



# World of MEPhI

October 19

SCIENCE  
FESTIVAL AT

MEPhI

Команда МЭФТИ –  
призер Московских  
студенческих спортивных  
игр в соревнованиях  
по фитнес-аэробике



## YOUTH AND SCIENCE

# SCIENCE FESTIVAL AT MEPHI

October 12, the National Research Nuclear University MEPHI became one of the venues of the All-Russian Festival of Sciences called NAUKA 0+. Nikolay Kudryashov, Head of the Department of Applied Mathematics, opened the festival with a welcoming speech on a briefing session with the leading scientists of the university.

Georgy Tikhomirov and Ivan Astapov, deputy directors of the INPhE, Andrey Kuznetsov, director of the LaPlas Institute, Denis Veselov, deputy director of the NESPI Institute, head of the ICIS Academic Affairs office Pavel Ryabov and acting director of PhysBio Alexander Garmash made speeches on the meeting. They talked about the achievements and prospects of modern science, as well as about industrial, information and medical technologies of the future.

Is it possible to transmit electricity through the air? What nuclear medicine inventions can be used to treat cancer? How secure are modern encryption algorithms? Can a nuclear reactor fit inside a mobile phone and generate energy for its functioning? Representatives of the institutes answered these and other questions at the meeting, inviting young festival guests to enter the MEPHI after high school graduation and join research teams that work in these study fields.

Then began the work of other festival venues: exhibitions,

shows and master classes. Students and university employees demonstrated their scientific achievements, did experiments and even treated the participants of the festival with ice cream!

At the exhibition in the library of the main building, guests could see the visualization of nuclear facilities in virtual reality glasses, participate in a nitrogen show and get acquainted with the process of generating digital holograms. A demonstration of experiments in physics and chemistry was organized in classrooms for schoolchildren by their peers – participants of the «Chemistry Around Us» club of Lyceum No. 1511 of the MEPHI Pre-University.

A lecture within the framework of the project "University Saturdays" on the topic "Search for dark matter in the Universe, or how to see the invisible?" continued the discussions in the popular science lecture hall. The lecture was given by Alexander Bolozdynya, head of the interdepartmental laboratory of experimental nuclear physics.

Alexander Putilov, dean of the Faculty of Business Informatics and Integrated Systems Management, carried out a digital foresight, where participants learned about the strategic horizons and prospects for the development of advanced technologies in Russia and the world to determine their place in the technological future.

Within the framework of the "University Saturdays" project,

lecturers also held "Search for Dark Matter in the Laboratory" and "Digital Space of an Engineer" master classes. Throughout the day, guests could visit the Laser Centre, Nanocentre, Scientific & Educational Centre NEVOD, the Bionanophotonics Laboratory, the Department of Physical Problems of Materials Science, the Department of Computer Medical Systems and other scientific departments of the MEPHI, which generated considerable interest among future applicants.



## ICPC WORLD PROGRAMMING CHAMPIONSHIP



**The National Research Nuclear University MEPHI has become one of 18 venues among Moscow universities, on the basis of which the qualification stage of the Moscow Programming Contest (1/8 of the International Collegiate Programming Contest) took place.**

The competition set a new record for the number of participants, bringing together 1275 students in 423 teams from 35 universities. This is 194 more people than last year, when the previous record was set. The result is documented in the Russian Records Register. 100 teams made it to the next round.

Nine teams from the MEPHI participated in the competition, four of them reached the quarterfinals.

The competition was held according to the rules of the ICPC World Championship on the Yandex.Contest platform. Participants had to solve twenty tasks in the C, C++, Java, Python, or Kotlin programming languages in five hours. Each team consisted of three students, who were under the age of 24 or who started their undergraduate studies after 2014. Teams that did not meet the rules of the championship could participate beyond the competition.

The winners of the quarterfinals are allowed to qualify for the Northern Eurasia Finals of NERC 2019, where teams from Russia and CIS countries compete (ICPC semi-finals).

The ICPC World Championship is the main global sports programming competition held by higher education institutions around the world. The headquarters is located at Baylor University in Waco, Texas. The event's competitive environment helps participants test their teamwork skills, show their creativity and contributes to creating new software products.

# MEPhI CONFIRMS LEADERSHIP POSITION IN PROJECT 5-100



On October 26, the Council on Global Competitiveness Enhancement of Russian Universities among Global Leading Research and Education Centres (Project 5-100 Council) completed its work in Moscow.

The two-day meeting was attended by the Deputy Prime Minister (Chair of the Council) Tatiana Golikova and Deputy Chairmen of the Council Mikhail Kotyukov, Minister of Science and Higher Education Andrey Volkov, Scientific Director of Moscow Skolkovo School of Management alongside with other members of

the Council: President and Chairman of the Board of Sberbank of Russia Herman Gref, President of the Russian Academy of Sciences Alexander Sergeev, Honorary Rector of York University Malcolm Grant, President of the Chinese Strategy Society Weifang Min, Founding Director of the Center for International Higher Education at Boston College Philip Altbach, and Debaker Conrad, General Director of Leuven Catholic University.

As a result of the meeting, the Council recommended that the Ministry of Science and Higher Education of

the Russian Federation continue to provide state support to 21 universities participating in Project 5-100 in 2020. At the same time, universities were divided into three groups, each of them included seven universities.

MEPhI confirmed its leadership positions in Project 5-100 and, as in previous years, entered the first group along with the HSE University, ITMO University, MIPT, NUST MISIS, Tomsk State University and Novosibirsk State University.

As noted in the official report of Project 5-100, the allocation of universities into

groups took into account the assessment on three parameters: achievements in the ratings, the values of indicators that characterize scientific, educational, international, and financial activities of universities, and the assessment received by universities from the Council members.

In accordance with the provisions of the federal project «Young Professionals» (Improving the Competitiveness of Vocational Education) of the national selection of universities, that will receive government support to improve

their global competitiveness, will be made in 2020. It is planned that at least 30 universities will participate in the new competitiveness improvement program since 2021. It is going to be the second level of Project 5-100 that ends next year. Minister of Science and Higher Education of the Russian Federation Mikhail Kotyukov emphasized that the list of requirements for the competition will be adjusted to ensure entry into the updated and expanded program of the Project 5-100 for participants from all federal districts of the country.



## CONFERENCES

# ABOUT FUTURE OF LASER, PLASMA AND RADIATION STUDIES

Intelligent Technologies in Robotics  
October 21-23, 2019  
NRNU MEPhI, Moscow, Russia



At the end of September, Institute for Laser and Plasma Technologies LaPlas held a field-school «The Future of Laser, Plasma, Radiation Researches and Technologies» for graduate-students of the 1st year in the Ershovo rest home for the third time. This school became an opportunity to learn more about modern development of science and technologies, but a peculiar student initiation ceremony for LaPlas master-studies freshmen.

The event began with a welcome speech by Andrey Kuznetsov, director of the LaPlas Institute. The School's program traditionally included the scientific part (lectures), creative competitions and an engineering competition.

In the beginning, all the participants of the School were randomly divided into five teams, as a part of which they had to perform all the contest tasks. In the evening, students introduced their teams to the judges and other participants as

well as their mottos, banners and credos. Five team-names were GREEN REAPERS, Red Band Team Beam, PHYSOK, Diamond and Dark Blues.

The second day of the School began with lectures by visiting scientists and professors of the LaPlas Institute. Topics of the lectures covered a wide range of trends from the history of discoveries in physics to the truly fantastic prospects of applications of laser, plasma and radiation technologies nowadays and in the near future. After the lectures, the school participants took part in active intellectual competitions in the open air, during which they had to solve different cases. But it wasn't the end of the second day. A special event lied ahead of the students – participation in the antiscientific conference. Each team had already been given topics for reports from the great area of modern antisience such as nanotechnology in the construction of castles

in the air, the phenomenon of superfluidity of cats, a comparison of the types of Thai massage for photon relaxation, ballistic properties of the flight of thought, gravitational waves as proof of the existence of unicorns.

An engineering competition became the finishing point of the field-school. The task was to make a generator tower. In fact, during the participating in the competitions, the teams were earning points that they could spend to purchase the necessary equipment for the construction of the generator tower. Six hours were given for its building, after which the jury measured the energy generated by the towers. According to the results of the engineering competition, the first place was taken by the PHYSOK team, whose tower-generator showed the maximum energy result.

All participants of the winning teams received memorable prizes.

## INTELLIGENT TECHNOLOGY IN ROBOTICS

On October 21-23, Moscow hosted a school-conference «Intelligent Technologies in Robotics.» The National Research Nuclear University MEPhI, Ivannikov Institute for System Programming of the RAS, the National Institute of Applied Sciences Rennes (France, INSA Rennes) acted as organizers of the event. 50 reports of scientists from Russia, Armenia, France, Great Britain and the US were chosen to participate in the conference.

Robotics is an interdisciplinary science that includes theoretical mechanics, theories of machinery and mechanisms, theories of control, artificial intelligence (AI), IT technology. Mathematical methods and methods of applied mathematics serve as a basis for all abovementioned disciplines. When studying about technical part of robots and ways of controlling them, scientists must deal with differential equations of high orders that cause a huge number of unsolved problems.

Considering the importance of this direction, the plenary report of the first section was made by Pr. Nikolay Kudryashov, Head of Department of applied mathematics at the MEPhI, on topic «Schroedinger's Generalized Equations to Describe Pulses in Optical Fiber.» Such important topics as group management of robots, optimization (synthesis) of control, engine optimization and mechanical part of robots were discussed as well.

The theme of the second day of the conference was artificial intelligence as the most dynamic direction of science, including robotics. Speakers touched on many relevant issues such as the use of imaging tools to analyze similar objects, neural networks and machine learning for intelligent

robotics, technical vision (recognition matrix to compare text pages by a robot), a robotic doctor and a robot for forensic analysis.

The third section focused on IT technologies in robotics, including information security. Issues of mobile application protection, methods

and approaches to the confidentiality of machine learning, increased security of the facial biometrics system through the survivability detection module, new vectors of cyber-attacks and new IS methods for critical infrastructure enterprises were raised.



## PROJECTS

# NEW SEASON OF COMPETITION

## “I AM A PROFESSIONAL”



On October 2, Moscow hosted the opening ceremony of the All-Russian Student Olympiad «I am a Professional.» The third season was launched by Sergey Kiriyenko, the First Deputy Chief of Staff of the Presidential Administration of Russia. “I am a professional Olympiad is the creation of conditions, like all the projects of the autonomous non-profit organization “Russia is a country of opportunities”. Very often, these projects, including the Olympiad, are called a social elevator. But in order to get on the elevator, you must first go into it, at least press a button, but this can only be done by yourself,” he stressed.

Valeria Kasamara (the head

of the Olympiad “I am a Professional”), Marina Borovskaya (Deputy Minister of the Ministry of Education and Science), Alexander Shokhin (President of the Russian Union of Industrialists and Entrepreneurs), Herman Gref (President and Chairman of the Board of Sberbank), Andrey Kostin (President and Chairman of the Board of VTB Bank), Elena Bunina (Yandex CEO in Russia), Tatyana Terentyeva (HR Director of Rosatom State Corporation), and rectors of a number of leading universities in the country also delivered an encouraged speech.

Aleksey Komissarov, General Director of NPO “Russia is a Country of Opportunities”,

noted the importance of the Olympiad: “This is the third time we are launching the Olympiad “I am a Professional, “and I can say with confidence that this is one of the most demanded projects of our presidential platform “Russia is a Country of Opportunities». The overall number of applications for the first two years was more than 800.000. Thousands of children have already become prize-winners, hundreds have become winners. But the most important thing is that these young people found themselves, found new directions, new opportunities for study, some of them successfully completed internship programs and already work in

large companies.”

At the opening of the third season, prize-winners of 2018-2019 spoke about their internships and ways to success, and the MEPhI student Nikita Popov was one of them. He became a prize-winner in the field of “Materials Science and Materials Technology” and got an internship at the Taganrog Metallurgical Plant.

This season, MEPhI as an organizing university holds an Olympiad in five study fields. These are four fields of engineering sciences and technologies: nuclear physics and technology; laser, plasma and radiation technologies; physical engineering, nuclear and nanotechnology in medicine; automation and electronics. And one study field is in the section of computer sciences: the security of information systems and technologies of critical objects.

The general partner of all programmes of the Olympiad at the MEPhI is State Atomic Energy Corporation ROSATOM. Its leading scientific and industrial enterprises have become partners in areas on methodological issues and internships for future winners and prize-winners of the study fields of the Olympiad.

Until November 18, all students of Russian universities will be able to register for participation in the Olympiad on the website of the project. On November 22, the online qualifying stage of the competition starts. It can be passed from anywhere in the world –

applicants only need laptops and Internet access.

Students, who will complete the tasks of the online stage and pass an additional competition, will be able to get to specialized winter schools. These are practice-oriented educational forums where talented young people from all over the country get together annually. Leading teachers of large universities, industry experts, scientists and top managers of companies present lectures and give master classes. This time, students will have 18 winter schools in different cities of the country. Particularly, in association with the State Atomic Energy Corporation ROSATOM and its enterprises, the Winter Nuclear School will be held in five areas of the Olympiad, where MEPhI acts as the organizing university. The Winter Nuclear School will be devoted to promising scientific, industrial and cyberphysical technologies, in which Rosatom is the Russian and international leader.

MEPhI provides benefits for the winners of the relevant fields for admission to the graduate and postgraduate studies. Prize-winners will also get the opportunity to undertake an internship in a large specialized company. Winners of the Olympiad will receive cash bonuses (200 thousand rubles for winners on the track «Bachelor» and 300 thousand rubles on the track «Master»).



## BEYOND CLASSROOMS

# YOUNG SCIENTISTS MET IN SCIENTIFIC STAND-UP BATTLE



Science Slam was held at the National Research Nuclear University MEPHI. This is an event in the format of a "scientific battle", in which young scientists told in an interesting and understandable way about their researches for 10 minutes, and the audience selected the winner with applause. Not only students and employees of the MEPHI, but

also guests from other universities came to watch the Science Slam. In total, the event was attended by more than 170 people.

"One great physicist said that if you are a scientist, a quantum physicist, and you cannot briefly explain to a five-year-old child what you are doing, you are a charlatan. Today, there are people gathered in this room, who can speak their problems in the

most accessible language possible. This is the feature of professionals, truly talented people. All talented people are very different. But what brings them closer to each other? They have a great sense of humour! They all are alike in the way they look at the world – freshly, innovatively, with humour. The participants in today's event are just such people. I want to greet you all and wish you good luck!"

said the Vice-Rector of the MEPHI Elena Vesna in her opening statement.

The first speaker was a special guest – Georgy Shahgildyan, Ph.D., Assistant of the Department of Chemical Technology of Glass and Sitalls at the Mendeleev University of Chemical Technology of Russia. He spoke about the main problems of glass and about the possibilities of solving them using new materials. The issue turned out to be crucial, but alas, the best advice that scientists can give us so far in order to avoid scratches on the screen of a smartphone is simply not to drop it on the floor.

Then the competition program began, in which five young scientists and engineers of the MEPHI took part. Alexey Egorov, an engineer at the Institute of Cyber Intelligent Systems, told viewers why digital technology does not change people. Diana Bachurina, a postgraduate student at the Department of Physical Problems in Materials Science, explained how a soldering iron can help make a thermonuclear power plant work. Alexey Bakun, an engineer at the Institute of Functional Nuclear Electronics, raised the problem of creating perfectly smooth surfaces. Anastasia Kulichenko, a graduate student at the Department of Laser Micro-, Nano- and Biotechnologies, told the story of a doctor and a scientist who were looking for a cure for cancer and found it in nuclear physics. Yaroslav Sadovsky, associate professor of the Department of Plasma Physics, showed the danger of dust in a thermonu-

clear reactor and how to get rid of it.

Each performance was the result of a long preparation. The organizers of the event helped the participants with the elaboration of presentations and reports. Judging by the many questions asked and long applause, the audience liked all the performances, but still only one of them had to become the best.

According to the tradition, the winner of Science Slam was determined using a sound level meter. The loudest ovations from the audience went to Anastasia Kulichenko.

The main prize – boxing gloves – was given to the winner by Sergey Filippov, head of the Directorate for the Promotion of the Fund for Infrastructure and Educational Programs of the RUSNANO Group. He encouraged young scientists to follow the example of the Science Slam participants, to tell others about their own researches and to change the attitude of society towards science for the better.

Science Slam at the MEPHI was supported by the Ministry of Science and Higher Education and the Fund for Infrastructure and Educational Programs of the RUSNANO Group. In total, in 2019, within the framework of the Science Slam University project, 10 university slams are held throughout Russia. Venues can serve as the distinctive features of the project – slams are organised on the territory of universities. The best slammers will take part in the program «Scientific Stand-Up» on the channel «Culture».



## REGIONS

# HACKATHON IN THE ARCTIC CIRCLE

From October 21 to 24, the Hackathon in the Arctic Circle was held in Salekhard and became the first forum of developers of the Yamalo-Nenets Autonomous Okrug.

The competition was attended by 80 of the best young representatives of the IT sphere from Moscow, St. Petersburg, Yekaterinburg, Tyumen and Yamal. In 48 hours, they had to create software products that would help solve various socio-cultural problems.

Vladislav Kashchei, a third-year student of the Technological Institute MEPHI from the study programme "Computer science and computer engineering", participated in the hackathon as a member of the "Blockchain for people" team, which demonstrated a worthy solution to the problem of motivating people and creating good habits. They developed a prototype of a chat bot, where people can subscribe to each other, follow events and motivate their friends to do useful things. An administration bar was

also developed, with the help of which participants of the system can be sent various notifications about sporting events, promotions, as well as useful tips and training programs.

In addition to the competitions, the hackathon participants got acquainted with the history and the culture of Yamal. A tour was organized around the city and the most interesting places in the area. In particular, the participants visited the Yamal-Nenets Shem- anovsky Museum-Exhibition Complex, where they saw the mummy of a baby mammoth that was found on Yamal in 2007.

"The most important thing at such events is new acquaintances and experience. The participants had the opportunity to communicate with each other, compare different solutions to similar problems, exchange experiences and contacts for further cooperation, communication and friendship," said Vladislav Kashchey.



# ROBOTIC WORKSHOP FOR SCHOOLCHILDREN

**On October 12, in the computer laboratory of information systems and mathematical modelling of the Department of Computing and Information Technology of the Faculty of Information Technologies and Electronics (FITE) at Sarov Physico-Technical Institute MEPHI held a robotic workshop that was organised as an experimental engineering event for children. Pre-schoolers and students of primary school age got acquainted with various platforms and received initial skills for further work with educational robotics.**

Three robotic platforms were presented to the workshop participants: Lego Mindstorms (Denmark); Ping-Pong Robots (South Korea); Arduino (Italy / China). Each of them allows young engineers to learn the basics of algorithms and programming, as well as learn how to independently create simple automated systems.

The first part of the robotics workshop consisted of a demonstration of ready-made robots built and tuned

by students of the institute. Based on the results of the work in the second part of the lesson, the workshop participants assembled their own self-propelled mechanisms with electric traction, using the original equipment (Arduino Uno microcontrollers, motors, wheels, batteries, ducts tape, connecting wires, etc.) and following the instructions of the moderator. The models assembled by the children proved their full viability and were able to confidently overcome the expanses of university corridors.

The workshop was developed, organized and conducted by SarPhTI Junior Researcher Andrei Dodin. Support and technical assistance in working with children and during the event was provided by students of the Faculty of Information Technology and Electronics Denis Plekhanov (2 year, gr. AVT-28) and Artyom Kostylev (1 year, gr. VT-19).

The necessary preparatory work was carried out by the head of the SarPhTI information center Artyom Valeryevich Ryabkov, the staff of the Department of Computing and Information Technology of the FITE – the head of the laboratory Evelina Vladimirovna Kirpichenko, and the laboratory assistant Andrey Krasitsky (3. year, group DP-37).

The team of organizers and the youngest participants recognised the workshop as successful, interesting and promising. Activists of the student laboratory of robotics at SarPhTI MEPHI are preparing new interesting events.



CITIUS, ALTIUS, FORTIUS!

## MEPHI BADMINTON PLAYERS REACH THE FINAL!

**At the end of October, the second stage of the Spartakiad of student youth of Russia and the Republic of Belarus took place in Sochi. The program included volleyball, table tennis and badminton competitions.**

In each sport, four club student teams, that had previously passed strict selection at national tournaments, represented the countries. Nearly 200 students under the age of 21 competed for prizes in personal and team competitions. It is noteworthy that the opening ceremony of the Spartakiad was attended by deputy sports ministers of Russia and Belarus.

A team of eight badminton players from the "Reactor" student sports club of the Moscow venue and Obninsk Institute for Nuclear Power Engineering participated in the Spartakiad from the MEPhI. The team included Alexander Anikin, Nikita Zakurdaev, Denis Shiro-

kov, Nikolay Kutaitsev, Katerina Kazakova, Maria Mikhailova, Alexandra Morozova and Aigul Sirazova. The team was led by Viktor Tkachenko, an international referee and OINPE coach.

The strongest competition occurred in the badminton tournament, where the winners of national tournaments and the winners of the Youth European Championships of Russia and the Republic of Belarus fought for new victories. The games were held in the men's and women's singles and doubles mixed division, 16 athletes from each country.

Denis Shirokov, a student of the LaPlas Institute at the MEPhI, participated in international competitions for the first time, but this didn't stop him from reaching the finals and showing his skills. However, the victory was on the side of Dmitry Klimenko, a student at the Institute of Physical Education at the Russian State Pedagogical University.

In the women's singles, a student of the INPhE MEPhI Maria Mikhailova reached the semifinals and took third place. In the mixed doubles division, three pairs of the MEPhI students made it to the quarterfinals, and Denis Shirokov and Maria Mikhailova took third place, which ultimately allowed the MEPhI team to take third team place, only slightly losing to the club from Kazan. The first place was taken by the MIREA team.

Overall, Russian badminton players performed very well, winning eight out of nine medals.

Right after returning from Sochi, MEPhI badminton players took part in the largest 19th All-Russian tournament RSL-OPEN, which brought together more than 300 athletes in Khimki. Denis Shirokov once again excelled among the nine MEPhI students and took 1st place in the MDC category along with HSE student Igor Egorov.



## NEW SUCCESSES OF SAMBO WRESTLERS

**Since the beginning of the year, students who are members of the university's team in sambo participated in many competitions at various levels.**

The new sports season was opened by the master tournament «In Honour of St. Nicholas of Japan» in Rzhev. Traditionally, the strongest athletes, masters of sports and candidates for master of sports met to participate in the tournament. In a stubborn fight for the title of winner, student of the S16-402 group Oleg Karnaukhov took third place showing excellent fighting technique. Furthermore, Oleg became the winner of the Moscow championship and became a member of the main national team of the city, which will have to fight with other teams in the framework of the Russian Championship 2020 in Cheboksary.

In mid-October, MEPhI sambo wrestlers took part in the championship of Moscow among sports-

men of second and third class. The competition was attended by a large number of participants, in each weight category viewers could observe the dramatic rivalry. The winners of the tournament were Almaz Akhmetov (M19-202) and Vladislav Danilkin (B19-105), Stepan Muromsky (B16-202) became the silver medalist, Artyom Muravyev (B19-105) won the bronze medal.

Sambo team is actively involved in judo competitions. In mid-October, the judo championship of Moscow among athletes under 21 was held. The honor of the university was defended by a student of the B19-201 group Diana Gimaletdinova, who became the winner, confidently defeating all rivals with clean throws and joint locks. In November, Diana will take part in the main start of the season in the championship of Russia as a part of the junior national team of Moscow.

