

Skoltech's first 20 students celebrating the end of the academic year June 18.



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NEWSLETTER  
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# Skoltech

Skolkovo Institute of Science and Technology



Mats Hanson,  
Dean of Education

## Welcome to Skoltech!

The past few months have seen a number of key events take place at the Skolkovo Institute of Science and Technology. The academic year has come to a close, and I would like to share some of our most exciting activities with you.

**In June**, our first 20 M.Sc. students returned from their year abroad at pilot programs in Energy Science and Technology and Information Science and Technology. During a ceremony at Skoltech, we celebrated their successes from the past year at our partner institutes, including: clinching a victory in the TAPPED hackathon at MIT, reaching the finals in the CleanTech Challenge and becoming semi-finalists at the MIT \$100k competition.

We also made concrete steps in building our network of Russian university partners. From June 24 through 29, nine Skoltech students participated in an intensive training at the FabLab at the Moscow Institute of Steel and Alloy (MISIS). The 'Fabrication Laboratory' provides cheap and simple fabrication of almost any product. In five days, they worked in groups to construct a small radio-controlled robot. They will use this experience as they help us develop our own FabLab at Skoltech.

**As of September 1**, we will also launch a partnership in the form of a double degree program with the Moscow Institute of Physics and Technology (Phystech). Our students will start taking courses with fellow classmates at one of Russia's most prestigious universities and develop their Master's thesis in partnership with co-advisors from Phystech.

The Skoltech Board of Trustees also approved the formation of the Center for Advanced Structures, Processes and Engineered Materials. This Center is deeply integrated with industry as companies such as United Aircraft Corporation and Rosatom have signed on as key partners. We look forward to the technological innovations that will arise from their research and opportunities our students will have in developing advanced materials.

Skoltech continues to rapidly develop with much already accomplished in close collaboration with MIT and Skoltech's faculty. Much remains, however, and we excitedly take on the challenge. We are forming a new kind of university grounded in bridging research and innovation. With our partners and excellent students we are confident in the road ahead.

Sincerely,  
Mats Hanson

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## Students@Skoltech

### Celebrating a Year of Growth



**On June 18, Skoltech celebrated the end of the first academic year as the first 20 students returned from their year abroad at partner universities.**

For more information about Skoltech students and admissions, please contact Bram Caplan, Director of Student Affairs at [caplan@skoltech.ru](mailto:caplan@skoltech.ru) or visit the admission's website <http://skoltech.ru/admissions>

The M.Sc. students spent their pilot year at one of four world-leading universities in science and technology: Eidgenössische Technische Hochschule Zürich (ETHZ), the Hong Kong University of Science & Technology (HKUST), Imperial College London (ICL), and Massachusetts Institute of Technology (MIT). At these universities, the students attended courses for energy science and technology and information science and technology as well as participated in innovation competitions.

"My former colleagues at MIT have told me that our students are great students. And this means great in relation to the students who are normally at MIT – this is a very high bar." – said Edward Crawley, Skoltech President

Upon returning, the students gathered at Skoltech, and the Institute recognized the accomplishments they had made throughout the year.



M.Sc. student Dmitry Smirnov giving a speech on behalf of the students.

Nikita Rodichenko, Vahe Tahmazyan and their fellow MIT student Petr Kaplunovich took first place at the TAPPED hackathon. They developed a prototype that with the push of a button enables audiences at lectures to download a speaker's slides.

Dmitry Smirnov studying at ETH Zürich and fellow students from St. Petersburg State University developed a concept for an engine that generates Co2-free electricity. The project proved so promising that it made it to the finals at the CleanTech Challenge and became one of the top 10 out of 151 projects.

Alexandra Kudryashova, Vladimir Eremin, Ekaterina Kotenko and Dmitry Vasilev made it to the semifinals of the MIT \$100k Launch competition. Under the mentorship of Skoltech Professor Alessandro Golkar, they developed a project called Satelease which provides a satellite imagery service for small businesses to improve their competitiveness.

During the celebration ceremony, Skoltech President Edward Crawley gave an opening address and handed out certificates for completing the first year. He then congratulated the students and challenged them to take an active role in the continued development of the university.



"I want to empower you to be responsible and analyze how to make Skoltech better," said President Edward Crawley. "Today is the day you really start to help us build the Institute; we have to build all this together."

The students will use their experience from their year abroad to help build the culture at Skoltech. They will work alongside the professors to develop the educational programs and implement best practices from Skoltech's peer institutions.

## Education@Skoltech

**Skoltech and the Moscow Institute of Physics and Technology (Phystech) have signed an agreement launching a double degree program and making Phystech a key Russian university partner to Skoltech.**

Strengthening the bonds between the two institutes, from September 1, 2013, Skoltech students will be able to participate in the program and receive degrees from both Phystech and Skoltech. They will work with co-advisors from both institutes on their Master's thesis and research within Phystech laboratories.

Currently, three Phystech research departments are already collaborating with Skoltech: the Department of General Applied Physics, the Department of Control and Applied Mathematics, and the Department of Physics and Power Engineering Problems. All of Phystech's research departments are deeply integrated with industry. This means Skoltech students will work on real problems that have societal benefit and that they will participate in the actual innovation process. In the future, the two institutes also expect to work together on joint research projects.

Skoltech also plans to collaborate with Phystech to implement the CDIO Principles. The CDIO Initiative ("Conceiving – Designing – Implementing – Operating") was developed as an international project for the reform of engineering education and bridging the existing gap between theory and practice. The Initiative has received wide support from the professional engineering community, as well as from a number of leading universities in the world and from international accreditation

agencies. Currently more than 100 institutes of higher education from 25 countries have started the realization of CDIO ideas into their degree programs.



**Mikhail Myagkov, Vice President, Academic Affairs:**

"We welcome this partnership with Phystech and are confident that it will benefit both institutes as we strive to develop an education for innovation within Russia. Combining Skoltech's focus on innovation with Phystech's renowned high-level of engineering education will guarantee that we are successful in graduating the world's future leaders in high-tech innovation. Undoubtedly, the first alumni from this double degree program will be in high demand by industry."

**Yuri Volkov, Vice-Rector for Academic Affairs Phystech:**

"Phystech is a symbol of quality, recognized both in Russia and abroad. Skoltech, for its part, will add innovative and international components. Students will receive not only a first-class education, but also practice, learning how to apply their knowledge to create innovations and will have the opportunity to cooperate with foreign partners and integrate with innovation already present in the global economy."



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For more information on Skoltech's educational programs, please contact Mats Hanson, Dean of Education, at [hanson@skoltech.ru](mailto:hanson@skoltech.ru). Further information can be found at the Skoltech website: <http://skoltech.ru/education>

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## Industry@Skoltech

### CREIs and Industry: Science With a Consideration for Innovation



Zafer Gürdal,  
Director for the Skoltech  
Center for Advanced Structures,  
Processes and Engineered  
Materials

On June 3, the Skoltech Board of Trustees signed off on the formation of the second Center for Research, Education and Innovation (CREI) – Advanced Structures, Processes and Engineered Materials – and the CREI most deeply intertwined with industry interests.

A key element in Skoltech's strategy to address critical challenges in Russia and bridge science and innovation is its 15 CREIs. Through working groups, Skoltech engages Russian industry to ensure the research projects focus on societal issues and are systematically designed to produce technological results.

Each CREI will also unite the best researchers from around the world by forming an international collaboration between Skoltech, institutes of the Russian Academy of Sciences and Russian research universities as well as a non-Russian participant.

The Advanced Structures, Processes and Engineered Materials CREI will conduct high-impact scientific and applied research based on a holistic and integrated view of design, analysis, manufacturing, deployment, and end of life disposal of these materials. Its main goals focus on modeling, testing and certifying composite structures.

The Center unites leaders in industry and science, including: Central Aerohydrodynamic Institute (TsAGI), Ural Division of the Russian Academy of Sciences, Delft University of Technology, University of Dayton Research Institute, Massachusetts Institute of Technology, Technical University of Berlin, and Catholic University of Leuven.

Industrial partners consist of United Aircraft Corporation, S.P. Korolev Rocket and Space Corporation Energia, Rosatom, Russian Helicopters and ApATeCh—Applied Advanced Technologies.

Zafer Gürdal, a renowned researcher in the design and optimization of composite materials and structures, will lead this CREI as its director. He previously served as technical director of the McNair Center for Aerospace Innovation and Research at the University of South Carolina.

Professor Gürdal also has taught and led research groups at both Virginia Tech (USA) and Delft University of Technology (Netherlands). His research interests focus on structural and multidisciplinary design and optimization, design and optimization of composite materials and structures, adaptive structures, buckling and postbuckling of thin-walled

structures, global/local design methodologies for optimization of large complex systems, and computational methods for design.

Professor Gürdal's research contributions have resulted in more than 200 publications. He is a co-author of 3 books; "Design and Optimization of Laminated Composite Materials", "Elements of Structural Optimization", and "Optimal Design: Theory and Applications to Material and Structures".

#### Areas of fundamental research:

1. Physical Mechanics of Materials
2. Methods of multilevel modeling of deformation and fracturing of materials
3. Methods for producing low-dimensional structures
4. Physical-chemical methods and technologies for producing materials with multilevel structure (incl. composite materials)
5. Methods of modeling the physical and mechanical processes of complex structures
6. A multi-disciplinary analysis of composite structures

#### Areas of applied research:

1. Develop and produce materials with the ability to adapt to the external environment
2. Develop technologies for integrated joints
3. Develop complex methods of data collection on process and service damageability of structures
4. Providing safety, efficiency and maintainability of composite structures
5. Develop the methodology for calculating the level of safety for structures including the multi-factorial combinations of possible damage
6. Develop tools for the creation of computer models for the structures using CALS technologies
7. Develop mathematical models, numerical methods and equipment for monitoring and structure state evaluating service safety

For more information about Skoltech's CREI Program, please contact Ivan Sherstov, Director of Research, at [sherstov@skoltech.ru](mailto:sherstov@skoltech.ru). Further information can be found at the Skoltech website: <http://skoltech.ru/research>

# Innovation@Skoltech

## The Innovation Support Program: Focus On Commercialization

On May 22-24, 28 participants of the Skoltech Innovation Support Program (ISP) assembled in the historical center of Moscow to discuss the Program mid-term results and discuss their working plans for the future.

The Innovation Support Program (ISP) is designed to assist Skoltech researchers and partner institutions in bridging the gap between the laboratory and market, and serves as a catalyst for technological innovation and entrepreneurship.

The event was hosted by the Skoltech Center for Entrepreneurship and Innovation (CEI) and included a two-day workshop and an open forum discussion. The workshop was mostly attended by the ISP participants and was designed to stimulate entrepreneurial thinking, define challenges for each of the ISP

tional markets, licensing and patent rights and Intel's experience in Silicon Valley and in Russia.

## Open Forum

On May 24, the CEI hosted a Forum Discussion on 'Commercializing University Innovations: from idea to business'. The forum was tailored for Russian universities and experts on E&I from local and international companies specifically interested in developing an innovation ecosystem in Russia. Among participants, there were representatives from Cisco, Intel, Rusnano, and other companies.

The discussion focused on how to understand and interpret translational research in Russia, the forms of translational research and its difference from R&D.

Some of the key points included the importance of finding new opportunities to support academic and applied research through

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For further details about activities by the Center for Entrepreneurship and Innovation (CEI), please contact Ilia Dubinsky, Director of CEI, at [dubinsky@skoltech.ru](mailto:dubinsky@skoltech.ru)

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President Edward Crawley speaks about the importance of innovation before the ISP participants.

projects, and identify steps the projects may take to reduce their technology and market risks.

The workshop featured lectures, presentations, discussions, case studies, and Q&A sessions. It also aimed to equip the participants with the necessary knowledge to reinforce their strategies in the future.

Experts from a broad spectrum of academic and business backgrounds joined the workshop. They included representatives from the Radioisotope Laboratory at the Institute for Nuclear Research of the Russian Academy of Science, the Skolkovo Center for Intellectual Property Rights, Intel and Siemens LLC in Russia. They shared insight on breakthrough research and successful development of production for Russian and interna-

collaboration between government, venture funds, industrial companies and entrepreneurial universities like Skoltech.

Igor Seleznev, Director of Research Programs at the CEI, explained how Skoltech is evolving the translational research model developed at MIT to fit the Russian context.

Following Igor's presentation, Dmitry Pebalk, ISP Manager, showcased the results delivered from the start of the Program, which is anticipated to evolve into a program with a larger number of participants from Skoltech and partner institutions.

Wrapping up the discussion Ilia Dubinsky, Director of the Center for Entrepreneurship and Innovation, pointed out that interest in the event and active discussion reflect progress in development of a vibrant ecosystem in Russia.

## Research@Skoltech



Anton Berns,  
Director for the Skoltech Center  
for Stem Cell Research

### Anton Berns: Research is International

On April 8, 2013, in Amsterdam, the Netherlands, Skoltech President Edward Crawley signed a three-sided agreement to found the Skoltech Center for Stem Cell Research. The center is the first of 15 Centers for Research, Education and Innovation (CREI) that Skoltech plans to launch by 2020.

The center unites leading researchers from multiple disciplines, from chemistry and biology to medicine, from technology to computer science. The researchers will develop deeper insight into the science and applications of stem cells as well as the techniques to study them. These approaches will then lead to new therapies and drugs.

On June 3, 2013, the Skoltech Board of Trustees confirmed Anton Berns as the director for this CREI. Skoltech spoke with Professor Berns to learn about his future plans and research.

### What made you excited to engage in a brand new university?

I was enthused by the concept underlying this initiative. To engage top research groups in building a university by making it attractive to participate is a wonderful concept. Furthermore, I know many of the group leaders involved in this. I have known some of them already for a very long time and I respect and like them. So it is fun to join forces with them. But it is also a big challenge. This has to become a success. This should start with building trust among the politicians, the management and the scientists. Only then will Skoltech fully get off the ground.

### Why is it so important to conduct research in induced pluripotent stem cells?

Stem cells form the basis for regenerative medicine. They can be used to study e.g. inherited disease and will also in the long run enable us to “restore” diseased tissues. Understanding how they can be nurtured and stimulated to expand is also at the base of longevity. In order to use them to the benefit of man we have to understand all the ins and outs of stem cells to safely use them in the future. A first-rate stem cell research team at Skoltech would not only train students in good biomedical science, the center should also serve as a reference point that can be — and probably should be — consulted before stem cell technologies are implemented in the clinic. This can help to prevent inappropriate and unacceptable stem cell experiments with patients.

### What practical results do you hope to achieve through the work of the Center for Stem Cell Research?

My goal is to create an efficiently working lab with high-quality group leaders who work at an internationally competitive level. This should give visibility and esteem to Skoltech. The rest follows.

### What experience do you consider pivotal in preparing you to lead the center?

I have led the Netherlands Cancer Institute for many years, an organization that includes both a hospital and a research institute. It is very useful knowing the ins and outs of directing such an organization, which is substantially larger than Skoltech is projected to be. I know what is needed. Furthermore, I have ample experience in how research funding should be organized. I am still a Trustee at Cancer Research UK, a cancer fund spending about 350 million pounds (about USD 530 million) every year on cancer research.

### How important is international collaboration in research?

This is critical. Research is international. If you do not collaborate with excellent colleagues elsewhere in the world, you soon will be second rate.

### What are the advantages of teaming up with Russia?

I think Russian Biomedical research needs a boost. The attraction of teaming up with Russia is that there are many excellent students and scientists. Good people are always in short supply. I hope that we can identify and train many young Russian scientists who subsequently can help to advance biomedical science in Russia thereby contributing to the international research endeavor.

### What is your favorite part of higher education?

My favorite part is research, but of course this includes teaching students, postdocs and independent investigators how to do research in the right way: according to rigorous standards both practically—in executing experiments—and ethically.

### Anton Berns,

Senior Group Leader, Division Molecular Genetics, The Netherlands Cancer Institute. Professor of Experimental Genetics of Inherited Diseases, University of Amsterdam.

Anton Berns studied biochemistry at the University of Nijmegen and received his Masters degree in 1969 and his PhD in 1972 from that same University. He did his post-doctoral training in the group of Rudolf Jaenisch at the Salk Institute in La Jolla, CA., where he studied the role of retroviruses in causing lymphomas in mice. In 1976 he returned to the University of Nijmegen where he became junior staff member. His group explored proviral insertional mutagenesis as a means to identify new oncogenes. In 1985 he was appointed as staff scientist at the Netherlands Cancer Institute and in 1986 he became head of the Division of Molecular Genetics of the Institute. Here his group did pioneering work to generate and utilize genetically modified mice as a tool to search for new cancer genes. In 1999 to 2011, he served as Director of Research and Chairman of the Board of Directors of the Netherlands Cancer Institute - Antoni van Leeuwenhoek Hospital.

For more information about Skoltech's CREI Program, please contact Ivan Sherstov, Director of Research, at [sherstov@skoltech.ru](mailto:sherstov@skoltech.ru). Further information can be found at the Skoltech website: <http://skoltech.ru/research>

# Space@Skoltech

## Shaping the Way the World Looks at Space

From July 8-12, Skoltech and MIT brought together young researchers and leaders in the space industry as they laid the



Participants in the workshop for the International Space Exploration Strategy Group gathered in Moscow, Russia.

groundwork to increase support for human space flight in public policy and throughout society.

“We want to shape the way the world looks at space,” said Skoltech President Edward Crawley during his opening address at the conference.

Twelve young researchers came to Moscow and participated in the five-day workshop. They used this opportunity to formulate a strategic plan for human space flight based on the



Students and young researchers from Australia, Guatemala, Italy, Japan, Russia, and USA participated in the workshop.

work they had been doing since May as members of the International Space Exploration Strategy Group.

On May 17, Skoltech and MIT launched this research group to identify next steps in human space flight. Jonathan Battat, representing the MIT Skoltech Initiative, led the project, collecting applications and forming the 23-member community. The members then created working plans around three themes: 1) Exploration Rationale, 2) Exploration Destinations, and 3) Exploration Technologies.

“Our group has a rich background covering policy and engineering aspects of space,” said Battat. “I’m excited for them

to bring their ideas together to figure out what the next steps will be in the future of exploration.”

For one month the researchers developed ideas through on-

line discussions on a Wiki and presented their results during the conference. They received direct feedback from each other and mentors, including Skoltech Professor Alessandro Golkar and President Edward Crawley.

“The Wiki allowed us to stew our ideas and develop them, so when we got together, we could quickly iterate on what we were doing,” said participant Jon Mihaly a postdoc at Caltech. “Because the problem is open-ended, coming together allowed us to close on what we were working on and decide how we can get there in the next two months.”

The researchers also visited the Gagarin Cosmonaut Training Center and listened to presentations by leaders in Russia’s space industry such as Vitaly Davydov, deputy director of Roscosmos 2005-2013.

Following the conference, the International Space Exploration Strategy Group will continue formulating their strategy proposal on how to promote space flight with the ultimate goal of putting a man on Mars. The group’s work will then culminate in a report synthesizing recommendations for future exploration strategy. This report will be disseminated at the International Astronautical Congress in Beijing (September, 2013) and the Moscow Open Innovations Forum (October, 2013).



Edward Crawley, “We want to shape the way the world looks at space.”

For more information on the International Space Exploration Strategy Group contact Yaroslav Menshenin, Skoltech Analytic, at [menshenin@skoltech.ru](mailto:menshenin@skoltech.ru)



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