

PETER THE GREAT  
ST. PETERSBURG  
POLYTECHNIC UNIVERSITY



POLYTECH



SPRING, 2021

04

INTERNATIONAL  
SPbPU  
REVIEW

BEST  
PRACTICES



Rector of Peter the Great  
St. Petersburg Polytechnic  
University, Academician of the  
Russian Academy of Sciences  
**Andrei RUDSKOI**



We send you warmest greetings from Peter the Great St. Petersburg Polytechnic University! Spring is a special time and season for St. Petersburg. Everything starts flourishing and after the difficult year we hope for the development and all the positive plane implementation. In the new semester Peter the Great St. Petersburg University has opened the doors for students and teachers. We have resumed the work of our campus and offline work. Students and faculty members are happy to have an opportunity to resume communication in the offline format as well as the close work with applied projects and implementation of the hands-on tasks to develop applicable skills.

SPbPU keeps carrying out a very active work on providing safe conditions for our students and staff. In view of the situation with the pandemic at SPbPU we have started the process of wide vaccination in order to ensure safety of the educational process and take care of a well-being and health of our students, faculty and staff. SPbPU has organized a vaccination centre against coronavirus at the university campus.

We are looking forward to the borders reopening and the opportunity to welcome all our friends and partners at SPbPU as soon as the situation with the pandemic allows.

A handwritten signature in blue ink, corresponding to Andrei RUDSKOI. The signature is fluid and stylized, written in a cursive-like style.

Vice-Rector  
for International Affairs  
**Dmitry ARSENIIEV**



SPbPU would be pleased to share our current news and tell about the most significant events at the Polytechnic University and with our active participation. We have included in the new issue of SPbPU International Review the most relevant information about our current research projects, international events and best practices in the field of education etc.

We have decided to include new sections devoted to the introduction to SPbPU campus: you will find out about the SPbPU museum and will get acquainted with one of the oldest SPbPU institutes.

Traditionally we bring you up to date with the news about our partnership programs, positions in rankings, participation in conferences and news about education and research at SPbPU.

SPbPU is looking forward to celebrating its 125th anniversary and we are already preparing for it and organizing some improvements that we will as well share with our friends and partners.

As well, this issue will provide you with the information on SPbPU contribution to UN SDGs: participation in the Global University Presidents' Forum organized by Zhejiang University with the support of the United Nations and under the auspices of UNESCO, as well as the current research and education projects in this area.

We wish you good health and look forward to developing cooperation with our partners and friendship!

A handwritten signature in blue ink, corresponding to Dmitry ARSENIIEV. The signature is stylized and written in a cursive-like style.



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PARTNERSHIP



TOWARDS 125<sup>th</sup>  
ANNIVERSARY  
OF SPbPU



RANKINGS



SPbPU  
SCIENTIFIC  
EDITIONS



ASSOCIATIONS  
AND NETWORKS



EDUCATION



JOINT  
AND DOUBLE  
DEGREE PROGRAMS



INTERNATIONAL  
EDUCATIONAL  
PROJECTS



SUMMER  
AND WINTER  
SCHOOLS



CONFERENCES



SPbPU  
INSTITUTES  
INTRODUCTION



RESEARCH  
PROJECTS



R&D



VISITING  
PROFESSORS  
PROGRAM



CHINA REGION  
(SPbPU Representative  
Office in Shanghai)



ALUMNI



## POLYTECH PRESENTED ITS MISSION IN THE FIELD OF SUSTAINABLE DEVELOPMENT GOALS AT THE GLOBAL UNIVERSITY PRESIDENTS' ONLINE FORUM

The Polytechnic University was the only university in Russia to take part in the Global University Presidents' Forum, which was held online on March 24, 2021. The Forum "Role of Universities in the 2030 Agenda" was organized by SPbPU strategic partner Zhejiang University with the support of the United Nations and under the auspices of UNESCO. The Polytechnic University was presented by SPbPU Rector, Academician of the Russian Academy of Sciences **Andrei RUDSKOI**.

Within the framework of the Forum, leaders of global universities in the world discussed the role of universities and shared their strategies and best practices for achieving the UN Sustainable Development Goals expressed in the 2030 Agenda.

In his opening speech, the President of Zhejiang University **Wu ZHAOHUI** underlined that education plays a key role in the development of society, represents a fundamental basis and must be innovative.

Welcoming remarks were made by **Nikhil SETH**, Assistant Secretary-General, United Nations, **Stefania GIANNINI**, Assistant-Director General for Education of UNESCO, **Peter SALOVEY**, President of Yale University, **Pam FREDMAN**, President of IAU. After the keynote speeches, presentations were made within the framework of three sessions: "Education for a Sustainable Future", "Advanced Scientific Collaboration", "Creating a Greener Campus".



*Peter the Great St. Petersburg Polytechnic University sees its mission in the development of scientific technologies and the creation of such an educational environment that will make it possible to intelligently manage the precious resources of our planet, to provide future generations with knowledge, ideas, aspirations for the sustainable development of mankind.*

### SUSTAINABLE DEVELOPMENT GOALS



SPbPU Rector **Andrei RUDSKOI** presented the mission, vision and activities of Peter the Great St. Petersburg Polytechnic University in the context of the UN Sustainable Development Goals.

The UNESCO Chair "Management of the quality of education in the interest of sustainable development" has been established at SPbPU. The chair acts as an integrator of a number of large projects, and organizes the most important meetings of the national and international level. In 2022, the Polytech will become the venue for the Session of the UNESCO World Heritage Committee.

SPbPU largest projects in the field of SD are the following: In the field of obtaining clean energy, this is the development of special technologies and the creation of a power supply network for the Arctic territories based on combined wind turbines, as well as a unique technology for a full processing cycle - obtaining biogas from solid domestic waste, purifying methane up to 98%, and its further conversion into pure hydrogen, including for fuel production purposes.

In the field of climate change and water management digital model (digital twin) of the Ob-Irtysh basin has been developed. Using this model, it is possible to predict the impact of, for example, climate change, catastrophic floods, as well as man-caused impacts.

To ensure the sustainability of cities and communities, the Polytechnic University has implemented a number of projects for St. Petersburg and Russia – this is participation in the design of the construction of a Flood prevention complex (Dam) in the Gulf of Finland, and a unique project of the Zenit football stadium (Gazprom-Arena) and BIM technologies used in the design and construction of the highest skyscraper in Europe - Lakhta Centre. In terms of economic growth priority, SPbPU is developing a comprehensive model for the economic development of the Arctic zone, including the consequences of climate change, new realities of the logistics of the Northern Sea Route, urban planning and the development of the Arctic lands.

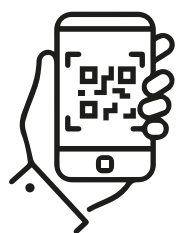
➤ **SPbPU became the only Russian university at the Global Forum of University Presidents**



One of the most important tasks of the Polytechnic University is to create an appropriate educational environment. Special educational programs that combine engineering and entrepreneurship are being carried out; the Polytech-Strasheg student start-up support center has been established, as well as the creative space Boiling Point.

Summarizing the accumulated experience, the Polytechnic University initiated the first in Russia specialized edition “Sustainable Development and Engineering Economics”, having invited international experts and scientists from all over the world to join the Editorial Board. Realizing its mission in the context of sustainable development goals, SPbPU have come up with a development strategy, based on the strongest scientific schools and areas of research and proposed a format that allows us to concentrate resources on crucially important tasks. This concept formed the basis for the establishment of a World-Class Research Centre in the field of advanced digital technologies. The center accumulates resources not only of the Polytechnic University, but also attracts Russian and foreign partners, and brings together leading scientists. For example, an electric car KAMA-1 has been created and in the record time a model for the spread of the coronavirus in an urban environment has been developed by the biomedical research cluster.

Following the results of the Forum, the participants approved the Joint Statement of Global University Leaders on the 2030 Agenda for Sustainable Development. More details can be found in the Handbook “**The Role of Universities in the 2030 Agenda**”.

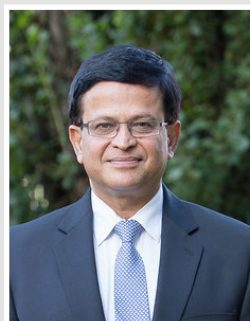


“The article was prepared making use of the materials of the Handbook\_Global University Presidents’ Forum”



**WU ZHAOHUI,**  
President  
Zhejiang University

*For centuries, universities have been at the heart of social and cultural transformation, and innovation-driven universities in particular have unique roles to play in the 2030 Agenda. Universities can work to improve “SDG competencies” while harnessing the power of technology to expand access to quality education, and should draw on their academic ecosystem to support scientific collaborations and knowledge transfer across disciplines. They can also act as a central hub to combine strengths, link the global and the local, and promote cooperation among multiple stakeholders.*



**NIKHIL SETH,**  
Assistant Secretary-General  
United Nations

*Emerging quality education for all includes the call for all teachers to instil in the learners a sense of good global citizenship. SDG’s belong to each of us and everything we do impacts on the achievement, in the aggregate, to SDG achievement. Internalizing this and making this personally relevant is at the heart of good global citizenship.*



**PETER SALOVEY,**  
President  
Yale University

*At Yale, faculty and students are working across sectors and disciplines to safeguard the planet for future generations. Every academic department or school at Yale has at least one faculty member whose scholarship relates to the SDGs. Yale not only supports groundbreaking research in this area, but it also has a long history of preparing students to work across sectors to solve major challenges. For example, in 2018, William Nordhaus, a Yale alumnus and Yale Sterling Professor of Economics, was awarded the Nobel Prize in Economics for transforming our understanding of the costs of environmental degradation and climate change.*





## NEW CONSUL GENERAL OF THE FEDERAL REPUBLIC OF GERMANY IN ST. PETERSBURG VISITED SPbPU

On February 10, two months after taking the office, the Consul General of the Federal Republic of Germany in St. Petersburg **Stefano WEINBERGER** visited the Polytechnic University together with the Deputy Head of Economics Department Dirk Zirpka.

It was a great honor and pleasure for the SPbPU to welcome the honored guests and during the visit SPbPU Rector Andrei RUDSKOI emphasized that cooperation with Germany has a long and creative history and presented the details of these long-term ties. When the Polytech was being built, the equipment of many laboratories was purchased from Germany. And the first five years after the opening, classes were conducted in three languages: Russian, German and English.

In the 1950s, a new era of cooperation between the Polytechnic University and Germany began. And now it is one of the most important areas of SPbPU's international activities. Today Peter the Great St. Petersburg Polytechnic University has established with more than 60 universities in Germany, several of which are SPbPU strategic partners. Leibniz University Hannover (LUH) was the first university in West Germany with which the Polytech signed a partnership agreement. In 2019, our universities celebrated 35 years of our cooperation. A joint project of SPbPU with Leibniz University of Hannover under the Strategic Partnership Program of the German Academic Exchange Service DAAD (2013-2018) won among 117 applications and received support of one million euros. This strategic partnership project has been recognized by DAAD as one of the best university cooperation practices.

Last year, a joint project with SPbPU strategic partner TU Berlin "Sustainable Development as a Basis for Strategic Partnership" won in the Open Russian-German Call "Russia and Germany: Scientific and Educational Bridges.", organized by the Ministry of Foreign Affairs of the Russian Federation, the Federal Ministry of Foreign Affairs of the Federal Republic of Germany with the support of the Ministry of Science and Higher Education of the Russian Federation. The joint application, which the international offices of SPbPU and TU Berlin had submitted, was recognized one of the best in the category "cooperation between institutions of higher education".

Over the past five years, SPbPU scientific groups have submitted more than 20 applications for joint research



projects with partner universities from Germany. Andrei RUDSKOI spoke also about the joint structures created by SPbPU with partner universities from Germany, and about cooperation with industrial enterprises.

Cooperation with Germany is multifaceted and is far from limited to academic exchanges, scientific collaborations and educational projects. Polytechnic University contributes to strengthening public relations and humanitarian ties between our countries. So, SPbPU was the organizer and active participant of several events within the framework of the Russian-German Year of Scientific and Educational Partnerships 2018-2020. The most striking of them were: a two-day Forum "Polytech Days in Berlin", a victory in the Russian-German competition "Russia and Germany: Scientific and Educational Bridges" together with TU Berlin, events within the framework of the annual Germany's Week in St. Petersburg.

For the Consul General acquaintance with the university began with a tour of the Main Building of SPbPU. **Mr. WEINBERGER** visited the Fundamental Library and the White Hall, where the famous toccata in D Minor, a work for organ by Johann Sebastian Bach, was performed for the honored guests.



➤ *Germany is one of the long-term and outstanding strategic partners of the Polytechnic University in the field of science, education and innovation.*





”  
**STEFANO WEINBERGER,**  
*Consul General of the Federal Republic of Germany in St. Petersburg*

During a tour to the research building “Technopolis Polytech”, the delegation of the German Consulate General visited the NTI SPbPU Competence Center “New manufacturing technologies”, the Supercomputer Center, the joint International Polytech - Siemens Research Center, the Center for Open Education and the Laboratory of Light Materials and Constructions.

SPbPU Vice-Rector for Innovative Projects, Head of the World-Class Research Center “Advanced Digital Technologies” and the NTI SPbU Competence Center “New manufacturing technologies”, Head of the “Computer Engineering Center” (CompMechLab®) **Alexey BOROVKOV** presented a project to create an electric vehicle “KAMA-1”, developed on the basis of digital twin technology. **Aleksey BOROVKOV** emphasized that the pre-production model of the electric vehicle was developed from the very beginning and without the predecessor internal combustion engine in the shortest possible time according to the automotive industry standards - in just 2 years. The Vice-Rector shared his plans for the further implementation of the project and said that in 2021, maximum preparation will be carried out for the launch of serial production of electric vehicles. In fact, the Polytechnic University acts as a developer of new competitive products in world markets and thereby forms the electric transport market in Russia.

Upon completion of the negotiations, SPbPU Rector expressed the hope that after the final stabilization of the epidemiological situation in St. Petersburg, the German Consul General could visit the Polytechnic University again to meet with the student community. The doors of the Polytechnic University are always open for our friends.



*Cooperation of the Polytechnic University at such a level, with such intensity and duration can be considered to be a worthy example of Russian-German interaction. I am very glad that you are cooperating with the German scientific, industrial and educational community, as well as with us, the Consulate General, for example, in the framework of events such as the German Week in St. Petersburg.*





## SPbPU AT THE FIRST FORUM OF RECTORS OF RUSSIA AND THAILAND



Peter the Great St. Petersburg Polytechnic University took part in the First Forum of Rectors of Russia and Thailand. The event was organized by the Russian Union of Rectors and Lomonosov Moscow State University. The Forum was supported by the Embassy of the Russian Federation in Thailand, St. Petersburg Government and the Rectors Council of St. Petersburg.

The Forum of Rectors of Russia and the Kingdom of Thailand became the first big university congress of the two countries with over a century history of diplomatic relations. The event was focused on the enhancement of humanitarian ties, implementation of academic and student exchange programs between universities, as well as research and business development. In total, exhibition, strategic sessions and round tables were organized for about 55 leading universities from Russia and Thailand that joined the Forum.

Friendly diplomatic relations between Russia and the Kingdom of Thailand date back more than 120 years. Economic, political and social relations between the countries are developing with the growing goods exchange, touristic flow and strengthening cultural relations. Today, the entire region of Southeast Asia, including Thailand, is on the rise. Certainly, the pandemic changed the overall process of the world international cooperation, however,

as well the global community initiated the new projects in the areas related to research and education, and finding the ways to promote international links with more regions and partners.

In the welcoming speech **Ms Waraphanee DAMRONG-MANEE**, Charge des Affaires A.I., Embassy of the Kingdom of Thailand in Moscow said: "The economic and social relations of our countries are directly related to interaction in the field of education. Academic and scientific cooperation between our countries is carried out in many areas: expert exchange, military education, technology and innovation. The Forum's platform will serve to develop new ideas and prospects for interaction".

**Mr. Igor GANSHIN**, Director of the Department of International Cooperation of the Ministry of Education and Science of Russia, announced that in order to support the development of practical bilateral cooperation with Thailand on the implementation of joint research projects, it is planned to sign the Program of Scientific and Technical Cooperation between the Ministry of Science and Higher Education of Russia and the Ministry of Higher Education, Science, Research and Innovation of Thailand for 2021-2025.

The keynote speech was delivered by Prof. **Dr. Pornchai MONGKHONVANIT**, President of Siam University: "An important mission of universities is to collaborate together for human well-being and sustainable development as defined by the United Nations".

**Dr. Niwat KEAWPRADUB**, President of Prince of Songkla University made a point of the importance of internationalization of educational programs, as well as interaction on long-term plans aimed primarily at improving the economic situation of both countries.

SPbPU took an active part in all the events of the Forum.

» *The Forum of Rectors of Russia and the Kingdom of Thailand became the first big university congress of the two countries with over a century history of diplomatic relations*

At the strategic session “Education and Science” on behalf of the university, Vice-Rector for International Affairs Professor **Dmitry ARSENIIEV** presented the key areas of SPbPU activities and made specific proposals for developing cooperation with Thai universities both in the field of education and international cooperation. Thus, students from Thailand have the opportunity to enter the Polytechnic University by taking part in the Open Doors Olympiad. It is a Russian national program that offers scholarships to winners to take Master’s and postgraduate programs at the best universities in Russia. As well, applicants from Thailand have the opportunity to enter SPbPU using quotas and scholarships provided by the Ministry of Science and Education of the Russian Federation, that are implemented through Rossotrudnichestvo and the Russian Centers for Science and Culture at the Embassies, in particular, in Thailand. The famous International Polytechnic Summer and Winter Schools, which offer a wide range of short-term international educational programs in English, will also be available to students from Thailand.

In particular, Prof. **Dmitry ARSENIIEV** underlined the importance of developing scientific partnerships, including relying on the capabilities and potential of the World-Class Research Center of the Polytechnic University, and invited professors and researchers from Thailand to participate in joint research in advanced areas, to conduct experiments in the laboratories of the Polytechnic University, as well as in joint conferences and publications.

At the end of the speech, SPbPU Vice-Rector for International Affairs invited colleagues from Thailand to take part in the celebrations dedicated to the 125th anniversary of the Polytechnic University in 2024.

Representatives of the International Office and SPbPU higher schools took part in the round tables and the exhibition. Thus, a meeting of employees of international cooperation departments took place in the format of three sessions. **Elena IOPEL**, Director of SPbPU Expert Center for Credential Evaluation, spoke about SPbPU’s experience in recognizing foreign qualifications, and **Elizaveta SUKHOVA**, Deputy Head of the Department of International Educational Programs and Academic Mobility, presented a report “Mutual recognition of academic load according to the Bologna system”. Head of the International Educational Programs and Academic Mobility Department **Olga EMELYANOVA** at the second session presented summer and winter schools as a tool for the internationalization of the university. And, finally, at the final session, **Pavel NEDELKO**, Deputy Director of the Higher School of International Educational Programs, made a presentation on SPbPU volunteer programs to support foreign students in the era of a pandemic.



**VICTOR SADOVNICHY**,  
Rector of Lomonosov Moscow  
State University  
The President of the Russian  
Union of Rectors

*The Forum is a long-awaited and significant event for the academic community of Russia and Thailand.*



**EVGENY TOMIKHIN**,  
Ambassador Extraordinary  
and Plenipotentiary  
of the Russian Federation  
to the Kingdom of Thailand

*Budget quota for students from Thailand will be increased by 1.5 times next year. There is an active discussion of issues on the creation of training programs for various sectors of the Thai economy.*



**DMITRY ARSENIIEV**,  
Professor, Vice-Rector for  
International Affairs of SPbPU

*We propose to attract innovative companies to support the joint research of our scientists. In addition, we hope that we will have the opportunity to receive state support for the development of cooperation in science and education in the form of special competitions, grants and relevant funds.*





## TSINGHUA UNIVERSITY, STRATEGIC PARTNER OF SPbPU, CELEBRATES ITS 110<sup>th</sup> ANNIVERSARY!



Tsinghua University was established in 1911, originally under the name “Tsing Hua Imperial College”. The university section was founded in 1925. The name “National Tsing Hua University” was adopted in 1928.

Three years after the founding of the People's Republic of China, a nationwide restructuring of institutes of higher education began, and in 1952, Tsinghua University became a multidisciplinary polytechnic university specializing in training engineers. Since 1978, Tsinghua University has been carrying out systematic modernization, strengthening scientific and educational activities in sciences, economic management, humanities and law. Today, Tsinghua has become a leading university in the world, recognized as a global leader in education, science and innovation, consistently ranked in the top 15 universities in the world in all international rankings.

### Global celebration

Preparations for the celebration of the 110th anniversary of the university have been underway since the autumn of 2020 when the special website 2021.tsinghua.edu.cn was launched. Video congratulations to Tsinghua University were sent by the leaders of many partner universities. SPbPU Rector **Andrei RUDSKOI** also congratulated Tsinghua University in a special video message.

The anniversary week was very eventful, its program included more than 180 events. Within its framework, numerous meetings of alumni from different years took place, various sports competitions and cultural events - art exhibitions and concerts. A number of forums and conferences on key and priority areas of advanced research for Tsinghua University - healthcare, computer science, automation, promising gas turbine engines, and the humanities were held within the anniversary week. The key event of the week was the Global Forum of University Presidents 2021. The Forum brought together more than 110 leaders of the world's leading universities to discuss the new image and new mission of universities, exchange views and open discussions on how



universities around the world can unleash their highest potential for the benefit of human development.

The forum was held from 19 to 24 April 2021 in a blended online and offline format. Each day of the Forum was dedicated to one of the key topics:

- University as a Cultural Space: Looking Back into the Future
- Global Carbon Neutrality: Universities Responsibility and Action
- Rethinking the Future and New Mission of Online Education
- Global Leadership of University Presidents.

### Global Leadership of University Presidents

SPbPU Rector, Academician of the Russian Academy of Sciences **Andrei RUDSKOI** took part in the Forum's fourth session “Global Leadership of University Presidents”, which took place on April 23.

After welcoming remarks from Tsinghua University President QIU Yong and Vice President **PENG Gang**, the session participants discussed the role and contributions of university presidents, the challenges they face, and issues that will be important for future university leaders. The President of the Tokyo Institute of Technology Prof. **Kazuya MASU**, President of ParisTech Prof. **Christian LERMINIAUX**, Rector Magnificus of Delft University of Technology Prof. **Tim van der HAGEN**, President of Tohoku University Prof. **Hideo OHNO**, Pro Vice Chancellor of the University of Oxford Prof. **David GANN**, President of LMU Munich Prof. **Bernd HUBER** and others shared their expert opinion and practices.

In his speech, SPbPU Rector **Andrei RUDSKOI** presented the mission, vision and activities of Peter the Great St. Petersburg Polytechnic University in the context of the role of presidents in the era of global challenges.

➤ *More than 70 years of friendship between SPbPU and Tsinghua University*

## Tsinghua-SPbPU partnership

Tsinghua University became one of the first partners of SPbPU in China. The cooperation began in the 50s of the last century when young scientists and teachers from Tsinghua University came to PhD programs and for an internship at the Leningrad Polytechnic Institute.

Many Chinese alumni of our university have become famous representatives of the scientific world in China: Academician **GAO Jingde** – President of Tsinghua University from 1983 to 1988, Professor **NI Weidou** - Vice-President of Tsinghua University from 1988 to 1994 and others. Tsinghua University professors are Honorary Doctors of SPbPU. This is the Chairperson of Tsinghua University Council, Professor **CHEN Xu**; Professor **NI Weidou** and Professor **XIONG Jiajiong**. Rector **Andrei RUDSKOI** is an Honorary Professor at Tsinghua University.

Major joint research projects are being implemented as part of a strategic partnership with Tsinghua University. Wireless sensor network technologies are being developed for automatic monitoring of engine systems; investigated plastic deformations, microstructure and mechanical properties of light alloys; joint work on intelligent systems and control of industrial robots is carried out; the mechanisms of destruction and restoration of structural elements are studied; an assessment of environmental safety and climate change is carried out taking into account various factors.

For many years, the SPbPU Institute of Humanities and the Institute for Strategic Cooperation between China and Russia of Tsinghua University have been conducting joint research in the field of history and oriental studies. A joint laboratory with SPbPU has been opened based on Tsinghua University to research in the field of aerospace and electronic technologies.

For many years, Tsinghua University has been organizing the most important global events and SPbPU takes part in them. The “Tsinghua Global Vision Lecture” project is widely known. As part of this prestigious event, renowned world leaders deliver lectures on hot topics. In 2019, the Rector of SPbPU **Andrei RUDSKOI** became one of the speakers and delivered a lecture “Peter the Great St. Petersburg Polytechnic University and Tsinghua University - Strategic Partners and Leaders of World Innovation”.

In 2020, against the backdrop of a pandemic, it was Tsinghua University that brought together the leaders of more than 20 top universities in the world for a Special Dialogue “Online education in the COVID-19 Response and Beyond”, including inviting SPbPU as the sole representative of Russia.



**On April 25, Tsinghua University celebrated its 110th anniversary!**

## CONGRATULATIONS!

*Dear President QIU Yong,*

*On behalf of Peter the Great St. Petersburg Polytechnic University and on my own behalf, I extend my heartfelt congratulations to the famous Tsinghua University on its 110th anniversary. Tsinghua University is one of the best universities in the world, the number one university in China, with which our Polytechnic University is connected during decades of beneficial cooperation and strong friendship, strategic partnership.*

*I am immensely pleased that for many years Polytechnic University and Tsinghua University have been working together for the development of our countries, on the frontier of modern education, science and technological development. We have much in common: we share common views on the sustainable development of the society, humanitarian values, and the need for internationalization, while at the same time preserving national features and traditions. Peter the Great Polytechnic University and Tsinghua University cooperate in 10 important scientific areas such as space research, information technologies, intelligent systems, additive technologies, and together solve global problems of development, launch and implementation of advanced digital technologies. Both our universities understand the importance of developing cultural, historical and social components in technical education - that is why our joint research and projects in the area of humanities are as well developing very actively.*

*The scale of Tsinghua University, the level of scientific laboratories, the clear understanding of the strategic development plan, and the optimism with which you look to the future are admirable and inspiring. And for me personally, it is essential and valuable that in 2019 I became an Honorary Professor at Tsinghua University and thus am part of your distinguished academic community.*

*Everyone says that 2020 brought many challenges. This is the year when we truly appreciate how important friendship, mutual help, support, and understanding are in our life. We do fully realize that no distance and limitations will ever be an obstacle for sincere strong relationships, new initiatives, and new opportunities.*

*I sincerely wish Tsinghua University prosperity, well-being, and new achievements. Let the new milestone in your history bring only breakthrough discoveries and great achievements. And we, for our part, are always ready to support all your endeavors.*

**SPbPU Rector,  
Academician of the Russian Academy of Science  
Andrei Rudskoi**





## STRATEGIC PARTNERSHIP WITH THE MINISTRY OF THE FEDERAL STATE OF MECKLENBURG-VORPOMMERN



Peter the Great St. Petersburg Polytechnic University and the Ministry of Economics, Employment and Health of the Federal State of Mecklenburg-Vorpommern actively continue to develop partnership.

During the March and April 2021 leading scientists of the Polytechnic University, Fraunhofer Institute for Large Structures in Production Engineering IGP (Fraunhofer IGP) in Rostock, Institute for Implant Technology and Biomaterials e.V. (IIB e.V.) and Leibniz Institute for Plasma Science and Technology (INP) in Greiswald participated in the 5 joint workshops. The workshops were dedicated to the priority areas of the Strategy of innovative and technological development of the Mecklenburg-Vorpommern region – mechanical engineering, biomedicine, methane pyrolysis and environmental protection. The main goal of the activities is to identify the matching of research topics for future projects and create project consortia that bring together universities and industrial companies from Russia and Germany. The organizer and moderator of the online meetings was the Director of the St. Petersburg Foreign Economic Bureau in Germany **Dmitry UCHITEL**.

### Workshop in the field of mechanical engineering



In Mecklenburg-Vorpommern with its geographical advantages and access to the Baltic Sea, one of the structure-forming branches of industry is shipbuilding. This topic was in the focus of the presentations of colleagues from Fraunhofer IGP. Prof. **Wilko FLÜGGE**, Director of the Fraunhofer IGP, presented the capabilities of the Competence Centre “Production Technology and Shipbuilding in the Mecklenburg-Vorpommern.” Prof. **Knuth-Michael HENKEL** spoke separately about thermal and mechanical joining technology for large marine and structural steel structures. Current projects in the field of new technologies in port logistics and robotics in modern agriculture were presented by researchers **Benjamin ILLGEN** and **André SIGRIST**.

Director of the Institute of Mechanical Engineering, Materials and Transport Prof. **Anatoly POPOVICH** presented the activities and projects of the Institute. **Yuri CHURKIN**,

Financial Director of Baltic Industrial Company – industrial partner of SPbPU, presented the advantages of interaction between universities and industrial companies using productive cooperation with SPbPU as an example. Prof. **Andrey VOLKOV** presented projects implemented for city purposes, among them special equipment for the rolling field of Gazprom-Arena stadium, the complex of Petersburg flood protection structures, rotary stage of the Bolshoi Theatre of Russia and many others. Dr. **Irina KHRUSTALEVA** talked about the automation of technological preparation of machine-building production using computer modeling.

### Workshop in the field of biomedicine



The seminar began with presentations made by the IIB e.V. in Rostock, which carries out production of innovative products such as implants and develops concepts for quality assurance of implants.

The Director of the IIB e.V., Prof. **Klaus-Peter SCHMITZ** presented development, testing and registration of implants for cardiology and cardiac surgery. The Managing Director of the IIB e.V. **Andrea BOCK** presented to the participants the prospects and facilities of the Competence Center for Medical Technology in the Mecklenburg-Vorpommern. The presentation delivered by Dr. **Stefan SIEWERT** was aimed at an overview of research in the field of stenting technology development. Dr. **Michael STIEHM** presented the interim results of a study on the development and registration of transcatheter heart valve prostheses, as well as the technology for their testing. And Dr. **Valeria KHAIMOV**, made a presentation on evaluation of the biocompatibility of biomaterials and implants for obtaining a marketing authorization.

Director of the Institute of Biomedical Systems and Biotechnology, Prof. **Andrey VASIN** presented the activities and development prospects of the Institute. Prof. **Vladimir YUDIN** made a presentation on polymer nanocomposites for tissue engineering and transplantation. Dr. **Yulia NASHCHEKINA** spoke about synthetic and natural hydrogels for bioprinting of organs and tissues. **Ekaterina MAEVSKAYA** made a presentation on the topic of composite fibers based on chitosan and chitin nanofibrils with a hemostatic effect. Dr. **Alexander TIMIN** presented the development of multilayer polymer structures for the diagnosis and therapy of malignant neoplasms.

➔ *Together develop products that can compete globally*





### Workshop in the field of methane pyrolysis

The key goal of the joint seminar of researchers from SPbPU and INP became an opportunity to discuss technical solutions for the technology of hydrogen production from methane without greenhouse gas emissions - primarily in order to increase the efficiency of using pipeline gas.

Chairman of the INP Board and Scientific Director, Division Manager of Environment and Health Prof. **Klaus Dieter WELTMANN** made a short presentation of the Institute and its activities. Prof. **Dirk UHRLANDT**, Scientific Board Member, presented in every detail the directions devoted to welding and switching, methane pyrolysis and the possibilities of plasma research for methane pyrolysis.

The Russian colleague's presentations began with a speech by Dr. **Alexander CHUSOV**, who is a head of a research group that has been dealing with gas processing and methane pyrolysis for many years and has a unique experience in developing technologies. The main focus of the group's projects lies in the processing of biogas, including that obtained from solid domestic waste. SPbPU Professor **Vladimir POLYANSKY**, Director of the Institute of Problems of Mechanical Engineering of the Russian Academy of Sciences, presented a completely different perspective on the approach to hydrogen topics and shared the experience of the university laboratories in mechanical engineering, oil and gas industry and construction.

### Workshop in the field of environmental protection

Prof. **Klaus-Dieter WELTMANN** from INP presented research activities in the field of ecology and the environment. Prof. **Jürgen KOLB** spoke about the peculiarities of using non-thermal plasma for the decomposition of pollutants and reducing their amount and made an overview of technical developments in the field of water treatment, air and gas flows, as well as in the field of processing and purification of biomass.



**RALF SVOBODA**,  
*Head of the Department for Technological Cooperation of the Ministry of Economics, Employment and Health of the Federal State of Mecklenburg-Vorpommern*

*I would like to share my dream with you: I wish Germany and Russia would together make an effective contribution to the fight against global warming around the world. And this dream can come true thanks to the joint Russian-German cooperation in the field of research and development.*



Prof. **Wilko FLÜGGE** (Fraunhofer IGP) presented the topics of smart agriculture (Smart Farming) and the development of innovative technologies that contribute to sustainable agriculture along the entire value chain.

The presentation of the Prof. **Viktor ELISTRATOV** was devoted to the integrated use of renewable energy sources to improve energy efficiency and reduce greenhouse gas emissions. Dr. **Alexander CHUSOV** presented research in the field of coastal zone management, including issues of environmental monitoring, dredging problems and studies of the state of the sea day, soils and grounds during hydraulic construction. Prof. **Natalya POLITAIEVA** made a presentation on the key research topics in the field of biocology - wastewater treatment using microalgae, processing biomass, obtaining valuable components (lipids, pigments, pectins), as well as optimal conditions for high-speed cultivation of microalgae. Prof. **Andrei VOLKOV** presented complex equipment and technological processes for the industrial production of anolyte and ferrate for water disinfection and wastewater treatment. The final report was made by Prof. **Igor ILYIN**, Director of the Higher School of Management and Business. He told about the integrated water supply and sewerage management system to maintain a clean environment.





## SCALING UP AND MOVING FORWARD IN INTERNATIONAL RANKINGS

Nowadays international rankings serve as the regulatory mechanism so that everyone could trace the impact each university makes on the world. The system of rankings advocates for transparency and integrity, which in its ultimate form is the benchmark every university needs to strive for.

Country leaders fathom the importance of ending poverty and other deprivations, and ending global world problems must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while combating climate change and working to preserve our oceans and forests. Therefore, higher education and research have become one of the steps on the way to meet Sustainable Development Goals (SDGs), which had been formulated by the UN to make this world a better place.

The strategic aim of Polytech is modernization and development of the university, turning it into a worldwide competitive research and education center integrating interdisciplinary research and world-class technologies and belonging to the leading group of world universities. Presence and prominence in the international rankings can become a powerful tool in evaluating, whether the university fulfills its purposes, as well as whether the university managed to make a feasible contribution to solving global concerns.



### 9 QS WUR by Subject 2021

With 9 subject rankings in QS World University Rankings by Subject 2021 Polytech has scaled up its presence in various subject areas and made promising steps moving forward in engineering and economics.

This year Polytech showcased positive dynamics taking higher positions in almost all featured subjects. With the 180th position in the world and 4th in Russia according to QS Subject Area SPbPU is acknowledged as a leading university in engineering and technology. A well-marked leap by 50 ranks getting the TOP 200 in the world and 3rd place in Russia in QS Engineering – Mechanical, Aeronautical & Manufacturing is proved by the growth in academic reputation with experts' votes from all over

the world. The same rise in 50 ranks is peculiar to QS Subject, Engineering - Electrical&Electronic, QS Subject, Computer Science & Information Systems (TOP 300 in the world), and is underpinned by the increase in reputation scores both among academics and employers. Positive results in the Subject area - Natural Science should be highlighted as well. This year Polytech has reached 265th position in the world moving 43 ranks up. A remarkable bounce by 50 ranks has placed Polytech in TOP 400 in QS Subject, Natural Sciences, Mathematics. Increasing academic reputation in QS Subject, Physics & Astronomy has strengthened Polytech position in TOP 300.

Record highs by 100 positions have positioned SPbPU in QS Subject, Social Sciences, Economics & Econometrics in TOP 350 due to the strategic decision to develop the multidisciplinary research being more often practiced forming new blended research teams with members profiling in different topics, which resulted in positive outcomes for other subject area rankings.

A couple of words about newly-comers should be said. This year we can boast of 2 new subject rankings: QS Subject, Engineering – Chemical in TOP 400 and QS Subject, Business and Management in TOP 500.



### TOP 35 in THE Emerging Economies University Rankings

Polytech has soared up to 35th position in the world in THE Emerging Economies University Rankings including BRICS countries, Eastern Europe and other developing countries showing the best results by the growth rate and taking the 5th place among Russian universities.

Polytech has highest scores in 3 featured categories: research income, research output and international outlook. The scores assigned to research income, are higher than the average scores of other TOP 25% universities. Due to intensive participation of our researchers in international conferences with the scientific papers as an outcome, Polytech has shown good results in research output. Far outweighing the worldwide median for the international outlook, SPbPU has demonstrated sustainable and impactful growth.





## SCIMAGO INSTITUTIONS RANKINGS

### 8th in Research Percentile in SCImago Institutions Rankings

The SCImago Journal & Country rank is a publicly available portal that includes the journals and country scientific indicators developed from the information contained in the Scopus® database (powered by Elsevier B.V.). Polytech takes 4th place in SCImago Institutions Rankings in Russia, with Russian Federation being the 12th in the country rankings, which exhibits Polytech's immense contribution to being present in such ranking. Compiling 21st place in overall percentile, 8th in Research percentile, 68th in Innovation percentile and 10th in Societal percentile, Polytech shows successful effort in its ambition to become associated with sustainable development.

Polytech produces a vast amount of scientific publications (taking aim at spanning Q1-Q2 publications in Open Access journals) as a result of thorough and thoughtful research, which is reflected in the country rankings. An Open Access Journal (Q2 in Building and Construction), Magazine of Civil Engineering, is highly acclaimed by the international scientific community, maintaining high quality standards of peer reviewing and providing unmatched coverage in its area of expertise. It is also indexed by Web of Science Core Collection.

## RANKING WEB OF UNIVERSITIES

### 69th place in Webometrics in Brics

Presence in international rankings would be incomplete without mentioning The Ranking Web. The Ranking Web or Webometrics is the largest academic ranking of Higher Education Institutions offering an independent, objective, free, open scientific evaluation for providing reliable, multidimensional, updated and useful information about the performance of universities from all over the world, following the introduced methodology with the use of both webometric (all missions) and bibliometric (research missions) indicators. Webometrics performs deep evaluation of the university global performance, going deep into web presence analysis, which shows the success of Open Access initiatives implementation, making science more accessible for everyone.

The web presence is a trustworthy mirror of the university, and Polytech shows great advances in this respect with the numbers speaking for themselves. Being the 6th among Russian universities, and the 5th among polytechnic universities in the world, Polytech demonstrates sustainable growth in all metrics which construct the methodology of this ranking simultaneously, namely Impact, Openness and Excellence.



**ANDREI RUDSKOI,**  
*SPbPU Rector, Academician of the  
Russian Academy of Sciences*

*Cooperating with industries, setting the goals to meet the challenges in close relation to our partners we see the recognition and growth in the number of collaborative innovation projects. And this gives us more resources and velour to develop and provide such outstanding engineering solutions as the pre-series electric car' says.*



**MARIA VRUBLEVSKAYA,**  
*Head of the Strategic Planning  
and Programme Development  
Office*

*A step-by-step approach to increase Polytech research outcome and disseminate the knowledge of our researchers contributes a lot to the gradual promotion in the international rankings. It's a great pleasure to observe how the international presence and awareness of Polytech is increasing each year' comments.*





## NEW SPbPU JOURNAL “SUSTAINABLE DEVELOPMENT AND ENGINEERING ECONOMICS”

During several years Peter the Great St. Petersburg Polytechnic University aligns its activities with the Sustainable Development Goals (SDGs). The large-scale activity of the Polytechnic University in terms of implementing SDGs recognized in THE University Impact Rankings 2020. University has been ranked 37th in the world ranking and the first among Russian universities.

Based on the accumulated publishing experience and in connection with the importance of implementing the SDGs for universities, regions, and overall world, in 2021 SPbPU established a new journal “Sustainable Development and Engineering Economics”.

“Sustainable Development and Engineering Economics” journal is a new scientific edition covering the following thematic sections:

- Economics of engineering decisions
- Enterprises and sustainable development of the region
- Regional infrastructure development
- Management of innovations

From the first journal issue in the spring of 2021, it will be assigned an ISSN and will be indexed in the Russian Science Citation Index (RSCI). Our experience in educational and research activities in the field of SD allows us to predict high level publications and positively assess the prospects for approval of the “Sustainable Development and Engineering Economics” journal to be indexed in the Scopus and WoS databases in 2 years.

The Editorial Board includes distinguished scientists from many countries of the world. The editors set themselves an ambitious, but quite achievable goal: to create a platform for discussing engineering economics in the context of sustainable development. They believe that such an international platform will contribute to the development of scientific communication and the exchange of ideas and technologies that are essential for the implementation of the UN sustainable development goals.



**IRINA RUDSKAYA,**  
Professor, Editor-in-Chief of the Sustainable Development and Engineering Economics journal, Dr. of Economics, Professor at the Graduate School of Industrial Economics

*We positively assess the prospects for the development of our journal and set high requirements for the quality of published articles. This can only be achieved through the work of an international Editorial Board composed of renowned scholars in different fields. In addition, we believe that this work will help scientists from different parts of the world to share their developments and research, to present different points of view on the role and contribution of engineering economics in achieving sustainable development goal-sinnovative products in the industry.*



» **Starting from January 2021, preparations for the first issue of the magazine are in full swing!**

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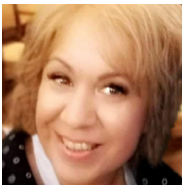
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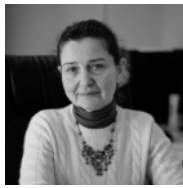
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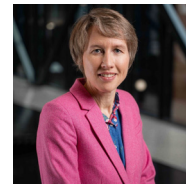
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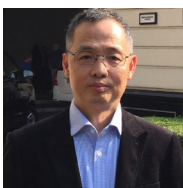
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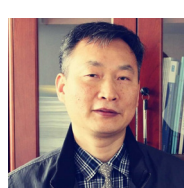
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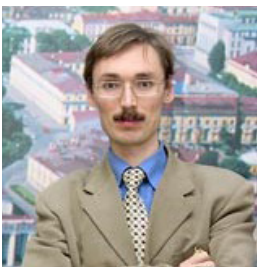
**Emma Juaneda-Ayensa**  
University of La Rioja, Logroño,  
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## 2021- YEAR OF SPACE: 60TH ANNIVERSARY OF GAGARIN'S FLIGHT

In April 2021, the whole world celebrated an important date. 60 years ago, on April 12, 1961, the Soviet cosmonaut Yuri Gagarin and the Vostok-1 spacecraft took off from the Baikonur cosmodrome and flew around the Earth for the first time in history. This flight marked an entire era of the country's leadership in high technology and engineering. 106 minutes of flight required long-term work of many local scientists, engineers, researchers, test pilots. The Leningrad Polytechnic Institute (LPI, now Peter the Great St. Petersburg Polytechnic University) is also involved in those great events, so this is a special holiday for the university staff.

**On April 12, the Museum of History of SPbPU opened an exhibition dedicated to the contribution of polytechnics to the development of space technologies**



**Alexander SHCHUKIN**, Associate Professor of the SPbPU Institute of Computer Science and Technology *"It was in our educational institution on the basis of the radio engineering faculty at the end of the 50s that design and research were carried out aimed at the development of computers capable of*

*solving problems of modeling and control of aircraft. It was here that the electronic computers "Quartz" were developed, which were used to support the launches of artificial Earth satellites and spacecraft-satellites. By creating the "Quartz" machine, the Polytechnic Institute made an important contribution to the development of a system for measuring the parameters of aircraft trajectories. An automated trajectory measurement system was built on the basis of the then new digital technology, capable of operating in the field. And these developments were possible due to scientists, engineers, graduate students of the Polytechnic Institute. They were enthusiasts in their field; they were "burning" at work, literally living in educational buildings".* The results of the work of polytechnics were appreciated by the government and the scientific community, and a decision was made to further support advanced developments. And in 1961, the "Quartz" machines, serviced by Leningrad Polytechnic Institute (former name of SPbPU) employees, were successfully used to support Yuri Gagarin's flight. Taras Sokolov, who led the research team, invited real enthusiasts who were not afraid to offer new, revolutionary ideas. Without this, there would not have been

such world-scale events as the launches of artificial satellites and manned spacecraft.

**On the Cosmonautics Day in Russia, on the day of the 60th anniversary of the first manned space flight, the Polytech hosted thematic exhibitions, intellectual competitions and educational events.**

For example, the international thematic action dedicated to the 60th anniversary of the first manned space flight - "Let's go!" Star Dictation, allowed to test the participants' knowledge in the field of the Russian language and space exploration. It was conducted in an online format, so Russian speakers living in different countries and foreigners studying Russian joined it. The action was attended not only by Russians, but also by residents of Argentina, Belgium, Germany, Denmark, China, Malaysia, Portugal and other countries! The dictation was organized by Rossotrudnichestvo. The Polytech became the only offline platform of the "Star Dictation" in the city. Polytechnics and guests were given a literary text on the topic of the national history of space exploration. But everything is not so simple: instead of some terms and names, there were gaps that the participants had to fill in, demonstrating their knowledge of the history of space exploration. The text of "Star Dictation" was prepared and read by science fiction writer **Sergei LUKYANENKO**.



**Marianna DYAKOVA**, Head of SPbPU Public Relations: *"The participation of the Polytechnic University in this project is very symbolic. After all, even that famous phrase "Let's go!" Yuri Gagarin took over from his instructor - test pilot Mark Lazarevich Gallai, who was a graduate of the Engineering Physics Faculty of the Polytechnic in 1937. Throughout the space era, polytechnics have made a huge contribution to space exploration, and for outstanding services in space exploration, 11 lunar craters and 16 planets are named after polytechnics!"*

*"The participation of the Polytechnic University in this project is very symbolic. After all, even that famous phrase "Let's go!" Yuri Gagarin took over from his instructor - test pilot Mark Lazarevich Gallai, who was a graduate of the Engineering Physics Faculty of the Polytechnic in 1937. Throughout the space era, polytechnics have made a huge contribution to space exploration, and for outstanding services in space exploration, 11 lunar craters and 16 planets are named after polytechnics!"*

The series of space events of the Polytechnic University was completed on April 12 by a scientific and educational event. Students of the Polytechnic University, together with an expert, searched through the famous space blockbusters - "Interstellar", "Gravity" and "The Martian" - in order to find contradictions and discussed them from a scientific point of view. A young scientist of the Higher School of Theoretical Mechanics, the author of the book "Mysteries of Space. Planets and exoplanets" **Andrey MURACHEV**.

**»» On April 12, 1961, the Era of human spaceflight began!**



## TWO NANOSATELLITES OF THE “SPACE PI” PROJECT WENT INTO SPACE

On March 22 at 09:07 am from the Baikonur cosmodrome, the Soyuz-2.1. launch rocket brought 38 nanosatellites from 18 countries into orbit, two of which were created within the framework of the All-Russian “Space Pi” project. The organizer of the “Space Pi” project for launching miniature satellites into space is Peter the Great St. Petersburg Polytechnic University together with the Russian movement of schoolchildren with the support of the Foundation for Assistance to Small Innovative Enterprises in Science and Technology.



**Sergey MAKAROV**, Doctor of Technical Sciences, Professor of the Higher School of Applied Physics and Space Technologies, SPbPU, Scientific Director of the “Space Pi” project “The project was first implemented on a domestic platform using exclusively Russian software. Within the framework of the

*Space Pi project, it is planned to launch about 100 cubesats into orbit over several years with a passing load during the launch of Soyuz-2 carrier rockets”.*

One of the main tasks of the “Space Pi” project is to attract schoolchildren to the study of space technologies. Within the framework of the Planetary Duty program, which unites space contests with various specializations, the project “Scientific orientation: Open space” is being carried out with the support of SPbPU. Children aged 12 to 16 offer their research or practical ideas for application on an orbiting nanosatellite. More than 1000 applications were accepted for the competition, of which 20 best projects were selected. Winners will bring their ideas to life with data from nanosatellites.

Ultra-small artificial satellites called “cubesat” are cubes measuring 10\*10 cm, their outer surfaces are equipped with solar panels. Inside the satellite are microelectronic batteries, signal transmission, etc. It is most convenient to combine nanosatellites in a structure of three cubes. This allows you to place the maximum amount of equipment inside the cubesats. They are also equipped with video cameras for satellite imagery of the Earth’s surface.



**ANDREI RUDSKOI**,  
SPbPU Rector, Academician of the  
Russian Academy of Sciences

*Dear friends!*

*I sincerely congratulate you on  
Cosmonautics Day in Russia!*

*This is a great date in the history  
of all mankind. 60 years ago, the flight of the Soviet  
cosmonaut Yuri Gagarin opened the space age. From that  
moment on, countries and people of the world followed the  
path of great discoveries and space technologies, which  
determined the vector of development of many industries,  
science and even art.*

*60 years ago, man made the first space flight, believed in  
himself and today continues to improve knowledge about  
the Universe, discover new galaxies, stars and planets and  
actively use the possibilities of space in communications  
and research on Earth.*

*For Russia, this is a truly national holiday, an important  
and significant day. We are proud of our achievements  
in the space field, the exploits of the first cosmonauts,  
the developments and discoveries of our engineers and  
designers, who provided a technological breakthrough  
that allowed us to become the first in space.*

*We are living in amazing times. A time when everyone can  
touch the study of space, but what is there to touch - to  
really explore it. Petersburg Polytech has always made  
a significant contribution to the development of this  
area, and today we are glad to pass on our knowledge to  
schoolchildren and students who will soon become space  
explorers - engineers, designers, scientists.*

*I am convinced that Russia has a great future as an  
advanced space power with excellent human, scientific  
and industrial potential that will enable our country to  
withstand the growing competition in the space sector.*





## TOGETHER WITH T.I.M.E. ASSOCIATION - ON THE EURASIA HIGHER EDUCATION SUMMIT (EURIE)



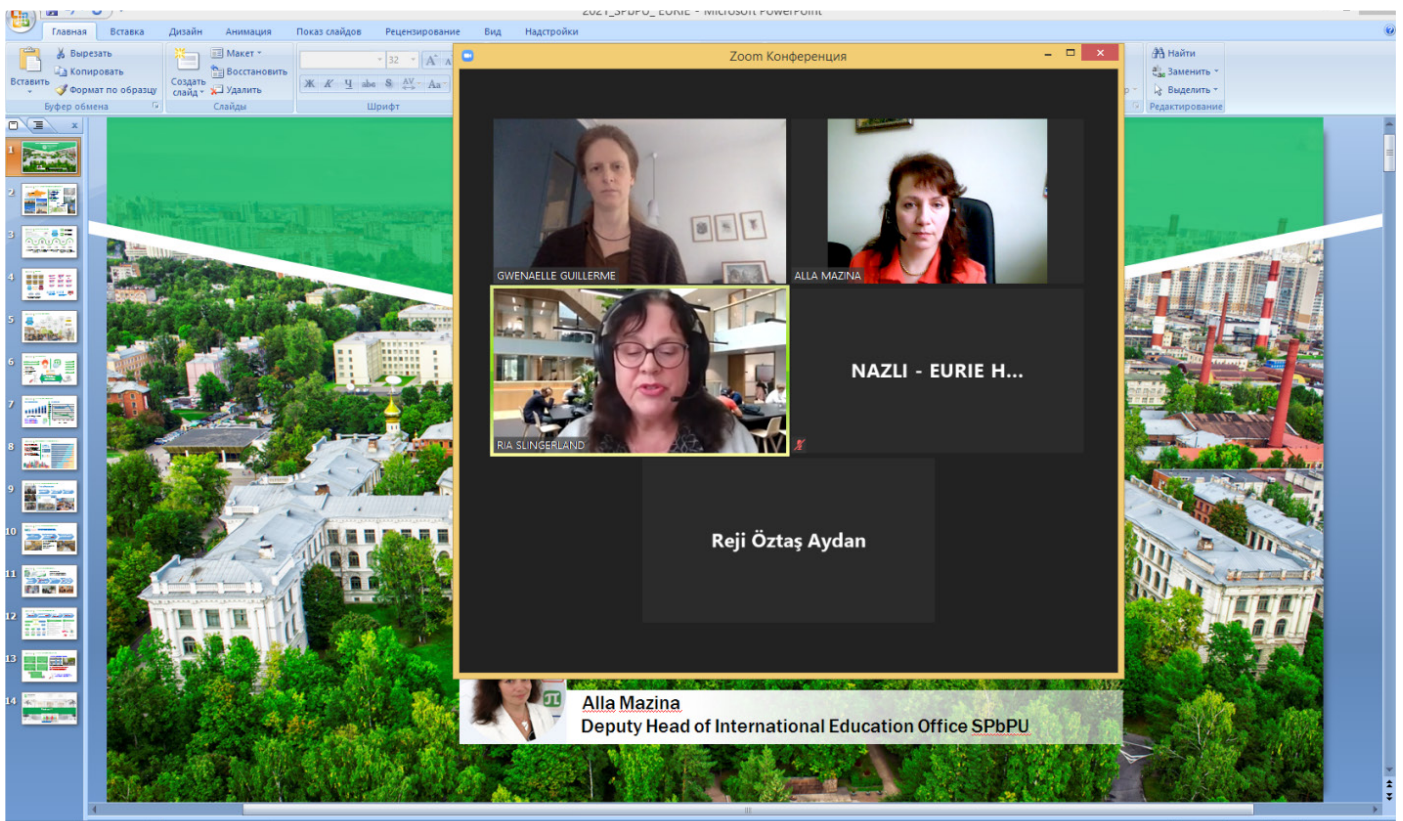
This year EURIE for the first time invited T.I.M.E. Association (Top International Managers in Engineering) and Peter the Great St. Petersburg Polytechnic University to be speakers and hold one of the panel discussion “Virtual mobility: A Critical Analysis” devoted to blended and virtual mobility.



Top International Managers in Engineering

In March 2021 Peter the Great St. Petersburg Polytechnic University for the 4th time took part in the Eurasia Higher Education Summit (EURIE) and international educational exhibition. This one of the largest educational event in Eurasia brought together over 120 speakers from the UK, Canada, USA, Australia, Belgium, Japan, Turkey and more than 20 countries. In total, about 3000 participants from all over the world joined the various sessions of the summit.

The situation in Europe and outside Europe, at least in terms of internationalization for higher education institutions is mainly based on physical mobility. However, in the last few years, increased attention has been given to virtual formats, partly to increase access to international education. However, can we assume that virtual study mobility provides the same competences, the same benefits and learning experience as one would have with physical mobility? Does it meet





## » VIRTUAL MOBILITY IN FOCUS OF DISCUSSION

international student's expectations? As there is an increase interest for such format, the aim of the panel discussion was to have an open debate and tackle this matter with a constructive way, to see the pros and cons for virtual student mobility.



**Alla MAZINA**, Deputy Head of the SPbPU International Education Office together with **Gwenaëlle GUILLERME**, Secretary General of the T. I. M. E. Association held 1 hour-long remote session devoted to the experience of transition from the real to the blended and virtual mobility - the parties discussed the prospects of developing academic mobility programs during and after the COVID-19 pandemic. The topic of virtual mobility and the experience of student project-oriented virtual and blended mobility at SPbPU was met with interest by the session participants.



**GWENAËLLE GUILLERME**,  
Secretary General of the T.I.M.E. Association

*The T.I.M.E. Association (Top International Managers in Engineering) is focused on engineering education. It is a network of leading technical universities and engineering schools founded in 1989. The members have a strong international dimension in their research, teaching and industrial relations, and are all committed to international cooperation and student exchanges and recognition of studies abroad.*

*The last decades have witnessed great change in the field of higher education. Through their studies, students have taken advantage of ever-increasing opportunities to discover a more globalized and multicultural world, and researchers collaborate with partners all around the globe. The challenges we are facing in the 21st century know no borders, not least the pandemic which has swept the planet.*

*In this context, a collective effort to promote cooperation in education and research, and to enhance cultural agility and language skills, is more crucial than ever for tackling this and all of today's societal challenges.*



**ALLA MAZINA**,  
Deputy Head of the SPbPU International Education Office

*In Russia there is a proverb: "It is better to see once than hear a hundred times." So, on my opinion virtual academic mobility can never completely replace the real mobility. However, based on the successful experience of SPbPU in holding student project marathons and other forms of project-oriented mobility, we believe that the most promising form is a blended mobility. It is significantly cheaper and provides an opportunity for more students to acquire new competencies and international experience.*





## ADMISSION CAMPAIGN 2021: POLYTECHNIC UNIVERSITY WELCOMES INTERNATIONAL APPLICANTS



Polytechnic University is home to 8.5 thousand international students from 120 countries. Therefore, an important priority for the University is comprehensive support for international applicants and students at all stages of their admission and study at the university. This creates a favorable and comfortable environment for international students to study and live.

### **Infrastructure Development in a Pandemic: the Renewed Admission Office**

In 2020, the coronavirus pandemic gave the University the opportunity and time to implement a project to create a new Admission Office for international students. The new office embodies a one-stop-shop system, where all university departments involved in working with foreign nationals, as well as information and logistics services, are integrated into a single complex. Thanks to this approach, the process of entering the university and documentary support during studies becomes much easier.

The large-scale reorganization lasted for more than 6 months. At the end of 2020, after a global redevelopment on the SPbPU International Campus, the renovated Admission Office began operating. It features a large 100-square-meter open-space office, a consultation center, an electronic queue system, comfortable waiting areas, and a multilingual campus navigation system in Russian, English, Chinese, and Spanish.

### **Admissions 2021: the challenge of adapting to the post-covid phase**

Under the conditions of the pandemic, Polytechnic University, like many universities around the world, faced the task of introducing the services necessary for international students to enroll and study in a distance format in the shortest possible time.

In 2021, the Admission Office will be completely switched over to the “Applicant’s Personal Office” system. The Applicant’s Personal Office is focused on foreign nationals and takes into account their needs. With the help of this information system, foreigners can easily apply for education, pass entrance exams and execute the necessary documents. For the convenience of foreign applicants, the Personal Web Office contains detailed instructions in 9 languages: Russian, English, Chinese, Spanish, French, Turkish, Arabic, Turkmen, and Uzbek.

Employees, students, and applicants were able to evaluate the functionality and convenience of the new Admission Office immediately after its opening. The admission campaign for the year 2021 is in full swing - admission of applications began on February 1. SPbPU has received applications from many countries. So far, most applications have come from Turkey, Colombia, Vietnam, Egypt, India, Indonesia, Venezuela, Kazakhstan, and Uzbekistan. Polytechnic has also begun to see applicants who applied last year but had to withdraw for reasons related to the pandemic. Admission Office managers also note an increase in demand for international Master’s degree programs in English.

### **New tools for the admission of foreign applicants**

The technical equipment of the renovated Admission Office allows for a more visible and high-quality representation of the university at a variety of online events. To attract international applicants, SPbPU International Services have organized participation in a number of online exhibitions, online presentations and webinars, an advertising campaign and consultations in social networks.







In the near future, SPbPU is planning a series of webinars for university applicants with explanations and answers to frequently asked questions about the admission procedure, ongoing programs, accommodation in the dormitory, etc. Webinars will be held in Russian and English.

The University has begun to process admission documents for the winners of the international competition “Open Doors: Russian Scholarship project,” under which this year international students will come to study at SPbPU Master’s and PhD degrees programs.

### **The 2021 exams will be held online**

Understanding the complexity of entering and studying at a foreign university under the conditions of the ongoing pandemic, the University will continue to conduct entrance exams in an online format. The exams for international applicants will again be organized using remote technologies, including an identification system. This ensures the transparency and quality of the entire testing system for applicants. Due to a large number of applications from applicants, SPbPU has also decided to increase the periods of admission tests. The exams will be held remotely in 6 periods: from April to September, taking into account the time zones.

### **Can you come to Russia?**

Still one of the most popular and worrying questions for international applicants is whether it is possible to come to study in Russia? Admission Office managers regularly monitor the situation with the opening of borders. Information is promptly updated on university websites about the countries that are open to entry into Russia in accordance with RF government directives. Already now more than 31 countries are open. Students who entered last year are successfully arriving in St. Petersburg and joining full-time classes after passing all quarantine measures.

### **The Polytechnic campus is open!**

Due to the improvement of the epidemiological situation in Russia, the easing of measures to counter the spread of Covid-19, and the large-scale vaccination, Polytechnic University opened its campus and switched classes to full-time and mixed modes. These measures have had a positive response among students - Russian and international students have happily returned to their familiar format of study. Many undergraduate students graduating this year have begun to apply to the university for letters of recommendation to continue their education at SPbPU’s Master’s degree program. For its part, Polytechnic University makes every effort to ensure a safe learning and living on campus.



**DMITRY ARSENIYEV,**  
*SPbPU Vice Rector for  
International Affairs*

*Every year, the infrastructure of Polytechnic University becomes more and more attractive to foreign audiences. The coronavirus pandemic gave us time to globally restructure the Admission Office for foreign applicants, which takes care of coordinating all issues related to admission and enrollment of foreign citizens.*





## THE CAMPUS OF POLYTECHNIC UNIVERSITY IS OPEN AGAIN



Since February 2021, the campus of Polytechnic University is officially open. Slowly, step by step, the university is returning to normal life. The voices and laughter of students can once again be heard in the corridors and classrooms, professors lead lectures and seminars in full-time format, and conference halls and science centers welcome the first delegations. All events are taking place with strict security measures - it's too early to say that the world has definitively defeated the coronavirus pandemic.



**EUGENIA SATALKINA**  
Head of International  
Education Office

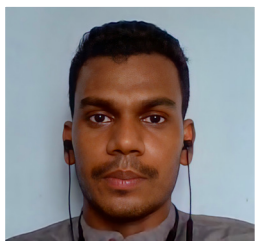
E-mail: [satalkina@spbstu.ru](mailto:satalkina@spbstu.ru)

*"We've held hundreds of online events, made new partnerships and friendships, and participated*

*in remote symposia, conferences, and workshops. Like you, this is the first time we've been faced with having to administer entrance exams online, and because of closed borders, many international students have studied remotely for a long time and kept in touch with their professors and friends only through various online platforms.*

*But even the darkest night will sooner or later be replaced by dawn. Gradually, step by step, we return to real life. The coronavirus vaccination center, which our university was the to open in St. Petersburg, operates on the premises of Polytechnical University. Most of the students and staff have already received the vaccines. After almost a year, the university is opening its doors again, international students who went home for the pandemic are returning, and the first delegations are also arriving. So far, unfortunately, only from those countries whose borders are officially open. But there are more of them every day. I hope that very soon we will see each of our dear partners and friends in person."*

The international students themselves also talk about their desire to return to full-time education as soon as possible.



**KUMAR KALLABETTU SHAMANTH,**  
a student at the Institute of Computer Science and Technology, India

*"In the first semester, there were no particular difficulties. There were easy subjects. But in the second semester, we have to have lab work and programming. The professors are always in touch, guiding us through the projects and telling us what to do next. I'm looking forward to coming to Russia, to St. Petersburg,"*



**LINA SALMAN,**  
a student of the university foundation program, Canada

*"It's harder to tune in to my studies at home - you want to relax there more than to work. University classrooms help you focus and start studying. Now I'm actively studying Russian to continue my Bachelor's degree studies. So there's no time to relax,"*



**ANTHONY KATUMWESIGYE,**  
a student of Institute of Energy, Uganda

*"We were supposed to study face-to-face, but because of the coronavirus pandemic, all classes were switched to online. We listened to 90% of the lectures while in the dorms. Many felt lost; it was hard to concentrate. Nevertheless, the situation was not unmanageable: we quickly pulled ourselves together and got to work. When the whole world is in self-isolation mode, there is nothing you can do about it - only adapt to the new conditions. We all accepted the new rules of the game and continued to learn using electronic resources - such as Zoom, Microsoft teams, and others. But, of course, we took the news of resuming regular classes with great joy."*



# JOINT AND DOUBLE DEGREE PROGRAMS



## TRILATERAL MASTER DEGREE PROGRAM SPbPU – LUT UNIVERSITY – LEIBNIZ UNIVERSITY HANNOVER



**ALENA ALESHINA**

Coordinator of International Educational Programs, SPbPU Institute of Energy

[Alena.Aleshina@spbstu.ru](mailto:Alena.Aleshina@spbstu.ru)

Energy sector provides excellent opportunities for smart and innovative minds. It is so incredibly vast that it's hard to know where to start. We will help you experience the world of energy knowledge on a global scale.

Since winter semester 2018/19, the trilateral Master's programme Energy Technology has been offered in cooperation of the three partner universities, Lappeenranta-Lahti University of Technology (LUT), Peter the Great St. Petersburg Polytechnic University (SPbPU) and Leibniz University Hannover (LUH). It is the only strongly interdisciplinary dual or triple degree Master programme in Europe on this emerging field of technology, joining competencies in electrical power engineering and thermomechanical power engineering. Five students per partner university are selected for the international programme from several hundred applicants each year.

The total of 15 students per year begin their first semester at LUT where students are immersed in renewable energy concepts and use various computational packages to solve the problems of modeling energy objects. Core courses at LUT are affiliated on the sustainability of energy systems and based on international scientific research.

» **Three countries – three Universities – three diplomas in 2 years! Apply for Trilateral Master Degree in Energy Technology!**

The second semester takes place at SPbPU. Students apply the knowledge gained in Finland for numerical simulation of heat and fluid flow problems and learn to analyze and verify calculation results by comparing with both well-known bench-mark solutions and experimental results. Understanding that the students enrolled in the program represent different countries with various power generation structures, students are also given an insight into the development of solid fuel energy industry, design and operation of thermal power plants.

In the third semester at LUH students study modern power electronics with a strong focus on the operation principle of power electronic circuits and their components, electrical energy storage systems and its application areas, electro thermal processing.

In the final semester, each student works on the Master thesis under the guidance of a supervising professor, usually at the university that has granted him/her admission to the international branch.

The workload is 30 ECTS cr per semester, i.e. a total of 120 ECTS. The 15 students remain together in the same group for the entire duration of the programme.

The Master's programme is taught in English. In addition to the core subject-specific competences taught in the trilateral Master's programme, linguistic and intercultural competences are also particularly developed. The participants of the Triple Degree Programme thrive with the intercultural experience in the programme. After successfully completing the programme, the graduates receive three Master degrees, one from each university. The first graduation took place in December 2020 - 10 students from Russia, Finland, India, Colombia, Turkey, and Ghana successfully defended their master's theses and have already received their diplomas.

The next round of applications for the international programme is possible until May, 31st. For the new academic year, LUH will offer course Heavy-Duty Gas Turbines of Professor Dr.-Ing. Jörg Seume. Students will be able to design and construct thermal flow-machines, using heavy-duty gas and steam turbines as an example. One more new course Electrical Machines for eAutomotive Traction Applications explains key requirements as well as design challenges for electrical machines in the context of the e-automotive market, covering fundamentals and working principles of electrical machines, several design aspects, manufacturing techniques and product costs.



**BERND PONICK**,  
Professor, Head of the Institute  
for Electrical Machines and Drive  
Systems, Academic Dean at the  
Faculty of Electrical Engineering  
and Computer Science  
Leibniz University Hannover  
Germany



**Mahmud FAIYAZ**, SPbPU student, Bangladesh: *“Being a part of the Trilateral Master’s Program would mean that I would go to 3 different countries just to study. Each country has its own way of handling the issue of energy conversion – which is unique and exciting. I could also visit some of the*

*most beautiful places in the world, learn new languages and meet new and wonderful people.*

*After graduation I wish to try to find professional opportunities in Europe in the field of renewable energy and energy conservation and gather much needed experience. Later on, I hope to use this knowledge and skills to develop the energy sector of my country, Bangladesh”*



**Dmitry INKOV**, SPbPU, student, Russia *“I traveled a lot to different English-speaking countries to learn the language and understood that every country has a different approach to education and I need to try everything to understand the value of learning.*

*I chose trilateral master program as there would be an opportunity to visit two countries instead of one. Also I liked the fact that one semester would be at my home university.*

*At the moment my favorite course is computer modeling where we study the program Ansys Fluent. Not only is it a very interesting subject, where you can show imagination, calculate, and see a lot of interesting processes, at the same time it is practically very useful”*

*We are particularly looking for interdisciplinary Bachelor’s graduates who have prior knowledge of both, mechanical and electrical engineering as a background. A profound basic knowledge of both fields is essential for admission to this interdisciplinary programme.*



**JÖRG SEUME**,  
Professor, Head of the Institute  
for Turbomachinery and Fluid  
Dynamics at the Faculty  
of Mechanical Engineering  
Leibniz University Hannover  
Germany

*Three countries in three semesters - that is quite a big challenge and offers great job opportunities worldwide. All partner universities are very pleased about the lively international interest in the trilateral Master’s programme, which represents a great enrichment for the long term partnership between the three universities.*





## STUDENTS FROM VIETNAM HAVE BECOME SPbPU GRADUATES

12 students from Vietnam have successfully completed their studies at the Peter the Great St. Petersburg Polytechnic University and received diplomas of higher education in the field of nuclear energy. It is noteworthy that 11 of them became holders of diplomas with honors.

Eleven diplomas with honors from Peter the Great St. Petersburg Polytechnic University (SPbPU) were received by students from Vietnam, who became certified specialists in the atomic field.

A group of students from Vietnam studied at the Polytechnic University for six and a half years: first – in the foundation program (preparation for entering the university), then they were enrolled in the educational pro-

gram “Design and Operation of Nuclear Power Plants” of the Institute of Energy, which operates under the patronage of the State Corporation “Rosatom”.

The program is aimed at training qualified specialists who are able to solve design, operational, research tasks in the field of nuclear power, use modern automated control systems for nuclear power plants in their work, and work with up-to-date regulatory and technical documentation. As part of the studying process, students regularly had hands-on training and internships at partner enterprises, received advice from representatives of the nuclear industry organization and acquired significant experience in the field of professional activity.

Students studied at SPbPU for six and a half years. First, they took preparatory courses, after which they received knowledge on the design and operation of nuclear power plants. The educational program is being implemented under the patronage of the State Atomic Energy Corporation Rosatom.

» *Students from Vietnam became certified experts in the field of nuclear power having received the diplomas with honours graduating SPbPU.*





**TANG FU NGO,**  
SPbPU graduate

*I am proud to have studied at Peter the Great St. Petersburg Polytechnic University. For six and a half years, it has become my second home. The teachers of the Polytechnic University are kind and full of enthusiasm. They helped all of us a lot, and I am incredibly grateful to them. It's great that, in addition to the curriculum, we had the opportunity to participate in various events and competitions, as well as to have practice making use of the facilities related to our future specialty. There is currently no nuclear power plant built in Vietnam, but I will do work similar to my specialty in thermal power plants. I firmly believe that the experience and knowledge gained at SPbPU will help me in my work. I will apply modern technologies, as well as the acquired practical skills, in order to contribute to the development of the electric power industry in Vietnam.*



A graduate of the Higher School of Nuclear and Thermal Power Engineering with a degree in Nuclear Power Plants: Design, Operation and Engineering Tang Fu NGO received a gold medal: for the entire period of studying at SPbPU, he passed all exams only with excellent marks. An excellent student of the 1st degree **NGO Tang Fu** was born in a peasant family in Long An province on the border with Ho Chi Minh City.

Tang Fu NGO: *"As a child, I dreamt of becoming a doctor, because I have always believed that this is one of the most noble professions, and on the other hand, doctors make a lot of money. I wanted to help my parents, at that time my family was very poor. Sometimes my mom didn't even have enough money to buy rice."*

In high school, Tang Fu became interested in physics. His literature teacher **NGUYEN Thi Quin Giao** helped him enter the Russian University. One day she read in a magazine that there was a scholarship for studying in Russia under the program "Physics Engineer" and told about it her student. And Tang Fu began to prepare to get this scholarship.

**Tang Fu NGO** liked St. Petersburg when he arrived, as well as, the Polytechnic University: "After completing my studies, I believe that the choice of SPbPU is the right decision. Because here the teachers are always friendly, helpful and very kind to foreign students".

The graduate told that there is no nuclear power plant in Vietnam, but he will apply the knowledge gained in Russia at thermal power plants and that thanks to SPbPU he will be able to contribute to the energy development of his country.

It is not the only case that foreign students from Vietnam have been awarded with the golden medal. According to the results of the previous academic year **NSUEN Tien Hoang** from Vietnam graduated from the Institute of Energy of SPbPU with a degree in Nuclear Power Plants: Design, Operation and Engineering. He studied only with excellent marks, and therefore, based on the results of the defense of the final qualification paper, the Academic Council of the University awarded him with the SPbPU medal with the title of "Best Graduate of the year 2020".

Many students from Vietnam traditionally study at the Polytech. Alma Mater is very honoured and pleased that the graduates returning to their homeland do not forget SPbPU. They stay in touch with their teachers, express their appreciation of all the efforts and support as well as the knowledge they gained and apply this knowledge in their career.





## IMPLEMENTING COIL - POLYTECH STUDENTS TOOK PART IN AN INTERNATIONAL CASE TOURNAMENT FOR THE DEVELOPMENT OF AN INTERNATIONAL BUSINESS STRATEGY

# COIL

## Collaborative Online International Learning



### nuffic neso

On April 15-16, students from international educational programs of the SPbPU Institute of Industrial Management, Economics and Trade took part in an international case-tournament to develop a strategy for an international company, organized with the support of the Dutch Organization for Internationalization in Education (Nuffic), the official representative of Dutch higher education in Russia (Nuffic Neso Russia), Rotterdam University of Applied Sciences, Netherlands Embassy in Moscow.

The Nuffic Neso Russia COIL idea is to organize an online case-solving competition. More than 15 international teams took part in the case tournament, each of which consisted of 5 people. The essence of the case proposed by Deloitte was to work out a strategic development plan for a large Russian telecommunications company. The teams had to decide in which direction to develop the company's business, based on available resources and market trends, propose a strategy and develop an action plan for its implementation.

Within this project twenty students from SPbPU have collaborated with twenty (both Dutch and International) third- and fourth-year students from the Rotterdam University of Applied Sciences (RUAS). In the morning of

the 15th of April, the COIL has been opened by a member of the Dutch Embassy in Moscow. After this, an International Business case has been presented by Deloitte, one of the most prominent accounting organizations in the world. Besides that, a short course about working in multicultural teams has been given by a lecturer of RUAS. After this, students started working in teams of five to find a solution to the case. When needed, students could plan a coaching session with a lecturer from both RUAS and SPbPU during the two days.

On April 16, the teams presented their projects to the international jury, 5 teams were selected for the final round. The jury consisted of representatives from Russian universities, the Rotterdam University of Applied Sciences, the Netherlands Embassy in Moscow and Deloitte.

The international case tournament has been undertaken in the framework of COIL project cooperation. Collaborative Online International Learning (COIL) refers to a virtual mobility experience linking students from (at least two) higher education institutions located in different countries to collaborate for a short but intensive period. To gain knowledge of each other's culture, work in a multicultural environment, and build an international network.

### The Benefits of COIL

1. COIL is a short but intensive way for students to collaborate. Students will need to be proactive and fast in getting to know each other's cultures.

» **New format of students' collaboration – online case solving challenge.**





2. Since travelling is not needed, COIL is an easy and inexpensive way for students to get an intercultural experience.
3. Having online meetings, collaborating digitally, and taking into account time differences, COIL will give students a real International Business experience.
4. This COIL gives students a taste of each other's country, making students more prepared and open to study abroad in the future.

### The Learning Outcomes

1. Students will build on their international network by meeting and actively working with international students. Students will gain at least two new contacts within their team but are motivated to connect to other teams.
2. Students will work on a real-life case while considering cultural differences, a foreign business environment, and foreign business scenes' customs, which is measured by a short reflection as part of the teams' final products.
3. Students will provide professional business advice, taking into account creativity and all aspects of the problem provided.

*"The peculiarity of this case tournament is not only in gaining experience in international business and the opportunity to develop "soft" skills using the example of a real business problem, but the ability to integrate the approach into educational programs due to online mobility and its intensity, making students more prepared and open for their studies at partner universities"* - said **Nikita LUKASHEVICH**, Deputy Director for international activities of IIMET, member of the international jury of the tournament and mentor of the winning team.



**ELIZAVETA YATSKOVETS**, SPbPU student of the international educational program "International Business Development"

*At this event, we were able to try ourselves in the role of real business consultants and solve the problem faced by a large Russian company. The case provided by the organizers was rather complicated and required serious study of various aspects, from market analytics to determining the financial effectiveness of our initiative. But this is what makes such competitions interesting. It is also worth mentioning that the teams were formed by participants from more than 20 different countries, so we not only solved the case, but also gained experience working in international teams, and even made new friends from different parts of the world.*



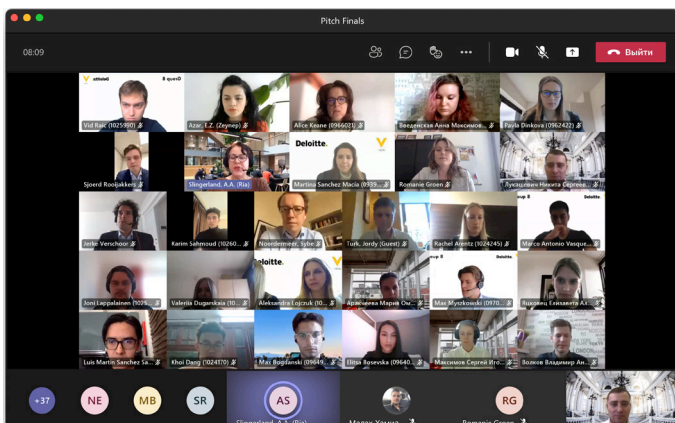
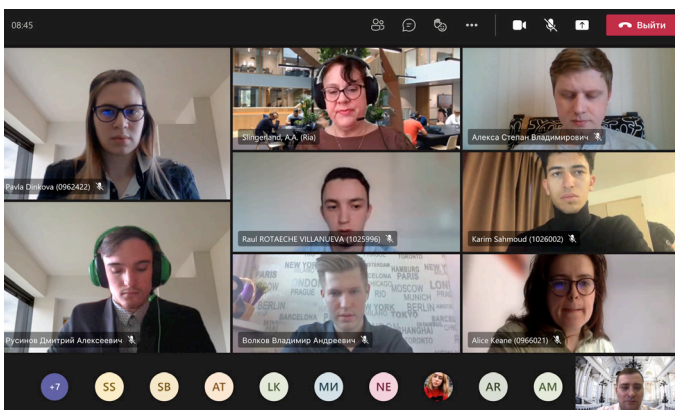
**VLADIMIR VOLKOV**, a member of the winning team, SPbPU student of the Innovative Entrepreneurship program

*My experience of participating in the Russian-Dutch student case championship was successful largely due to well-coordinated teamwork and a diverse composition of team members from both Russia and the Netherlands, Ireland and France, each of whose participants had their own unique skills and knowledge. Two days of persistent and tense, but at the same time exciting and effective joint work on the solution of the case from Deloitte led our team to victory.*



**RIA SLINGERLAND**, Professor, Director of the International Office of the University of Applied Sciences Rotterdam

*The pandemic has had a huge impact on education, but one of its positive results has definitely been the focus on virtual mobility projects. It was a great cross-cultural educational experience for everyone involved. We all have new friends around the world and especially in Russia. Thank you so much for sharing this experience with us. We are looking forward to new opportunities and strengthening of our cooperation"* - said at the end of the tournament.



# SUMMER AND WINTER SCHOOLS



## ONLINE WINTER SCHOOL AND INTERSEASONAL COURSES



**DARINA KLIMOVA**

Chief coordinator of short-term international programs

*E-mail: [dklimova@spbstu.ru](mailto:dklimova@spbstu.ru)*

SPbPU keeps meeting challenges of the pandemic and ran International Polytechnic Winter School 2021 (IPWS) in the online mode. IPWS took place online for the very first time and hosted around 150 students from 20 countries.

The programs presented in the frame of IPWS 2021 were a concentrate of the recent years' most successful and sought-after courses. Participants were offered a wide variety of 22 online programs in six fields of study: engineering and natural sciences, information and digital technologies, civil engineering, energy, business and management, Russian language and culture. Furthermore, three new winter courses were developed and run in season 2021: Big Data: Theory and Application, Supply Chain Strategy Development and Deployment, and Power Electronics. The energy cluster of IPWS also improved and relaunched two programs: Renewable Energy, Energy Efficiency and Sustainable Development.

It is also notable that a very popular course Plasma Physics and Controlled Fusion was held jointly with SOKENDAI, The Graduate University for Advanced Studies, and Japanese professors delivered classes in the online mode.



National University  
**SOKENDAI**  
The Graduate University for Advanced Studies

The Winter School classes were delivered in the format of webinars and project activities, and as a result of the successful completion of the course, winter school students received international certificates with ECTS credits that can be acknowledged at their home universities.

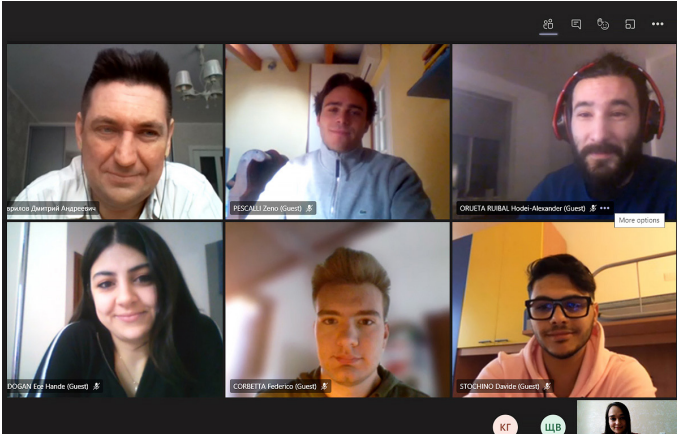
In spite of the distance learning format foreign audience showed a considerable interest in online winter courses of Polytechnic University. The participants' origin geography was truly wide, students joined programs even from the farthest corners of the globe – Mexico, Colombia and Indonesia. On top of that even with the time zones differences our winter school students actively participated in the interactive classes, tried their hardest to connect to live broadcasts of lectures and successfully perform their group tasks and team projects.

In addition, a rich cultural program was held for students as a traditional and very important component of IPWS. Participants enjoyed an interactive tour at the Polytechnic University museum, an online quiz on Russian history and culture, and a virtual tour of the Hermitage, Russian Museum and Petrodvorets in Peterhof.

Furthermore, in Fall 2021 we launched a new side project - the interseasonal courses. They are given in Spring or Fall as one-week foundation programs to certain International Polytechnic Summer and Winter School modules and are geared towards students who wish to gain an introductory knowledge of a certain summer or winter course subject. The basic idea of the interseasonal courses is to deliver modularity and flexibility of educational process to students so that they had an option of taking two courses



» **Interseasonal course + Winter School course = ECTS equivalent of a full semester course**



**VYACHESLAV  
POTEKHIN,**

*The Head of the IT section of the International Polytechnic Winter School, associate professor of the Higher School of Cyber-Physical Systems and Control, director of the SPbPU-FESTO*

*The IT-section is in great demand, and it's developing rapidly. We launched four programs that extensively covered Industry 4.0: summer and winter courses on machine learning, big data, cyber systems technologies and artificial intelligence.*

*We are also keeping a high-level of practical classes delivery - participants have a remote access to Polytechnic University equipment. More than 50% of the time students work with software products and complete complex projects.*



**DANIEL DENK,**

*Participant of International Polytechnic Summer & Winter Schools (2019, 2021)  
Student at Frankfurt University of Applied Sciences*

*My first course at SPbPU was in 2019 when I took part in an on-site summer program and enjoyed this experience a lot. The content of the lectures, the presentation of the material, the competent instructor, the cultural program - everything was organized at a high level. At the end of the course, I had a clear understanding that I had learned a lot. That is the main reason why a few years after I chose Polytechnic University again and joined the online winter course «Big Data: theory and application».*

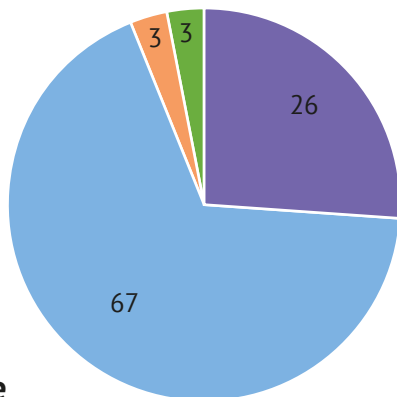


that form a module on a relevant subject. Upon completion of both the courses (the preparatory and the main one) students receive a certificate with ECTS credits equivalent to a full semester course.

The first experimental interseasonal course Artificial Intelligence For All has been already run twice in November 2020 and March 2021 and successfully hosted almost 30 students. This program is an introduction to a very popular summer and winter two-week course Machine Learning: Theory and Application. Inspired by results of the interseasonal programs launch we are planning to actively expand this project that greatly complements SPbPU summer and winter schools.

Despite the new online format of the courses and continuing global challenges, it is very important for us that students not only get new knowledge and expand their educational background but we also keep doing our best to make the International Polytechnic Summer and Winter Schools a mean of communication and networking for participants from all around the globe and a platform for cooperation and exchange of new ideas.

**Distribution of Winter School students by region (2021):**

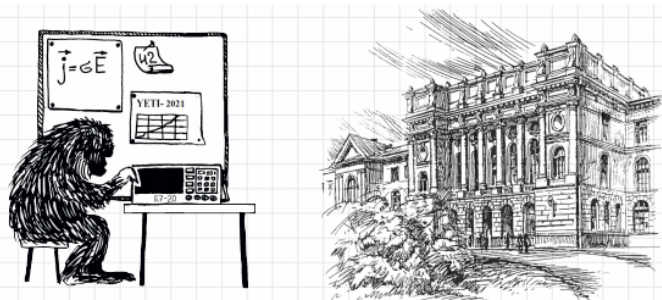


- Europe
- Asia
- Middle East and Africa
- North and South America





## YETI2021 - INTERNATIONAL CONFERENCE FOR YOUNG SCIENTISTS ON ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGIES



### Conference Program

"INTERNATIONAL YOUTH  
CONFERENCE ON ELECTRONICS,  
TELECOMMUNICATIONS AND  
INFORMATION  
TECHNOLOGIES" (YETI-2021)

April 22-23, 2021  
Saint Petersburg, Russia



The International Youth Conference on Electronics, Telecommunications and Information Technologies (YETI-2021) was held 22-23 of April in SPbPU.

YETI-2021 is a conference that goals to bring young scientists for discussions on actual problems and major advances in electronics, telecommunications, and information technologies. The YETI-2021 Conference will give an opportunity to young researchers and early-career scientists to participate in a series of lectures which review the current trends and knowledge in the mentioned fields. We think, that scientific discussions among young scientists can help them to increase their knowledge and interest while working on projects.

The main topics discussed at YETI-2021 were the following:

- Electronics and Nanotechnologies
- Photonics and Optical Information
- Information Technologies and Signal Processing
- Telecommunications and Navigation Systems

Among the participants of YETI-2021 there are scientists and researchers from Germany, Italy, Spain, Finland, Armenia, India, Iran, China etc. Currently such international activities seem to be especially important. A number of invited speakers in cooperation with younger colleagues also gave speeches at the conference. **Ladislau MATEKOVITS** (Politecnico di Torino, Italy) and **Lida KOUHALVANDI** (Politecnico di Torino, Italy) presented a talk entitled "Automated Power Amplifier Design through Multiobjective Bottom-Up and Particle Swarm Optimizations using Neural Network" in the section Information Technologies and Signal Processing. The talk "Optimizing of ALPHIE grid system with particle-in-cell simulations" (Electronics and Nanotechnologies section) was prepared in cooperation with Dr. **Luis CONDE** (Universidad Politécnic de Madrid, Spain). Group of young scientists from the Leibniz University Hannover performed the talk "Destruction of unresectable brain tumors: Simulation of thermal spread and tissue damage during MRI-guided laser ablation". The speaker was a student of the Institute for Multiphase Processes, **Gesine HENTSCHEL** (Leibniz University Hannover, Germany).

To encourage young scientists to develop their projects the best report was chosen in each topical section. The best oral report was awarded to Wei Cao in the Electronics and Nanotechnologies, for best poster report in this section was chosen report "Comparative study of ion-induced damage formation in GaN and beta-Ga<sub>2</sub>O<sub>3</sub>"



» The YETI conference was held  
in SPbPU for the 3rd time!



Prof. Vladimir Sorotsky opening the conference



Lida Kouhalvandi

by **Andrei STRUCHKOV**. In the section Photonics and Optical Information the best oral report was made by **Valentina TEMKINA**, wining poster report was “Infrared finger-piece sensor for ICG concentration measurement” by **Ilya KOLOKOLNIKOV**. The strongest competition was in the section Information Technologies and Signal Processing. As a result, best oral report titled “Synthesis and analysis of avionics functions digital twins applying machine learning classification algorithms” was made by **Kseniya TRUSOVA** Poster report which committee chosen from others was made by **Mojtaba Najafi OSHNARI**. In Telecommunications and Navigation Systems best oral report was made by **Egor EGOROV**, best poster certificate was awarded to **Ilya LAVRENYUK** for the presentation titled “Application of nonlinear algorithms with decision feedback for FTN signals coherent detection”

In total more than 70 talks were performed at the conference in both oral and poster formats. A big part of them was performed by or in cooperation with foreign colleagues. We hope that such events will help to strengthen international connections and involve students in scientific activities.

The conference proceedings will be published in Springer Proceedings in Physics, indexed in Scopus.



**SERGEY ANDREEV**,  
professor,  
YETI2021Conference Chairs,  
Tampere University,  
Finland

*Such a number of reports at the conference a great result. We want to involve as much young scientists as we can in our research because most fresh and innovative ideas come from young generation inspired by experienced elder colleagues.*



**GE DONG**,  
professor,  
YETI2021Conference Chairs  
School of Aerospace Engineering,  
Tsinghua University,  
China

*Such conferences for young researchers are a great start. It is very important to show your work and to hear comments from more experienced colleagues, as well as from other students. That’s how things work in science.*



**HAYK SARKISYAN**,  
professor,  
Russian-Armenian University,  
Armenia

*The competition for the best poster and oral talk, that took part at the conference, is a good way to benefit most outstanding results and engage even more the activity of young people in science.*





## 6<sup>th</sup> INTERNATIONAL SCIENTIFIC CONFERENCE “THE ARCTIC: HISTORY AND MODERNITY” AT SPbPU

The 6th International Scientific Conference «The Arctic: History and Modernity» was held at the Peter the Great St. Petersburg Polytechnic University on April 14 and 15. Scientists, representatives of educational organizations, St. Petersburg representations of the Arctic regions of the Russian Federation, authorities and companies, including foreign ones, showed great interest in the event. In 2020, the Forum was held in an online format, so this face-to-face meeting turned out to be in great demand. In 2021, the conference took place at two sites at once - in St. Petersburg and Murmansk (April 21 and 22).

Welcoming the guests, SPbPU Vice-Rector for Research, Corresponding Member of the Russian Academy of Sciences **Vitaly SERGEEV** stressed the need to intensify research and innovative developments in the Arctic, and expressed confidence that the conference at the Polytechnic Institute will contribute to sustainable socio-economic development and development of the Arctic, stimulate scientific and technical activities in the region, create favorable conditions for attracting investment in development projects Arctic zone.

Consulates of different countries, representations included in the Arctic Council with the status of members and observers, took part in the conference. **Pascal SLIVANSKI**, Consul General of France in St. Petersburg, **Carl Eric Laantee REINTAMM**, Consul General of the Estonian Consulate General in St. Petersburg and **Janne HIRVONEN**, Consul for Economy and Regional Cooperation of the Consulate General of Finland in St. Petersburg made welcoming speech to participants of the conference, emphasizing their attention to the issues discussed - primarily ecology, economic development and scientific cooperation in the development of the Arctic region.

The conference is supported by the St. Petersburg Committee for Arctic Affairs. At the plenary session, Deputy Chairman of the Committee **Anna BULATOVA** addressed the participants with a welcoming speech. She spoke about the role of the Committee and the contribution of St. Petersburg to the Arctic agenda.



The Arctic is a region of an international significance, first of all, regarding the issues of ecology and climate change.

### **SPbPU Rector, Academician of the Russian Academy of Sciences Andrei RUDSKOI:**

*“St. Petersburg Polytech has been at the forefront of the development of the Russian Arctic, first of all, it concerns ice-class vessels - from turbine generators and the development of special steels for icebreaker hulls to the development and construction of the world’s first nuclear icebreaker “Lenin” “I can responsibly say that Polytechnic graduates were involved in the creation or maintenance of most of the vessels of Russian icebreaking fleet. But we are proud not only of our past. The university’s research groups continue to contribute to the implementation of the “Strategy for the Development of the Arctic Zone of the Russian Federation and National Security for the period up to 2035”.*

The Arctic remains home to many generations of indigenous peoples and the main resource of the Arctic North is not oil or gas, but human capital. That



» *The conference at the Polytechnic Institute traditionally contributes to sustainable socio-economic and sustainable development of the Arctic region*

is why the transformation of the Arctic zone of Russia should take place taking into account the interests of local residents. **Nina VEYSALOVA**, Vice-President of the Russian Association of Indigenous Peoples of the North, Siberia and the Far East greeted the participants, as well as well-known Mansiysk poet **Yuvan SHESTALOV**. They emphasized that the future of the world and humanity lies with the Arctic civilization, its fabulous natural resources, its worldly wisdom and harmony with nature. In general, the questions, problems, topics and points of view that the participants voiced during the two days of the conference speak of the scale of the research field. Among the speakers are leading scientists from more than a dozen universities of the country and practical experts from industries related to the Arctic region. Their reports covered the following topics: history of research and development of the Arctic, military security and strategic stability, problems of environmental and technological security in the Arctic region, oil and gas projects, logistics, international cooperation, problems and prospects of economic development, historical and cultural heritage of the Arctic, tourism and prospects its development in the Arctic region, the development of human capital in the Arctic, the problem of energy supply, the indigenous peoples of the Arctic and the problem of their sustainable development, materials science, robotics, education, shipbuilding and Arctic navigation, biological resources of the Arctic ecosystems, Arctic technologies and competencies, mineral resources, mass culture, technologies Industry 4.0 in the Arctic, and many others - the list of reports at the conference does not fit even on 30 pages. More than 500 scientists have been announced for two days in the program of speeches (both face-to-face and online).

The experts agreed: the forum is useful because in a short time it is possible to discuss almost all important issues and work out a set of solutions. In addition to the professional dialogue, in the hall of the Technopolis Polytech, where the conference was held, participants and guests could familiarize themselves with an exposition dedicated to Russian icebreaker construction. It was provided by the partners of the conference - the Museum of the Arctic and Antarctic, the Baltic Shipyard and the Icebreaker Krasin Museum. The official partners of the forum were also the Arctic, Antarctic Research Institute and the Project Office for the Development of the Arctic.



”



**PASCAL SLIVANSKI**,  
Consul General of France  
in St. Petersburg

*It is important to discuss and solve the problems facing the Arctic region. The transformation that the Arctic is undergoing today brings with it new economic opportunities. But it is also a source of great challenges. Given the nature and scale of the problems in the Arctic, such as the loss of biodiversity, the increased risk of marine pollution, the impact of changes on the way of life of the indigenous population, France considers it necessary to conduct increased international cooperation. For this reason, it has been taking an active position as an observer in the Arctic Council for 20 years and calls for greater responsibility on the part of states external to the Arctic region. The Arctic must remain a stable, sustainable and prosperous region.*



**CARL ERIC LAANTEE REINTAMM**,  
Consul General of the Estonian  
Consulate General  
in St. Petersburg

*We are aware of the burden of responsibility associated with this step, but we want to contribute to the sustainable development of the Arctic region. Estonia, like Russia, cares about the future of the Arctic, we have a common history of polar expeditions and research. But Estonia is interested in cooperation with all members of the Arctic Council. Our cooperation with Russian scientists in solving Arctic issues has always been good, and we believe that observer status will help bring it to a new level, which will benefit both sides.*



**JANNE HIRVONEN**,  
The Consul for Economy and  
Regional Cooperation of the  
Consulate General of Finland in  
St. Petersburg

*This region is of particular importance for the future of our entire planet. That is why we must pay close attention to the economic, social and environmental sustainability of the Arctic. We look forward to Russia's chairmanship of the Arctic Council to further expand cooperation in the Arctic. As we all well know, climate change and its consequences are an urgent issue both for the Arctic region and beyond, and many of these consequences are of global importance.*

“



## CIVIL ENGINEERING INSTITUTE



**GALINA KOZINETZ**

Professor, Doctor of Technical Sciences,  
The duties of the Director of the Civil Engineering  
Institute



### HISTORY AND MODERN DAYS

In 1907, at the initiative of a group of professors of the Polytechnic Institute, an engineering and construction department was established. In 1918 it received the status of a faculty. Over the past years, much has changed in the organization of the educational process, its tasks, the principles of training specialists, the names of the faculty have changed (Engineering and Construction Faculty, Hydraulic Engineering Faculty, Civil Engineering Institute), separate structures spun off from it, which later became independent large organizations. Only one thing remained unchanged - the desire to train such specialists that the country needed.

Since September 2019, the departments of Civil Engineering Institute (ICE) have been transformed into Higher Schools. Currently, the ICE structure includes 4 Higher Schools: the Higher School "Hydraulic and Power Engineering", the Higher School "Industrial Civil and Road Construction", the Higher School "Technosphere Safety" and the Higher School "Design and Architecture".

### MAIN RESEARCH FIELDS

- Scientific and technical support and examination of construction objects;
- Expertise and design of facade structures;
- Digital technologies for the design of energy facilities taking into account climate change;
- Research and development in the field of production and consumption waste management. Biotechnology;
- Scientific and technical support for the reliability of highways;

### LABORATORY BASE

ICE has a modern laboratory base in all major areas of educational and scientific activities of the Institute:

- Research Laboratory "Height";
- Research Laboratory of Building Structures and Materials "Polytech-SKiM-test";
- REC "Renewable Energy Types and Installations Based on Them";
- REC "Facade structures of buildings and structures";
- Research Laboratory of General Construction Technologies;
- Study Laboratory "Soil Mechanics";
- Study Laboratory "Engineering Ecology";
- Research Laboratory "Technologies for the treatment of industrial and surface wastewater";
- Hydraulic laboratory;
- Laboratory of Technosphere Safety;
- Study Laboratory "Life Safety".
- Study Laboratory "Design Laboratory"

» *The strategic goal of sustainable development of ICE is its promotion as an educational, scientific and innovative center in the context of the creation of the digital economy of the Russian Federation and the use of BIM technologies in construction.*



## INTERNATIONAL COOPERATION AND JOINT PROJECTS

ICE actively cooperates with the world's leading universities. The result was the receipt of 4 international grants over the past 3 years:

1. Development and implementation of innovative biotechnologies for processing microalgae *Chlorella sorokiniana* and *Lemna minor* duckweed (lead partner - Hamburg University of Technology, Germany) - 2017-2019.
2. Lightweight hybrid wood composite materials for sustainable construction technology (lead partner - Lappeenranta University of Technology, Finland) - 2018-2021.
3. Energy efficient systems based on renewable energy sources for arctic conditions (lead partner - Lappeenranta University of Technology, Finland) - 2018-2021.
4. Integration of education with consumer behavior related to energy efficiency and climate change in universities in Russia, Sri Lanka and Bangladesh (VESK) - (lead partner - Vilnius Gedeminas Technical University) - 2018-2021.

ICE provides training for students in four international master's educational programs (in English):

- 08.04.01\_12 Civil Engineering / Civil Engineering;
- 08.04.01\_14 Energy Efficient and Sustainable Building;
- 08.04.01\_23 Environmental Engineering in Urban Construction;
- 20.04.01\_12 Emergency preparedness and response (new 2021).
- Professors from leading foreign universities are actively involved in conducting classes



*Rangika Umesh Halwatura, University of Moratuwa, SPbPU (ICE) Visiting Professor*



*Vincenzo Bianco, University of Genoa, SPbPU (ICE) Visiting Professor*

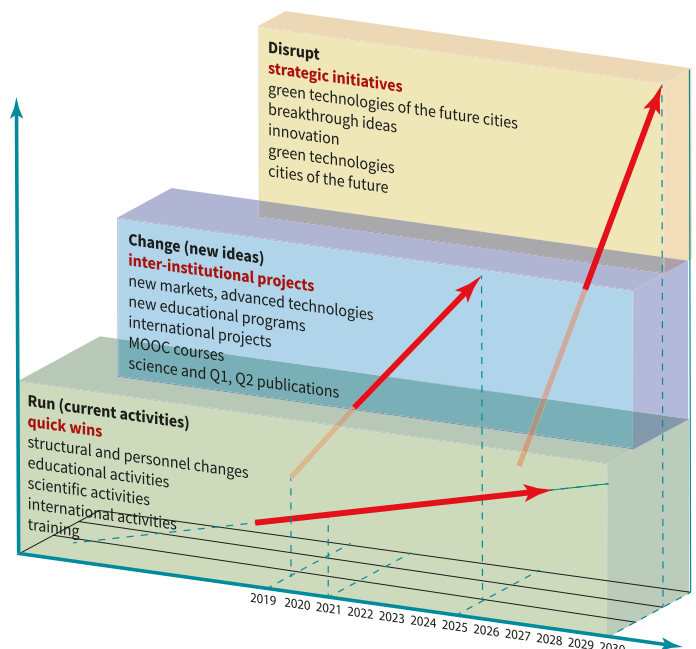
ICE employees have developed distance courses in English, posted on the Coursera educational platform:

- BIM fundamentals: from sketch to digital twin;
- Renewable Energy: Resources and Technologies (spring 2021);
- Urban Development and Climate Change (Spring 2021).

## INDUSTRIAL PARTNERS



## INTERNATIONAL ACADEMIC PARTNERS





## JOINT RESEARCH OF RUSSIAN AND SPAIN SCIENTISTS ON MAGNETIC FLUIDS

In January 2021, a paper on the results of the joint research of Russian and Spanish scientists was published in the Q1 journal of Applied Science (MDPI). The paper describes new methods for studying the stability of the magnetic fluids. This publication was the result of a long joint work of scientists from SPbPU and Universidad Politécnica de Madrid (UPM).

Cooperation of the Institute of Physics, Nanotechnology and Telecommunications, SPbPU with the Institute for Optoelectronic Systems and Microtechnology (ISOM), UPM started with the visit of the Head of the Laboratory of Laser Photometry and Spectroscopy, Director of the Higher School of Applied Physics and Space Technologies **Elena VELICHKO** as a member of the SPbPU delegation to UPM.

Spanish colleagues meet SPbPU representatives very cordially and with great readiness for joint cooperation. As a result of the discussion of possible topics for cooperation and joint projects, an agreement was reached on an internship for Russian young scientists in the ISOM laboratories at the UPM.

A little later, with the support of the Russian National Academic Excellence Program "Project 5-100", a postgraduate student and two graduate students of the laboratory of laser photometry and spectroscopy went for an internship at UPM. The students spent a fruitful and interesting two

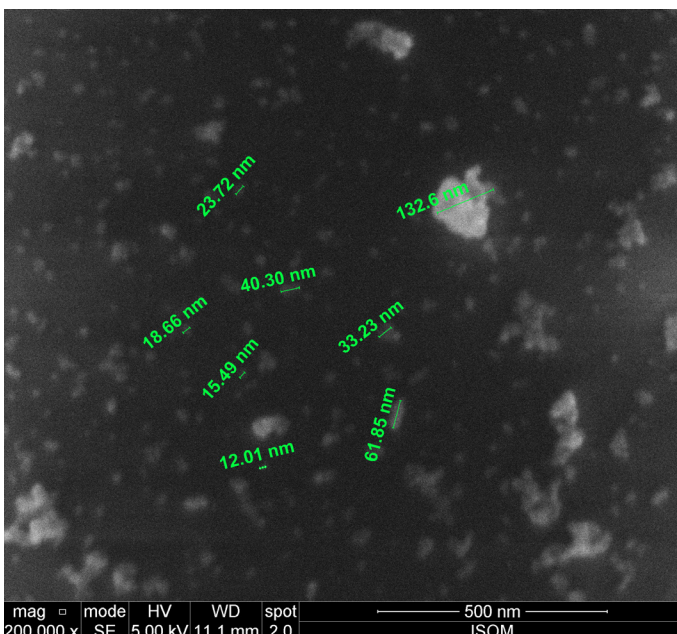


weeks working in the laboratories of the UPM guided by **Dr. Javier MARTINEZ**, Subdirector of ISOM.

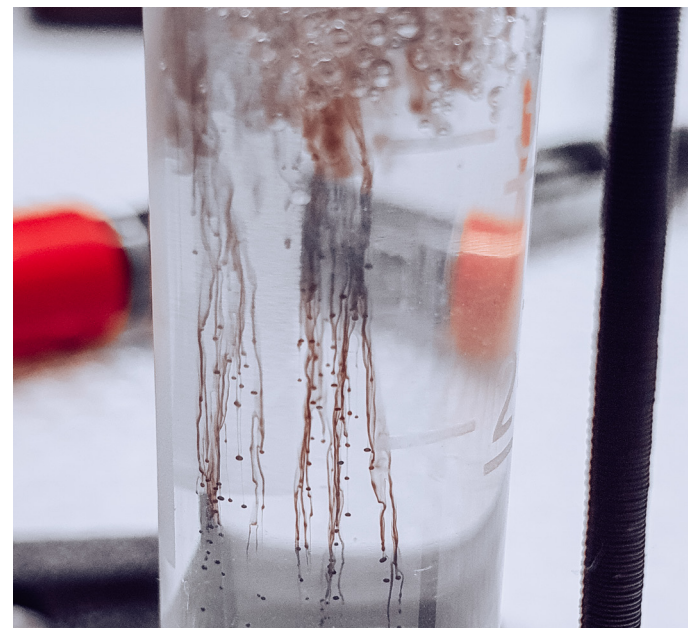
The laboratory staff provided students with comprehensive assistance in mastering new instruments and measurement technologies.

Young scientists managed to obtain new scientific results on the study of the properties of magnetic nanofluids.

Series of research works conducted in the UPM under the control of **Dr. Marco C. MAICAS**, ISOM, allowed young researchers to evaluate magnetic properties and receive images of the structure of magnetic nanoparticles in the liquid.

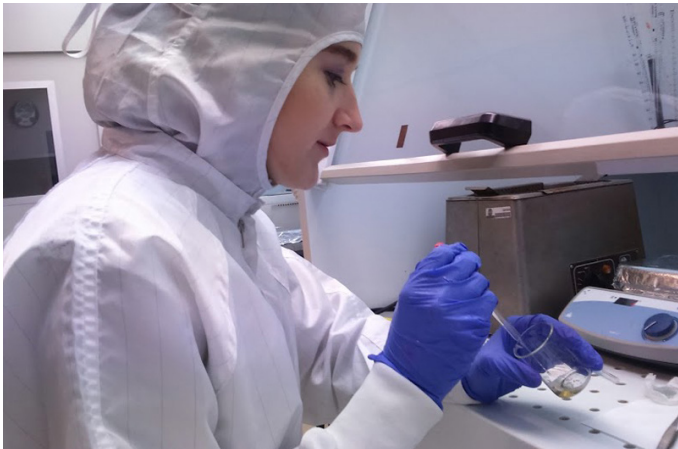


Scanning electron microscopy image of magnetic nanoparticles



Dilution of magnetic fluid

» *International cooperation allows not only to share knowledge and scientific interests but also give starts to new promising projects.*



*Polytechnic students conduct research in laboratories ISOM*

Upon returning to their native walls of SPbPU, the students continued their scientific research, which led to the development of a new method for studying magnetic fluids, which allows one to determine such parameters as shape and aggregation dynamics of the test solution that cannot be measured with the available high-tech equipment of the UPM.

Such research cannot be organized using electron microscopy methods, it was necessary to develop new approaches to the study of nanoparticles in liquids.

As a result of cooperation scientific group under the guidance of **Dr. Elena VELICHKO** started a project on assessment of the aggregation stability of magnetic nanoparticles in the liquid. The study resulted in a new technique based on the dynamic light scattering method. It allowed estimating size, shape, dynamics of nanoparticles aggregation in the magnetic fluid. These parameters were used to obtain the characteristics of magnetic fluid stability.

Magnetic fluids are used in various fields of engineering, including mechanical engineering, mining, and electronics as well as in medical diagnostics and sensing devices. The focus of this work was aimed at studying the properties of dilute magnetic fluids used in medicine. The stability of such liquids is an extremely important criterion that determine their safety for use in medical diagnosis and therapy.

The method of assessing the aggregation stability of magnetic fluids is simple, quick and allow research directly in the liquid medium. Thus, the authors of the study expect their results widely demanded in the production of biocompatible magnetic materials. The proposed method can be applied in studies of structural and morphological properties of nanoparticles not only in diluted magnetic fluids but also in a number of metallic as well as biological fluid solutions. Thus, the cooperation of two universities and the organized internship gave the launch of a large platter of promising research.



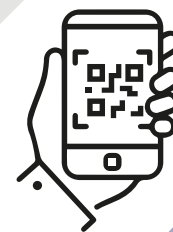
**JAVIER MARTINEZ,**  
*Subdirector of ISOM, Universidad Politécnica de Madrid, Spain*

*I want to congratulate my Russian colleagues for the Publication in Applied Science. I know that it has been difficult to organize such research, especially due to this pandemic, but you have been very tenacious until you have succeeded. So, my sincere congratulations.*



**DR. ELENA VELICHKO,**  
*Director of the Higher School of Applied Physics and Space Technologies; Head of the Laboratory of Laser Photometry and Spectroscopy, SPbPU, Russia*

*The success of the project, which started thanks to jointly organized research with UPM, may indicate great prospects for such cooperation. The results obtained in the laboratory were included in the PhD dissertation of Elina Nepomnyashchaya, engineer of the Higher School of Applied Physics and Space Technologies of SPbPU. We hope that we can continue to work together with our Spanish colleagues. This will allow us to make an even more significant contribution to the development of modern science”.*



Article

### **Characterization of Magnetite–Silica Magnetic Fluids by Laser Scattering**

Elena N. Velichko <sup>1,\*</sup>, Elina K. Nepomnyashchaya <sup>1,\*</sup>, Kamil G. Gareev <sup>2</sup>, Javier Martínez <sup>3</sup> and Marco C. Maicas <sup>3</sup>

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\* Correspondence: velichko-spbstu@yandex.ru (E.N.V.); elina.nep@gmail.com (E.K.N.)

**Abstract:** The paper is concerned with structural, morphological and magnetic properties of magnetite-silica magnetic fluids. The granulometric composition of the magnetic fluids was investigated by scanning and transmission electron microscopy, the phase composition was studied by X-ray diffraction and reflection high-energy electron diffraction, and magnetic properties were studied by vibrating sample magnetometry. In order to reveal the particle size distribution, dynamic light scattering and a proposed modification of depolarized dynamic light scattering were employed. The shape and dimensions of magnetic nanoparticles and also their aggregates are described. While the aspect ratio for the aggregates was 0.5–0.99, individual nanoparticles had an average aspect ratio of 0.9 and were nearly spherical. The sedimentation stability of a diluted magnetic fluid was also investigated. When the fluids were diluted 200 times, the stability was partially lost, and the nanoparticles aggregated, thereby forming clusters, and precipitated.



## THE PROJECT OF THE LABORATORY OF SPbPU WON AN AUTODESK FORGE RESEARCH GRANT

In 2021, a team from Peter the Great St. Petersburg Polytechnic University under the leadership of a research engineer of the World-Class Research Center for Advanced Digital Technologies, SPbPU postgraduate student of the Civil Engineering Institute **Nikolai BOLSHAKOV** received an international grant “Forge Research” from one of the largest IT companies Autodesk according to the results of the annual competition in the second half of 2020.

Autodesk, Inc., an American multinational software corporation that makes software products and services for the architecture, engineering, construction, manufacturing, media, education, and entertainment industries, regularly organizes the competition to support projects built making use of the Autodesk Forge platform. This year teams from two universities - Moscow Polytechnic University (first half of the year) and Peter the Great St. Petersburg Polytechnic University (second half of the year) became the winners of the Forge Research grant.



*SPbPU Autodesk Grant Project Team*

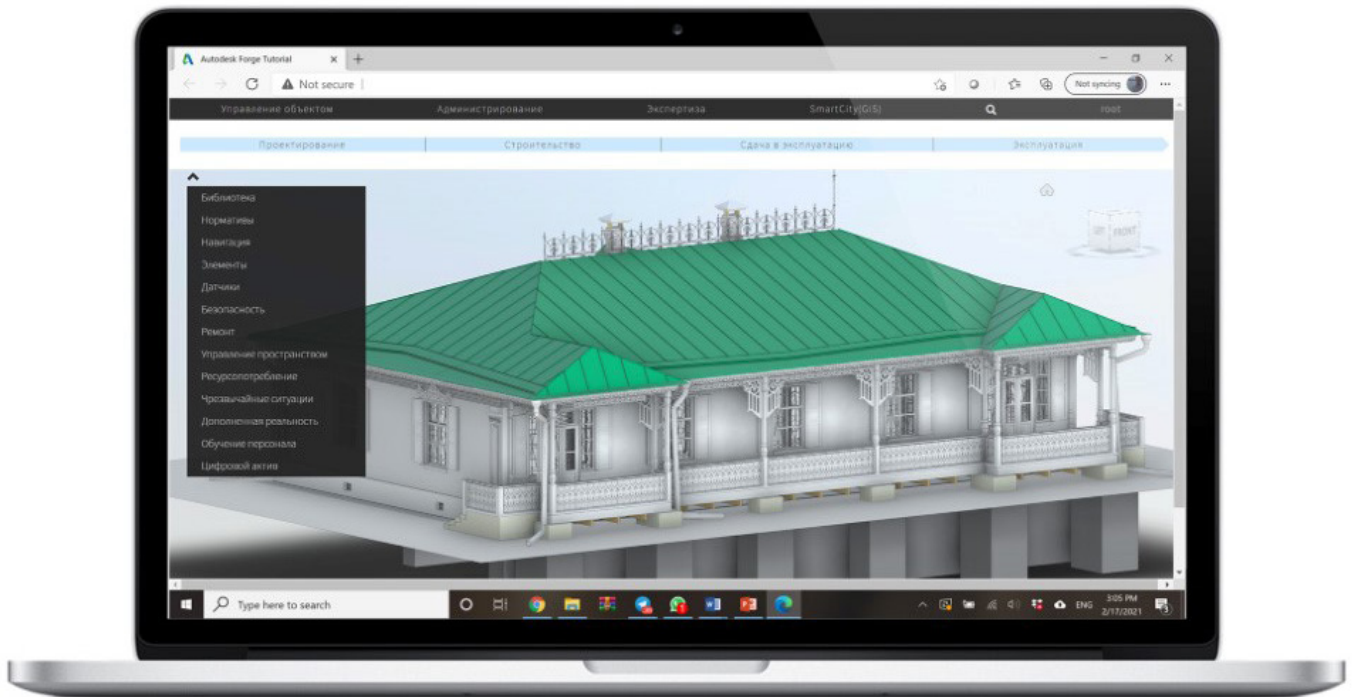
» **Digital model for constructions life cycle developed by SPbPU Young Researchers received Autodesk Forge Research Grant**



The team’s project was implemented in the framework of the Laboratory “Modeling of technological processes and design of power equipment” of SPbPU NTI Center for Advanced Manufacturing Technologies. A leading researcher of the Laboratory of the NTI Center for Advanced Manufacturing Technologies, professor of the Civil Engineering Institute of SPbPU **Vladimir BADENKO** was the scientific supervisor of the project. The team included specialists from SPbPU and industrial partners of the project in various fields: engineers, architects, programmers and web development specialists.

For the competition, the **Nikolai BOLSHAKOV** team presented the project “Web service for managing the life cycle of a capital construction object (Digital Asset)”. The project is aimed at forming an information model of the life cycle - a digital resource for the owner of a physical asset. In other words, the team created and presented a web service for managing the life cycle of various construction projects, built using the Autodesk Forge platform, which is of interest to owners and operators of civil and industrial construction projects.

The relevance of the project is determined at the federal level: in the regulatory documents, requirements and special legislative documents on formation and maintenance of digital models of construction objects, as well as the electronic documents formation, preparation of project documentation, construction, reconstruction of capital facilities there is no complete information on the certain requirements on information models, so the project has been extremely relevant for the current stage. Project leader **Nikolai BOLSHAKOV** has developed overall scientific basis for the project in the cooperation with the Innovation Support Fund within the framework of the “UMNIK - Digital Russia” program.



During the implementation of the project, the team tested the application at a new construction site (a school building in the Moscow region) and at an object that is undergoing restoration (the museum-estate of the artist **Nikolay YAROSHENKO** in Kislovodsk) thanks to cooperation with the industrial partner VIK Project LLC. In the process of preparing the project, it is planned to solve the following tasks:

- linking the operational BIM model with the ERP system;
- inclusion of the Forge product in a system project for digitalization of real estate lifecycle management;
- inclusion in the application of a web navigation system, a library of operational data on the elements of the building, and information in case of emergencies;
- creation of an as-built BIM model based on the results of laser scanning;
- comparison with the as-designed model and the formation of an actual HVAC model at the construction stage for subsequent use in operation;
- digitalization of the examination process;
- formation of information flows between the object and GIS systems and others.

Based on the results of the successful implementation of the project, it is planned to create a standard service that solves the real operational tasks of industrial and civil construction facilities.





## ARVEDI - SPbPU SUPPORT PROGRAM FOR YOUNG RESEARCHERS

Supporting young scientists is an important area of the Polytechnic University activity and SPbPU cooperates with leading Russian and foreign companies and enterprises. In March 2021, the 4-year SPbPU and the Italian metallurgical holding ARVEDI Group joint program organized to support graduate students research reached its finalizing stage.

Within the framework of this program, two graduate students of the Institute of Mechanical Engineering, Materials and Transport **Roman SMELYANSKY** and **Nikita ZHUKOV**, under the supervision of scientific advisers Prof. **Nikolai KOLBASNIKOV** and Dr. **Anton NAUMOV**, received funding from Arvedi for a period of 4 years and the opportunity to implement research projects within the framework of dissertation.



**Nikita ZHUKOV**, Senior Engineer of the Research and Education Center Severstal-Polytech, Research Engineer of the Scientific and Technological Complex "New Technologies and Materials", tells about the role of the support program from a foreign partner in his professional development.

### *How did your cooperation with Arvedi start?*

The cooperation began with the proposal of the scientific supervisor to get acquainted with the technological

challenges a modern metallurgical company located in Cremona, Italy is facing. We held several introductory meetings, and then, after obtaining a visa, we went to the Arvedi enterprise. First of all, we got acquainted with all the divisions of the company, global goals and the production process.

### *How different are foreign and Russian metallurgical companies?*

Arvedi has proven technologies ISP (in-line strip production) and ESP (endless strip production) as its main technological capacity. Both technologies are foundry-rolling complexes. Modern, technological and optimized.

Unfortunately, I didn't have a chance to see the foundry-rolling complex at UMC, in Vyksa, in order to make a comparison, but the scale of the continuous technology itself, taking into account a huge number of factors, makes a serious impression.

### *What is your research devoted to?*

Currently, the topic of the dissertation is the development of technologies for the production of pipe steel grades through computer and physical modeling. Active work is underway on "Severstal" projects using all modern SPbPU tools. A number of articles are being prepared for publication. Work is underway to develop new methods for assessing the relationship between the structures and properties of steels.





» 4 years of support for cutting edge research, internships and scientific careers



**GIOVANNI ARVEDI,**  
Founder of ARVEDI Group  
SPbPU Honorary Doctor

*Students are my colleagues, I call you that not only because I am an Honorary Doctor of the Polytechnic University, but as well because I myself am still studying. We need to keep learning throughout our lives, because study, science and their implementation into practice is the basis of success. So, you need work and work, but, first of all, study and study. Then learn and learn again. Then you will be successful. Loving your work, following your intuition, believing in your own ideas and their success - this is our secret, and this is what we will continue doing.*



**Prof. ANATOLIY POPOVICH,**  
Director of IMEMT, Scientific Advisor of Structure materials and Additive technologies laboratory  
E-mail: [director@immet.spbstu.ru](mailto:director@immet.spbstu.ru)

*Arvedi is an example of a successful high-tech metallurgical company, which focuses not only on the profit but also on the quality of the products and environmental safety of manufacturing. That is why the experience of cooperation with this enterprise is invaluable for our institute. We thank Arvedi for the support of our graduate students and look forward for further cooperation.*



**What spheres and companies can use the results of your research?**

As for the Russian Federation - absolutely any metallurgical company, perhaps a design institute or R&D centers of oil and gas companies, but it should be noted that now I am a senior specialist at the joint center "Severstal-Polytech". As for foreign companies, work is now underway on quite topical issues in the field of metallurgy. Interaction with representatives of various "metallurgical schools" is carried out at the level of collegial correspondence.

**What are your plans for the future?**

Globally, there is a plan to realize the potential of the metallurgical and resource extraction potential of the largest companies in the Russian Federation. Science, as a sphere, that allows not only to deeply dive into various subtleties of the physics of processes, but also to carry out a scientific exchange of knowledge. I like doing large-scale projects. Therefore, in the near future, science appears to be an excellent tool for achieving personal and career goals.

ARVEDI Group is a concern for the production and processing of steel (Italy). The main areas of activity are the production of pipes from carbon and stainless steels, as well as stainless strips. The founder of the concern, an SPbPU Honorary Doctor Mr. **Giovanni ARVEDI**, who made a breakthrough in the creation and implementation of an innovative and unique technology for the production of hot-rolled steel coils, called Arvedi ESP, which includes 460 patents.





### PROFESSOR FRANK RÖGENER: ALL THINGS ARE DIFFICULT BEFORE THEY ARE EASY!

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Professor Frank RÖGENER from the Technical University of Applied Sciences of Köln (TH Köln; Germany) is a long-time friend of Polytechnic University. For many years, Professor RÖGENER has been lecturing at SPbPU on environmental engineering. The coronavirus pandemic has not become an obstacle to productive cooperation: the professor continues to work with students remotely and is also active in academic mobility. And Frank RÖGENER also appreciated the news digest SPbPU International Review and noted that, thanks to the electronic issue, he felt a connection to Polytechnic again. About this and more in our interview.

- Professor RÖGENER, how do you feel about the pandemic and global isolation?

- Despite the crisis, I don't feel bad. The current situation has shown that many of us have begun to think more about the things that really matter in life. In particular, I really miss seeing my relatives, friends, and colleagues from Russia in person. This is the unpleasant side of the situation. The lockdown is a litmus test for all of us in terms of personal and professional development.

- Is it difficult to teach remotely?

- There are different aspects of remote teaching. Scientific work and teaching are the matters of the personal contact, where students, professors and society receive impact and learn from the interaction. Science in general lives through human interaction. And when we asked students what they miss most about during the remote teaching, they also talked about the lack of personal contact. Needless to say, we all lack it! When I give lectures, I only see photographs of the students and sometimes only their names or nicknames, so that is very unpleasant, it is just like talking to the wall. As the human beings, we also need the interaction, we need to see students' faces, if they understand us, what do they think, do they show emotions, and this specific feedback is certainly missing. In small educational groups where there are only three students, they turn their cameras on and this interaction is more effective.

- What about academic work? Is it still going on as well?

- Yes, of course! Mutual research activities continue. For example, in spring, a student from Polytechnic University, Liya SAGITOVA, worked in my lab as part of the Erasmus+ program. Liya finished the practical part of her master's thesis. She performed some experiments in water related field, it really helped her with her master's thesis. Thus, we continue joint activities between Germany and Russia and support Erasmus+ students not only in scientific, but also in life situations. For example, when Liya had some problems with returning home, my wife and I helped her to return home safely to Russia, so she was able to complete her studies over the summer. And with another colleague from Russia, Maria ANDRIANOVA from the Higher School of Hydrotechnical and Energy Construction at SPbPU, we wrote a book about new technologies in drinking water and wastewater systems. The book was published at the end of November. Thus, life goes on, and with it, scientific activity.

- We heard that you appreciated the new electronic news digest of Polytechnic - SPbPU International Review. How did you find out about it?

- I received an electronic journal from your German cooperation coordinator. I was surprised and thought "Wow, something from Polytech!" and again felt a connection between your university and me.

- Which sections did you like best?

- I saw that Polytech was participating in the Formula student competition, where students prepare self-driving cars. Actually, a couple of years ago students from my institute also took part in this competition. It is quite nice to see that this topic is interesting for people all over the world.

- We know that you are a visiting professor at Polytechnic University. How long have you been teaching here?

- I started lecturing at SPbPU in 2004. Then there was a short break, but now I have been in contact with Pol-



otechnic University for more than five years. So my relationship with your university is quite long, and also, since I speak a little Russian, I can also translate a little into Russian when some students don't understand the material completely.

Today I lecture to Master's degree students in environmental engineering with a focus on modern developments in the field of hydro science. I am a chemical engineer by background and have devoted myself to environmental protection. In my lectures, students consider issues related to water supply difficulties caused by, for example, the coronavirus crisis and climate change. Additionally, I have given lessons on "Team and Leadership" in international environment cooperation.

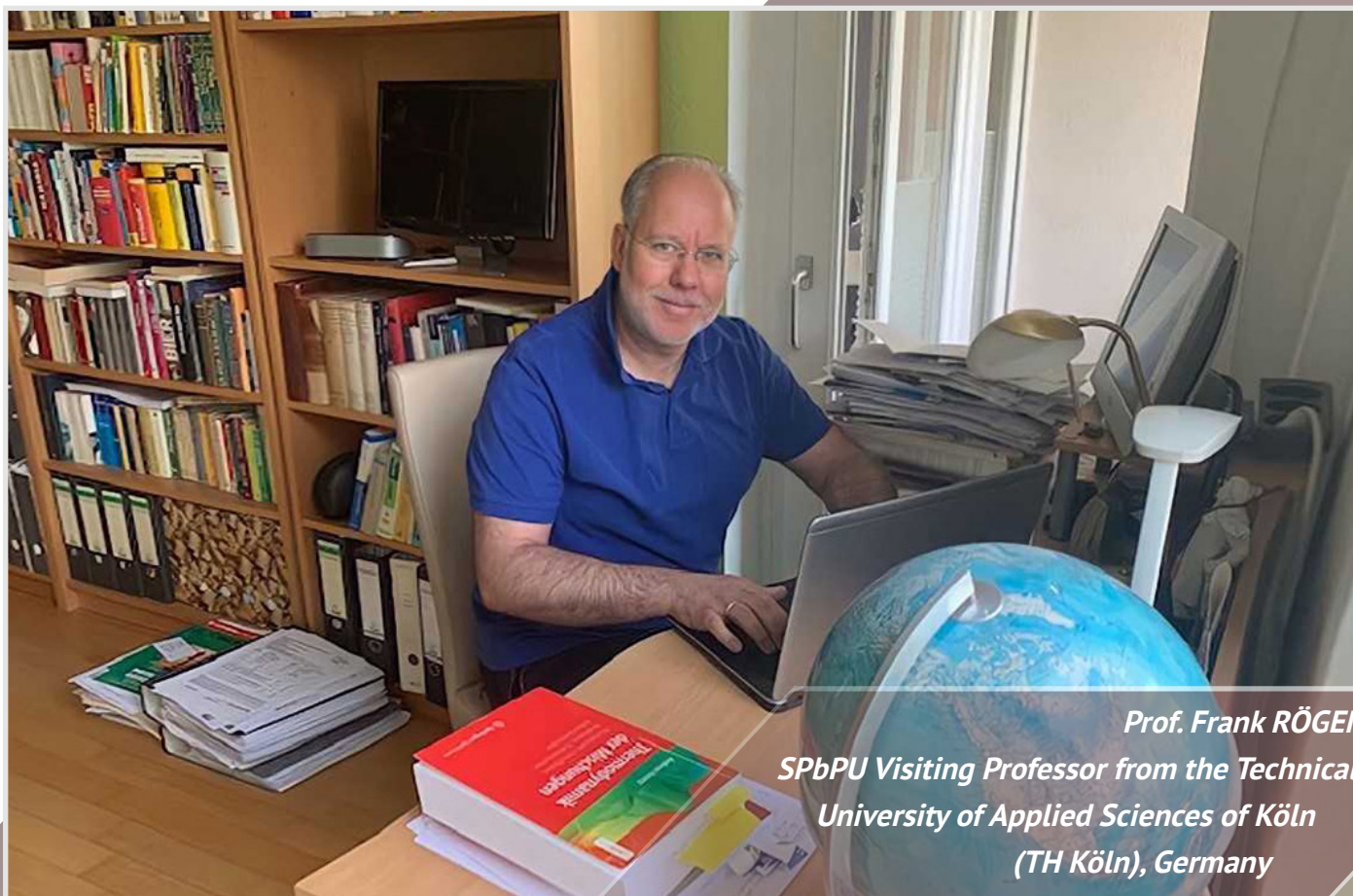
- At the beginning of our interview you spoke about academic mobility. This is an essential topic in the development of cooperation between Russia and Germany. Do you think there might be difficulties with academic mobility programs after the pandemic?

- Student and faculty exchange programs provide tremendous experience and excellent opportunities for international cooperation, and can lead to significant career advancement. Even before the coronavirus crisis, I tried my best to motivate German and Russian students to participate in such programs. In spite of everything, I am optimistic and confident that the desire to learn from each other will only grow.

- However, there is a possibility that many students will miss the chance to study in other countries after the pandemic. What advice would you give to those who might be afraid to travel?

- Of course, at the moment, participation in exchange programs is not available, because the borders between our countries are closed, and airlines are working intermittently. Thus, take the opportunity to learn foreign languages now, especially English. And soon after the pandemic: go for it! And I would like to say my main advice in Russian: as my wife's grandmother says, "глаза боятся, а руки делают!" – which means that all things are difficult before they are easy!

- Professor RÖGENER, thank you for the interesting interview! We wish you professional success and good luck!



**Prof. Frank RÖGENER**  
*SPbPU Visiting Professor from the Technical  
University of Applied Sciences of Köln  
(TH Köln), Germany*



## COOPERATION BETWEEN NARI GROUP AND PETER THE GREAT ST. PETERSBURG POLYTECHNIC UNIVERSITY

Peter the Great St. Petersburg Polytechnic University (SPbPU), thanks to its Representative Office in Shanghai, became the only foreign laureate of an international competition for research projects, having won a nomination for the development of a diagnostic system for high-voltage electrical equipment for Chinese megacities. The Chinese company NARI Group, a member of the National Grid of China, initiated a competition. Over 60 research organizations took part.

Cooperation between NARI Group and Peter the Great St. Petersburg Polytechnic University began in 2017. A delegation of the State Grid Electric Power Research Institute (SGEPRI) of China, with the assistance of the Representative Office of SPbPU in Shanghai, visited SPbPU. SGEPRI is the world's largest supplier of electrical equipment from China and an active player in the global energy industry. The head of the delegation was Professor, Academician of the Chinese Academy of Engineering **Xue YUSHENG**, an Honorary President of SGEPRI. In April 2018, a round table «Strategic cooperation between the NARI Group and SPbPU» was held, where the parties discussed joint projects in the development of electric transport.

Within the framework of the project, SPbPU scientists are developing and researching digital models of hybrid electric power systems with pulse converters based on high-voltage multilevel converters (HVMC) that are optimal in terms of speed and accuracy. Also, the research group is developing a methodology for modeling and researching non-stationary modes of a hybrid power grid to identify characteristic signs of a violation of the reliability, safety and quality of power transmission.

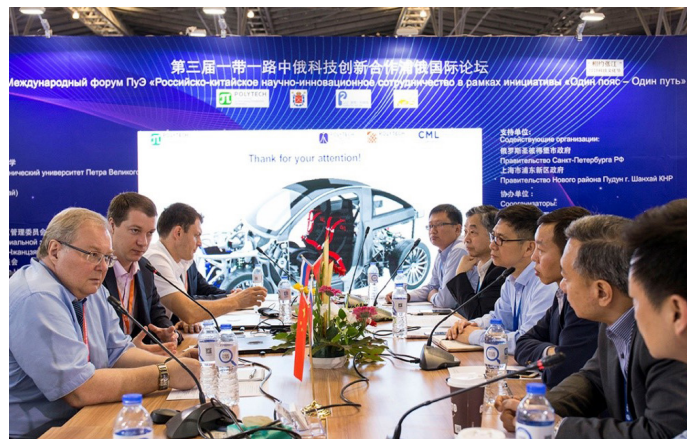
The creation of extended inter-system (interstate) power transmission systems is a modern urgent scientific, technical, economic and geopolitical task. As

the length of electrical networks of high and ultra-high voltage classes in interconnected power systems grows, it becomes necessary to solve fundamental and new technological problems of ensuring reliability, energy security, stability, quality and control (including non-stationary) processes of electricity transmission.

In modern conditions of the development of the united power systems of China, the issue of the development of distributed generation, including alternative and renewable sources of electricity, is quite acute. In particular, in the near future, it is planned to increase the installed capacity of single units of traditional power plants to 2000-2500 MW, as well as to cover the electricity consumption schedule up to 150 GW using wind and solar power plants. At the same time, according to the strategy of technical and economic development and modernization of the PRC's electric power industry, it is not planned to significantly reduce the volume of electricity generation using traditional thermal power plants, most of which are significantly remote from large centers of industrial, commercial and cultural development. In addition, at a considerable distance, along the coast, there are the largest megalopolises and the technopolises and business incubators located nearby, which together are also large centers of power consumption.

All these technical and economic aspects predetermined the relevance and topics of scientific research aimed at analyzing non-stationary modes of operation of high-voltage multi-level converters (HVMC) used as part of

» *SPbPU became the only foreign laureate of an international competition for research projects initiated by the Chinese company NARI Group*





equipment, long power lines with parallel operation of large regional power systems and provinces in China.

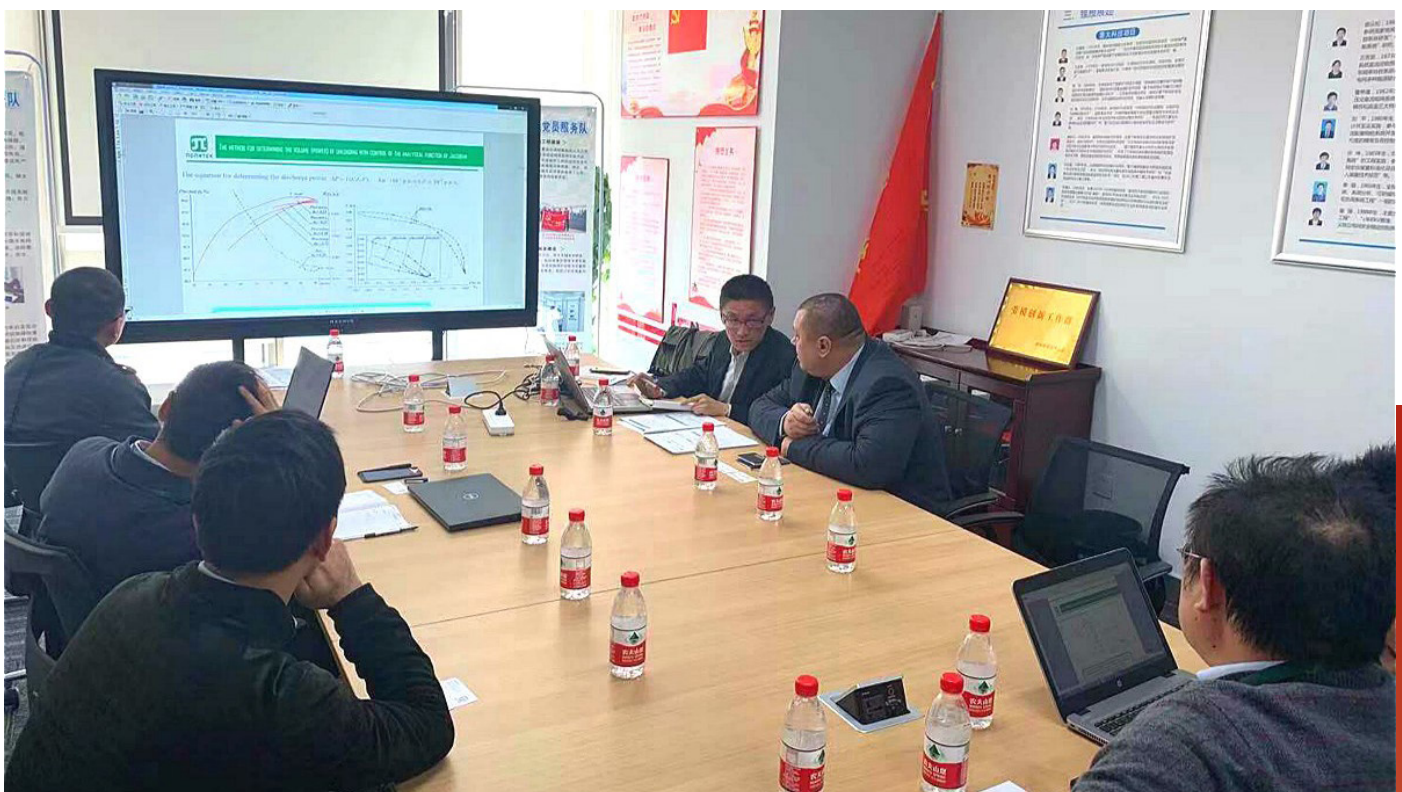
In the future, it is planned to experimentally test the effectiveness of digital models and by 2025 to develop a laboratory sample of a device for high-speed protection of a multi-level DC and AC power distribution network.

**Maxim POPOV**, Professor, SPbPU Higher School of High-Voltage Power Engineering: *"In the context of the globalization of power interconnections in Russia, China, and other progressive countries, the issues of energy security, electromagnetic compatibility of hybrid power grids, parallel operation of alternative and renewable energy sources with traditional power systems, etc. are quite acute. Introduction and safe operation of new, expensive power electrical equipment and impulse technology is possible only with sufficient speed of protection and automation. Modern adaptive means of emergency control, including early diagnosis systems, can significantly increase the service life of power electrical equipment. For testing and early diagnostics of power electrical equipment and its protection of such complex electrical systems, the Polytechnic University is developing the proposed hardware-digital system as part of a research project."*

**Xu JIANBIN**, Laboratory Director at NARI Group: *"Our previous traditional research model has obvious shortcomings such as low funding, research lead times, and not enough new results. We hope that thanks to our cooperation with the St. Petersburg Polytechnic University, we will be able to find a more effective model of cooperation in the scientific and technical sphere."*

multi-level, cascade voltage and current rectification and inversion circuits in order to identify characteristic signs of a violation of reliability, safety and quality transmission of electricity. The regularities and signs of the manifestation of non-stationary processes and phenomena revealed in the framework of scientific research will allow at subsequent stages to develop highly efficient and highly sensitive methods and functional algorithms for high-speed protection of high-voltage converter modules HVMC.

The introduction in the future of the possibility of their early diagnostics in the control, protection and management system of the HVMC converter modules on the basis of their mathematical models (including digital real-time models) developed and studied within the framework of this scientific and technical project will provide a significant expansion of the area of stable operating modes of the power controlled electrical





## SPBPU FOREIGN POSTGRADUATE STUDENT SUCCESSFULLY DEFENDED HIS PhD THESIS



A foreign graduate student of Peter the Great St. Petersburg Polytechnic University from Syria successfully defended his Ph.D. thesis for the degree of candidate of technical sciences. The defense took place at the SPbPU Theses Defense Council. Ramadan AMER's work is dedicated to the use of renewable energy sources for the conditions of Syria. The scientific supervisor of the young scientist was Viktor ELISTRATOV, Doctor of Technical Sciences, Professor of the Higher School of Hydraulic and Power Engineering Construction of SPbPU.



### **Professor ELISTRATOV :**

*“Ramadan AMER conducted large-scale studies to assess the state of the Syrian energy sector and the possibilities of using renewable energy sources, the results of which have high potential and prospects for implementation, especially in the current state of the Syrian economy.*

*During the entire period of study at the Polytechnic University - first in the Master's Degree program, and then in the postgraduate one - Ramadan showed himself to be an active, proactive and systematically working graduate student. The topic he was working on is really relevant and very complex. For its part, the research team of the Polytechnic University has a wealth of experience in research and development of energy supply technologies in various natural and climatic conditions and helps our foreign graduates to successfully carry out and implement research work in their homeland.”*

» *SPbPU foreign postgraduate student has successfully defended PhD thesis and will contribute to the development of wind and solar energy in homeland country*

Ramadan AMER studied in Russia for more than seven years: first, as part of the program of preparation for entering the university, he studied Russian at the Polytechnic University, then continued his studies at the master's degree at SPbPU. The next step was the postgraduate study in the direction "Nuclear, thermal and renewable energy and related technologies."

**Ramadan AMER:**

*"The theme of my work is "Substantiation of the parameters of energy supply systems based on renewable energy sources for the conditions of Syria". This is very important for my country, and upon returning home I plan to continue working in the chosen direction. Of course, during the seven years I spent in St. Petersburg, it was not easy: I learned Russian from scratch and worked a lot. But the result was worth it. I would like to express my gratitude to the management of the Polytechnic University, my supervisor and the entire SPbPU team for their help and support."*

During his postgraduate studies at SPbPU, Ramadan AMER for the first time, based on the electronic resources of the Global Wind Atlas and the Solar Map Atlas, using an original methodology, assessed the gross and technical resources of wind and solar energy in Syria and created atlases of wind and solar energy resources. In addition, an engineering methodology for assessing the energy, environmental and economic efficiency of the construction of wind and solar power plants in Syria was developed for the first time.



**RAMADAN AMER,**  
SPbPU graduate

*I hope I can contribute to the development of wind and solar energy in Syria. According to its climatic and geographical conditions, Syria has significant and inexhaustible resources of solar energy, practically attractive resources of wind energy, which are advisable to use for the development of the country's energy sector. And I am very glad that the St. Petersburg Polytechnic University gave me enormous theoretical and practical material.*



# RUSSIAN-SPANISH LANGUAGE SCHOOL & INTERCULTURAL COMMUNICATION (SPbPU – UNIVERSITY OF CÁDIZ)

## ONLINE SUMMER SCHOOL – 2021

JULY 19-30, 2021

Peter the Great St. Petersburg Polytechnic University and its longtime partner University of Cádiz with their strongest language schools created a powerful course for all who wants to dive in Russian-Spanish world, to study Russian or Spanish language and to become more effective in cross-cultural communications.

The purpose of the program is to provide students with opportunity on the direct cross-cultural dialogue, to go deeper to Russian-Spanish relations and cultures and to help Summer School participants become more effective in their international relations in the future.

Within two weeks of the Summer School in July international students and Russian students are going to master one level of Russian or Spanish language (by choice, A1-B1) and to practice it with native speakers during all the course time. Moreover, Summer School participants are going to broaden their knowledge of Russian-Spanish culture and history and to improve their skills in cross-cultural and digital communications.

### The Summer Course program includes:

- Russian or Spanish language classes
- Intercultural Communication lectures
- Russian-Spanish relations lectures
- Digital Ethics and Digital Communication
- Online cultural program

All classes and extracurricular activities are carried out in Russian and Spanish. Knowledge of the English language is not required. The course activities will be delivered synchronized as live talk with professors and group-mates. Records of classes will be available on SPbPU platform for 1 month after the course end.

If you like to participate in the Summer School of Polytech and University of Cádiz “Russian-Spanish Language School & Intercultural Communication”, please register on Polytechnic Summer Schools web site.



About the  
Summer Course



Registration  
Form on  
Polytechnic  
Summer Schools  
web site.



OCTOBER 14-15, 2021

The International Conference on Electrical Engineering and Photonics will be held in SPbPU for the 4th time!

2021 International Conference on Electrical Engineering and Photonics (EExPolytech-2021) is a conference that aims to bring together specialists in Electrical Engineering and Photonics.

The topics cover diverse applications in technology fields such as imaging, communication, sensing, and instrumentation, as well as the sciences such as biology and medicine, chemistry and fundamental physics. The conference is designed for researchers to report on the latest findings on Electrical Engineering and Photonics and stimulate scientific exchange among researchers and engineers from industry and academia. Participants from partner universities, students and IEEE members have reduced registration fee.

All accepted and presented papers will be sent for the indexing in IEEE Xplore (Scopus).

**IMPORTANT DATES**

**Full Paper Submission:** 06th of September 2021

**Notification of acceptance:** 04th of October 2021

**Conference:** 14-15th of October, 2021

**TOPICAL ISSUES OF INTERNATIONAL POLITICAL GEOGRAPHY (TIPG 2021)**

OCTOBER 15-16, 2021

<http://tipg.spbstu.ru/>

Topical Issues of International Political Geography is planned to be held at Peter the Great St. Petersburg Polytechnic University on October 15-16, 2021.

The Conference will address the main issues of contemporary political geography and international relations, providing a platform for discussion and collaboration of experts in the fields of Political Geography, Geopolitics, International Relations, International Law and other related areas.

**The conference will include five panels:**

**Panel 1:** Political geography in the modern world

**Panel 2:** New challenges to international relations

**Panel 3:** Topical issues of international law

**Panel 4:** Migration and socio-demographic processes in Europe

**Panel 5:** Ideologies of regionalism and globalization in historical context.

Philosophy of politics

**IMPORTANT DATES**

**Submission Deadline:** 25th of August 2021

**Notification of acceptance:** 20th of September

**Final paper submission:** 10th of October

ANNOUNCEMENT







#great2be

#spbstu

#peterthegreat

#polytech

#summerschool

#Polytech\_Petra

## DISCOVER POLYTECH

DISCOVER POLYTECH



Founded 120 years ago, Polytechnic University is a recognized Russian and international leader in the field of engineering and economic education. SPbPU is one of in TOP-3 Russian Universities in the number of international students. Polytech is listed on the top positions in QS and THE rankings.



EN ES CH

## SPbPU REPRESENTATIVE OFFICE IN SHANGHAI, PRC

SPbPU REPRESENTATIVE OFFICE IN SHANGHAI, PRC



In 2016 SPbPU opened the Representative Office in the Pudong New Area of Shanghai. Polytech is the first Russian University to open an official representative office in China. More information about its goals, facts and major areas of activities by scanning the QR.



EN CH RU

## SCIENCE, RESEARCH AND DEVELOPMENT

SCIENCE, RESEARCH & DEVELOPMENT



Peter the Great St. Petersburg Polytechnic University is a first-rate scientific and educational center of industrial development and world-class competence. Scan QR to learn more about international research at Polytech.



EN

## EDUCATIONAL PROGRAMS FOR INTERNATIONAL STUDENTS



The University provides a wide range of up-to-date educational programs taught Russian and English languages. Scan QR to learn more about programs for international students in the field of engineering, natural sciences, management and economics.



## DEGREE PROGRAMS IN ENGLISH



Discover English-taught International Master Degree Programs in a wide-range of subject areas: engineering, IT, natural sciences, economics and management. Double degree and student mobility options, world-class professors are the key advantages of University's degree programs.



## INTERNATIONAL POLYTECHNIC SUMMER SCHOOL



SPbPU offers a unique opportunity to take part in the largest Summer School in Russia that has more than 35 programs. Summer school – chance to explore outstanding studies with star professors from over the globe, English-speaking tutors and cultural program in wonderful city.



Polytech  
official video





## PETER THE GREAT ST. PETERSBURG POLYTECHNIC UNIVERSITY

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