



World of MEPhI

August' 18

DEAR FRESHMEN!

Today you've entered a big multinational MEPhI family, where you will spend several happy years and may be the whole life. I am sure that you will worthy succeed glorious traditions of the legendary University, which today is one of the leaders of the Russian engineering education. The National Research Nuclear University MEPhI has a great educational and scientific potential. Students study in specially designed, unique educational programs, listen to lectures of the best teachers of the world, conduct research under the guidance of world-famous scientists, participate in international projects, gain new knowledge and experience during foreign internships, make scientific discoveries. I wish you to effectively use years of study at MEPhI. I am sure that it will take a little while we will be proud of you and your achievements!



Rector of MEPhI
M.N. Strikhanov



**YOU ARE IN MEPhI.
WHAT'S NEXT?
READ IN OUR SPECIAL ISSUE**

“I’M GOING THERE TO BECOME A CHAMPION”

The student of MEPhI Vladislav Rozov will have a one year internship in the Skills Samsung scientific center in South Korea. This is one of the stages to prepare members of the Russian WorldSkills national team.

The purpose of the internship is to develop professional skills and prepare for the WorldSkills world championship, which will be held in Kazan in 2019, where he will be able to represent Russia. Vladislav will be trained in the competence «Manufacturing of products from polymeric materials». This year he took the first place in the regional championship in Moscow in the competence «Multiaxial manufacturing on CNC machines».

Vladislav Rozov told about the admission to MEPhI, participation in WorldSkills projects and his achievements.

- How did you get interested in physics?

- Until the midst of the 11th grade, I was a 100% humanitarian: I loved the Russian, History, Social studies, and then became interested in popular science literature and realized that Physics is also interesting. I passed the unified state exam in the subject, and entered MEPhI.

- Do you have an idol, who influenced to you?

- Elon Musk (whispering)... In fact no, I haven't. I was just interested in everything from some basic engineering things to nuclear physics and space research.

- Why did you choose MEPhI?

- I really liked the Admissions commission. That day I was delivering documents to universities, and the first on the list was the MSU's physical faculty, after which I wanted to go to the Bauman University, but I decided to go to MEPhI first. I learned about the University from social networks: I surfed different groups for students, and I began to see the news of MEPhI. When I came to submit documents, I felt myself at my own place: there were polite and nice people, I immediately received a temporary student card. I decided to stay in MEPhI and did not go further to apply.

- How did the University contribute to your success?

- It gives me opportunities for self-realization. If a person really wants and tries to achieve something, tries and manifests himself, then the University is a great help. For example, I learned about the WorldSkills competition in MEPhI, participated in the intra-University stage, and then independently went to the regional one.

- How did you receive an ability to have an internship at the Samsung Skills science center in Korea?

- I successfully passed the first two stages of the regional WorldSkills championship and was among four people who reached the final. Then colleagues from Korea came here and started to choose not only for professional skills and speed of training, but also, first of all, for the psychological state of the contestant, because for the year you can teach almost anyone to do anything, but it was much more difficult to find a person who was mentally ready for this and who had a motivation. To check psychological stability, the commission asked how we treated difficulties and failures, also asked questions about the family: if something keeps a person, if he is strongly attached to the house, how can he go to another country for a year to train, undertake internship and study for 12 hours a day? Also, great attention was paid to the education of a person, because the Samsung Skills teaches students in the international center, and a person should behave politely and with dignity: respect other people's traditions and create a good impression of their country. It turned out that I was the most suitable candidate for the commission.

- What were the tasks?

- At the intra-University stage, I participated in the competence of «Prototyping», there were modified versions of tasks of the



last year, which included 3D modeling of the drawing, creation of a drawing of the simulated part, conversion of the 3D element in the G-code for 3D printers and printing, post-processing. At the second WorldSkills competition, the regional Moscow stage, it was the same. Then I participated in the competence of «Multiaxial manufacturing on CNC machines». They gave us a drawing, and it was necessary to model the element, cut it out of the aluminum blank on the machine. The competence within which I am having the internship combines everything: modeling, drawings, reverse engineering, work on the machine, that is, in total – it is one large production cycle.

Traditionally WorldSkills movement doesn't change the tasks a lot from year to year. Some nuances, some geometry of the element can be changed, but the essence remains the same.

- What was the most difficult thing for you during the selection process, how did you cope with it?

- I had to master new software in a couple of days. It's good that I'm learning fast enough and can get involved on the go. However, the most difficult was to answer the question: «Am I really ready to leave for a year and live in another country?» People in South Korea work 12 hours a day, and it is normal for them. This internship is a psychological test for me: will I be able to adjust, adopt a different rhythm of life, find the strength for hard work. My goal is to test myself.

- What language will be used in training?

- As it is an international training center and there will be representatives of different countries of the world, the main language of teaching will be English. Two people come from Russia for training: another contestant and I, we will have our own translator from Russian to Korean, who will help us, because it is very difficult to tell the technology and explain some nuances in the field of production even in English. «Difficulties of translation», as they say. I think that we will succeed with a good Russian-Korean translator.

- What are your expectations about the internship?

- I will get a lot of opportunities: starting from the practice of language and experience of adaptation in another country to the world championship and further work with the WorldSkills Russia. I am going there to become a champion: I will prepare, train and in 2019 I will present the Russian team in Kazan.

- What would you advise people who are going to take part in WorldSkills competitions?

- The intra-University stage of WorldSkills will be again in June. My advice is «Even if it doesn't work, don't be afraid to try again.» For example, I did not succeed at the first competition, but I felt this atmosphere, plunged into WorldSkills and realized that I wanted to progress in this direction. Lots of people mistakenly believe that one success will immediately entail some growth. It is not true. It is always important to improve and go the extra mile.

RUSSIAN SCIENTISTS SUGGEST MAKING ELECTRONIC DEVICES FROM “CARBON PEAS”

Scientists from the National Research Nuclear University MEPHI have studied the properties of fullerene nanotubes, also known as «carbon peas,» during stretching. The article on the project, which will help develop sophisticated nano-electronics, has been published in *Diamond and Related Materials*.

Metals are known for their impressive electrical and thermal conductivity levels and their electrical resistance increases during heating. They also have a distinguishing luster.

These properties are determined by the presence of free electrons that can move under the influence of an electric field. Therefore materials with a complex composition and containing free electrons act as metals.

In the past 30 years, experts have synthesized many new carbon materials, including nanotubes filled with fullerenes. These tubes are called «carbon peas» because they resemble pea pods.

“It turns out that carbon peas can be used as semiconductors and as metals,”



Konstantin Katin, an assistant professor in the Condensed Matter Physics Department at MEPHI, explained. “Just stretch them by four percent to unlock their metallic properties. Their high resilience and tensile strength allow them to remain intact after stretching.”

The distance between fullerenes and the nanotube’s surface is so small that electron clouds can travel between the nanotube and fullerenes and back. This phenomenon is called hybridization. The extent of hybridization determines electronic properties of various devices that can be manufactured using electronic peas.

“Everything depends on the correlation between energy levels of electrons inside nanotubes and fullerenes,” said Mikhail Maslov, an assistant professor in the Condensed Matter Physics Department at the National Research Nuclear University MEPHI. “Our nanotube initially acted as a semiconductor and had an energy gap. Although fullerene electrons lacked the energy to fill this gap, the application of mechanical tension changed the entire picture. Energy levels shifted, with carbon peas displaying their metallic properties.”

Today, scientists have to use all kinds of materials, including metals and semiconductors, for making sophisticated nano-electronic devices. However, the MEPHI’s project proves that they can be replaced by only one compound, namely, pre-stressed carbon peas. This will make it possible to manufacture simple resonant-tunneling diodes, terahertz radiation generators, electronic switches, and sensors.

TEAM PROJECT UNITES PARTICIPANTS OF INTERNATIONAL SUMMER SCHOOL AT MEPHI

On July, 13 the Third International Summer School on Engineering Computer Modeling has ended in the National Research Nuclear University MEPHI.

The summer school on engineering computer modeling has gathered young specialists, graduate students and undergraduates in the field of computer modeling of various physical processes as well as designers working with engineering and precision calculation codes from 12 countries: Russia, Spain, Algeria, Turkey, Egypt, Nigeria, Kazakhstan, Greece, Poland, Bangladesh and Norway. The latter was represented by two universities: Western Norway University of Applied Sciences and the University of Bergen.

This year special attention was paid to team interaction. The participants were divided into four groups. They received a task on multiphysical modeling of neutron-physical and thermal-hydraulic characteristics of a fuel element of a nuclear reactor washed by the coolant. The work on the project allowed to get acquainted with the world of modern modeling, where calculations of individual elements are replaced by a complex calculation of the whole system. In addition, the experience of cooperation in an international English-speaking group helped young researchers to get new social connections for the future.

A master degree student from the Istanbul Technical University Ozkan Fadime Ozge said that there is intense competition among applicants for her specialty in Turkey. «There was not enough practice at home. It is important that here attention is paid to complex topics in the field of nuclear energy. Therefore, it is a great opportunity for me and my colleagues from Istanbul to learn more useful skills, new competencies.»

Earlier Ozkan had never participated in similar schools. In addition, it was a great opportunity for her to see the city, to study at one of the best universities in the nuclear field.

An engineer from Podolsk, the chief specialist of the Department of non-reactor and reactor tests and research of the Research and production association “Luch” Ekaterina Solntseva said that she heard about the school in 2016: «However, that year I failed to be selected for participation.»

Her work is to plan, organize and conduct tests of fuel elements of a nuclear reactor, as well as promising fuel and structural materials for reactor plants of the new generation. «Organizing reactor tests it is necessary to justify the safety and modes of experimental devices, in which the tested materials and model fuel elements are tested,» Ekaterina explained.

In her opinion, the organizers of the school and invited lecturers went to considerable lengths. “They conducted a ten-day course of neutron-physical modeling using the MCU program (Kurchatov Institute) and modeling of heat-hydraulic processes using the CFD FlowVision program,» Ekaterina listed. She added that the lecturers made «almost impossible», expressing the belief that the knowledge would be absolutely useful to her work.

In addition to the official part of the busy agenda, the organizers paid attention to the leisure program outside the working space of the school. «They tried to make foreign participants feel comfortable and were able to enjoy their stay in Moscow,» the researcher shared.

As a result, the participants presented the results of their work on the group project and received certificates of participation in the summer school.



MILITARY DEPARTMENT OF MEPhI

The military Department of MEPhI, implementing its main task — training of reserve officers for the Armed Forces of the Russian Federation, carries out work in the following areas:

- Training of reserve officers in high-tech (requiring a high level of basic engineering training) military specialties, related civilian specialties and areas of University training.
- Training of reserve soldiers and sergeants. The task is implemented in accordance with the Order of the Russian President V.V. Putin, given after the visit to MEPhI on January 22, 2014.

- Recruitment of graduates in scientific companies created by the Ministry of Defense.

Upon completion of training, all graduates receive a military rank with enrollment in the reserve. They can also enter the voluntary military service for the positions of officers in the research institutions of the Russian Ministry of defense. It is worth noting that today a significant part of the scientific companies, which use information technologies in the solution of practical military problems, consists of MEPhI graduates. At the same time, according to the results of service, more than half of them decide to continue their military career.



SPORT IN MEPhI

It's not only study where MEPhI students are engaged in. Within the walls of our University there is a sufficient number of different sport clubs to maintain health, teach something new, find new friends and spend pleasant and useful time.

Rugby. The section has existed since 1965. At the moment, our University is represented by women's and men's teams. MEPhI Rugby players win prizes in Moscow and all-Russian competitions. In winter, spring and summer teams go to the training camp.

Sambo. The Sambo section of MEPhI is the oldest sports section of the University, organized in the 1950s. For a long history its graduates became multiple Champions of Russia and world, and also winners of various international tournaments.

Hockey. The ice hockey team of MEPhI was organized in 2011 and plays in the Moscow Student Hockey League. The team became the owner of the Small Cup of Moscow students, and its players have a lot of personal awards.

Volleyball. In recent years, the volleyball team of MEPhI has been successfully performing in the Higher Student League of Moscow, is a multiple winner of the Student Games of the Southern Administrative District in Moscow.

Orienteering. This is a fascinating sport in which participants search for located on the ground checkpoints with the help of a sports card and a compass. The MEPhI orienteering section was established in 2005.

Sport tourism. The direction of sports tourism was revived in MEPhI in 2005. During the year, members of the MEPhI team participate in competitions in sports tourism on foot, ski and mountain distances. Sports tourists of MEPhI are in regional teams, successfully and regularly participate at the Championships and Cups of Russia.

Also there are the following sports sections in our University: fitness aerobics, baseball, kettlebell lifting, arm wrestling, chess, tennis, badminton, shaping, rock climbing, athletics, etc.

