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**Maryna VIAZOVSKA:**

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the ideas that help  
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**The Ukrainian scientist Maryna Viazovska was recently awarded a Fields Medal, a prestigious award in Mathematics. She became the second woman in the world to win this award.**

**Maryna is a member of the Board of International Counselors of the National Research Foundation of Ukraine. The main task of the Board is to promote establishment and development of cooperation of the NRFU with foreign organizations, institutions, international organizations to implement the best world practices in the NRFU activities.**

**The team of the Foundation sincerely congratulates Maryna Viazovska on the award, which is often referred to as 'the Nobel Prize' in Mathematics. We are confident that more and more Ukrainian researchers, in particular, the NRFU grantees, will receive high-level awards in the near future. We also hope that results of research that will be obtained after implementation of the projects will help to rebuild the economy of our country.**



Maryna Viazovska won the award for solving the sphere-packing problem in eight dimensions. This problem was included in the list of so-called unsolvable problems. Since the 16th century, Johann Kepler and Isaac Newton have been puzzling over it. Initially, it was connected with the need to come up with the most effective way of stacking cannonballs on ships of the British navy.

Until 2016, the solution was found only for two- and three-dimensional spaces. The Ukrainian Mathematician gave an example of using the  $E_8$  grid as the densest packing of spheres in the eight-dimensional space. By the way, a few days after the publication of the solution to this problem, it was announced that one more important "puzzle" was solved. Together with the Ukrainian scientist Danylo Radchenko and mathematicians Henry Cohn, Abinav Kumar and Steven Miller, Maryna found a solution for 24-dimensional space as well – the so-called Leach grid proved to be the best packing.

Today, the scientist works at the Federal Polytechnic School of Lausanne in Switzerland and holds the Chair of Number Theory. But she always emphasizes that she is Ukrainian.



Maryna was born in Kyiv, graduated from the Faculty of Mechanics and Mathematics of Taras Shevchenko National University of Kyiv and defended her PhD thesis at the Institute of Mathematics of the National Academy of Sciences of Ukraine (she also received Master's degree in the German city of Kaiserslautern and Doctoral Degree in Natural Sciences at the University of Bonn).

To the question of the journalists of the Ukrainian edition nauka.ua: "What's next? What mathematical peaks would she like to conquer?" Maryna Viazovska answered that the Fields Medal is awarded to young scientists to stimulate the desire to move on. This is exactly what she plans to do – to continue working. The researcher is interested, in particular, in geometric optimization problems.

The scientist is convinced that to achieve new results you need to work hard and not to stop. By the way, Maryna Viazovska does not really believe that talent decides everything in science. In her opinion, talent is curiosity (interest) in something and the ability to do this for a long time.

The scientist believes that Mathematics is part of Philosophy. Answering the question if Mathematics can be called a 'tool' for physicists, she said: "Mathematics is not just some tool out there, like a screwdriver. It is about ideas!". The researcher is sure that mathematicians influence physicists and engineers, and they, in turn, change the life of all humanity for the better. This is how scientific and technological progress is made. In addition, according to the scientist, Mathematics is simply beautiful!

## Nothing is impossible!

We are convinced that scientific success is impossible without educational success. It is the teachers who inflame the students with the desire to reach the top and show the way how to do it. We asked the Dean of the Faculty of Mechanics and Mathematics of Taras Shevchenko National University of Kyiv, Professor Oksana Bezushchak, to tell us more about Maryna Viazovska.

Oksana Omelianivna remembers Maryna perfectly. She says that it was already clear in her student years that this young scientist is one of those 'self-made' persons. Maryna worked hard and stubbornly for many years to achieve this result. And the faculty helped her to form a 'scientific character', to understand that nothing is impossible.

► *"For many years, Mathematics was a male profession", Professor Bezushchak notes. "But Maryna's example shows that women are excellent at implementing their ideas".*

For the Faculty of Mechanics and Mathematics, Maryna Viazovska's award is a sign of the quality of Ukrainian Mathematics education. "These are the specialists we are training. Many of our graduates have received prestigious international awards and honors. It is important that these young people who live with us at the same time, are concerned with the same problems as we are", Oksana Omelianivna added.





## This task is like two birds in the bush

We also asked Maryna's Supervisor, Professor of the Faculty of Mechanics and Mathematics of Taras Shevchenko National University of Kyiv, corresponding member of the National Academy of Sciences of Ukraine Ihor Shevchuk to tell us about her. Ihor Oleksandrovych is the leader of the world-famous Ukrainian school of approximation theory. Under his scientific supervision Maryna defended her PhD in 2010.

Professor Shevchuk told his students about problems that are practically impossible to solve. And when the youth 'fired up' by solving one of them, he warned, that this task is like two birds in the bush. 'Catching two birds' would be nice, but there is only a little chance to do that. And he advised, in addition to practically impossible goals, to set more realistic tasks. After all, a scientist needs to earn for a living, to come out with scientific products.

Today, the Professor feels great joy that his student has reached such heights. Moreover, the world recognition and the reward are fully deserved.

- ▶ *"Three of my students – Andriy Bondarenko, Danylo Radchenko and Maryna Viazovska, – started solving this problem" – said the interlocutor. "They are extremely talented mathematicians, and I was convinced that one of them would win a Fields Medal. By the way, Bondarenko and Radchenko won the American Vasyl A. Popov Prize (for an outstanding contribution to approximation theory).*



Professor Shevchuk said that together these mathematicians also solved an extremely interesting problem about spherical design. It was also a 'bomb'!

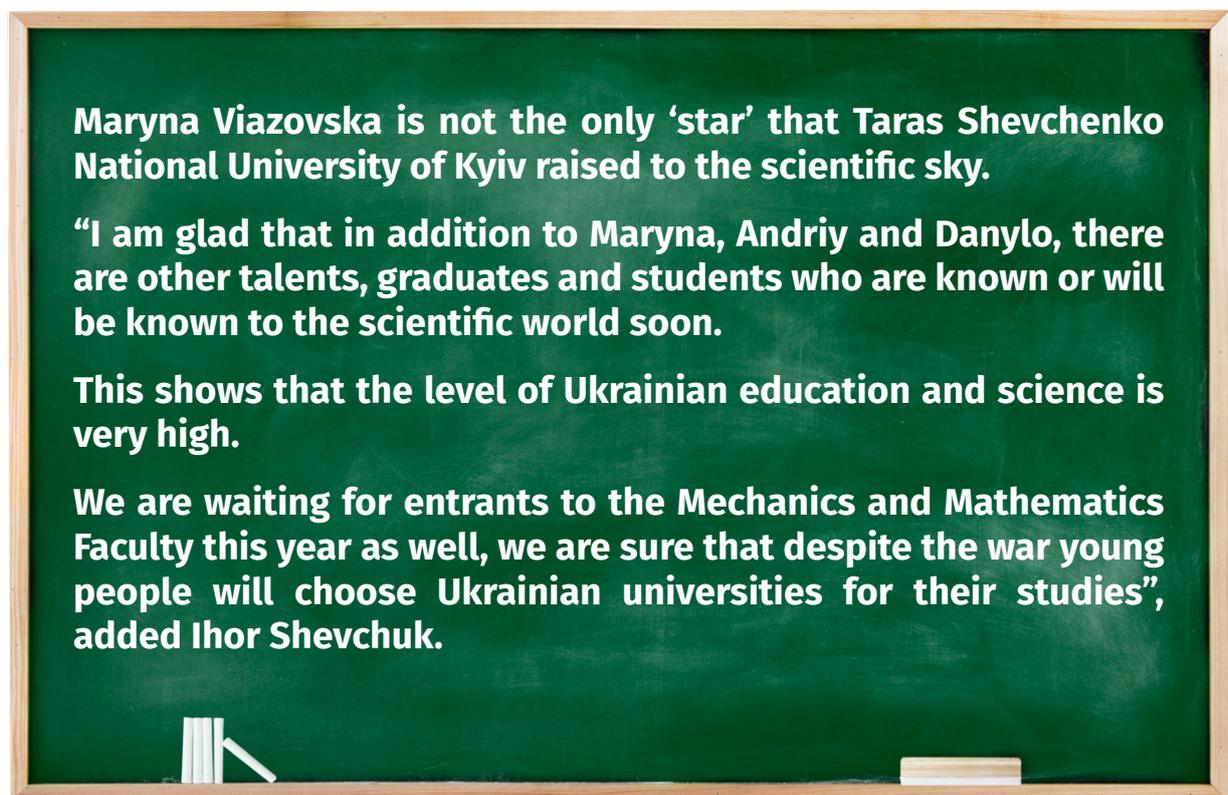
As we already mentioned, young scientists were also solving the problem of packing spheres in 8-dimensional space. And they have made a significant progress in this! At some moment Maryna offered a non-conventional approach to the final stage of the task, and later solved it herself.

We ask the Professor about traits of character (besides mathematical flair) which helped Maryna cope with the problem that seemed insoluble:

- ▶ *“Maryna is extremely determined, collected, persistent”, answered the scientist. “Of course, her character helped her to bring the case to the end. But I want to say that at the same time she is very sincere and easy to communicate with. It is easy to work with her and discuss tasks of any level”.*

The mathematician said that after the start of the full-scale invasion his former student called and offered help to her Kyiv colleagues.

Maryna often comes to the capital of Ukraine, meets with the scientific community of the faculty, talks about her research and achievements. “A month and a half before solving the packaging problem, Maryna came to Kyiv and delivered a report at our scientific seminar. We felt that the finish line was near” added Professor Shevchuk.



By Svitlana GALATA

