute of Nuclear Physics on a permanent basis; the total of 12 scientists, the majority of them young scientists, participate in the project."

## KM3NeT project

KM3NeT is an international scientific project of neutrino physics and astrophysics. and the Tbilisi State University, namely, the High Energy Physics Institute joined the project in 2017. At present, research centers and universities of 15 countries are involved in this collaboration.

The aim of the KM3NeT collaboration is to locate neutrino detectors on the bottom of the Mediterranean Sea, enabling to conduct research in neutrino physics and astrophysics. KM3NeT is a complex and expensive project and its implementation is planned in several stages. At the current stage (KM3NeT 2.0), detectors will be located along the seashores of Italy and France. It should be noted that KM3NeT is the research infrastructure located in the sea, which will enable the conduct of interdisciplinary studies in Sea and Earth sciences (e.g. oceanography, marine biology, seismology).

From the Georgian side, the participant in the project and leader of the team Prof., Dr. Revaz Shanidze:

"To explore the Universe scientists are using various physical equipment and detectors; you have already learned about them with regard to ATLAS and JEDI experiments in which the HEPI is involved. The first ever detector to explore the universe was a human eye. After many centuries of observations astronomy was formed as the first science studying celestial bodies and their movement. Today we know that a human eye can see only a small part of the Universe. This is proved by modern optical telescopes as well as observations in other range of electromagnetic radiation. Such observations became possible with the help of new equipment, in particular the radio telescopes and X-ray and Gamma-ray space telescopes that are placed on the satellites. Observable matter of the universe, which leave trace in our detectors, proved to be only a small part of the matter existing in the Universe. The matter that cannot be detected by existing detectors is known as dark matter.

"The scientific and technological advancement enabled us to study the Universe not only by means of electromagnetic radiation, but also with the elementary particles – neutrinos. Neutrinos allow exploring such astrophysical processes and sources that are otherwise unobservable, for example, thermonuclear reactions in the sun and stars, sources of cosmic rays and dark matter.

"The KM3NeT collaboration uses the neutrino detector to identify and study astrophysical sources of neutrinos. This will enable us to work on the issues of cosmic rays and dark matter. Neutrino astronomy belongs to a new branch of fundamental research, astroparticle physics. KM3NeT is the first project of astroparticle physics, where a team of researchers from HEPI is engaged. The project involves up to 300 scholars, engineers and doctorate students from 15 countries.

"On 21 September, at the Tbilisi State University, a cooperation agreement was signed between the HEPI and KM3NeT international scientific collaboration. This agreement and KM3NeT collaboration conference, which will be held at the Tbilisi State University in 2019, will facilitate the involvement of Georgian scientists and students in this international scientific project.

"The project is, inter alia, interesting for the possibility to conduct multidisciplinary studies on the sea bottom (at the depth of 3 km). Consequently, KM3NeT is interesting for Sea and Earth sciences, oceanographers. The experiment will operate continuously, round the clock. Conducting the experiment in the deep sea, which is connected to uninterrupted power source is indeed an unprecedented development. The experiment infrastructure located on the bottom of the sea will also house detectors for Sea and Earth sciences."



# "NOTHING IS IMPOSSIBLE"

***A foreign-based Georgian scientist, who has been working at Lund University (Sweden) since 1992; Professor at the Department of Clinical Sciences; Director of Stem Cell Center; Coordinator of StemTherapy: National Initiative on Stem Cells and Regenerative Therapy; Head of the Laboratory of Stem Cells & Restorative Neurology. This list contains only brief information about professional activities of Zaal (Zaza) Kokaia, a graduate of the TSU Faculty of Biology. Along with high professionalism, a clear civic position, consistency and responsibility are quite obvious in a conversation with him. It seems that some of his character traits emerge from his childhood:***

– I really do not remember who I wanted to be in my early childhood. As for biology – my decision was probably driven by the fact that my elder brother, Merab, studied at the TSU Faculty of Biology. So, I had a certain knowledge about this field and I knew for sure what was necessary to become a biologist. The Institute of Medicine was very popular at that time; however, research activities attracted me more. At that time, research and medicine were not linked with each other in Georgia, but now this approach is gradually changing. In the West, biomedical research is conducted by medical specialists in partnership with biologists. I had little interest to be practical clinician and I wanted to become biomedical researcher.

**– You worked at school before becoming a famous scientist. Did you benefit from work experience at school?**

– Working at school was very interesting and challenging for me. Generally, I always liked to have communication with children. In 1987, I defended Candidate of Sciences thesis; I worked at the I. Beritashvili Institute of Physiology and was simultaneously offered to work at German School No. 6. At that time, it was an absolutely new form of teaching. Lessons were given by the teachers, who simultaneously worked at research institutes and were scientists. We were given an opportunity to teach according to our points of view. We were motivated to present

various issues to children from scientific point of view. I will never forget children's reaction, when we had the lesson on eye anatomy. I went to a market and bought a cow eye. We dissected it together and looked into its structure. My students still remember this lesson and recall about it when we meet today. My work at school was not only teaching, but it was implementation of science, kind of experiment in the process of teaching. It was very interesting and creative.

**– So, you believed already then that studying physics, chemistry or other subjects that are difficult to learn depends on the methods of teaching, did not you?**

– I do not agree that physics or chemistry are difficult to learn. On the contrary, I think that these subjects are interesting and easy if we present physics and chemistry laws not in an abstract form, but in a form of reality, if we explain where they can be seen in the nature and where their activities can be studied in an everyday life. Contextual learning is very important, especially for children, for whom abstract thinking, perceiving what they cannot see or feel is relatively difficult. Motivation and interest are especially important in the process of learning and without it it is very difficult to force a child to study and improve his/her knowledge. Motivation defines the quality and duration of memory. I have no recipe, textbook or methodology how to teach, but I am absolutely sure that a child should be motivated and interested in the process of learning. Not only each subject, but even each topic needs individual approach and special presentation to children so that they understand a subject easily and show interest towards it.

**– What can you say about education system, education policy in Georgia? How competitive is a school-leaver or a graduate with European peers? What are the pros and cons that we face?**

– I find it difficult to make such a comparison. As for natural sciences and medicine, I think that Georgian students have a very good potential. One can easily become a world-level researcher or specialist with education received in Georgia. Of course, this can be achieved much easier, if you continue studies in a Western and modern higher educational institution. But it is always possible to lay down a foundation. I also graduated from the Faculty of Biology in Georgia, which was quite archaic and when I recall today what and how we were taught, I cannot even believe.

**– How is one and the same issue or subject learnt in Georgia and abroad?**

– The main difference what I notice is that the Georgian educational area is not fully student-oriented. In the West, a student learns and a lecturer simply assists, giving a correct direction. Students are main actors; they are actively involved in the learning process, they are motivated and receive lecturer's assistance necessary for achieving their goals as much as possible. So, the major principle is student-oriented and student-centered education.

**– What is necessary to develop science in Georgia?**

– The only thing that hampers the development of science is a political will – not a declared but a real will to make science and education the priorities. On the other hand, it should be a long-lasting policy. It is impossible to change the plans, and strategies every time new minister will be appointed. Education and science require long-term and purpose-oriented investment. A uniform plan should be developed and implemented, no matter which political party rules the country. Everybody claims over the past 25 years that education is a priority, but we move ahead very slowly. If we had agreed 25 years ago and started methodically moving forward with the goals acceptable for everyone, the today's reality would have been absolutely different. We would definitely have had deviations, but the key direction would have been maintained.

**– Georgia is a small country and education needs a lot of money…**

– Just because we are a small country, education and human resources are the main capital that needs investments. It is difficult to develop all fields of science in a small country. We should agree on what field, direction is important for the country; clarify what intellectual or technological resources we have that can be used to develop internationally competitive research.

**– Stem cells help repair brain damage in stroke victims – you are working in this direction. So, it becomes possible to create any type of human cell and defeat certain diseases, doesn't it?**

– It is true, but in most cases, they are experimental directions. The only stem cells that we have been using for decades are blood stem cells, with the help of which blood cancer stem cells can be replaced by new healthy stem cells. Just this is the main purpose of bone marrow transplantation. The development of this method has significantly increased children leukemia survival rates. As for clinical use of neural stem cells, it is unreal today. There are some experimental data, according to which these cells can replace damaged neural cells or promote regeneration processes. A lot of researches are being conducted to introduce these experimental data clinically. That's what we are also doing. The next stage will involve clinical examination of patients. Today, many clinics, including in Georgia, use bone marrow-derived cells for treating various neurological diseases, rather than blood diseases. Regretfully, this downgrades the reputation of Georgian medicine. These methods are not recognized, accepted and introduced in leading medical centers. I hope that in future this branch will develop in the right direction and we will offer new, clinically examined and proven methods for treating those diseases and symptoms, which we cannot treat today. I have been working on this issue during my whole life and I hope very much that by the end of my scientific career, it will be possible to prove that a method of treating stroke victims with clinically compliant stem cells can be introduced.

**– You said that there is a certain progress at the level of experiments. Can we hope that time will come when we, the people, will invent immortality drugs?**

– No, I could not call it an immortality drug. This method makes it possible to replace a damaged tissue by a new one, but it will not last for an indefinite time. The process of ageing will not stop. Ageing is a normal physiological process. Simply, we should aim and try to achieve healthy ageing. Healthy ageing should be our goal rather than avoidance of ageing. I do not think that many people strive for immortality.

**– Will it ever be possible to replace the human brain?**

– Probably, it will be possible to replace certain physiological functions of the human brain. Modern computers perform many of those functions that we perform with our brain, for example, counting, and logical calculations. In future, a computer will probably replace more functions, but I doubt that the brain, which controls thinking and many vital body functions, may be replaced ever. But each time, when we predict something, we should emphasize that we base the prediction on our present knowledge and information; if something is currently impossible, it does not mean that it will be impossible tomorrow either.

**– You deliver lecture courses for PhD students at TSU: modern methods of teaching and academic writing. Why do you deliver lectures on these two subjects instead of biology?**

– I think that these lecture courses are important for the specialists of any fields. I teach PhD students, who want to become scientists and perform research a part of their profession. The main product of a scientist, on the one hand, is a scientific article, and on the other, it is information and knowledge you generate as a result of your research activities, which you should share with colleagues and society in a form of scientific papers or presentations. In order to develop science and implement scientific projects, you need to have resources – research grants. For this to happen, you should write an application, formulate a scientific problem and the ways this problem can be solved. These three main components – writing a research article, preparing scientific presentation and applying for grant support are united in a lecture course – academic writing. I decided that it would be very important to teach PhD students this subject, to give them a fishing rod for catching fish. The second subject that I teach PhD students is a problem-based learning (PBL) method. We use this method when teaching the medical students at Lund University. Briefly, we give students some problems and students after discuusing around this problem in groups define what they should learn to solve the given problem. It is one of the examples on how the student-driven education may work and lead the process of receiving contextual quality education and knowledge. My goal is to enrich thinking of Georgian PhD students. They should see that besides classical, there are other types of modern educational methods as well.

**– Georgian University Society was restored at TSU last year and you are the first head of this society.**

– It was a very important and interesting initiative. Georgian University Society was established a century ago to raise funds for founding the first Georgian university. Georgian University Society still can play a very important role. Today, its main purpose is to promote and support the initiatives, which are so important for the development of TSU and its students. Secondly, for me, as a TSU alumnus, it is very important to have a tool that will help graduates to make a contribution to the development and advancement of their alma mater. I reiterate frequently that people should be given a chance to do a kindness. A person has a requirement to do a kindness. I believe that it is good not only for the university, but it is positive and good for the alumni as well.

**– What would you advise young scientists?**

– I would like to advise them two things – they should remember that nothing is impossible and second, they should believe in themselves. Everything can be achieved; everything is in their hands. Of course, it is easy to shift blame on others – I have a bad lecturer, I do not have a textbook… frequently, the objective factors may really exist, but if you have a high motivation, desire, determination, nothing is impossible. It is important to believe in yourself, your capabilities and with diligent work you will achieve even more than you could ever imagine.

# ALEXANDER TSISKARIDZE: "WE MUST ACT PROMPTLY IN ORDER TO RECEIVE INFORMATION, PROCESS IT AND USE IN CLINICAL PRACTICE IN A TIMELY MANNER"

*needs no introduction – you may have to stand in a queue for more than a week to get an appointment with this neurologist. Many people probably do not know that despite such tight schedule, he is Professor of Neurology, former Dean of the Faculty of Medicine at Ivane Javakhishvili Tbilisi State University. Presently, he also serves as Deputy Rector for Research of TSU.*

*Quite recently, the book Treatment-Related Stroke by Professor Alexander Tsiskaridze, co-authored by two foreign scientists, was published by the University of Cambridge. We started our conversation just with this book.*

## Cambridge Bestseller

– It is difficult to talk about how much my international awareness increased after the book was published. However, the University of Cambridge periodically sends circulars to the authors, listing the bestsellers of the Cambridge University Press. To my pleasure, our book also appeared in this list. The fact is that it has made direct or indirect influence on my career in Georgia. It can be said that now I have much more work in respect of clinical activities, because creation of similar products results in increased awareness about you, as a field expert (in this particular case, neurology). Increased work load at TSU, stemming from my new status implying coordination of scientific activities, is also added to it.

Despite it, I always try to work on new publications, not to slow down the pace. I try to publish a new paper per year, at least once every two years in order to avoid disqualification as a scientist. At the same time I am a peer-reviewer and a member of editorial boards of several international scientific journals which also helps me to "retain the form" of active scientist.

Medicine is a field where current knowledge and information become outdated quite soon. Alongside with rapid development of diagnostic and treatment technologies, what is modern and high-technology today can appear the past stage tomorrow or the day after tomorrow. Knowledge reserves increase constantly and they need processing and systematization. Therefore, those the high-quality medical textbooks and monographs, which are are popular among readership, are revised every five or six years. Our field knows some classical monographs with the 5th, 10th or even 15th editions being published. As a rule, the content is essentially renewed in this case. Soon, it will be necessary to publish a revised version of Treatment-Related Stroke.

## Brain diseases and their secrets

– My research sphere mainly involves cerebral vessel pathology, stroke and the so called degenerative diseases related to progressive damage of structures in the brain, its cells and neurons, such as for example Parkinson's and Alzheimer's diseases. Management of such diseases is very problematic. However, some may be treated more effectively and others – less effectively. For instance, treatment of Alzheimer's disease is less effective. This disease is progressing quickly. As for Parkinson's disease, despite the progredient course of disease, it is subject to effective pathogenetic and symptomatic treatment. Anyway, in general, the diseases related to the brain and spinal cord, as well as peripheral nervous system are rather difficult to be either diagnosed or treated.

Multiple sclerosis is also one of my spheres of interest. Unlike a concept of "sclerosis" established within the population, this disease is not characterized by memory loss and is mainly typical for younger people... Disturbance of motor, sensory, and visual functions as well as coordination is typical for multiple sclerosis. This disease may start even in childhood; however, it is mostly met at the age of 20-40. The causes of multiple sclerosis are not known. It may be driven by a lot of factors, including predisposition and genetics, as well as various risk factors, such as viruses, which can promote the disease development through influencing the immune system. When we talk about climatic conditions, we come across a certain pattern: incidence of this disease is higher in the North and lower in the South. It gives way to speculations that the sun rays have kind of protective effect and respectively, disease incidence is higher in the areas which suffer a vitamin D deficiency. Although multiple sclerosis is a chronicle progressive disease, some important achievements have been reported in its treatment, which allow to suspend its progress through long stabilization or even recovery. Generally, when we talk about disease increasing frequency of multiple sclerosis in Georgia and worldwide, it is mainly related to the fact that the figures of its detection and proper diagnosis have increased. The disease can be detected and diagnosed at earlier stages. There was no such opportunity let say 20 years ago. Early detection of a disease allows its management.

## Information and English language – the scientist's weapon

– Obtaining up-tp-dated information is one of the major issues in our field. We should not be late in acquiring, processing and then using information in clinical practice. Textbooks play a very significant role in this respect, but familiarization with scientific journals available in libraries or internet is not less important. The majority of scientific articles are available in English; therefore, it is necessary to know English at a level that will help you work with specific literature. Teaching medical English at higher educational institutions in Georgia is very important in this respect. The English language is universal for medical science in terms of both communication and terminology. Previously, Latin played this role, but gradually it lost its significance and gave way to English. Of course, if you know another language, besides English, it opens up more opportunities to you. However, if we talk about alternatives, English has no alternative.

## Pragmatism in science

– There are a lot of reasons why young people are less engaged in the research activities in Georgia. One of the reasons is that a lot of schools that we had in basic or applied sciences no longer exist. Another reason is that the society became more pragmatic – young people prefer to work in the field that will bring them material and economic independence more quickly, almost instantly. Scientific activities, especially at the beginning of your career, will not bring great economic success,. A successful and established scientist does not face economic hardship, but it can be achieved only as a result of hard work and not immediately. Frequently, our youth prefers not to enter upon this path. This is a problem persisting in economically less developed countries. As for more developed countries, where huge investments are made in the field of science, young people have an opportunity to stay financially independent from the very beginning of their career.

Theoretical and practical fields of science are closely interlinked. Theoreticians provide a hypothesis, substantiate the right of its existence and then it is confirmed in labs that is followed by practical results and frequently commercialization. For example, the method of magnetic resonance imaging, which is extremely important in medicine and not only, would not have existed, if we had not obtained it through theory

and then experiments. Therefore, we should understand that science and its development have no alternative.

### Ways of scientific development – research internationalization and fund-raising

– Much should be done in terms of scientific development and I would not limit myself only by the university problems. Science cannot be maintained easily in the countries with similar level of economic development like Georgia, because it needs a lot of money. We need finances to keep the existing one at a competitive level and develop new one. Therefore, we should spare no efforts to attract any types of resources, including our national scientific funds, international resources, foreign grants, targeted funding from the state and the government, etc.

The second issue is collaboration, mutual cooperation with our partner universities. Modern science is the result of international cooperation. As a rule, a powerful scientific product cannot be created in one laboratory or university, but it is the result of joint research conducted by many labs and medical centers. Respectively, if we face financial deficiency, it can be somehow compensated through this cooperation. So, if we are ready, have ideas and stay at the same level, we can join various consortia. Our cooperation with CERN and participation in ATLAS experiment is a good example of it. It encourages us somehow.

Internationalization is possible in terms of humanities as well. We should cooperate in those fields, which are Kartvelological. We should not stew in our own juice. Be sure that these directions are interesting not only to us but generally to science. Generally, Georgia may turn into the center of cultural studies. Archaeological research in Georgia, which becomes part of research conducted by a strong international consortium serves as an example of it. Scientific papers about artifacts discovered in our country and research results are always published in highly ranked journals. It increases our recognition and promotes popularization of science. We can give international direction to all sciences as there are a lot of topics related to vine, wine or other issues. Besides the fact that these researches can become interesting from international point of view, they, as a rule, are interdisciplinary that is not less important and open up more opportunities in various directions.

# TAMAR GAGOSHIDZE: "SCIENCE IS DEAD IF IT CANNOT BE APPLIED IN PRACTICE"

***Dean of Faculty of Psychology and Educational Sciences of Ivane Javakhishvili Tbilisi State University, neuropsychologist, Professor Tamar Gagoshidze is one of those rare scholars whose opinions expressed via media or social networks are equally shared, accepted and praised by people with different interests, values or professions. These opinions mostly concern the upbringing and development of children. However, as the scholar explains herself, she got interested in child psychology at a somewhat later stage of her professional career:***

"By the way, I am not a specialist of child psychology. Child neuropsychology was not a field of my primary interest. I was primarily interested in studying behavioral and mental changes caused by damage to an adult brain - this was the main focus. I developed the interest towards children somewhat accidentally, as people often sought advice, assistance from me in that area. I though then that the knowledge of neuroscience could be well deployed in dealing with child development problems and effective teaching of children and actually, that appeared to be true.

"That was a purely practical activity because I did not have scientific interest. Science is the generalization of practical activities. It proved to be an inductive approach whereby we gathered much empirical material, discerned regularities and then felt a desire to verify those regularities. We examined the results, which we obtained through empirical work, with various groups and put them in practice. Science for science is unacceptable for me; it is important that people benefit from our science. Abstract science is something that I cannot understand. Even fundamental, theoretic science necessarily translates into practice. For me, science is what we encounter in daily life; it means analyzing, generalizing, modelling it and testing these models. Do these models work? If they do not, then you analyze where can they work and cannot work? When you see a variety of problems and at the same time, discern some regularities, it becomes very interesting and then, you develop scientific interest too."

**– Many people, including my friends, frequently share records of your broadcast appearances on social networks. I have heard many of them saying that in your talks everything seems so clear and simple but it would be difficult for them to arrive at those findings themselves.**

– "I cannot say what makes it simple. This might be resulting from practical experience. In fact, science is the theory in practice. Science is dead if it cannot be applied in practice. There is a term 'applied science,' though it sounds somewhat weird to me. Even the most theoretical and fundamental branches of science, in physics and mathematics, are necessarily applicable. If they are not now, they will be in future."

**– How important is that conclusions and findings, in addition to being understandable to society, are shared by international scientific circles too?**

– "I do not have extensive international contacts. Our field of science is, in general, somewhat closed in this regards. Moreover, my generation was raised in a closed regime and studied in a closed regime too.

"It pleases me to find out that we have independently arrived at a conclusion which other scientists arrived at too. I remember my emotion when, being on my first visit to the US, I found a book about the finding which we arrived at ourselves through observations and theories. Then

it turned out that it was not my sphere of science at all but belonged to the sphere of occupational therapy; however, the principle itself and the approach were interesting.

"Similarly, in Germany I discovered the system which I and my employees had been using in our work with children, the only difference was that it had a different name; thus, it was very pleasant to find out that other people applied the same holistic approach."

**– What makes you approaches to children different?**

– "Our system of neuropsychological habilitation and rehabilitation rests on the theory which implies that the functioning of an individual is multifaceted and negative, i.e. minus, symptom and problems represent just one facet of it. We must not concentrate on these problems. We must find strengths and compensatory mechanisms to substitute the negative with them.

"We follow the logic of development; we know what comes after what and know how to work. You either work bottom-up, i.e. from so-called elementary to complex or vice versa, depending on a situation. We deal with the situations when biology cannot be changed, bad cannot be eliminated – we cannot change damaged or dysfunctional central nervous system, but we can offer such situations to this system where it can learn how to reconstruct, how to develop new mechanisms of adaptation and functioning.

"This system works virtually in case of any developmental disorder and any type of damage of central nervous system. We apply the same principle both to adults and children. An additional difficulty with children is that along with their problems children, at the same time, develop. Development has its regularities; it may be retarded, atypical or distorted and therefore it is important what type of development it is, what logic it follows. We apply behavioral models too because a human being has motivation and requirements. However, we look at human behavior in a broader sense and consider it in a broader, multi-faceted context than just motivation, incentive and reward or punishment."

**– Have you had cases when you achieved such a success that you could have hardly imagined at the beginning?**

– "Clearly, our forecast is more pessimistic than the result may prove to be. When large sections of brain are damaged, for example, when after a traumatic brain injury and insults, an individual cannot speak, cannot self-regulate behavior, has his/her memory lost and is disoriented, it is difficult, by any logic, to make an optimistic forecast.

"However, a human nervous system has amazing plasticity. We just exploit this capacity of the nervous system. In the past, it was assumed that neurons cannot regenerate; however, it has been discovered that the process may be renewable, that new systems that are connected to other neurons may form.

"Neurosciences have accumulated enormous amount of practical information. Our object is not a neuron activity, our object is an individual. There are numerous modern studies that explain what's going on in the brain; there are amazing studies and results which describe neurophysiological and neurobiological reasons of plasticity of brain, neuron systems. This does not seem a miracle to us because at the end of the day, we sometimes obtain the result which we have not expected ourselves: an individual did not speak but has started to speak after neuropsychological rehabilitation, while his/her brain is damaged in those sections which are responsible for speaking; nevertheless, the individual speaks.

"There are cases when there is either no progress or a very insignificant progress. Such cases are very frustrating."

**– People should, perhaps, know more about these possibilities because having hope is very important.**

– "Our work and science is linked to values. For example, neuroanatomy also studies brain but when we study the brain activity we study it in relation to human behavior which is linked to values. Attitude is very important; it is important what you believe in.

"Deficit and defect is one facet of reality and that reality has many other facets. Although we work on deficit, we take into consideration those other facets too.

"One may think that neuropsychology and neuroscience is a science for itself and is not connected to real life. But, this is not true. Our method and approach has proved successful because we apply them not only to the results of functioning of damaged brain but also to ordinary people. Their brains function normally. A normal brain may not have those problems that damaged, dysfunctional brain has. But it was precisely the damaged and dysfunctional brain that taught us what a normal functioning of brain should be. You cannot understand a clock mechanism unless you dissemble and then assemble it. The same holds true for brain functioning. Interaction with people having damaged brains teaches us the functioning of which system affects human behavior, emotions, cognition. True, such a brain is qualitatively different, but it shows principles of normal functioning better, shows what may be changed in normal functioning. I am addressed as a representative of positive psychology or psychotherapist, but I am neither of them. I am a neuropsychologist who knows how brain works and how our psychological state affects our brain and vice versa, how our brain affects, how it changes our psychological and behavioral activity.

"Positive expectation is of great importance. There have already been conducted studies that tell us that psychological state has a serious impact on our physical condition and I can cite numerous examples of that.

"Psychosomatic medicine is not 'in fashion' in Georgia. In the developed world, however, every disease – from stomach ulcer to skin diseases, is considered psychosomatic. Consequently, the approach to treatment is psychologized. A patient is actively engaged in his/her treatment; a strong emphasis is placed on education and psychological wellbeing.

"If you do not have a positive expectation from an ordinary individual, that individual cannot be motivated. Numerous psychological studies have proved that. This is especially obvious in case of children. For example, a change in teacher's expectation, may undermine a pupil's motivation, a pupil may lose interest in learning and from a well-doing pupil turn into a failure. Or vice versa, with his/her expectation and encouragement a teacher may motivate an unsuccessful student and help him/her achieve success and realize his/her own potential."



**– Does the existing tense situation, conflict in society affect our physical health?**

– "Definitely; but it raises a question: why is the situation so tense? It comes from mental state, doesn't it? People are unhappy, they failed to achieve their aims, everyone is unhappy about their lives. A low happiness index, which we have, affects our physical health. When people are stressed, it affects their physical state, they fall ill more frequently because stress undermines their immunity, they feel unhappier about their lives. This causes tension, anxiety in society.

"What does the management of emotions mean, in general? Our brain consists of three parts: brain cortex, which is the director of everything, then comes midbrain and finally, the oldest and seemingly elementary section of the brain – brainstem. But this elementary section is a vital part. The frontal lobe of brain is precisely that lobe which manages other parts, it receives information from every part and gives commands to act. At the same time, this is the very part which can be influenced by society.

"The phrases - 'You have your forehead nerve snapped,' 'you have lost forehead' [meaning, a person lost honesty, decency] – are not accidental. With the frontal lobe of the brain an individual controls his/her behavior, quells impulses that are unnecessary and inadequate to the situation, sets goals, devises plans, manages risks.

"There is a well-known case of Phineas Gage, which is cited in every textbook of neuropsychology as an example of frontal lobe injury, illustrating how such injury may turn a very polite and well developed, hardworking man into an impolite, impulsive and rude person.

"In reality, the frontal lobe develops until the age of 21, whereas all other parts are developed by the age of 11. I am talking about formed systems which more or less determine behavior. If you cannot learn how to quell the impulse and self-regulate before the age of 21, after 21 I will not be able to teach you how to do that; if you cannot learn how to make a choice before the age of 21, after that you will find it difficult to learn how to choose; if you failed to learn to act and plan according to you aim before the age of 21, after that I will not be able to teach you that."

**– You said that you do not have much international contacts. However, you are the most cited scientist among contemporary Georgian psychologists. What are the topics you are most frequently cited for?**

– "Neuropsychological topics which relate to epilepsy, because quite a long time of my life has been and is connected to the treatment of people suffering from epilepsy. In this regard, the Institute of Neurology and Neuropsychology was, I think, the only institute in Georgia. It was also the institute which implemented the state program and consequently, numerous research papers were published on the treatment of epilepsy and psychological peculiarities of people suffering from epilepsy.

"Epilepsy is the life of a person and how he/she views this life affects his/her treatment. Epilepsy has biological causes: pathological activity of neurons, though it is also related to psychological and neuropsychological problems and often, person with epilepsy suffers from psychological problems more severely than from the disease itself.

"I remember, in the Soviet period parents kept their children out of sight; even now parents find it difficult to openly acknowledge that. By acting so they try to protect their children and themselves from stigmatization.

"Sometimes consciously and sometimes unconsciously such persons are viewed as inferior, different and this is one of the signs of stigma. Stigmatization occurs when it is shared by a powerful group.

"The degree of stigmatization has been gradually changing, though plenty of prejudices remain with regard to epilepsy. There is another extreme too, when they think that 'it is nothing.' This is rejection. Such rejection is characteristic of family members, society and people suffering from this disease themselves.

"Our most recent paper, which will soon be published, concerns stigmatization of persons suffering from epilepsy. It describes in detail how teenagers with epilepsy perceive their condition. They think that they have no future. For example, girls often associate epilepsy with infertility, ugliness. Boys associate it with passivity, loneliness, past. These views come from a surrounding environment, prejudices. Unfortunately, the study showed that these youngsters lack positive expectations – in this regard, the state of girls is graver than that of boys."

**– Can we manage our expectations?**

– "Of course, we can; this is a realm of psychology. But expectation must not be inadequate – this is problematic. We have problem in both cases, when the expectation is inadequately low and when it is inadequately high. The main objective of upbringing is to help a person form adequate expectations and relatively adequate impression about him/herself, be self-confident but without inadequate narcissistic traits.

"Now we are talking about the formula of success. The functioning of our brain is very important in this case, because with our psychological attitudes we can somewhat influence it. Adequate expectations and self-esteem is a foundation of an individual's mental health."

## KHATUNA MARTSKVISHVILI:

# “CARING FOR THE DEVELOPMENT OF COGNITIVE SKILLS IN CHILDREN IS VERY IMPORTANT AND VALUABLE IN OUR SOCIETY, ESPECIALLY AS IT IS CONSIDERED THAT EMOTION MANAGEMENT AND CONTROL SKILLS EXIST AND ARE ESTABLISHED BY THEMSELVES. HOWEVER, THEY SHOULD BE STUDIED EQUALLY AS WRITING, READING, FOREIGN LANGUAGES AND MATHEMATICS”

*Khatuna Martskvishvili belongs to the young generation of Georgian psychologists who already managed to gain a foothold in an international scientific market. Her research about emotional intelligence is well cited. The topics of her research, among them psychology of personality and individual differences, and positive psychology – emotional intelligence, creativity, stress coping strategies and posttraumatic growth, are interesting not only for science, but also for the society unaware of psychological issues. Probably that is why the Doctor of Psychology, Associate Professor of the Faculty of Psychology and Educational Sciences welcomes her choice made in favor of the university and science as the right and best decision.*



– When I graduated from the university, along with working at TSU, I worked in some other places too – the Ministry of Education and Science, school; I was also involved in various projects. I worked everywhere, where I could. Since 2005, I worked as Assistant Professor. It was just then when I understood that nothing gave me better opportunity for professional growth and development than the university and working with students. It was a well-thought-out choice. I knew that one can never receive good income from it, but nothing made me happier than the university and students. In addition, we had a research group working on personality and individual differences, psychological assessment and counseling issues. We worked together but at the same time we were friends too and worked for almost no money. Thus, we overcame especially difficult period for science. We, the entire team, are still cooperating closely and I believe that this cooperation has largely contributed to the achievements made by each of us.

**– Emotional intelligence is one of your research topics, which is very important and, at the same time, very interesting for the public.**

– I first got interested in emotional intelligence in 2005. We, the psychologists, are actively researching general intelligence, so called IQ. If you want to study individual differences, intelligence is one of the most important topics, which cannot be frequently bypassed. However, I thought that besides general intelligence, there was something else, very important individual characteristic, which was necessary for academic or occupational achievements or for successful social relationships. But I did not know what it was. Then I accidentally came across the book “Emotional intelligence – why it matters more than IQ” by Daniel Goleman. I came across this book accidentally in the waiting room of one of the centers. It happened before 2005. English-language scientific literature was not easily available at that time. It was just since then when I became infected with mythical intelligence. From 2007 I started working on emotional intelligence actively. Everything what I was working on, I linked to emotional intelligence. But nobody was interested in it then. Today, this topic has become very popular. Moreover, there is a false and a bit exaggerated interpretation about emotional intelligence – if you have high emotional intelligence, you will definitely achieve success. Emotional intelligence really helps achieve success in both social relations and academic field or career, but only simultaneously with a certain level of general, cognitive intelligence. Therefore, we should consider the role of emotional intelligence while controlling the level of other characteristics.

Emotional intelligence is the ability of individuals to recognize and understand, as well as to express, manage, regulate and use their own emotions and those of others. Intelligence had always been in the focus of attention here. Even today, cognitive aspects are very important. If we look closely, parents will spare no efforts to teach their children foreign languages or any “important” subject, for example, mathematics. Caring for cognitive development is very cultural and traditional. However, nobody cares for emotional development. Caring for the development of cognitive skills in children is very important and valuable in our society, especially as it is considered that emotion management and control skills exist and are established by themselves. However, they should be studied equally as writing, reading, foreign languages and mathematics.

**– Can emotional intelligence be developed?**

– Yes, emotional intelligence can be developed; though slowly, but it can be developed and learnt. At the initial stage of researching emotional intelligence I was more skeptical, but today I believe that it can be studied gradually. Of course, it is impossible to turn an individual who cannot perceive emotions in others into an individual who excellently reads the emotions of others. But generally, skills of perception, expression, management and use of emotions can be trained and studied. The smaller a child is, the earlier we teach them how to manage, how to express their emotions in an acceptable form, the better and certainly, the probability for their development and training will be higher. The same is with general intelligence. A chance of development is higher at a younger age. As for training at a later age, it will still be accumulated as knowledge about how important it is to perceive and understand the emotions of others, to manage and express own emotions. It later brings success in itself and it can be trained.

There are three main models of emotional intelligence. According to one of the models, emotional intelligence is a personality trait; the second model discusses it as an ability which very much is based upon intelligence framework, but here reasoning and thinking operate on emotional information and emotions facilitate thinking process. According to the third model, emotional intelligence is nothing but a studied and acquired competence. No matter within which model we discuss emotional intelligence, as a personality trait, ability or competence, it can be studied and exercised within certain limits.

**– If it is a personal trait, how can it be developed?**

– Recent research proves that personality traits, which were considered to be stable and unchangeable during entire life, appeared to change more or less and most of all, during childhood. But, of course, it happens within certain limits and various traits are changed at a various degree. Therefore, if we discuss emotional intelligence as a personality trait, it can be changed and developed.

**– I have come across a lot of trainings recently. Emotional intelligence is mainly linked to success. If you train your emotional intelligence well, you will become more successful. Is it true?**

– Yes, because research proves that those individuals, who have high emotional intelligence, can easily cope with problems, have fewer mental health problems, are very successful in social relations and achieve success in various domains. Shortly speaking, they achieve success in social relations, academic field and career. Of course, it is a good marketing trick to declare that success can be achieved through training emotional intelligence, but development of emotional intelligence really brings success in both, social relations – family, romantic relations, friends – and education or career. As I already mentioned above, if I read others’ emotions, I will be able to understand, manage and adequately express my emotions and respectively, I will be better adapted to the environment and be more successful. If I understand that now I am angry and that is why I am making this decision, I will wait and refrain from making this decision. This preliminary understanding and assessing of feelings, emotional control will ultimately lead us to good results. Understanding emotions and their management really helps people achieve success in various fields.

**– How can you diagnose yourself?**

– There are various tools to assess emotional intelligence. We also have instruments adapted to the Georgian language and to our culture. But if it is easier to assess intelligence in case of general intelligence, because there are standardized tests, where a question/task has one correct answer, here we have to pass through the more difficult path. There are two methods of assessment – objective methods (for example, how well an individual can solve emotional tasks/problems) and subjective methods, which are self-report instruments, when an individual himself/herself assesses own emotional characteristics. It should be noted that during self-assessment, people frequently assess their capacities quite well.

**– Let's imagine that I am a parent of a five-year-old child; he/she takes English, music lessons and now I think what else I can do to help my child develop emotional intelligence?**

– Many European and U.S. schools offer special programs, activities aimed at emotional development of a child. In Georgia, we do not have a great choice, but it should be noted that the national curriculum envisages support for emotional development and it is considered one of the priorities. When we talk about child development, we should take into consideration cognitive as well as physical and emotional development. And what happens here? Parents always focus on a child's intellectual development. Though rarely, they still care for their child's physical development and engage their children in sport, for example, swimming, when they are still small, but ultimately they prefer to focus on their intellectual development. Emotional development is actually left beyond their attention. It should be noted that playing, sport, physical activities are excellent means to help children learn better, develop and train their social and emotional skills.

**– You have shown interest in positive psychology as well. What does positive psychology mean?**

– Two years ago, we received a grant from the Shota Rustaveli National Science Foundation for the development of a doctoral program in psychology and today my colleagues and I are actively involved in conducting research in this area. My interest in positive psychology can be explained by the fact that the topics of my research interests are united under a common umbrella. I also teach positive psychology as an elective course on BA degree program.

Positive psychology is a relatively new direction in psychology, which completely changes the perspective of vision about an individual, his/her functioning and psychological counseling and it mainly focuses on personality growth, mental health and effective functioning rather than on pathology. It studies various aspects of a person's positive functioning at biological, personal, social relations, institutional and cultural levels. The purpose of the research conducted in frames of positive psychology is to research those factors, which affect an individual's psychological/emotional well-being. It is a new, collective identity for the scientists studying these issues and not a new area, which has never been explored by psychologists. Simply, there is some misbalance in psychology – we constantly study mental disorders, conflicts in social relations, problems and we have accumulated huge knowledge in this direction. Modern positive psychology movement has emerged just from recognizing and perceiving this misbalance; from the desire to encourage the research of rejected positive topics and to make psychologists as much interested in improving the lives of normal, ordinary, healthy people, as in treating pathology.

**– Did your choice made in favor of science and university justify itself?**

– I am really happy with my choice and I have never regretted it. I think that my hopes have been realized. I believe that nothing gives us an opportunity for professional growth and development, as the university and working with students. Professional growth leads you to professional satisfaction and ultimately to happiness and psychological well-being.



# KORNELY KAKACHIA:

# "IT IS HIGH TIME TO ENGAGE IN THE ACQUISITION AS WELL AS CREATION OF GENERAL HUMAN KNOWLEDGE"

*Kornely Kakachia, PhD in political sciences and Professor at Ivane Javakhishvili Tbilisi State University, is well known to Georgian and international community for his research papers and expert comments on Georgia's domestic and foreign policy. He is a cofounder and director of Georgian Institute of Politics, a think tank based in Tbilisi. The scholar discusses his explorations into geopolitical aims of small countries and changeability of these aims; tries to promote the idea of "Black Sea Trio" region instead of conventional South Caucasus Region; exposes "borderization" as an important political lever in the hybrid war; explains the reasons why Russia's war against Ukraine may never end.... Although his papers appear in numerous academic editions, he thinks that it will take Georgian scholars great efforts to attract international attention to their researches and studies on Georgia. Therefore, we started our talk with this topic:*

"Social and political sciences is a relatively new field of science in Georgia and it is no wonder that we do not have such strong traditions in this area as we do in many other fields. We lack expertise to internationalize this sphere. This criticism is especially directed at theoretical approaches and the understanding of a whole set of issues. If we look at our best researchers of politics we will see that their research is focused on either the region or the country. This is natural, but it must not acquire a form of regional studies. We must avoid stereotyping ourselves on the international arena as writing only about Georgia because we are Georgians. This trend needs to be changed. We must engage in the acquisition as well as creation of general human knowledge; we must analyze available literature and modern scientific approaches which already are readily accessible today; we must also gain insight into processes underway in the world so as to be able to make a comparative analysis between Georgia and other countries and to understand the realities of our country as well as the entire region in a wider context. The role of young researchers in this process is enormous. I think a new generation has yet to secure their firm place in the academic sphere and it is crucial to open this sphere to them. Fortunately there are young, promising Georgian researchers who publish their papers in international academic editions, but we must provide them with the opportunities to get engaged and established in the Georgian academic space."

## "South Caucasus" or "Black Sea Trio"

"Over the past 27 years, the European Union has made efforts to transform a historical and geographic region of South Caucasus into a "political region," much like it happened in the case of, for example, the Baltic region. However, developments of recent times have convinced everyone, including EU officials, that "South Caucasus" is a failed political region rather than a sustainable entity oriented on further political integration. The modern history of EU integration has shown, however, that it is important for the EU integration process which region a country belongs in.

"The book Geopolitics and Security: A New Strategy for the South Caucasus, which was presented in Berlin, is authored by a group of Georgian and European researchers.

"The key objective of the book is to offer the EU to abandon its solely traditional, conventional regional approaches in terms of EU integration and to view Georgia, Ukraine and Moldova as a common region of "Black Sea Trio." The tradition of considering Georgia as part of the South Caucasus alone should be changed because we are a littoral state of the Black Sea too, which is geopolitically more interesting for Europe today. Hence, the EU needs to rethink those political stereotypes that will impede the European prospects of countries of the region. In this sense, it is clearly much more favorable for Georgia to be grouped with Ukraine and Moldova than be confined to the South Caucasus where each state has chosen its own different geopolitical vector. We believe that the EU needs to foster a new geopolitical and regional identity, to separate the EU associated countries of Georgia, Ukraine and Moldova from Eastern Partnership countries, as it was done in due time in regard with the Baltic states. This will be important for the European prospect of both the region and Georgia."

## Why Russia's war against Ukraine (and Georgia) may never end

"One of inherent problems of Russia is the fight between pro-Western and imperial ideas. As Zbigniew Brzezinski once famously observed, without Ukraine and Georgia Russia will cease to be an empire. The Eurasian Union without Ukraine and Georgia is functionally unattractive organization. Domination in Kirgizstan, Tajikistan, Kazakhstan, Belarus and Armenia is not something that could satiate Russia's political ambitions. Many in the Kremlin believe that without Georgia and Ukraine they cannot build an empire that would be the counterpoise to the US and the EU.

"In this sense, Ukraine, for its political weight and geographic location, is naturally more important for Russia. Furthermore, the Russian political elite and society, in general, deem it unacceptable for Ukraine to be an independent state as they believe that these two Slavic nations are intertwined with their shared identity. Putin openly declares that Ukraine as a nation does not exist; Russians find it difficult to overcome the imperial mentality.

"Georgia is also important for Russia because having control over Georgia means having control over the entire South Caucasus and having control over the South Caucasus means having control over Central Asia. This is extremely important for Russia."

## Borderization – tactics to thwart Georgia's Euro-Atlantic aspirations

"Borderization (i.e. expansion of territories occupied by Russia, instability along the dividing line with the occupied territories) is a Russian tactic deployed in Georgia to obstruct Georgia's Euro-Atlantic aspirations. The country where people can be kidnapped at its borders is not an attractive option for investors. Consequently, Russia's aim is to create an image of Georgia as of unstable failed country which one cannot pin great hopes on because it will never be able to succeed as a democratic state."

## Georgia as a promising example of democratization

"Georgia somewhat managed to become a successful model of democratization in the region. Had it not been so, Georgia would have never received that international support which it continues to enjoy to date. Irrespective of our geographic isolation, which has always been the Achilles heel of our country, we still manage to attract attention. We do not have oil or other significant mineral resources, but the successful reforms implemented in a number of areas of public administration over the past decades have actually made us the regional center of continuous democratic reforms. It is also apparent that the failed post-Soviet state strives, more or less successfully, to stand on its own feet and to carry out political transformation. All this triggers interest and sympathy in Western countries towards Georgia. The West deems it important to provide support to such country regardless of the fact that Georgia is not a consolidated democracy yet and is still undergoing transformation.

"Is a small country like Georgia capable to successfully complete its democratic transformation especially when it neighbors with authoritarian countries? Is it possible to maintain a small European-type democratic island in the long run? These questions, naturally, arouse interest and sympathy in the West and that's why we enjoy the support which we have now."

## Geopolitical aims of small countries – how their politics change

"Research into small countries was popular several decades ago, though with the emergence of new trends of realism and liberalism this area of research was considered unimportant. However, not every scholar agrees with that. Developments in small countries may often turn well-established paradigms and theories upside down. This is precisely the perspective from which small countries are interesting and this kind of research was pioneered by Alexander Rondeli in Georgia. According to a classic theory, small states do not have a significant role in international politics because they cannot influence it. Given their small size they are rather restricted in pursuing their own foreign policy. Some scholars go even farther to claim that small states are objects of international politics, not subjects. In our research we have tried to show that while a small state may be an insignificant player, its foreign policy may change in line with the developments inside the country and under the influence of a political regime running the country; to show how important are the attitudes of political elites at times of the power change, how a new regime alters attitudes towards other countries and how this may affect international politics. The research paper on this topic provides attitudes of two political parties (the Georgian Dream and the United National Movement) towards Russia. We conducted 40 interviews. We launched this research in 2013, when the change of power already took place as a result of elections and we had the luxury of interviewing former foreign minister, vice-premier and other important former decision makers (the total of 20 interviews). As for the new government, we interviewed all those persons who worked on the foreign policy. However, compared to representatives of the former government, much fewer representatives from the incumbent ruling party, Georgian Dream, agreed to be interviewed, because it proved difficult to find the respondents among them, who would have some experience in foreign policy.

"One of the difficulties in studying politics is that politicians are honest only after they leave their jobs. It should also be noted here that politicians are not keen to cooperate with scholars and this is a serious problem but a topic of separate discussion.

"As regards the results of our research, they showed that both political parties developed their identities with regard to foreign policy relations. The policy of Georgian Dream towards Russia is more pragmatic and less ideology-driven; the United National Movement, however, is in favor of strongly ideology-driven and value-based foreign policy. The Georgian Dream is ready to even make concessions to Russia in some cases. The United National Movement has an uncompromising stance including on defense and strategic security issues. Despite differences between these two political parties they have common approaches too, but it is clear that the Georgian Dream's tactic is different. However, this different tactic has not led to any radical improvements in relationship with Russia; for example, steps taken by the Georgian Dream has led to the resumption of some in trade and economic and humanitarian relations, but they did not achieve any breakthrough in the relationship with Russia. However, neither the research nor a paper prepared based on it reflects the problems that the Georgian Dream came to face with Russia later, because the paper had already been published by that time. Time matters very much in the research of politics, this is a characteristic feature of this field of research."

# JOSEPH SALUKVADZE:

## "SEPARATE GROUPS OF TBILISI CITIZENS MUST GET USED TO CONCEDING THEIR NARROW PRIVATE INTERESTS FOR PUBLIC BENEFIT AND WELFARE OF FUTURE GENERATIONS; THIS IS THE ESSENCE OF SUSTAINABLE URBAN DEVELOPMENT"

*Buildings constructed within arms' reach of our windows, dust in the air, crowded roads and traffic jams, shortage of public and recreational spaces and the feeling that this needs to be changed have led to a dramatic increase in the interest towards the topics of urban development. To discuss these issues, one can hardly find anyone better than Joseph Salukvadze, Professor of Tbilisi State University, researcher and specialist in human geography and urbanism, who in parallel with the practical activity has been engaged in scientific work for many years now. He gained his vast experience through studying cases not only in Georgia but also post-Soviet and other countries, by directly engaging in the development of renewed land-use master plan of Tbilisi and in dealing with urban problems of other countries. He served as Dean at the TSU as well as Deputy Rector and simultaneously led international projects, participated in researches and worked on solutions to practical problems. We started our interview with Joseph Salukvadze with the question about his choice of profession:*



**– How come that you developed interested in geography, urban studies? Young people often do not fully understand how interesting this sphere may be.**

– "When finishing the school, many years ago, I did not have a clear idea of which profession I would like to master in future. However, it happened so that in the early and mid-1970s, a newly established profession, called economic geography of foreign countries, gained in popularity. This specialty appeared innovative and attractive to me and my future colleagues because relations with foreign countries was not a usual sphere of activity in the Soviet Union because the overwhelming majority of the population could neither interact with foreigners nor travel abroad. In addition, the new specialty implied nuances of diplomatic profession which was a luxury and opportunity for Georgia one could hardly imagine at those times. Moreover, students of that faculty were taught foreign languages – one western and another oriental language. The educational program was very good, we had acclaimed lecturers such as Nodar Nachkebia, Vazha Gujabidze, Aleksander Rondeli, Revaz Gachechiladze, Gia Tsagareli; hence, I was happy. The faculty brought together quite a distinguished group of professors and then, of students, many of whom, after Georgia gained independence, represented the country in the international arena in the capacity of ambassadors and diplomats.

"There was indeed something accidental in my choice, but the topic of foreign countries, a broad outlook that geography implies, stirred up my interest. As regards urbanism, it attracted at a later stage of my life. As the time passed by, I became increasingly interested in issues concerning the functioning and development of cities. I was given a very good opportunity to cooperate with local specialists, to engage in professional networks and to establish contacts on the international arena. In 1991-1992, within the framework of the Swedish Institute program, I went to Sweden to study at Stockholm and Lund universities; before that, I participated in a joint research program at the University of Lodz in Poland while in the late 1990s, I was awarded the Fulbright scholarship and went to the Massachusetts Institute of Technology (MIT) where I was involved in urban planning and regional research program during nine months.

"It is clear that since then I have been working in the same field, conducting researches, performing pedagogic and scientific activities."

**– In your opinion, what determines the interest of foreign scholars to your researches?**

– "There is a widespread opinion that international community is not interested in Georgian scientific work. It's a fallacy and I, naturally, disagree with that: it depends on what you write and how you write, as well as how you position it within that coherent theoretical and practical context which is acknowledged globally. There is a certain room for post-Soviet cities and urbanism in the field of international research, which is not as developed as the research of classical Western cities, but has secured its place in the science in terms of factual and empirical evidence as well as theories and concepts. References are frequently made to studies conducted in cities of our region and therefore, when a research is conducted properly, rests on interesting and reliable materials and provides a thorough analysis, it is read and applied too. I think, the argument that Georgian reality is not interesting to international scientific community is weak. It is not interesting if it lacks substantiation. Researches on Georgia and of Georgian topics will be interesting if they are written, designed, structured and substantiated properly.

**– One of the areas of your research is the urban development and transition of post-Soviet metropolises. Is there a logic in this reformation? One can often hear that, for example, Tbilisi and Batumi have developed without any logic and plan. Is this true? Are there similarities between Georgian cities and other post-Soviet cities?**

– "Urban metropolises are large urban formations, especially around capital cities, which go beyond the legal boundaries of a city and cover larger territories. Of course, there is some logic in their post-Soviet transition. The logic is in that that transition happened from one social-political order, with central administration and so-called command economy, to another - the market economy. Radical changes occurred in this transition process – mass privatization was carried out, liberal systems of administrative and economic management were installed. We are not discussing now what was good and what was bad. We are talking about the results and the result was that cities transformed, the logic of their functioning radically changed. The effect of changes was especially conspicuous in central parts of the cities, although now peripheries are also undergoing notable changes. Many see both positive and negative aspects in all that. For example, while in the past, there was a housing shortage when individuals were unable to obtain apartments in the locations of their choice, lacked enough space and appropriate living conditions and were put on the waitlist for new housing, now lots of apartments are available on the market, but one needs to pay large amounts to buy them. On the other hand, numerous constructed buildings, developers' large-scale construction activity caused serious damage to the urban environment, especially in those locations which had been favorable living neighborhoods before. An example of this is the territories around the Tbilisi State University. Constructions and commercial activity seized significant public spaces of many cities.

"Each city has its different logic of development, but at the same time, there are many similar tendencies. Tbilisi and Batumi are distinguished because large scale changes and constructions were carried out there. It could be said that it was an unplanned development, which means that it lacked development strategies on what the cities would look like and hence, many things were done spontaneously. However, it cannot be described as illogical, because the logic of the development was determined by a market mechanism which, unfortunately, is still not fully serving public interest.

"Similar problems in urban development are characteristic for almost all post-Soviet cities; such changes are apparent especially in those cities where much money is accumulated. Because of complex landscape, Tbilisi experienced extremely intensive changes in its central parts; the impact of that on the environment and quality of life in traditional districts such as Old Tbilisi, Mtatsminda, Vake, Saburtalo and Vera is not benevolent at all."

**– You were engaged in the development of Tbilisi land-use master plan. Let me ask you a somewhat rhetorical question: in your opinion as the researcher of urban issues, what will become of this city? Can it be saved?**

– “Indeed, the question is rhetorical; we used to ask this question before too, but have forgotten that we did. However, this question has become more urgent now. Of course it can be saved. It will be saved if we decide to save it. These are the questions originating from the vision and city and urban culture. If the population finds the living in the conditions they live now no longer acceptable, they will change it by all means. However, to achieve that the population must treat priority aspects necessary for society, social living with understanding and must not tolerate many of those violations which we see in abundance in the city. For example, it is very unfavorable to have Eliava market near the city center, with its adjacent workshops’ units that stand next to residential buildings and produce dust and emit hazardous substances when it is possible to relocate all this somewhere else so that to avoid serious harm to the population and the city environment.

“We must not live in a city where one cannot breathe, where crossing a street is dangerous because of unregulated traffic, and so on and so forth. Balance between interests of various interest-groups must be ensured in the city. Citizens pursue their interests, they want to live in a healthy and well-organized city as citizens live in best Western cities. Therefore, various groups must concede some of their private interests. However, one should also recall that the population itself caused much harm to the city; an example of this was that unruly and unhealthy ‘do-it-yourself’ extensions added to houses, which became an unfavorable ‘calling card’ of Tbilisi. New constructions are not carried out on a large scale for the aim of meeting interests of low-income citizens. This segment of population cannot afford these apartments as they are very expensive. Targets of residential high-rises are foreigners who can buy them and invest in them, or locals who already have a number of other apartments and use them for a commercial purpose (mainly, for renting). This is not bad, but is it worth sacrificing precious public spaces that are unique to the city, such as Lisi Lake, Tbilisi Sea, numerous green areas (e.g. gorges of small rivers) and others?”

**– The topic of refugees and migration is one of significant and painful issues for Georgia; in your researches you also study the effect of this process on cities. Can you describe it briefly?**

– “I can describe the developments that took place so far. What happened so far is that after the country regained independence, many people left the country, for reasons that are quite understandable. We should not forget that in the early 1990s the population of Tbilisi decreased from 1 260 000 to almost 1 million within the span of four or five years. These people went abroad. That was the ‘brain drain,’ the majority of them had well-developed urban culture, they led an urban way of life and at the same time, had professional qualifications. Instead, population started to migrate from smaller cities and rural regions to Tbilisi, somewhat offsetting the decrease in Tbilisi population. At present, Tbilisi population is around 1 150 000, which is still less than it was 25-26 years ago. The offset was, however, quantitative; ‘new citizens’ were not accustomed to urban life and therefore, they brought with them a different, non-urban mode of behavior and attitudes towards urban spaces. The environment in Tbilisi changed not only in physical terms but also in social and cultural terms and this comes as a disappointment to very many people, especially those who lived in the Tbilisi of earlier times.

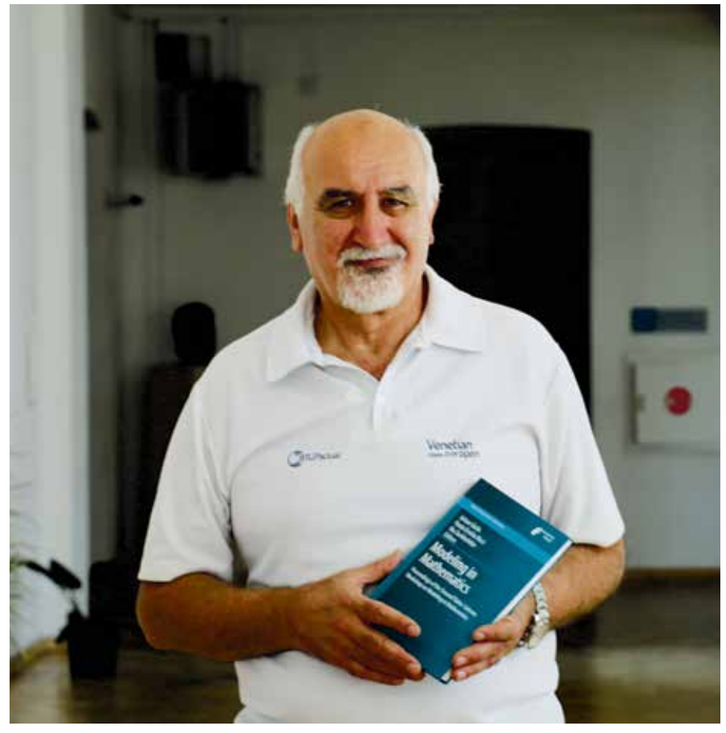
“In addition, Tbilisi has become more mono-ethnic, populated by Georgians, compared to the earlier period when it was a rather cosmopolitan city. By the time of the breakup of the Soviet Union, the number of Georgians in the population of capital city stood at maximum 65% whereas now it is more than 80%. Many citizens of different nationality left Tbilisi. This has also changed the culture. It is very arguable whether this is a positive or negative development. The fact that you see many tourists, visitors, especially from Oriental countries, which sometimes does not stir up excitement among us, is one of the indicators that Tbilisi is a vibrant city and attracts people of various origin and it is impossible to enclose it and prohibit the entry to everyone. We must learn not only to coexist but also to integrate with those who come in and must direct their capacities towards the needs of the city.”

**– You are among those researchers who apply their scientific knowledge in practice, including in the practice of neighboring and faraway countries. How important is for a scholar to have his/her researches applied in practice?**

– “My experience as well as the experience of my colleagues proved that our specialty cannot develop in the form of theory alone. It is very beneficial to use the knowledge, that theoretical and conceptual base which you have in the practical activity. This is, of course, a huge advantage.”



# ILIA TAVKHELIDZE:
# „FUNDAMENTAL RESEARCH HAS ONE GOOD ASPECT – CALMNESS. IN CALMNESS SOMETHING MORE SERIOUS COMES TO LIGHT. IN A HURRY, YOU MAY CATCH THE MAIN THING BUT MISS THE BEAUTY“




***It is not an easy task to familiarize children with science, especially mathematics, which children often find very difficult to understand, and explain it in a language they can comprehend. However, the PhD in Physics and Mathematics and Associate Professor of Ivane Javakhishvili Tbilisi State University, Ilia Tavkhelidze, never refuses to meet attendees of “TSU – Children’s University” to help them learn mathematics. Children’s University, this interesting platform of familiarizing schoolchildren with science, on the one hand, enables youngsters to attend lectures for free and on the other hand, provides an opportunity to lecturers to learn about interests, expectations, and quality of education of their future students. It is precisely with this topic that we started our interview with Ilia Tavkhelidze:***

“I think, many distortions took place in the education system. Mathematics, this one of the finest, prettiest and most refined fields of science, has been turned into a scarecrow for threatening children with exams. Therefore, the attitude children develop from the start is that they cannot learn mathematics because they know that they will have to take some very difficult and terrible exam in future. I think that the TSU – Children’s University is doing a great job by stirring up interest among youngsters towards science and enabling them to, so to say, ‘try’ what it tastes like. Many schoolchildren who attended that establishment, became students of the Tbilisi State University. Let me say that classes conducted there strengthened my conviction that when properly explained, math stirs up interest instead of fear and triggers a “tumbler for thinking“ in other words, young people start think! Because mathematics is the science about general regularities. No offence, but, unfortunately, many sciences are not included in the list of sciences of Galileo. Mathematics is the language of science because the great book of nature is written in the language of mathematics. It is a general regularity. A regularity that depends on time, personality, and management order cannot be a regularity. The knowledge of mathematics is not only the knowledge of mathematics for passing exams. It is our readiness, a degree of readiness to distinguish general regularity from local regularity and capability to understand this regularity. Are we ready to come in touch with something constant? What is constant? For example, if you divide a circle's circumference by its diameter you will get the number Pi (π). The science of mathematics operates precisely

with such regularities. Modern schools, modern countries that are world leaders, have, of course, understood that. By the way, the first among Georgian scientists to realize the necessity of knowing mathematics was Georgian mathematician Niko Muskhelishvili and he said - we must take this path. We must be capable of logical reasoning because Georgia survived over the centuries it was owing to the fact that it was always contemporary. This small nation was able to master whatever was advanced and beneficial. As soon as it stopped, lagged behind, stood frozen on one place, bad things instantly started to happen. With the establishment of the first Georgian university, Tbilisi University, a school of Georgian mathematics was created there, that was also the result of keeping up with the time and its demands."

## The beginnings of school of Georgian mathematics

"Georgian mathematical education rests on the activity of, as we call them, big four. They are Andria Razmadze, Giorgi Nikoladze, Niko Muskhelishvili and Archil Kharadze – three French-speaking and one German-speaking professors.

## They were all educated in Europe

"Georgian math school drew on the experience of European math school. It began in 1918; of course there were several assistant professors, assistants who were graduates of Russian military school, but the professors who were responsible for the advancement of mathematics or any other field had purely European academic background and therefore, the first generation of students raised by them proved to be extraordinarily effective. Among them were Ilia Vekua, Viktor Kupradze and many others. The next, that is, our generation came to face a different problem - whether we would be able to maintain those levels of achievement or not."

## Mathematics today

"Survival came in the form of the right to freely cooperate with Europe. Best students go to Europe or the USA. Thus, CERN, Bochum or London get highly qualified people without spending a penny. That is good for students, good for London, but what about our science? No one argues that international cooperation is very important, but those people must be also provided with opportunities to work in Georgia.

"For mathematics to develop as the science it is necessary, first, to engage in international projects and second, to raise the level of school education. The latter is extremely important because it is from where our students come. When a student's level is low, it takes very long to improve that level. Everyone is very much mistaken if they think that four years is much time. It is very painful for me to see that Georgian students do not choose the field of Niko Muskhelishvili and Ilia Vekua; they do so not because they lack talent but rather because these fields of science require lengthy and titanic work.

"At present Georgia needs around 6,000 math teachers. Half of them fall short of modern requirements. Elementary calculation suggests that even if we supply 100 teachers to schools every year, it will take 30 years for Georgia to solve this problem; but, can that problem be tolerated for so long?! Many universities should work diligently to achieve this goal.

"Young people are in search of quick solutions – as they pay for education, they want to see immediate results. We want to reconcile irreconcilable. In due time, large amounts were invested in the education of Georgian mathematicians: Giorgi Nikoladze was Niko Nikoladze's son and thus, did not have to worry about earning on living from this activity; Archil Kharadze was not a wealthy man but a son of postmaster, however, his postmaster father managed to send his son to Germany to acquire education and covered the cost of full course of his studies. Niko Muskhelishvili was not a poor man either, he defended his thesis in France. But there was someone who invested in this education, wasn't it? His father was a military officer. Andria Razmadze also went to France and let no one say that he was a son of poor father who had nothing. Ilia Vekua was sometimes a subject of ridicule from others who used to say that his father sold cattle to pay for his son's education. Indeed, his father sold his cattle and in addition, half of his house. Having done so he told his son: this is your share of the property, you made a choice to live in a city and to obtain education; I sold your house, take this money and do whatever you decided to do. Vekua took a personal decision himself. These people were used to taking strategic decisions. They want to do science and this is a very important choice.

"I am glad that many of my students have started to act in such a strategic manner; they often take out loans to go abroad. We should not think that all 100 graduates of the math faculty must engage in science as it will suffice if 2%-3% of them do so; however, those students often note regretfully that the level of employment in Georgia does not match the knowledge they have acquired."

## Science for practice

"Fundamental sciences do not produce quick results. However, there are practical tasks. Our economy and production are not able to provide the tasks of Georgian science.The biggest deal could be to calculate how one won the lottery or how to process gains of Adjarabet. This is also a science, because money is gained. At a certain point of time banks were interested in students of math faculty, but thereafter, as the banking faculty, faculty of finances advanced to a new level, no one needs any longer to know integral equations in order to calculate the compound interest in banks. That would be tantamount to shoot cannon on sparrows. However, a much more serious task and responsibility would be to calculate a capacity of a dam and sign under that calculation. Indeed, one of the dams of Enguri Hydro Power Plant was calculated in Ilia Vekua Institute of applied mathematics. Back then, several other institutes worked on that too. Now objectives of such a scale are no longer set in Georgia.

"The culture of dealing with a practical task is different. When dealing with a theoretical objective, however, one may fail today, but succeed tomorrow, fail the day after tomorrow and succeed the day after; a maximum failure that may happen is when someone proves smarter and publishes a paper earlier than you do. But when you have a practical task, you are dealing in addition to finance and over time.

"Practical mathematical objectives may be diverse. For example, in Denmark where dairy cow breeding is one of major economic sectors, every cow has an electronic ID neck collar; once a cow puts his head into automatic feeder, the connection is instantly established with the information center which sends back information on the recipe and doze: how much the cow milks, how much it must eat, what diseases it had and what additives and medication must be mixed into its fodder. In short, this is a symbiosis of applied informatics, mathematics, and problems of optimal control theory. We have to prioritize main sectors of economy and identify relevant practical objectives and try to solve them.

"Let me recall my talk with Paolo Ricci, my Italian colleague. We have been working together very efficiently since 1998. Mr. Paolo told me once: 'the difference between the education you obtained and the education I obtained is that you learn too many theoretical facts first and after that started to search where to apply them. My scientific education began with a practical task which was assigned to me and I built all my educational process around it, gathering all the knowledge available concerning this task. That task was so large and serious that it proved handy for the rest of my life both in terms of application and theoretic research. In Georgia, however, you start seeking objectives after you officially complete the acquisition of this fundamental theoretic education, and that is not an easy task.'

"By the way, an advice which I took into account and why I decided to engage in science was the advice of Niko Muskhelishvili: 'we Georgians are a small nation and must seek new problems on the junction of several sciences. It is there where such new nuances may be uncovered, which no one else has yet through about.' Niko Muskhelishvili gave this advice to all his students. Unfortunately I was not among his students, but was lucky to hear this phrase from him personally."

## Joint research

"Our research is rather theoretical. We prepared a book. This is a team that unites Belgian and Italian scientists and me. We cooperate and our cooperation is not registered as a scientific grant. While joking, Paolo warns us that our results may be stolen, Johan replies they will not be able to steal them. I think that they have to yet guess how to steal them. Of course this unity is fragile as it is not supported by sustainable funding. We try to gradually engage out colleagues in it. We identified two types of problems: first is Mëbius-Listing's bodies, which I submitted, while second - geometric shapes of Johan Gielis type; we succeeded in analytic representation of such geometric shapes in both topics. We worked much together, did many things and now, we deal with amazing objects that are seen in problems of various fields.

"Initially (in 2000), Johan Gielis and I worked independently; we did not know each other personally. Then, through Paolo Ricci, our common friend and the Honorary Doctor of TSU Ilia Vekua Institute of Applied Mathematics as well as via the Internet, we co-authored papers and published them during four years; thus, our scientific cooperation gradually evolved into friendship. Johan has the academic background in botany and he raised a very interesting question – whether it is possible to mathematically describe cross section cut of plant stem (plane problems). His predecessor in this regard was famous French mathematician Gabriel Lame; the result of this research was the so-called Gielis curvesand sufaces. I decided to expand the class of geometric shapes of surfaces studied by Ilia Vekua (spatial problems), in this regard my predecessor was great Gaspard Monge, the teacher of Gabriel Lame, and as a result generalized Möbius Listing's surfaces and bodies were reserached!

"Johan seeks practical tasks in forms of car antenna, while I and Professor M. Rogava - in anatomic modelling. But, I think, there are much more resources here. We must admit that the fundamental research has one good aspect – calmness. In calmness something more serious comes to light. In a hurry, you may catch the main thing but miss the beauty."

# MEDICAL RESEARCH FOR PRACTICAL RESULTS – ARTIFICIAL PERFUSION SYSTEM FROM TSU SCIENTISTS

*A lot of researchers and participants of the experiment gathered in the operating room of the Institute of Morphology at Ivane Javakhishvili Tbilisi State University on July 26, 2018, where the scientists were testing the artificial perfusion system in practice. This is the next stage of experimental research as well as the continuation of a multi-year scientific practical work, which aims at creating a new perfusion device. The device is economical but it is not its only advantage. As its authors state, its use is less traumatic for patients compared to its analogs. In the scientists' opinion, due to its simple nature and portability, the device can be used during mass casualty incidents (hostilities, terrorist acts, natural and technogenic disasters) to ensure adequate blood circulation and increase a victim's chances of survival.*

The Artificial Blood Circulation system, or a perfusion system, is a device that takes over the functions of the heart and lungs. It facilitates artificial blood circulation and delivers oxygen to the human organism. Scientists at Alexander Natishvili Institute of Morphology of Tbilisi State University started to work on the development of a perfusion system model in 2004. Today these researchers will present their invention to society. It is more economical than other well-known perfusion systems and at the same time respects all the parameters of more expensive systems.

The project called "Development of Artificial Blood Circulation Portable Device Designed for Field Use", financed by Shota Rustaveli National Science Foundation was implemented at the Institute in 2013-2015. A group of scientists from the TSU Institute of Morphology, which took an active part in the previous research, is now involved in the project : Professor Dimitri Kordzaia, MD, PhD, ScD, Head of the Department of Clinical Anatomy and Operative Surgery (DCAOS), Nodar Khodeli, MD, PhD, Associate Professor of DCAOS, Zurab Chkhaidze, Md, PhD and Mikheil Jangavadze, MD, PhD – the Assistant Professors of DCAOS; the students from bachelor's and doctoral degree programs of Faculty of Medicine are also involved in the project.

Presently, the research has moved to a new stage and the scientists are conducting experiments on particular animals.

"The key component of a perfusion system, which defines the efficiency of the entire equipment, is a blood pump. Existing devices used today in experiments or in clinical settings, have a number of shortcomings, including the non-physiological flow rate. Physiologically, blood flow is pulsatile, meaning that blood flow pulsates rather than flows evenly through vessels in the human organism. Most of the existing devices are characterized by non-physiological flow, known as a laminar flow, which can be harmful for living organisms if they are used for a long time, as they cause changes to physiological processes. In addition to large blood vessels, the circulatory system is made up of small capillaries; these fail to receive blood during laminar flow. Such non-pulsatile flow can be endured for short times but for longer use it causes damage that has to be repaired by intensive therapy and rehabilitation of patients through medication and other expensive procedures," Project Manager Zurab Chkhaidze said.

TSU scientists explained that the second problem related to the perfusion systems is their expensiveness.

"But the use of expensive perfusion systems with a pulsatile flow makes scientific research costly and reduces the chances for their experimental use. A main goal of our research is to create a universal, maximally physiological and cheaper perfusion system for both experimental and clinical purposes. We are working to develop a perfusion system for conducting bio-medical research on animals, and to create portable artificial blood circulation equipment for field use," Professor Nodar Khodeli said.

The experience of the researchers from Alexander Natishvili Institute of Morphology is based on years of scientific work on perfusion systems they have developed and patented. Implementation of the first project started under the guidance of Professor Nodar Khodeli at the Scientific, Educational and Training Center of Experimental Surgery. This involved ensuring adequate blood circulation of a recipient's organism during a full- or partial liver transplant, with anhepatic phases of different durations. In an anhepatic phase, the human organism suffers a deficit of blood when the liver has been removed or partially removed, and before the transplant of a donor's liver has been accomplished. Noteworthy that Nodar Khodeli is the owner of two patents of the perfusion system.

"Trauma is less likely when using our device, as it can be operated by both pressure and volume. A universal pump is the key block in our perfusion systems. The hemodynamic characteristics of this pump (blood pressure, amount of blood flow – capacity, volume of each circle, frequency of pulsation, etc.) are similar to those of the best (very expensive) pumps existing in the world. Furthermore, it is equipped with a simple operation system, which ensures both pulsatile (imitation of physiological arterial blood flow) and continuous, non-pulsatile flow (imitation of physiological venous blood flow) in the vascular system of experimental animals of various sizes (rats, young hares, dogs, sheep, etc.), in accordance with particular experimental requirements. Such pump enables to regulate the capacity by both the frequency of pulsation, and the amount of each cycle – at the expense of pressure regulation," says Nodar Khodeli.

TSU scientists explain that according to particular experimental requirements, it is possible to create various artificial perfusion systems using the developed pump, as well as to replace physiological blood circulation in the arterial or venous sections of experimental animals by an artificial pump. Moreover, it is possible to ensure blood circulation in isolated organs similar to physiological blood circulation.

The development of a portable artificial blood circulation device designed for field use on the basis of this pump implies the elaboration of a very different portable device and perfusion method.

The project participants explain that its use during mass casualty incidents (hostilities, terrorist acts, and natural and technogenic disasters) under conditions of sharp decline of functions in the victims' vital organs (brain, heart and lungs) will help maintain blood circulation and increase their chances of survival.


# LADO CHANTURIA: “LAWYERS OF MY GENERATION HAVE WITNESSED THE TURNING OF LEGAL LITERATURE INTO PULP MANY TIMES”

***Lado Chanturia, Professor at Ivane Javakhishvili State University, is primarily known to wider society for his practical activities – at various times, he served as the Justice Minister, Chairman of Supreme Court, Ambassador of Georgia to Germany. Today Lado Chanturia is judge to the European Court of Human Rights in respect of Georgia. However, in parallel to the practical jobs he has carried out academic and teaching activities. He is the author of more than 200 academic works with a number of them published abroad. The topic of one of his works, published in Germany in 2010, was the Europeanisation of Georgian law. A question raised by the author in that paper was something like that: “is it a wishful thinking or great challenge.” Today, the scholar answers this question in the following way:***

“In that paper I tried to show that although the Europeanisation of Georgian law is a huge challenge for Georgian lawyers, they have been handling it with honor. The Europeanisation of Georgian law is a historical and cultural process which cannot be gone through within a short period of time. At the same time, it is the reality that Georgian law has become part of European law. This is apparent not only in the legislation, but also in the academic literature and judge-made law which are being formed on the basis of this legislation.

“Georgia had never historically had such a chance of approximation to the European legal culture. The European vector of the country and the political decision in favor of European integration is the main prerequisite for the materialization of this chance. The modern law can only exist in societies that are organized into states governed by rule of law. Therefore, the decision of the state on the orientation of values is crucial. This influenced the activity of lawyers both inside and outside the country.”

## Legal literature turned into pulp and role of legal science in modern society

“An interesting discussion was held in the 19th century Germany whether the Jurisprudence was a genuine field of science. One German lawyer is still remembered then saying: “how can jurisprudence be called a science when just three powerful words of the king may turn whole law libraries into pulp.” Lawyers of my generation have witnessed the turning of legal literature into pulp many times. Therefore, that phrase reflects the reality to some extent. On the other hand, a modern society can hardly be imagined without the academic study of law, without studying how the law is applied, how lawyers or non-lawyers understand the provisions of the law, how it could be perceived and applied in a systematic way. In short, the scope of jurisprudence is very vast and no wonder that after the country’s independence, Georgian lawyers of new generation created serious academic works in the Georgian language. One may say that never was Georgian legal scoralship as productive and diverse as in the years after the independence.

“International contacts of Georgian lawyers and their researches in world leading centers is a relatively new development. Before the independence we did not have such a possibility. I remember that in the early 1990s, when we conducted an international conference at the University, one could hardly find lawyers who knew foreign languages. Today, Georgian lawyers speaking several foreign languages is an ordinary thing. And still, the main sphere of lawyers’ activity is practice because the law in books often differs from the law in action and lawyers must be capable of understanding the effective law and applying it in practice. Consequently, the demand on practicing lawyers is high.”

## Trace of globalization in Georgian jurisprudence

“Today, we live in an epoch of unimaginable opportunities. We may engage in global processes, perceive and experience problems and achievements of other countries. Citizens of our country interact with citizens of other countries. Such interactions naturally give rise to numerous problems, conflicts or issues which need to be resolved. In all these spheres there is a need for law. For example, we should apply the law of a particular country in identifying a legal status of a child (name, surname, citizenship, et cetera) whose parents are citizens of different countries. Such issues are numerous and they require qualified legal expertise everywhere. Georgian lawyers are well aware of that and they engage in numerous joint international projects. However, Georgia is a small country and its possibilities are limited. It is therefore very important to define priorities.”

## Compulsory linkage between theory and practice

“When I was young I was lucky to have an opportunity to study and conduct research in Germany. It was there when, for the first time ever, I clearly realized the need of a close linkage between the theory and practice of law. Good academic works cannot exist without law practice and vice versa, good practice cannot exist without academia. It provides a possibility to study, generalize and apply the existing experience. Before taking a decision, a practicing lawyer always takes efforts to learn about experience accumulated in this sphere and it is the academic literature that helps him/her do that.

“It is necessary to create favorable conditions for research, to provide adequate financing, to participate in international projects. Fortunately, there are many young Georgian lawyers who willingly undertake academic work. As regards research, it must always be topical, but, at the same time, honor the level achieved in a given sphere. Research must provide an answer to a raised question or must stir up interest towards a new problem.”

## Reason why despite busy schedule he cannot give up teaching

“I love students. Relationship with them gives me great pleasure, because accumulated knowledge and experience can be shared in the best possible way only with the youth. True, due to various functions I am not able to work with students at a desired degree of intensity, but I spare no effort to find time for them and perform my duty. At the time when I worked only at the university I remembered names and surnames of all my students. Now I am not as good at it as I was back then.”

# WINNER PROJECTS OF PHD EDUCATIONAL PROGRAMS GRANT COMPETITION IN 2017 SHOTA RUSTAVELI NATIONAL SCIENCE FOUNDATION

*PhD students from Ivane Javakhishvili Tbilisi State University (TSU) are still leading in the state grant competition announced by Shota Rustaveli National Science Foundation in 2017 to render financial support to PhD students. What are the students researching? Brief annotations about their research will answer this question.*

## Humanities

Mariam Khatiashvili

Project title: The United States of America's soft power towards the Soviet Union in the 1980s: Public Diplomacy Lessons for Georgia's Modern Foreign Policy Strategy

The project goals and objectives include but are not limited to the exploration of the Reagan administration's information programs addressed to change the fundamental Soviet political and ideological tendencies in Georgia. The project will evaluate the soft power trends highlighted in the U.S. national security strategies during the Reagan administration and their importance for achieving the U.S. foreign policy priorities. Although there are studies on the U.S. soft power, the U.S.-Georgian relations, and different aspects of the Ronald Reagan administration in Georgian and foreign academic spheres, none of them examine the U.S. soft power toward the Soviet Union in 1980s related to Georgia.



## Humanities

Salome Jamburia

Project title: Silk Road: Aspects of Sustainable Development of Cultural Heritage in Georgia

UNESCO Serial Transnational World Heritage nomination of the Silk Roads project has already gained currency in the political and cultural agenda in several countries along the historic route. The thirty-three components, including cities, trading settlements, fortifications and religious buildings in present day Kyrgyzstan, Kazakhstan and China were inscribed on the World Heritage List as transboundary cultural properties under the name of the "Silk Roads: the Routes Network of Chang'an-Tianshan Corridor" in 2014. Many State Parties have submitted tentative lists for Silk Road Sites. Although it is obvious from the archaeological data and written sources that Transcaucasia was involved into the northern branch of the Silk Road in different times with different destinations, the tangible and intangible heritage of this part of the Silk Road is not yet fully documented and well presented in an international scientific literature. The PhD student just plans to fill this gap.

## Humanities

Ana Tetruashvili

Project title: Types of farming on the Grakliani Hill (according to archaeological and traceological studies of the stone industry)

Traceology (French-"trace" and Greek-"teaching") - means study of a trace. It has been widely and successfully used not just in criminal trial but also in archeology. The first step of the Traceological method is study of trace remained on the tool in working process. The researches use two different microscopes, one Binocular Microscope and another, Metallographic microscopes. The second step of the research is to identify the functional analysis. The tools are classified by groups in order to highlight agricultural activities and their economic features/characteristics.

Traceological studies allow us to determine the processes of the work and lifelong activities on the archaeological sites. Therefore, the aim of the topic is to study agricultural tools by using techno-typological and traceological approach. The agricultural tools discovered on Grakliani Hill include the hand mill- top and bottom stones, chisels, pounders, sickle segments, obsidian flakes and chips. After collecting the data of above mentioned research, electronic database will be created for public use. Current interest is to promote the method of traceological analysis in Georgian Archaeology and to create the electronic database that will be updated on a regular basis with archaeological and traceological data.

## Social Sciences

Natia Sordia

Project title: From the creative potential to achievements: the role of personality and culture in creativity

In the century of inexhaustible capacities and technological progress, creativity becomes an important asset of human beings, which helps them make innovative changes in the environment and in this way it helps to remain competitive.

The author claims that there is only scarce information about personality traits hindering or helping creator to implement his/her original ideas, realize creative potential into creative activities and achievements. Presented research is related to creative potential and creative activities and achievements and the characteristics of personality that moderate this relationship. Practical recommendations based on the information will help teachers, lecturers, those who work in educational sciences, in educating future generations and make them creative thinkers, which, on its own, is the basis of progress.

## Social Sciences

Erekle Zarandia

Project title: Economic Policy for Development of Local Self-Government in Samegrelo-Zemo Svaneti Region

The main goal of the research is to study the economic policy of local self-governments in Georgia and develop new means and recommendations for its improvement and modernization; to characterize and analyze the functions, goals, means and results of regional self-governments. The Research Aims and Objectives: Revealing, studying and analyzing the possibilities of diversification of local revenues, after the example of Samegrelo-Upper Svaneti Region; determining the sources for local revenues in Samegrelo-Upper Svaneti Region, in order to enhance them; studying potential revenues and financial possibilities on the local level; working on specific recommendations for defining the functions of the local democracy, on the basis of the materials analyzed in the research.



## Social Sciences

Irakli Gabriadze

Project title: Institutional factors in economic growth and development models (after the example of the post-Soviet space)

The purpose of the project is to assess the importance of institutions for economic development and detect determinants and causes of change in institutional arrangements based on the evidence from the post-Soviet countries. Results will give the possibility to formulate recommendations for developing countries, how they can establish growth enhancing institutions and support their development process. Why some countries managed to establish growth enhancing institutions, while others failed to do so. To answer this question, it is essential to know the determinants of institutions. For this analysis, post-Soviet area is interesting for several reasons. The first is that all of these countries have started building of institutions at the same time and from the same institutional arrangement. Hence, the initial position was the same for all countries.

## Exact and Natural Sciences

Tornike Chabukiani

Project title: Surveillance materials obtained by the photodified method and research of their properties

The synthesis of high-temperature superconductors, their investigation and application is one of the most important directions of modern science and technology. Today high-temperature superconductors are usually obtained through solid state reactions. Since superconductors represent the key to future technologies, it is important to make their production available. There are a lot of potential users on the world market, who are interested in similar research. Among them are the world's leading companies, who produce high-technology materials by solid state reaction. Leading research institutes and universities, working in the field of high-temperature superconductors and other high-technology materials, are also interested in this technology.

## Exact and Natural Sciences

Miriam Makadze

Project title: Impact of volcanic processes on biotic and abiotic components of ecosystems - after the example of the volcanic region of southern Georgia

The purpose of the project is to determine the ecological background transformation factors caused by the volcanic products / lava, pyroclastic flows, post-volcanic solutions/ and other impacts on biotic and abiotic components of ecosystems. To achieve this goal, a complex geological and paleobotanical research should be carried out on the research territory, involving investigation of volcanoes in the research area, determining the types and nature of volcano eruption and defining its geochemical, petrographic and petrological peculiarities. It is also essential to ascertain the links of fossil flora with volcanism. The project is being implemented using the laboratory databases of the TSU Institute of Mineral Resources, the TSU Institute of Geology, the TSU Department of Geology and Vancouver (Canada).

## Exact and Natural Sciences

Ketevan Kharaishvili

Project title: Prepare new polysaccharide nature chiral stationary phases based on porous silicate and their chromatographic study

Separation of enantiomers is one of the hot topics of current chemistry from both practical and theoretical points of view. Chromatographic separation is based on different distribution of analyte components between mobile and stationary phases. In the last ten years application potential of so called core-shell particles is intensively studied for achiral separations. Chiral stationary phases prepared based on core-shell type silica offer following advantages: smaller dead volume, higher plate numbers, negligible decrease of plate numbers with increasing separation speed that allows fast separations without significant sacrifice of plate numbers.

Medea Tsaava

Project title: Boundary Value Problems for the Bi-Laplace-Beltrami Equation on a Hypersurface

Many problems in the Mathematical Physics, such as cracks in elastic media, scattering of electromagnetic waves by surfaces etc. lead to boundary value problems (BVPs) for elliptic partial differential equations in a domain with angular points on the boundary (so called Lipschitz boundary). The purpose of the present project is to investigate the boundary value problems for the bi-Laplace-Beltrami equation on a smooth hypersurface. Bi-Laplace-Beltrami Equation is used to describe equation for elastic surface waves in continuum mechanics, small deformation of plates in flexibility theory and many other problems.

The major goal of the present project is preparation of novel polysaccharide-type chiral stationary phases based on core-shell silica. In particular, in the first part of the project together with coated type chiral stationary phases, stationary phases with covalently immobilized chiral selector will be prepared for the first time. The above mentioned two types of materials (coated and immobilized), as well as the materials based on totally porous and core-shell (superficially porous) silica will be compared to each other from the viewpoint of chromatographic performance and other characteristics. In addition to above mentioned, the content of chiral selector in packing materials and chromatographic separation conditions will be optimized and kinetic characterization of prepared new materials will be performed.



## Exact and Natural Sciences

Tea Shavadze

Project title: Variation formulas for solutions for functional differential equations intermittently with the initial condition and delays in delays and their use in optimization tasks

The first part of the project deals with proving of the variation formulas of solutions for the nonlinear controlled functional differential equations with several constant delays in the phase coordinates and the continuous initial condition. In the project , an order of estimation of the increment of a solution is established with respect to small parameter and the value of the increment is calculated at the initial moment when variation of the initial moment takes place from the right or from the left. In the vicinity of the final point of the main interval the variation formulas of solutions are proved for the three cases when variation of the initial moment takes place from the right or from the left and from both sides. The second part of the project deals with the nonlinear optimization problems with several constant delays in the phase coordinates and controls with the general boundary conditions and functional.

## Medical Sciences

Levan Gogichaishvili

Project title: Hepatocellular cancer remedies, risk of development and blood-circulating new, high-sensitive tumor markers in the course of Ledipasvir/Sofosbuvir treatment of HCV infected patients

Hepatocellular carcinoma (HCC) is the third leading cause of cancer mortality worldwide. Development of HCC is multi-pathway processes: chronic inflammation, caused by viruses and metabolic disturbances and the genetic and epigenetic changes. Clarification of the issue would be helpful for development of effective methods of early cancer diagnosis, prediction and monitoring. Since 2015 HCV elimination program using new generation direct-acting antiviral agents (DAAs) Ledipasvir/Sofosbuvir (Led/Sof) was established in Georgia. This program gives a great opportunity to study the effect of the Led/Sof therapy on risk of HCC development and recurrence, HCC prognosis and on the tumor tissue. Only this protocol allows inclusion of patients with HCC, for therapy of HCV infection. Our clinical observation (2 cases, unpublished data) showed regression of HCV induced HCC during Led/Sof treatment and improvement of average life expectancy.

## Georgian Studies

Nino Popiashvili

Project title: Teaching of Abkhaz and Ossetian languages: History and Contemporary Situation

Georgian–Abkhaz and Georgian–Ossetian relations count centuries. Teaching of the Abkhaz and Ossetian languages began in the 19th century. In the 20th century there already were several educational centers for receiving primary and subsequent education. It should be noted that the Abkhaz and Ossetian languages were taught by the representatives of Georgian, Abkhaz and Ossetian intelligentsia at specifically established schools. After the University was established in Tbilisi (1918), the Council of Professors discussed the issue of teaching the Abkhaz and Ossetian languages there. Upon the initiative of Professor Ivane Javakhishvili, founder and rector of Tbilisi State University, Georgian professors (G. Akhvlediani and others) were instructed to address the issue. The purpose of the present research is just to study the historical and contemporary situation with respect to the issue.

# ISET

International School of Economics at TSU
Policy Institute

# INTERNATIONAL SCHOOL OF ECONOMICS AT TSU

## About ISET and the ISET Policy Institute:

ISET is a school of economics founded at Tbilisi State University in 2006 by the World Bank and a coalition of prominent international donors and governments. Operating in English, it is designed to prepare students from the South Caucuses region for top further education programs in the West, as well as corporate and public-service jobs in their home countries.

The affiliated ISET Policy Institute (ISET-PI) complements ISET's educational mission by conducting policy research and training, providing research-based policy advice, and contributing to the public policy discussion in Georgia and the South Caucasus.

## AGRINDEX – Biweekly

The AGRIndex was created by ISET and the Georgian Farmers' Association (GFA) in cooperation with the FAO-Georgia, and the Ministry of Environmental Protection and Agriculture of Georgia (MEPA).

The AGRIndex tracks market prices of up to 70, standard quality primary agriculture products produced in Georgia. The price data is collected by the MEPA in up to 60 municipalities across the country, but all self-governing cities, and municipalities in Abkhazia are excluded. Price data for the fixed basket of products is collected on weekly basis on predetermined dates in local bazaars and markets, but in special cases prices might be collected in supermarkets or in groceries.

AGRIndex is a weighted average of vegetable-, fruit-, dairy-, and meat price sub-indexes and each of these sub-indexes tracks the price dynamics (m/m, and y/y) of the specific products listed in the Classification of Individual Consumption According to Purpose (COICOP), while the weights to each specific product in the basket are assigned based on GeoStat's Integrated Household Survey Databases. The calculation methodology is based on GeoStat's methodology for calculating Consumer Price Index (CPI), but the data is pre-filtered and the weights to each municipality is assigned by ISET-PI's own methodology.

The AGRIndex is available in various web-sources and print publication on monthly basis.

### RECENT PUBLICATION RESULTS:

In June 2018, the AGRIndex declined by -2.54%. The main driver of this change was a -16.0% fall in VEGETABLE prices. FRUIT (-8.0%) prices also fell significantly, while MEAT (-0.1%) prices were practically unchanged, and DAIRY products gained +1.9% of their May 2018 prices.

In y/y terms, after a steady decline since last November, the gap between the current AGRIndex and its 12-month-old counterpart widened again and reached +2.49% in May 2018.

Highest increase: In June 2018, citrus fruits were the biggest price-gainers. Orange prices increased by almost 17%, while lemon prices increased by nearly 15%. Furthermore, in total, in the last 12 months, lemon prices have added almost half to their June 2017 values, probably due to the sharp drop in production (1.4 thousand tons in 2017, versus 3.0 thousand tons in 2016, according to GeoStat).

Highest drop: In June 2018, compared to May 2018, domestically produced peaches and nectarines each lost about two-fifths of their May values as these stone fruits entered the high harvesting season, and other main seasonal fruits (substitutes for peaches and nectarines), like watermelon, other melons, and cherries, are also widely available on the market.

### AGRI REVIEW – Monthly

The goal of the publication is to summarize major developments in the agricultural sector and provide brief analysis of related economic indicators.



The publication presents the main economic figures of Georgia's agricultural sector and consists of four sections:

- Sector at a glance featuring the most recent developments in the sector;
- Price highlights including domestic and international prices;
- Trade highlights describing share of agricultural exports and imports in total exports and imports;
- Policy watch providing brief review of major changes in agricultural policy of the country.

### RECENT PUBLICATION RESULTS:

There was 2.1% decrease in agricultural production in 2017 compared to the previous year. Production in the plant-growing sector declined by 0.4%, while animal production experienced a decrease of 3.8%. Lower production resulted in lower revenue from the sale of agricultural products compared to the period 2014-2016, both in percentage and absolute terms. While revenue from selling agricultural products decreased in 2017, the level of commercialization in the sector has increased.

As to prices, in the category of food and non-alcoholic beverages, prices decreased by 0.7% on a monthly basis (that is compared to April 2018) and increased by 1.8% on annual basis (that is compared to May 2017).

As to the international trade with EU and CIS countries, in 2016, Georgia's agricultural exports in EU countries increased by 5% compared to the previous year, while during 2017, a 38% decrease was observed compared to 2016. This change is mainly caused by a significant decrease in hazelnut exports. Georgia's agricultural exports to CIS countries are increasing in the last couple of years. Unlike exports, there are no significant changes in imports from either EU or CIS countries.

## BUSINESS CONFIDENCE INDEX – Quarterly

ISET Policy Institute's quarterly Business Confidence Survey (BCI) is conducted in partnership with BIA (Business Information Agency) and the International Chamber of Commerce-Georgia (ICC) since December 2013. The BCI is published on ISET-PI website and in Georgian media. The BCI comprises seven sector-specific sub-indices covering services, retail trade, agriculture, manufacturing, financial services, construction and other sectors. For each sector, confidence is measured through a simple survey instrument targeted at top business executives.

### RECENT PUBLICATION RESULTS:

BCI in the second quarter of 2018 has improved, reaching 39.6 index points, which is an 8.3 index point gain over the previous quarter. The improvement in Business Confidence is in line with the overall positive country performance (Geostat estimated 5.2% GDP growth in Q1 2018). The BCI increase is based on very high expectations and profitable past performance in almost all business sectors. Compared to other sectors, manufacturing assessed their past performance and expectations the most positively. In contrast, the agriculture sector is the most pessimistic, reflecting a low season in production.

## CONSUMER CONFIDENCE INDEX (CCI) – Monthly

The ISET Consumer Confidence Survey follows the standard EU methodology: we randomly sample 300-350 individuals on a monthly basis and question them about the past, current and future financial situation of their families and the country as a whole. Consumer confidence is the degree of optimism that consumers feel about the overall state of the economy and their personal financial situation. If consumer confidence is higher, consumers are making more purchases, boosting the economic expansion. On the other hand, if confidence is lower, consumers tend to save more than they spend, prompting the contraction of the economy. A month-to-month diminishing trend in consumer confidence suggests that in the current state of the economy most consumers have a negative outlook on their ability to find and retain good jobs.

### ELECTRICITY MARKET REVIEW (EMR) – Monthly

Energy is an essential production factor in every sector of an economy, demand for energy grows in line with the steady increase in overall economic activity. Launched in 2017, Electricity Market Review analyses the main trends and key events in Georgia's electricity sector. The review analyzes the main trends and developments characterizing the electricity sector of Georgia during the reporting period (consumption, generation, imports, exports, market concentration).

### RECENT PUBLICATION RESULTS:

In June 2018, Georgian power plants generated 1,208 mln. KWh of electricity. This represents a 6% increase in total generation, compared to the previous year (in 2017, total generation in June was 1,138 mln. kWh). The increase in generation on a yearly basis mainly comes from an increase in hydropower generation (more details in the report).

On a monthly basis, generation increased by 4% (in May 2018, total generation was 1,161 mln. kWh).

The share of electricity produced by renewable sources increased to 99.8% of total generation (1205 mln kWh), while thermal power generation decreased in comparison to May 2018, accounting for 0.2% of total generation (3 mln. kWh).

Consumption of electricity on the local market was 981 mln. kWh (+13% compared to June 2017, and +2% with respect to May 2018). In June 2018, generation exceeded total consumption by 227 mln, which is 19% of the total amount generated (compared to 198 mln kWh and 17% excess in total generation for May 2018).

In June 2018, the Georgian electricity market was highly concentrated, with an HHI value of 3,788 (which is significantly higher than the threshold value for a highly concentrated market, 2,500). The level of concentration increased compared to the prior year (from an HHI value of 3,389 in June2017).

### GDP FORECAST – Monthly

ISET GDP forecast uses Factor Analysis Method to provide a current-quarter and a quarter-ahead real GDP forecasts for the

Georgian economy. The forecasts are updated once a month. The depended variable is quarterly GDP (we are using the GeoStat rapid estimates of GDP whenever the final updated value of quarterly GDP is not available). The explanatory variables (currently 115) are monthly variables obtained from Geostat and NBG statistics.

RECENT PUBLICATION RESULTS:

ISET-PI has updated its forecast of Georgia's real GDP growth rate for the second and third quarters of 2018. Here are the highlights of this month's release:

Geostat has released its GDP growth estimate for the first quarter of 2018. The Q1 growth stands at 5.2%, which is 1.1 percentage points above the recent forecast.

ISET-PI's forecast of real GDP growth for the second quarter of 2018 remains unchanged at 5.9%. The first estimate for the third quarter growth forecast is at 7.2%.

Based on April's data, we expect annual growth in 2018 to be 6.2% in the worst-case or "no growth" scenario, and 6.5% in the best-case or "average long-term growth" scenario. Our "middle-of-the road" scenario (based on average growth over the last four quarters) predicts 6.3% real GDP growth in 2018.

## KHACHAPURI INDEX – Biweekly

Inspired by the Big Mac Index of the Economist magazine, the ISET Khachapuri index tracks inflation by using the most popular Georgian food, the Khachapuri. As opposed to other inflation indices relying on a complex basket of consumer goods the ISET Khachapuri index uses a basket for calculating inflation that includes only those ingredients that are needed to cook one Imeretian khachapuri - flour, cheese, yeast, milk, eggs, and butter. It also includes energy costs - gas and electricity.

RECENT PUBLICATION RESULTS:

According to the last publication, the average cost of cooking one standard Imeretian Khachapuri in June 2018 stood at 3.15 GEL, which is 0.7% lower month-on-month (compared to the previous month), and 2% higher year-on-year (compared to the same month of last year).

The main contributors to the m/m Khachapuri Index deflation were cheese (down 0.6%) and flour (down 1.1%). The Kh-Index fell in all Georgian cities. At 3.27 GEL, Telavi saw the largest drop in the Index (-1.4%). Tbilisi (3.29 GEL) and Batumi (3.27 GEL) experienced declines of 0.4 % and 0.2%, respectively. Kutaisi was the cheapest city at 2.87 GEL (down by 0.8%). The price difference between the most expensive (Tbilisi) and the cheapest (Kutaisi) city reached 0.42 GEL.

It is not surprising that in June, Tbilisi and Telavi remained most expensive cities in Georgia. According to Georgian National Tourism Administration, in June 2018, international travelers trips went up by 14.2% compared to the same month last year. It may be that in June, the main destinations for tourists were Tbilisi and Kakheti, rather than the seaside. However, it is expected that in July, more people will visit seaside cities, taking into consideration the weather (19°- 39°). Thus, this will increase demand in Batumi for milk and milk products, which will push khachapuri's price upward

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## MACROECONOMIC REVIEW – Quarterly

Macroeconomic Review of the Georgian economy is a quarterly publication. The publication offers a comprehensive review and an economic interpretation of the existing data trends, which are based on monthly statistics from Geostat, NBG, and other sources (e.g. data on tourism).

RECENT PUBLICATION RESULTS:

According to Geostat's rapid estimates of GDP growth, Georgia's economy continues expanding at a moderately high pace, reaching 5.2% in the first quarter of 2018. GDP growth was mainly driven by an enhanced external environment, improved business confidence, credit expansion and fiscal stimulus. Geostat's Q1 growth figure is higher than the National Bank of Georgia's (NBG) 4.8% projection for annual growth in 2018, but falls behind ISET PI's annual GDP growth forecast of 5.7%.

The beginning of 2018 saw robust growth in the wider region, which benefits the Georgian economy. According to the official data, economic growth in the first three months of 2018 in Armenia was as high as 10.6% YoY, while Russian and Azerbaijani economies advanced on average by 1.3% and 2.3% YoY, respectively. Turkey reached 7.4% YoY growth in Q1. These developments in neighboring countries further stimulate the Georgian economy though trade, remittances and tourism channels.

## REAL ESTATE MARKET LABORATORY (REMLAB)– Quarterly

REMLAB quarterly publications provide snapshot of real estate market in Georgia. In addition to sales, supply, price dynamics, REMLAB reports on Real Estate Index (REI), an index which represents real value of the real estate. Whenever we observe real estate prices, the first thing we look at is average price per square meter. However, average price can increase, if the sales of better quality properties (more flats in central districts or renovation, etc.) increases, which does not mean that real estate prices went up generally. We need Real Estate Index to track pure price changes. REI excludes `QUALITY EFFECT` and observes how the price of given property changes compared to the base.

RECENT PUBLICATION RESULTS:

The Georgian real property market grew by 0.1% (QoQ) in Q1 2018, in comparison with Q4 2017. The annual increase was more pronounced at 27.2% (YoY), in comparison with Q1 2017.

Tbilisi, with a 41.6% share in total sales in Q1 2018, dominated the Georgian real property market. The Tbilisi market was followed by Kakheti at 11.1%, and Adjara, with a 9.9% share in total sales. The highest annual increase (YoY) in sales was observed in the Racha-Lechkhumi & Kvemo Svaneti (105.0%), Guria (66.9%) and Kakheti (31.7%) regions.

In Q1 2018, Sale Price Index (SPI) and Rent Price Index (RPI) for residential properties experienced an increase of 5.1% (QoQ) and 1.4% (QoQ), respectively. Average Sale Price (ASP) varied between USD 860 and USD 906 per sq.m (monthly average), and Average Rent Price (ARP) was between USD 6.7 and USD 7.7 per sq.m (monthly average). Quarterly average are USD 883 for ASP and USD 7.34 for ARP.

# RESEARCH CENTRES

## HIGH ENERGY PHYSICS INSTITUTE

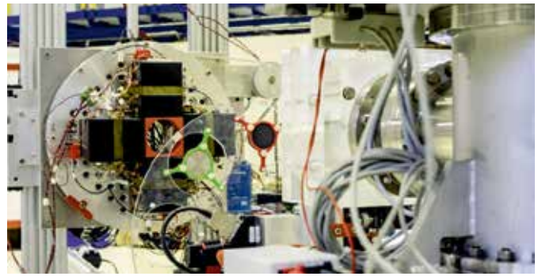
High Energy Physics Institute of Ivane Javakhishvili Tbilisi State University (HEPI) was founded in 1980 on the base of High Energy Nuclear Physics Laboratory. The idea of establishing the institute belonged to Academicians Nodar Amaglobeli, Albert Tavkhelidze, Teimuraz Kopaleishvili and Revaz Salukvadze. Since the day of its foundation, the Institute had been under the supervision of Nodar Amaglobeli and from 1996 - Albert Tavkhelidze. Professor Mikheil Nioradze has been the director of the Institute since 2004.

The scientific tasks of the Institute is mainly carried out in the framework of international collaborations with scientific centers such as: European Organization for Nuclear Research (CERN, Geneva, Switzerland); Jülich Research Center (Jülich, Germany); and Joint Institute for Nuclear Research (Dubna, Russia).

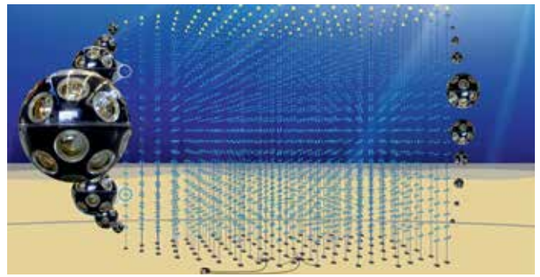
From TSU HEPI scientific activities three major directions can be distinguished. The physicists of the Institute participate in the ongoing ATLAS experiment on the Large Hadron Collider at CERN. The team of the Institute physicists has participated in ATLAS experiment since the very first years of the collaboration foundation (since 1994). They have contributed significantly to designing Tail-calorimeter of the ATLAS setup, as well as to the experimental data taking and analysis. Since 2017, in collaboration with CERN, TSU HEPI physicists have been delivering master classes in particle physics to young, from 15 to 19-year old students.

The Institute has 25 years' experience of collaboration with the Institute of Nuclear Physics (IKP) of the Jülich Research Center. Since 2004, in every two years the Jülich Research Center and TSU HEPI have been organizing the Conference in Fundamental Sciences in Tbilisi. The event is known as Georgian-German Science Bridge and it actively involves students. During this period Georgian students have completed 9 MA and 5 PhD theses at the Juelich Research Center. With the strong support of the Jülich Research Center, TSU and Rustaveli National Scientific Foundation have founded so called Smart|EDM_Labs for young scientists at TSU. Recently at IKP the JEDI collaboration embarked studying the forbidden in the Standard Model phenomena - electric dipole moment of charged particles using the COSY accelerator. TSU HEPI is a participant of the collaboration since its foundation. HEPI physicists are responsible for designing and building of a polarimeter - the critical measurement device for the experiment.

KM3NeT is a research infrastructure housing the next generation neutrino detectors in the Mediterranean Sea. The KM3NeT scientists will search for neutrinos from distant astrophysical sources and contribute to the research of the properties of the elusive neutrino particles. The facility will also house instrumentation for Earth and Sea sciences for long-term and on-line monitoring of the deep sea environment. The KM3NeT collaboration includes scientists and engineers from 15 countries. HEPI TSU joined this international collaboration in 2017. The researchers and students of the Georgian (HEPI TSU) group are taking part in the software development of the project, computer simulations, data taking and analysis of selected experimental events.



*JEDI collaboration*



*KM3NeT experiment*

*ATLAS experiment*

The Institute is engaged in the MA and PhD programs in physics at TSU. By publications and citation index, TSU HEPI is one of the leading scientific institution not only in the country, but in the region.

For further information, visit the following link:
**http://hepi.tsu.ge/en/**



## ELEVTER ANDRONIKASHVILI INSTITUTE OF PHYSICS

Elevter Andronikashvili Institute of Physics was founded in December 1950. The idea of founding the Institute belonged to Academician Elevter Andronikashvili. In 1999, the Institute was named after him.

At various times, the Institute of Physics was led by Academicians Elevter Andronikashvili and Giorgi Kharadze.

Since 2006, Dr. Gela Gelashvili serves as the director of the Institute.

The Institute of Physics carries out scientific research in five directions: elementary particle physics, condensed matter physics, plasma physics, physics of biological systems and nuclear physics.

Since 1992, the Institute of Physics has received over 90 international, over 100 local and over 50 individual grants.

The first international conference was held at the Institute in 1955. Since then, the Institute of Physics has been participating in various international events. The Institute of Physics annually publishes about 125 papers. The Institute is successfully cooperating with leading universities and scientific centers (Brazil, Czech Republic, Latvia, Japan, and Ukraine).

Scientists from the Institute are involved in a number of international projects, including in ATLAS experiment on Large Hadron Collider (LHC) at CERN.

In frames of local and international grants, the scientists are also working in the direction of applied research on a number of important issues, involving reduction of harmful toxic emission of motor transport with application of the combined nanotechnology methods; development of radiation resistant structural ceramics for friction units working under extreme conditions (pilot samples creation and testing), etc.

## MIKHEIL NODIA INSTITUTE OF GEOPHYSICS

Mikheil Nodia Institute of Geophysics was founded in 1933. The establishment of the Institute was initiated due to increasing trend of quantitative evaluation of geophysical phenomena at the beginning of the 20th century and the foundation of the first observatory in the Caucasus region.

Prominent scientists such as Nikoloz Muskhelishvili, Mikheil Nodia, Aleksandre Bukhnikashvili, Amiran Kartsidze, Beno Balavadze, Merab Aleksidze et al. worked at the Institute at different times.

Since 2007 the Institute has been run by Doctor of Science - Nugzar Ghlonti.

At present the Institute has the following divisions working on various topics: the Sector of Applied and Experimental Geophysics, the Sector of Seismology, Seismic Hazards and Natural Disaster Risks, the Sector of the Physics of Earth and Geomagnetism, the Research Center of Hydrogeophysics and Geothermy, the Sector of Dynamics of Geophysical Fields and Computing Geophysics, the Dusheti Geophysical Observatory, the Cosmo-physical Observatory, the Space Research Center; the Sector of Mathematical Modeling of Geophysical Processes in Sea and Atmosphere; and the Sector of Atmospheric Physics.

Institute of Geophysics is actively involved in international (NATO, EU) and local projects. It has obtained and successfully completed more than 50 grant projects. At the moment the Institute is working on the implementation of several grant projects funded by Shota Rustaveli National Scientific Foundation. It is noteworthy that the Institute is about to complete its project on creating new equipment – a telemetric system for early detection of mudflows / landslides. Among others there is a successful project underway: ''Keeping Enguri Hydroelectric power plant safe from geo-risks in Georgia''.

Institute of Geophysics has close connections with the scientific centers worldwide (Brazil, Bulgaria, Germany, Great Britain, Greece, France, Japan, Italy, Ukraine and USA).

Since its foundation, Mikheil Nodia Institute of Geophysics has published nearly 60 collections of works, more than 70 monographs, bibliographies of prominent scientists, etc.

For further information visit the following link:
**http://www.ig-geophysics.ge/ID**

*In field trip*

# VAKHUSHTI BAGRATIONI INSTITUTE OF GEOGRAPHY

Vakhushti Bagrationi Institute of Geography was founded on the basis of the departments of the Faculty of Geography of the Tbilisi State University in 1933. Academician Aleksandre Javakhishvili initiated the foundation of the Institute and later had been running it for 29 years. At different times, there were prominent scientists working at the Institute, such as Teopane Davitaia, Davit Tsereteli, Aleksandre Aslanikashvili, Levan Maruashvili, Vakhtang Jaoshvili, Zurab Tatashidze, Archil Kiknadze, etc.

Academic Doctor of Geography Nana Bolashvili has been the head of the Institute since 2007.

Main fields of study at Vakhushti Bagrationi Institute of Geography are the following: the assessment of natural resources of Georgia, natural disasters, issues and prospects of utilizing touristic-recreational potential, dynamics of modern and historic climate changes in Georgia, water resources, morpho and lithodinamic processes of the Black Sea coastline, snow-glaciers, karst caves, paleo-glaciological and paleo-geomorphological studies, landscape transformation and its dynamics, landscape-ecological analysis, identification of the names of geographic objects of Georgia, drafting geographic maps and atlases, etc.

The Institute published number of scientific works and monographs both in Georgia and abroad. Various textbooks for secondary schools and higher education institutions have been compiled. Since its founding, the Institute has been published thematic maps and atlases. Among them the following are notable: Atlas of Georgian SSR (in Georgian and Russian languages), Atlas of resorts and recreation resources of Georgian SSR (in Georgian, English and Russian languages), Educational-Geographical Atlas of Georgia, Atlas of Vakhushti Bagrationi, National Atlas of Georgia, etc. The Institute personnel have also contributed to the compilation of the Atlas of Cuba, the World Atlas of Snow and Glacial Resource sand the Polarimetric Atlas of the Moon.

The Institute hosts international conferences and exhibitions. It has carried out number of international and local grant projects in recent years including the one that was named a successful project by Shota Rustaveli National Scientific Foundation – Identification of conditions of karst phenomena formation (genesis) in the territory of Georgia and the prospects of use of revealed cave systems for tourist purposes (2014-2017); and the projects financed by Slovak Aid: Monitoring Chiatura's drinking polluted waters and Measures to protect drinking water from pollution. Currently, the Institute is working on the project that is being implemented with the partnership of Justus Liebig University Giessen - Capacity building through partnership projects, funding source: The German Federal Ministry of Education and Research.

The year of 2018 has been rather significant for the Institute – along with other news, the Institute has issued two atlases this year. International Book Fair of Frankfurt will display the first English language ''National Atlas of Georgia'' dedicated to the 100th anniversary of foundation of Ivane Javakhishvili Tbilisi State University, published by Steiner-Verlag, and ''Geographic Atlas of Georgia'' published by Palitra L. The Institute has also prepared ''Physical Map of Georgia'' (in English language), which will be published by the international publisher – Springer.

For further information, visit the following link:
**http://geography.tsu.ge/**

# ALEKSANDRE TVALCHRELIDZE CAUCASUS INSTITUTE OF MINERAL RESOURCES

Aleksandre Tvalchrelidze Caucasus Institute of Mineral Resources was established in 1929 by Academician Aleksandre Tvalchrelidze in order to find, study and exploit minerals. Currently, the Institute is the only institution in the field of applied geology in Georgia that is oriented to studying essential mineral resources of Georgia, identifying technological problems of their processing, studying geological environment including the geochemistry of landscapes, and conducting geoecological research.

Caucasus Institute of Mineral Resources has been conducting research on mineral resources and intensively cooperating with neighboring countries (Ukraine, Turkey, Kazakhstan, etc.). Within its competence, the Institute is capable of implementing state and private works and providing relevant information to the state executive and legislative agencies.

Throughout its existence, the Institute has managed to obtain valuable factual materials on the geological study of various useful fossils in the Caucasus region and technological studies of their processing. The information is protected in the Geological Foundation of Georgia.

The Institute has long gone beyond the Caucasus region. It has close connections with the state as well as private business entities of Turkey, Czech Republic, Israel, and Iran. The Institute is actively engaged in the geological-geophysical study of the Miverood Deposit in Iran and in providing appropriate recommendations. In the Chemical and Technological Department of the Institute, there are works underway in order to enrich deposit ores containing gold and to determine the material composition of enrichment products. Based on these works, there are works in process in Miverood Deposit (Iran) to design a large mining complex.

International organization, Business Initiative Directions (B.I.D.) obtained the information on the activities of the Institute and based on this information, B.I.D. awarded (in Gold nomination) the Institute for its outstanding performance at the event held in London. In addition, the Institute was granted the status of an honorary member of this organization with the right to vote in the decision making process.

Furthermore, Businesss World Coneference (USA, Houston) awarded the Institute and named it as its honourable member.

there are 10 scientific-research departments at the Institute and they are all working on the following project - Geological, technological and economic assessment of the potential of mineral raw materials of Georgia including gold, non-ferrous metals, construction materials, carvable stones, solid mineral fuels and fuel - analysis of conjunctive perspectives of engaging in market relationships and the development of investment proposals.

The exam center of the Institute – ''Geoanalytics'' holds an international certificate.

With its economic-contractual activities, the Institute supports business development in Georgia.

After joining the Tbilisi State University and having fulfilled contractual agreements with various organizations and enterprises, the Caucasus Institute of Mineral Resources has received about 2.5 million GEL.

Also, at this time, the Institute has won nine electronic tenders announced by the National Forensics Bureau.

# ALEXANDRE JANELIDZE INSTITUTE OF GEOLOGY

On December 25, 1925, Prof. Alexandre Janelidze initiated the foundation of the Institute of Geology on the base of the Department of Geology and Paleontology of the Tbilisi State University. The Institute was among the very first scientific-research institutions in the former Soviet Union.

Soon a unique Georgian geological school established in the Institute. Alexandre Janelidze, Alexandre Tvalchrelidze and Kalistrate Gabunia are considered to be its founders.

In the 1950s, the research findings of the Institute's scientists were published in the form of fundamental monographs in various fields of geology and they created a solid foundation for a detailed study of geology of the territory of Georgia.

Since 2009 to present, Doctor of geological-mineralogical sciences - Tamara Tsutsunava has been the Director of the Institute.

At present, in the Institute the researches are conducted in almost all fields of Geological science. There are 5 scientific Departments at the Institute working on the following scientific issues: stratigraphy of Mesozoic and Cenozoic sediments of Georgia, geological and geodynamic evolution of Georgia and of the adjacent regions, study of tectonic structures and the mechanism of their formation, the establishment of the nature and speed of the least movement of the Earth's crust, investigation of magmatism and metamorphism, geological study of minerals resources and geoecological, geochemical and hydrochemical study of the Black Sea water area of Georgia.

The research data of the last three years reflect the Institute's active scientific work:

- The Institute has implemented 7 grant projects of Shota Rustaveli National Science Foundation and 4 grant projects of International Scientific Foundations;
- 31 scientific studies have been conducted;
- 2 International maps, 5 monographs, English-Georgian Terminological Dictionary of Geology and 73 articles in peer-reviewed journals have been published by the Institute's scientists;
- The Institute's scientists participated in 92 International conferences.

In the recent years, in the Institute has been established Complex Geological Research Laboratory that is supplied with the modern equipment, where the investigations are carried out according to up-to-date standards.

Besides the scientific-research activities, the Institute's personnel constantly participates in the large State projects such as the establishment of geological and seismotectonic conditions of the territories of the Transcaucasian railway, Baku-Tbilisi-Ceyhan Pipeline and Shah Deniz Pipeline routes and a number of hydropower stations, also stydy of geo-ecological conditions of large building sites, etc. The Institute has produced digital versions of International maps (1:200 000 and 1:500 000) and digital maps of various scales for mineral deposits of Georgia. At the Institute, various applied works are being conducted as well.

The Institute personnel actively participate in various International scientific events; they have professional connections with number of Universities and Scientific centers worldwide. They are granted by a number of International and National Scientific Foundations and have received various State awards and prizes. The scientists are also engaged in the educational process.

Alexandre Janelidze Institute of Geology has a high scientific potential. Among the scientific staff of the Institute, there are 5 members of the Georgian National Academy of Sciences. The Institute never breaks with its tradition and keeps employing young professionals.

The Institute has a rather old and valuable scientific library and a unique Paleontological Monographic Museum, established by the Institute's scientists. Since 1932, the Institute has been publishing periodicals.

# SHOTA RUSTAVELI INSTITUTE OF GEORGIAN LITERATURE

Shota Rustaveli Institute of Georgian Literature was founded on August 13, 1942. Its main objective was to study and publish the centuries-old Georgian literature and folklore issues; to study current literary processes; to review scientific literary heritage; and to draw up a comprehensive course of the history of Georgian literature.

At different times, leading scientists supervised the Institute of Georgian Literature: Korneli Kekelidze, Shalva Radiani, David Gamezardashvili, Giorgi Leonidze, Aleksandre Baramidze, Giorgi Tsitsishvili, Sargis Tsaishvili, Giorgi Merkviladze, Guram Barnovi, Guram Benashvili. Doctor of Philology, Irma Ratiani is the head of the Institute since 2006.

Today, the Institute of Georgian Literature is a modern type research institution that aims to conduct fundamental and applied studies in Georgian literature and the theory of literature and folklore, to establish the research findings in practice and to internationalize these findings. Besides, the Institute strives and endeavors to implement a rather challenging task: elimination of the partial attitudes established by the Soviet ideology and reconsidering the history of Georgian literature in the framework of the literature studies that is not influenced by ideology.

The Institute has three scientific departments: the Department of Georgian Literature, the Department of Folklore and the Department of Literary Theory and Comparative Studies. There are three scientific centers operating at the Institute; these are Rustvelology Centre, Galaktionology Centre and Textology Centre.

Shota Rustaveli Institute of Georgian Literature publishes internationally peer-reviewed journal in the theory of literature and comparative literature studies – ''Sjani'', which is indexed in ERIH PLUS database and other international scientific databases. Furthermore, the Institute publishes its traditional and authoritative periodicals such as annual journal of scientific works – ''Literary Researches'', the collection of scientific works – ''Rustvelology'', ''Georgian Folklore'', ''Galaktionology'', and ''Kritika''.

For the last 10 years, the Institute has obtained about more than 30 scientific grant projects at international and national levels. One of the main strengths of the Institute is its connection among generations – there are young scientists at the Institute that work along with prominent scientists and are engaged in various research projects and scientific grant projects.

One of the most important missions of the Institute is the transfer its research findings to young generation. The institute recruits PhD students in its departments and centers and young scientists are given the opportunity to do internships at the Institute. Apart from scientific monographs, the Institute is working on textbooks and supplementary materials for students and on the translation of chrestomathy.

From 2007, Shota Rustaveli Institute of Georgian Literature has been hosting an annual international symposium – Modern Issues of Literature Studies; each year, the symposium focuses on different topics and there are more than 20 countries presented at the symposium. In 2012 and 2016, a prestigious publishing house, Cambridge Scholars Publishing issued the symposium materials in a form of books. The collection of 2012 – ''Totalitarianism and Literary Discourse (20th Century Experience)'' was the very first large-scale introduction of the Georgian literary studies to the international philological arena. Among recently held events, most noteworthy one was the symposium of 2017, dedicated to the 200th anniversary of Nikoloz Baratashvili, prominent Georgian romantic poet. On September 26-28, 2018, the 12th symposium is to be held – this time emphasis will be placed on the idea of state sovereignty and twentieth century writing. The symposium will be dedicated to the 100th anniversary of the proclamation of independence of the Democratic Republic of Georgia.

For further information, visit the following link:
**http://www.litinstituti.ge/index.htm**

# ARNOLD CHIKOBAVA INSTITUTE OF LINGUISTICS

Arnold Chikobava Institute of Linguistics was founded on the basis of Niko Marr Institute of Language, History and Material Culture in 1941. At different times, the Institute of Linguistics was supervised by prominent linguists such as Simon Janashia, Varlam Topuria, Giorgi Akhvlediani, Arnold Chikobava, Ivane Gigineishvili, Ketevan Lomtatidze (the latter was elected two times), Vladimer Panchvidze, and Besarion Jorbenadze. During the times of the country's independence, Gucha Kvaratskhelia, Lali Ezugbaia and Avtandil Arabuli were had been the directors of the Institute.

Since 2017 the Institute has been run by Doctor of Philology, Professor Nana Machavariani.

At the Institute of Linguistics, the Georgian language is taught studied both synchronically and diachronically; in synchronous and diacritical context; along with the Georgian language, the Institute is also engaged in the study of Kartvelian (Megrelian-Chan / Laz, Svan) and the mountainous Ibero-Caucasian (Abkhazo-Adyghian, Nakho-Dagestanian) languages. The Institute focuses on the phonetics, morphology, syntax, vocabulary, dialectology, normativity and terminology of these languages as well as the issues of general linguistics, lexicology-lexicography, computer processing of a language, etc.

The Institute of Linguistics is the only one institution it sorts that teaches studies more than 30 Ibero-Caucasian languages (Only 15 languages have their own writing system.).

The Institute's research findings are published as separate monographs, as well as in scientific publications.

During the 77 years of its existence, the Institute of Linguistics has compiled hundreds of dictionaries (different types of orthographic, terminological, dialectological dictionaries glossaries) collections, monographs, etc.

With Arnold Chikobava's initiative, the Institute drafted 8-volumes of "Explanatory Dictionary of the Georgian Language". The new generation of the workers of the Institute is currently working on the new edition of the dictionary (So far, 3 volumes have been released).

Furthermore, Varlam Topuria and Ivane Gigineishvili were supervising the publishing of the first normative "Orthographic Dictionary of the Georgian Language".

Each year, the Institute of Linguistics releases several scientific journals.

Employees of the Institute receive annual funding from both Shota Rustaveli National Science Scientific Foundation and foreign foundations.

Every year, the Institute organizes several international symposiums, sessions, conferences, and congresses. The participants are usually scientists from the North Caucasus, Europe, the USA and Eastern countries.

Along with other sessions, the Institute will host hold two rather noteworthy conferences this year:

The 5th International Symposium of Linguist-Caucasiologists, dedicated to Arnold Chikobava's 120th birth anniversary; the symposium will be financed by Shota Rustaveli National Science Scientific Foundation.

International Conference: Terminology - Heritage and Modernity.

The Institute actively cooperates with various state and private institutions. Today, the Institute is actively working along with the State Language Department.

For further information, visit the following link:
**http://ice.ge/of/**

# IVANE JAVAKHISHVILI INSTITUTE OF HISTORY AND ETHNOLOGY

Ivane Javakhishvili Institute of History and Ethnology is one of the oldest institutions in Georgia. Its roots date back to July 1, 1917 when Niko Marr founded Historic-Archaeological Institute of the Caucasus. The Institute changed its name several times during its existence. In 1964, the Institute was named Ivane Javakhishvili Institute of History, Archeology and Ethnography and from 2006 - LEPL Ivane Javakhishvili Institute of History and Ethnology. At different times, the Institute was run by Simon Janashia, Niko Berdzenishvili, Giorgi Melikishvili, Davit Muskhelishvili, and Vaja Kiknadze. At present, Giorgi Cheishvili is the director of the Institute.

Since its foundation, the institute has been conducting a wide range of studies in the labs as well as fieldwork, collecting historical materials, and has been engaged in various cultural-educational activities.

At present, there are 6 departments at the Institute: Departments of Ancient History, of Medieval History of Georgia and Source Studies, Early Modern and Modern History, Georgian Ethnology, Caucasian Ethnology and the Laboratory of Anthropological Research. Its library is known for its extensive book collections; historical and ethnological archives is the Institute's significant asset as well. The Institute is currently working on the establishment of an anthropological museum.

The Institute of History and Ethnology publishes the following periodicals: ''Works of the Institute of History and Ethnology'', ''Issues of New and Recent History'', ''Georgian Source Studies'', ''The Ethnological Collection of the Caucasus'', ''Studies in History and Ethnology'', and ''Caucasian-Near Eastern Collections''.

The Institute has been taking part in international and local scientific conferences. Among recently held conferences, the following are rather noteworthy: ''Source studies and Historiography research'' and ''Anthropology and Ethnology of the Caucasus''. These conferences were held with the participation of the Georgian National Academy of Sciences and TSU.

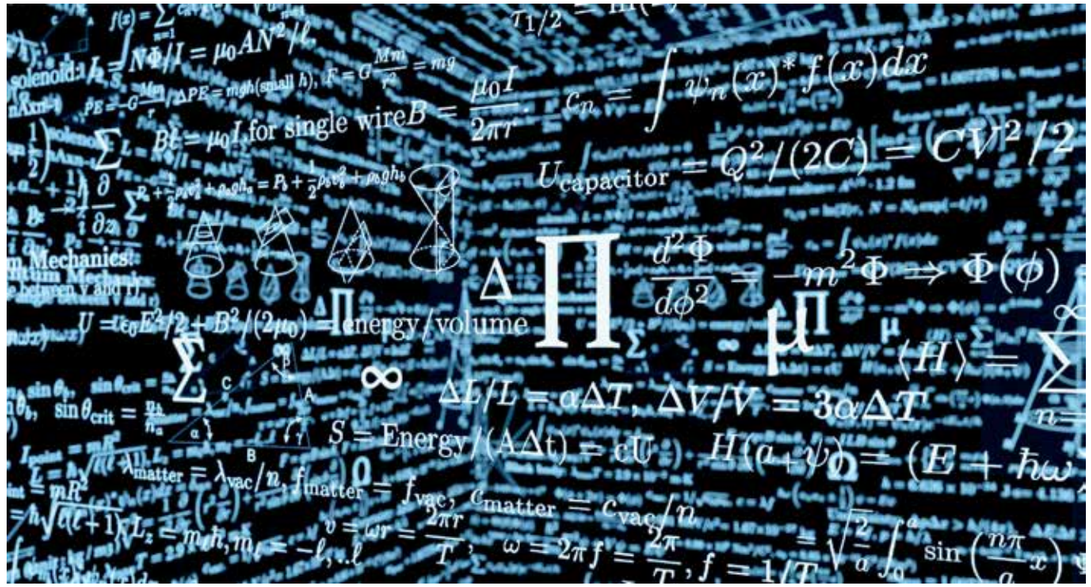
In 2016-2017, the Institute had carried out 3 projects funded by Shota Rustaveli National Scientific Foundation.

Below are the works fulfilled by the Institute personnel in recent years: ''Ossetians' Ancestors in the VIIth BC and the XVth centuries AC'' (Gioladze), ''Russian-Georgian Relations in the XVIII-XXI Centuries (according to scientific literature and documents)'' (Chumburidze, Kiknadze, Kokrashvili, and Saralidze), ''Country of Ani (Historical-geographical outlines)'' (Cheishvili), ''Georgian Folk Medicine'' (Mindadze), ''Traditional Culture of Mountainous Region of Eastern Georgia'' (Ghambashidze, Alaverdashvili), ''Traditional Law in the Caucasus, Local Legal Practices in the Georgian Lowlands'' (Janiashvili, Jalabadze ... was published in Germany), ''Dvaleti and Dvals" (R. Topchchishvili), etc.

The Anthropological Research Laboratory cooperates with Ca'Foscari University of Venice, Aix-Marseille University, and the University of Pennsylvania (2012-2018 project - Genetic diversity in Georgia considering the background of the Caucasian population volatility).

According to Scopus, the citation index of the Institute personnel is 12, and the Google Scholar - 285.

For further information, visit the following link:
**http://institutehist.ucoz.net/**




# ANDREA RAZMADZE MATHEMATICAL INSTITUTE

On October 8, 1933 with the leadership of N. Muskhelishvili Scientific Research Institute of Mathematics, Physics and Mechanics was established at Tbilisi State University. On October 1, 1935, N. Muskhelishvili and his colleagues V. Kupradze and I. Vekua initiated to found the Mathematical Institute on the basis of the Department of Mathematics and Mechanics. The Institute was operating under the management of the Academy of Sciences. In 1944, the Institute was named after Andrea Razmadze. From 2011, Andrea Razmadze Mathematical Institute has joined LEPL Ivane Javakhishvili Tbilsi State University. At different times, the Institute was run by prominent scientists: Viktor Kupradze, Niko Muskhelishvili, Vladimer Chelidze, Niko Vekua, Ivane Kighuradze. Nino Partsvania has been the head of the Institute since 2006.

Andrea Razmadze Mathematical Institute is carrying out fundamental research projects in mathematics, mechanics and theoretical physics. At present, the Institute has 9 scientific departments. These are: Department of Algebra, Department of Mathematical Logic, Department of Geometry and Topology, Department of Mathematical Analysis, Department of Differential Equations, Department of Mathematical Physics, Department of Elasticity Theory, Department of Theoretical Physics, and Department of Probability Theory and Mathematical Statistics.

The Institute issues three international scientific journals; these are: ''Transactions of A. Razmadze Mathematical Institute (has been issued since 1937, is included in the SCOPUS database), ''Georgian Mathematical Journal'' (has been issued since 1994, published by DE GRUYITER; it has been granted a high impact-factor status since 2008) and "Memoirs on Differential Equations and Mathematical Physics" (has been issued since 1994, is included in the SCOPUS database).

A. Razmadze Mathematical Institute has a scientific library, which enables the Institute to exchange scientific journals with more than 100 scientific institutions worldwide.

The Institute annually holds a scientific conference of the TSU A. Razmadze Mathematical Institute (http://rmi.tsu.ge/geo/conf), an international workshop on Qualitative Theory of Differential Equations - QUALITDE (http://rmi.tsu.ge/eng/QUALITDE.htm; ISSN 1512-3391), and various scientific forums.

The Institute has so far received more than 70 grants from international scientific foundations (INTAS, CRDF, ISF, DFG, The Royal Society, NATO Science Fellowships Program, Eurasia Foundation, Australian Research Council, SCOPE, Swiss National Science Foundation, Volkswagen Foundation, Heisenberg-Landau Program, Grant of the Government of Italy for Young Scientists, etc.). At local level, the Institute has already received more than 30 grants from Shota Rustaveli National Scientific Foundation of Georgia.

The Institute personnel has published more than 130 monographs (North-Holland, Pitman, P. Noordhoff-Groninger-Holland, Longman, Birkhauser, Kluwer, World Scientific, Cambridge University Press, etc.) and for the last 10 years, more than 900 scientific articles; nearly half of those articles were published in journals with an impact-factor status.

The Institute personnel has established strong scientific connections with more than 30 scientific centers of the USA, Japan and Western Europe. This in turn tells on the fact that the Institute has a number of joint scientific publications, scientific visits, joint conferences, etc.

The National Academy of Sciences of Georgia named A. Razmadze Mathematical Institute the best scientific-research institution of the year in the field of mathematics and physics three times in a row (in the years of 2008, 2009 and 2010).

For further information, please visit the following link:
**http://rmi.tsu.ge**



# ILIA VEKUA INSTITUTE OF APPLIED MATHEMATICS

The Institute of Applied Mathematics at Tbilisi State University was founded on 27 October 1968 year by Academician Ilia Vekua. Its foundation was initiated by the intensive development of computer technologies and new tendencies of research, the recognition of Georgian mathematicians' and mechanical engineers' success around the world; the aim of the Institute was to integrate scientific research and teaching process. The Institute was granted its founder - Ilia Vekua's name in 1978. At different times the Institute was led by Ilia Vekua, Andria Bitsadze, and David Gordeziani. Since 2006 to present, the Institute is under the direction of George Jaiani.

From the very foundation of the Institute, its main goal was to study current problems of applied mathematics, to engage University students and professors into the research process, and to promote the application of mathematical methods and calculating techniques in non-mathematical fields.

The main fields of study of the Institute are: mathematical problems of the mechanics of continua and related problems of the analysis; mathematical modelling and numerical mathematics; discrete mathematics and theory of algorithms; probability theory and mathematical statistics. The research work is carried out along with the university professors, PhD and graduate students in the framework of the Institute's scientific programs, and international and local grants (projects).

In the Institute undergraduate and graduate students of the Faculty of Exact and Natural Sciences undertake their Labs as computer experiments. During the last 10 years, under the supervision of the Institute professors, 12 PhD dissertations have been defended. The majority of these defenders were actual employees of the Institute during their MA and PhD studies. Currently, 9 of them are in the Institute team of scientists. During the same period, the Institute was awarded 13 international (INTAS, CRDF/GRDF, FP7, STCU, ECONET, etc.) and 30 Shota Rustaveli Georgian National Scientific Foundation grants.

Today the Institute publishes 6 different peer-reviewed scientific journals in English by the name of I. Javakhishvili Tbilisi State University publishing house. Two of them are related to the Tbilisi International Center of Mathematics and Informatics (TICMI) operating under the auspices of the European Mathematical Society (EMS) at the Institute base - Bulletin of TICMI (published since 1997) and Lecture Notes of TICMI (published since 2000). Both of these publications are included in the Scopus database.

The Institute sends its scientific materials to different scientific centers around the world and annually gets more than fifty scientific journals in the field of mathematics, applied mathematics, mechanics and information sciences. Furthermore, the Institute has an electronic signature on the abstract journal - Mathematical Reviews (USA); the University personnel also have an access on the journal. During the last 10 years, the Institute staff have published 744 scientific articles, among them, 278 - in peer-reviewed journals. At the same time, 21 monographs were published by the Institute staff (Springer, Kluwer, Chapman&Hall, Elsevier, Nova, and by the Tbilisi State University publishing house). Moreover, 20 printed and 12 electronic textbooks and courses by the Institute scientists have been issued. Over the last five years, the Institute has 50 employees on average and about 35 of them are academic personnel and up to 14 members are MA or PhD students. Average age of the employees is 55 years.

Each year, the Institute organizes several international scientific forums; part of these forums are held under the auspices of such prominent international scientific organizations as IUTAM, ISAAC, EMS. From 2007 to 2018, the employees of the Institute have delivered 547 talks at various scientific congresses, conferences, symposiums and other scientific forums; among them 280 talks were delivered abroad.

The Institute established collaboration with educational and scientific institutions of more than 20 leading countries around the world.

For more detailed information visit:
**http://www.viam.science.tsu.ge/**

# THE INSTITUTE OF ECONOMICS BY PAATA GUGUSHVILI

The Institute of Economics by Paata Gugushvili was founded in June 29, 1944.

It's very founder, academician PaataGugushviliwas the first director of the Institute. Afterwards, the Institute was supervised by the following directors: academicians - AvtandilGunia andVladimerPapava and Doctor of Economic Sciences, GiorgiTsereteli.

Sincen2008DoctorofEconomicSciences,professorRamazAbesadze has been the head of the Institute.

Prominent Georgian scientists and academicians such as Simon Janashia, NikoKetskhoveli and IrakliMikeladze, professor NikolozKoiavahad taken part in the first scientific board of the Institute. The Institute personnel comprised thenumber of prominent economists; these were: professor Pilipe Gogichaishvili, academician Vasil Chatladze, member-correspondents – Valerian Melkadze and Leo Chikava; professors – Giorgi Gekhtmani, Ioseb Bajadze, Nikoloz Iashvili, Luarsab Karbelashvili, Nikoloz Tkeshelashvili, Tamaz Chikvaidze, Giorgi Papava, Arcil Tetrauli and etc. At the present time, among others scholars, the Institute personnel includes: academician Vladimer Papava, professors - Alfred Kuratashvili, Rozeta Asatiani, Vakhtang Burduli, Giorgi Berulava, Murman Kvaratskhelia etc.

At present, there are 7 scientific-research departments operating at the Institute and for the time being, the all departments are working on the implementation of the large-scale scientific project – "Euro Integration and the Problems of Forming Innovation Economcs in Georgia'' which was adopted by the Ministry of Education and Science of Georgia in 2015. The Institute scientists constantly publish their works into international publishing (including journals). The majority of these published materials are indexed in the international databases (Scopus,

ERIH PLAS, Google Scholar, etc.). In Google Scholar, the Institute employee citation index exceeds 1000, in Scopus – the number exceeds 50. At different times, the Institute's scientists had been taking part in various international and national projects. In 2016-2017, the Institute obtained a grant from ShotaRustaveli National Scientific Foundation of Georgia.

The Institute of Economics by Paata Gugushvili has its own publishing house. Since 2009, the Institute has been publishing international peer-reviewed scientific-analytical journal, "Ekonomisti". It is issued both in printed and electronic (www.ekonomisti.tsu.ge) forms. The articles in journal are published in Georgian, English and Russian languages. The journal is indexed in the international search engine - ERIH PLAS. The Institute also publishes its annual collection of works (http://pgie.tsu.ge/?menuid=32&lang=1).

From 2009, the Institute has been holding international scientific conferences and has been publishing relevant collections of works. Since 2017, the Institute has been hosting International Scientific Internet Conference. In the same year, the Institute created a webpage for international conferences – ''Economics - XXI Century'' (www.conferenseconomics.tsu.ge) which includes the conference speeches in Georgian, English and Russian languages.

The above-mentioned events along with other activities of the Institute contributed to the deepening of international scientific relations. Currently, the scientific materials of the Institute are introduced worldwide and there are close connections established with international scientific and educational centers.

There is a scientific library operating at the Institute since its foundation; the library keeps various scientific works undertaken by the Institute personnel, and Georgian and foreign scientists. Currently, the Institute is working on becoming part of the International Library Center.

# PETRE MELIKISHVILI INSTITUTE OF PHYSICAL AND ORGANIC CHEMISTRY

Petre Melikishvili Institute of Physical and Organic Chemistry is the oldest Georgian scientific-research center in the field of chemistry, founded on October 1, 1929.

At different times, the Institute was supervised by academician Lev Pisarjevski, members of Georgian USSR Science Academy - Academicians Giorgi Tsitsishvili and Teimuraz Andronikashvili, in 2006-2017 years – member-correspondent of the Georgian National Academy of Science Vladimer Tsitsishvili. Currently, the head of the Institute is Candidate of science in Chemistry - Ketevan Ebralidze.

Georgian and foreign scientists made a great contribution to the Institute development; they personally led scientific-research works for the purposes of studying the issues of chemical-technological and chemical ecology of natural raw materials in Georgia. The technologies developed as the result of the undertaken scientific research were implemented in the industries of Georgia, Turkmenistan, Azerbaijan, and Russia. As the trial production, the Institute was making the medications against tortious insects and luminophore "Noriola".

With the OSCE funding, the team of scientists of the Institute, under the supervision of Professor A. Dolidze fulfilled 9 projects. Within the framework of the demilitarization program of Georgia, on the basis of so-called "Georgian model", the projects were aimed at neutralizing the components of liquid rocket propellant - "Melange" and "Samini".

Since 2015, Petre Melikishvili Institute of Physical and Organic Chemistry has been carrying out a ten-year scientific research program – "Chemistry and Chemical Technologies for the Economic Development of Georgia".

The main goal of the ongoing works at the Institute is to study the possibilities of the rational use of natural resources of Georgia in order to support the country's economic development, to obtain new materials and to develop innovative technologies for their use in the various fields of economics and environmental protection. The Institute staff is also engaged in consultation and export processes.

The Institute successfully collaborates with the leading universities and scientific centers of the world (USA, Canada, Bulgaria, Great Britain, Ukraine, Azerbaijan and Russia).

The results of the works implemented in 2015-2018 years are presented in more than 150 articles, which are published in the local and international scientific journals, and more than 150 theses are published in the international scientific conference materials. Sakpatenti (National Intellectual Property of Georgia) has issued 10 certificates confirming intellectual property of the Institute's research findings. 8 findings have been published as books and other printed materials.

Since 2000, the Institute personnel fulfilled up to 25 international (ISTC, STCU, CRDF and OSCE) and nearly 50 fundamental, applied, internship and participation (conferences in Slovakia, Belgium, Japan, USA, China) grant projects funded by Shota Rustaveli National Scientific Foundation.

In 2005, V. Tsitsishvili, N. Dolaberidze and M. Alelishvili were given the award of the Georgian National Academy of Science - Alexandre Tvalchrelidze award for their cycle of works "The Use of Georgian Natural Zeolites in Agriculture". Furthermore, in 2017 V. Tsitsishvili, N. Dolaberidze, M. Nizharadze and N. Mirdzveli received Giorgi Tsitsishvili award for their cycle of works "Zeolite synthesis from natural aluminosilicate raw materials of Georgia".

In 2017-2018, the Institute commercialized its innovative technologies. The projects - "Bio-diesel production" and "New zeolite fertilizers containing nitrogen obtained through the use of nano-technologies" have become the beneficiaries of the "Startup Georgia" program.

# R. AGLADZE INSTITUTE OF INORGANIC CHEMISTRY AND ELECTROCHEMISTRY

R. Agladze Institute of Inorganic Chemistry and Electrochemistry was founded in 1956 with the purpose of solving problems related to the development of technologies for gaining competitive products from the utility minerals of Georgia. The technologies developed at the Institute were implemented in the large-scale production, particularly:

- For the first time in Europe, Zestaphoni Electrolytic Metal Manganese Factory was launched (capable of fully meeting former USSR and Eastern Europe demands);
- In JSC Rustavi Azot, factory of electrochemical obtaining of potassium permanganate was launched (used to meet 1/3 demands of the former USSR)

According to the development process, studies have been diversified in different directions,:

Quantum-mechanical theory and experimentation of charge transfer

in chemical and electrochemical systems, adsorption, electrochemical kinetics, electrical crystallization, thermochemistry, radiation chemistry, etc.

Throughout the independence of Georgia, the Institute widely collaborates on an international level. In particular, within the framework of the EU framework Program (FP6, FP7), UK's Closed Nuclear Cities Partnership (CNCP), partnership projects were implemented with the finances of the US Department of Energy and US National Laboratories (Livermore, Los Alamos).

Based on the research conducted at the Institute, the hydrogen energy development plan was drafted and the president of Georgia issued Order № 1087 (04.09.2003) "about the development of hydrogen energy in Georgia, enhancement of collaboration and integration processes with international organizations and companies".

Since 2015, the Institute has been implementing a ten-year state scientific research program:

"Development of scientific perspectives for Nano chemistry, some local raw material processing technologies and solving ecological problems"

The project includes various fields of study, in particular:

"complex studies of charge and energy transfer processes in irregular nano and mezzoscopic chemical and electrochemical systems, using new methods of theoretical research; creating metallic nano-powders; developing thermo-resistant, fire-resistant, corrosion-resistant, radiation-resistant materials; fuel type current sources; thermochemical research; coordination chemistry; catalysis; radiation chemistry; Inorganic polymers; non-aquatic electrochemistry; electrolysis of melts; water purification-decontamination; utilization of solid waste, etc."

In 2015-2017 years, the Institute developed laboratory-type and afterwards, semi-production technology for secondary tire recycling by the direct investment of the US private company – Long Arc Technologies Corporation. The Institute developed carbon nano-material so-called "black carbon", which is highly demanded on the world market. By the co-authorship of the Institute staff (T. Marsagishvili, G. Tatishvili, A. Peikrishvili), this product obtained the US patent: USA Patent No 9663662, 05/30/2017, "System and method for tire conversion into carbon black, liquid and gaseous products".

Based on the obtained results, in the framework of STCU foundation, the Institute entered into a partnership project contract P#716: "Production of residual tire recycler reactor and development of black carbon enrichment technology – part #1" with the US private company G3C Technologies Corporation from January 1, 2018. The project is currently in active phase.

For further infromation, visit the following link:
**http://iice.ge/index.php?p=home&LN=ge**
**http://longarctech.com/pb/wp_a1106406/wp_a1106406.html**

# ALEXANDRE NATISHVILI INSTITUTE OF MORPHOLOGY

In 1946, upon the initiative of Academician Alexandre Natishvili, the Institute of Experimental Morphology was founded at the Georgian Academy of Sciences. The Institute was led by Academician Natishvili himself until his death in 1959. In 1959, the management of the Institute was taken over by his student, Academician Nino Javakhishvili, and the Institute was named after Alexandre Natishvili.

The Institute of Experimental Morphology provided a properly equipped research base enabling the conduct of cutting-edge experimental studies and tying up theoretical discipline with practical medicine. The research was conducted in various areas of medicine, such as anatomy, pathological morphology, cytology, andrology, gerontology, immunology, bacteriology, et cetera.

In 2006, Professor Dimitri Kordzaia, MD PhD, became the director of the Alexandre Natishvili Institute while Academician Nino Javakhishvili remained Honorary Director of the Institute until the end of her life. In 2015-2016 the management of the Institute was taken over by Simon Dalakishvili, MD PhD. Today, the director of the Institute is MD PhD Manana Kakabadze.

Since 2010, the Alexandre Natishvili Institute of Experimental Morphology has become an integral part of Ivane Javakhsihvili Tbilisi State University. It is one of educational and scientific-research bases of the TSU.

At present, the total of 36 researchers work for the three department of the Institute, those of Clinical and Experimental Pathology, Clinical Anatomy and Experimental modeling, and Gerontology and Palliative Medicine.

In 2017, the Institute completed the 2014-2017 scientific program, funded from the state budget of Georgia, which consisted of three directions: I. Oncomorphology; II. Modeling of Diseases and Pathological Conditions; III. Problems of Demographic Aging.

Within the scope of "Oncomorphology", two projects were implemented: 1. "Morphological Characteristics of Precancerous Processes of Hormone-dependent Organs and Dysplasia by Assessment of Cell Receptor Status for Early Diagnosis and Prevention of Cancer Risk", and 2. "Molecular Epidemiology of Breast and Lung Cancer in Georgia – Correlation of Molecular and Morphological Classifications". Two projects were also implemented in the direction of "Modeling of Diseases and Pathological Conditions"; they were: 1. "Regeneration of Remaining after Resection and Transplanted Half Liver: Regeneration after Denervation-Delymphatisation; Hepatocytes or Stem Cells?" and 2. "Development of New Methods of Organ Conservation". As regards the third direction, one project, "Socioeconomic Problems of Demographic Aging in Georgia", was implemented there.

The results of researches conducted within the scope of these projects are submitted to the Ministry of Education and Science of Georgia and the National Academy of Sciences of Georgia in the form of annual reports and also reflected in various publications.

Over the period between 2014 and 2017, researchers of the Institute published eight monographs (of which five were published in Georgia and three were published abroad) and 114 research papers: 72 published in the journals issued in Georgian and 42 – issued in different countries. As many as 37 presentations were delivered at international scientific conferences. Within the same period, the Shota Rustaveli National Science Foundation awarded grants for the implementation of five projects; moreover, four PhD theses, which were prepared on the basis of the Institute of Morphology, were defended at the dissertation council of the Faculty of Medicine, TSU.

In 2018, the Institute has started to implement a five-year scientific program which is funded from the state budget of Georgia. The program consists of two projects: I. Verification of Effectiveness of Extracorporeal Cardiac and Lung Support and Continuous Perfusion of Multi Organ Preservation (preclinical research) (project leader: Prof. Nodar Khodeli, MD, PhD, senior researcher) and II. "Decent Life Till the End – Identification of Social, Medical, Ethical Problems of Elderly and Recommendations for National Program of Geriatric Palliative Care (project leaders: Simon Dalakishvili, MD, PhD and Elene Janberidze MD, PhD).

Over many years, the Institute of Morphology has maintained professional contacts with scientific-research institutions of various countries (US, Germany, Spain, Japan, England, Slovakia, Russia, Ukraine, etc) and is engaged in the exchange of information with them, implementation of joint projects, and conduct of scientific forums. The Institute intends to continue the established cooperation in future and at the same time, to seek new partners for joint researches.

**http://morphology.tsu.ge/?lan=ge&cat=mtvtest**



# TINATIN TSERETELI INSTITUTE OF STATE AND LAW

The law studies in the system of Georgian Academy of Sciences and accordingly the existence of the Institute of State and Law has a 60-year-old history. In December 1957, the Institute of Economics opened the Department of Law, which was supervised by Professor Tinatin Tsereteli. Thanks to her endeavors, the department was soon developed into an independent sector, which eventually resulted in the foundation of the Institute of Economics and Law. In June 1988, the Institute of Economics and Law established an interdisciplinary Center of State and Law Studies, which was separated from the Institute of Economics and Law in 1989. In January 1991, as a result of the efforts of Professor Tamaz Shavgulidze and other scientists of the Institute, the Center was granted the status of the Independent Scientific-Research Institute and was named the Institute of State and Law. In 2004, the Institute was named after its founder – Tinatin Tsereteli.

At different times, various prominent scientists worked at the Institute – Tinatin Tsereteli, Vladimer Makashvili, Isidore Dolidze, Davit Purtseladze, Givi Jvania, Tamaz Shavgulidze, Giorgi Nadareishvili, Tengiz Liluashvili, etc. With the personal contribution of Tinatin Tsereteli and the team of scientists that she compiled, the Department of Criminal Law achieved significant progress and soon "Tbilisi School of Criminal Law" became rather popular at local as well as at the international levels.

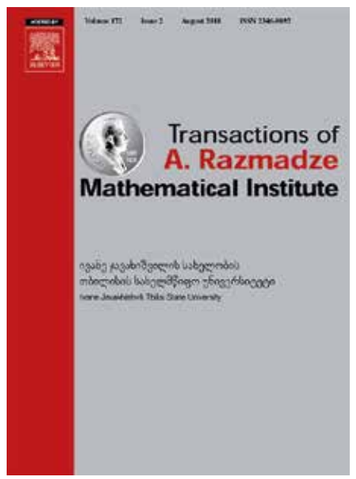
There has been number of local and international conferences held at the Institute of State and Law since its foundation.

At present, there are 19 scientists working on theoretical and practical fields of law at the Institute. The Institute has three departments: 1. History and Theory of Law 2. Private Law and 3. Criminal Law and Criminology departments.

In addition to analyzing legislative materials and preparing legal commentaries, the Institute focuses on the development of fundamental theoretical fields of law. The researchers at the Institute have prepared number of syllabi and as lecturers have taught some fundamental fields like theory of law, philosophy of law, sociology of law, and anthropology of law in various universities. At present, active works are underway in order to introduce the latest perspectives of the interdisciplinary studies of law. The Institute is currently working on the development of the following interdisciplinary fields: law and economics, law and development, law and global policy, law and literature, law and society, law and informatics, law and psychology, law and psychoanalysis, and law and cybernetics.

The Institute applies an innovative approach to dealing with legal doctrine – instead of conventional "methodological nationalism" according to which, law enforcement is brought down to national jurisdiction, the Institute undertakes various researches projects with the focus on global, transnational normative orders. Comprehensive processes of globalization, privatization and digitalization alter the dogmatic structure and form of the law, which results in "global law without a state". Accordingly, the innovative research done within the Institute is aimed at acquiring these very latest forms of law.


Ivane Javakhishvili Tbilisi State University releases a number of peer-reviewed scientific journals. A part of them may be searched in international scientific databases.




## Journal "Transactions of A. Razmadze Mathematical Institute"

**ISSN: 2346-8092**

The journal, launched in 1937 by Academician Niko Muskhelishvili, is the official publication of A. Razmadze Mathematical Institute at Ivane Javakhishvili Tbilisi State University. Initially, it was named "Proceedings of Tbilisi Mathematical Institute." In 1990-2015 it was renamed "Proceedings of A. Razmadze Mathematical Institute." Since 2016 it is published by Elsevier.

Since 2015, it is published only in English, in both electronic and print forms; one volume (three issues) per year. Elsevier database provides open access to its electronic version; in addition, TSU releases its print version and sends it to over 90 research centers abroad. The journal is also available in SCOPUS database.

The journal publishes high quality original research papers, review articles and short communications in all fields of mathematics, both pure and applied. Three issues of one volume are published per year; each issue includes about 12-14 publications and contains 135-140 pages.

**http://www.journals.elsevier.com/transactions-of-a-razmadze-mathematical-institute**



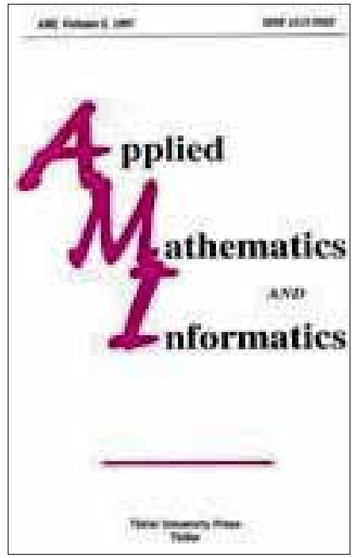
## Journal "Memoirs on Differential Equations and Mathematical Physics"

**ISSN 1512-0015**

The journal is jointly released by the Georgian National Academy of Sciences and A. Razmadze Mathematical Institute. It is an international journal for the publication of high-quality, peer-reviewed original papers and monographs in ordinary and partial differential equations and their applications. It is released since 1994, three times a year.

The journal is available in SCOPUS database. It is published in both electronic and print forms, three volumes per year and sent to over 90 foreign research centers.

**http://rmi.tsu.ge/memoirs**


## Applied Mathematics, Informatics, and Mechanics (AMIM)

**ISSN 1512-0074**

The journal is released by I. Vekua Institute of Applied Mathematics at TSU (Applied Mathematics, Informatics and Mechanisms).

The English-language journal publishes original research articles involving the fields of mechanics, exact sciences and informatics. The journal has been launched by the Tbilisi State University and the University of Malaga (Spain). The first issue was released in 1996. Since 1997 it is published in both electronic (open access) and print forms.

The journal has been reviewed and indexed by Mathematical Reviews.

„Mathematical Reviews/MathSciNet and Zentralblatt MATH/Mathematics Abstracts".

Its editorial board includes both Georgian and foreign scientists.

**http://www.viam.science.tsu.ge/Ami/Main.htm**

## Reports of Enlarged Session of the Seminar of I. Vekua Institute of Applied Mathematics (Rep. Enlarged Sess. Semin. I. Vekua Appl. Math.)

**ISSN 1512-0066**

The journal is released by I. Vekua Institute of Applied Mathematics at TSU. It publishes original peer-reviewed research papers, information in mathematics and its fields, with clear formulation of results. The reports are presented at enlarged sessions of the seminar. The journal was launched in 1985. Since 1995, it is released in English. Since 2004, the journal is released in both print and electronic forms (open access).

The journal is reviewed and indexed by Mathematical Reviews/MathSciNet, Zentralblatt MATH/Mathematics Abstracts.

Its editorial board consists of both Georgian and foreign scientists, as well as co-chairs of enlarged sessions of the VIAM seminar.

**http://www.viam.science.tsu.ge**

## Georgian Mathematical Journal

**ISSN 1572-9176**

The Georgian Mathematical Journal was founded in 1994 by the Georgian National Academy of Sciences and A. Razmadze Mathematical Institute. It is produced in partnership with De Gruyter (Germany). It is an international English-language peer-reviewed journal, publishing research articles of best scientific standard in pure and applied mathematics. The journal is covered in the Scopus database; impact factor since 2008; publication online and in print, 4 issues per year.

**https://www.degruyter.com/view/j/gmj**

## Bulletin of TICMI (Tbilisi International Center of Mathematics and Informatics)

**ISSN 1512-0082**

The journal is released by Tbilisi International Center of Mathematics and Informatics (TICMI) at I. Vekua Institute of Applied Mathematics It publishes original research papers from all fields of mathematics, especially mechanical and natural sciences, as well as computer science. The journal publishes original peer-reviewed papers, which were presented to international meetings organized by TICMI, as well as other materials about research. The journal aims to assist young scientists from the Black Sea basin to improve their skills as well as to disseminate scientific information throughout the world. The editorial board consists of members of the international scientific committee with three of them being appointed by the executive committee of the European Mathematical Society.

The journal is released in both print and electronic forms (open access); articles are published in English.

The first issue was published in 1997.

The journal is reviewed and indexed by Mathematical Reviews/ MathSciNet, Zentralblatt MATH/ Mathematics Abstracts.

**http://www.viam.science.tsu.ge/ticmi/bulletin/bulletin.html**
**http://www.emis.de/journals/TICMI/blt/bulletin.htm**

## Proceedings of I. Vekua Institute of Applied Mathematics

**ISSN 1512-004X**

The journal is released by I. Vekua Institute of Applied Mathematics at TSU. It involves original papers about various fields of pure and applied mathematics. “Proceedings of I. Vekua Institute of Applied Mathematics” is a peer-reviewed journal, which publishes research papers in the fields of pure and applied mathematics, including computer science. The journal was launched in 1969 by I. Vekua Institute of Applied Mathematics. Since 2002 it is published in both electronic (open access) and print forms. Since 1995 the materials are published in English.

The journal is reviewed and indexed by Mathematical Reviews/ MathSciNet, Zentralblatt MATH/Mathematics Abstracts.

Its editorial board includes both Georgian and foreign scientists.

**http://www.viam.science.tsu.ge/publish/proceed.html**

## Seminar of I. Vekua Institute of Applied Mathematics. REPORTS

**ISSN 1512-0058**

The journal is released by I. Vekua Institute of Applied Mathematics at TSU.

It publishes original peer-reviewed research papers (with full confirmation), short information in mathematics and its fields, with clear formulation of results. The journal was launched in 1969 by Ilia Vekua.

Since 2002 it is released in both print and electronic (open access) forms. Since 1995 it is released in English.

The journal is reviewed and indexed by Mathematical Reviews/ MathSciNet, Zentralblatt MATH/Mathematics Abstracts.

Its editorial board includes both Georgian and foreign scientists.

**http://www.viam.science.tsu.ge/reports.htm**


## Journal “Economisti”

**ISSN 2346-8432 (Online)**
**1987-6890 (Print)**

The journal is released by Paata Gugushvili Institute of Economics at TSU.

A Georgian-language international scientific-analytical journal “Economisti” was launched in 2008, by decision of the directorate and scientific council of Paata Gugushvili Institute of Economics. Its first issue was released in 2009. The journal consists of about 120 pages and it contains 10-12 articles, on average.

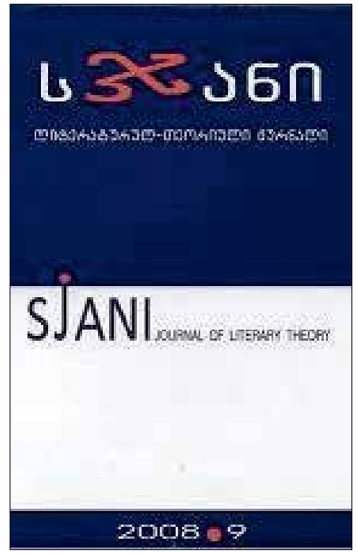
Since 2016, Economisti is an international, peer-reviewed, scientific-analytical journal, which is published in both electronic and print forms, in Georgian and English languages (open access).

The main purpose of the journal is to popularize modern scientific achievements in Georgia, to acquaint Georgian academia with the achievements of global economic science, and to present the Institute’s activities to broad public.

The editorial board consists of highly qualified Georgian and foreign researchers.

The journal is available in electronic databases - ERIH

**ekonomisti.tsu.ge**




## “Sjani”

**ISSN 2346-772X (online)**
**1512-2514 (Print)**

The journal is published by Shota Rustaveli Institute of Georgian Literature. It is a peer-reviewed journal.

The journal publishes papers, covering persisting issues and problems of modern literary studies, yet unpublished results of important research. Papers are selected for printing through anonymous review.

Sjani is an annual scientific journal covering the fields of literary theory and comparative literature studies.

Since 2008 the journal is available on the website of the Central and Eastern European Online Library (http://www.ceeol.com).

Since 2015, Sjani is included in the Flemish Academic Bibliography for the Social Sciences and Humanities (VABB-SHW). In 2017, it was included in ERIH PLUS database (https://dbh.nsd.uib.no).

The journal has an international editorial board; papers are published in Georgian, English, German, French and Russian languages.

**http://www.ceeol.com**

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The publication has been prepared by the TSU Department of Public Relations

Printed in TSU Publishing House
1 Ilia Tchavtchavadze Avenue, Tbilisi, 0179
Tel 995 (32) 225 14 32, 995 (32) 225 27 36
www.press.tsu.edu.ge



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