# Polytechnic University specialist undergoes internship at ITER

Peter the Great St. Petersburg Polytechnic University and the ITER international organization have been working together for several years; they signed an agreement on scientific cooperation in 2017. Thus, Polytechnic University joined the creation of the world's largest tokamak together with other research organizations from Russia and 34 other countries. One of the areas of the polytechnics' participation in the experiment was scientific internships at ITER. Representatives of the SPbPU international Office met with Alexander Smirnov, engineer of the Higher School of Mechanics and Control Processes at the Institute of Physics and Mechanics, who spoke about internships, development and integration of diagnostic equipment for ITER, and shared his experience working on one of the most ambitious projects of our time.

**— Alexander, how did you learn about the possibility of an internship at ITER and why did you decide to take advantage of it?**

— I learned about the internship from my supervisor Victor Modestov. Polytechnic University has been cooperating with ITER for a long time. In particular, under the leadership of Viktor Modestov, we are working on more than 20 projects. Since I was and am involved in several thematic projects, the internship in ITER was

a logical step for me.

**— What projects and research were you involved in at Polytechnic University before you went to ITER for an internship?**

— Mainly computational mechanics and strength calculations. What I particularly like about the work of our department is that there are always a lot of tasks and they are always different. I believe that this is the key to professional growth. At different times, I have had the opportunity to analyze completely different systems — from loads on an icebreaker and ice-class gas carrier to the fall of an airplane onto a reactor building.

**— Can you tell us more about what ITER does?**

— ITER is the International Thermonuclear Experimental Reactor. It is an international project, big, complex and versatile. Thousands of people are working on it all over the world, from the European Union, India, China, Russia, Korea, the United States, Japan and other countries. Today it is probably the most ambitious global experiment in the field of energy. Its goal is to demonstrate the possibility of effective fusion. Success will bring humanity one step closer to a source of virtually inexhaustible «clean» energy. The significance of such an event will be hard to overestimate.

**— What does your team do?**

— We are engaged in the development and integration of diagnostic equipment. Since the reactor is primarily experimental, it can serve as a site for numerous experiments to study both fusion processes and plasma physics in general. Observing the processes inside the reactor’s giant vacuum chamber is no easy task. The conditions that the equipment will have to «survive in» are nothing short of extreme. The incredibly powerful magnetic field and the proximity of plasma, which is ten times hotter than the sun’s core, are just the tip of the iceberg. Developers of diagnostic equipment put a lot of effort into making their systems work accurately and, most importantly, reliably. Even simple and familiar measuring instruments such as heat couples and strain gauges can be difficult to design for operation inside ITER, not to mention the most complex optical, microwave, neutron, spectroscopic and other diagnostic systems.

**— Does ITER often attract Russian specialists for internships? And what requirements does one have to meet in order to get an internship there?**

— ITER quite regularly publishes offers for internships on its website. Specific requirements depend on the vacancy, different departments and teams can have completely different tasks. If you are a senior engineering student, graduate student, postgraduate student or young scientist, there is a good chance that one of the internships offered might be suitable for you. Then you’ll need to be screened. If you have experience with ITER topics, this is definitely a plus. Otherwise, as far as I know, there are no special requirements. You have to be from an ITER member country, and your university or organization has

to agree on the details of the internship. Fortunately, this was quite easy to do at Polytechnic University, since they know about ITER and have been cooperating with it for a long time in various areas. In particular, the IPA (ITER Project Associate) agreement was signed, under which scientists and engineers from Polytechnic University have the opportunity to visit the project to work together and strengthen cooperation. The only thing I advise you to do is to make plans in advance: organizing international internships and business trips takes time.

**— What features of research activities have you noticed abroad?**

— ITER is a very special place. What immediately strikes one's eye is the multinational and multicultural environment, and this diversity is very much respected here. There is a great opportunity to socialize and work with colleagues from all over the world, learn more about other cultures, and attend language exchange groups, where you can learn any of the languages of ITER member countries if you wish. And the canteen sometimes hosts national cuisine days in different countries. Many employees come here with their families and there is the ITER International School for them, where classes are held in English and other languages.

Otherwise, I didn't notice much difference and felt like I was at Polytechnic University. The same people, united and passionate about a common cause, just in a different country.

**— How do you feel living in France in general? How quickly did you adapt to the specifics of a foreign country and was it easy?**

— My stay here has been pretty smooth; it hasn't taken long to adapt. But there are some things I still haven't got used to. St. Petersburg is a big city with a pretty fast pace, after that the south of France with its small towns and unhurried life feels a bit surreal. I came here without knowing French (the official language of ITER is English), and this is probably the main inconvenience. I can deal with everyday issues even without knowing the language, because we live in a time of globalization and digital technology, but it is unlikely that you will be able to fully absorb the local culture.

**— What are your creative and research plans for the near future?**

— At the moment I will continue working on the ITER project. So far, I feel that I still have a lot to learn here and I plan to take full advantage of this opportunity. I also want to participate to the end in collaborative projects, which I joined before my trip here. As for Polytechnic University, I have never lost touch with it, sometimes I even feel like I have never left it. We have a very close-knit team at the Graduate School, we continue to communicate a lot, work together and share experiences. Without that support it would have been much more difficult for me.

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