

“I need to achieve something that mathematicians all over the world have been awaiting for a decade”

The research objective of academician László Pyber may also qualify as a milestone in classic and more recent branches of mathematics, such as computer science. The professor of the Alfréd Rényi Research Institute of Mathematics of the Hungarian Academy of Sciences won an ERC Advanced Grant, one of the most prestigious grants of the European Research Council (ERC) supporting discovery research. László Pyber and his research team have been assisted by the bridging fund of NRDIFund over the past one-and-a-half years on his way to the grant. We asked the professor about the winning research project.

The ERC Advanced Grant encourages the outstanding minds in discovery research to implement long-term, ground-breaking projects with a prospect of high return. What is the element in your project that convinced decision makers?

The process started eight years ago. This was the year when I first submitted an application, then my third application in 2014 was rated as “excellent”. It is only this fourth attempt that has also brought success in terms of funding. Our research project focuses on group theory and symmetry-structures. Symmetry is omnipresent in our lives – it is there even in a Rubik’s cube –, as are networks, which are also present everywhere, for example on social media sites. Groups are made up of building blocks, which constitute various networks. The analysis of these networks is instrumental in learning about the world surrounding us. The basis of our ERC grant winning project is the so-called “Product Theorem”, our research finding dated 2010, that we published jointly with Endre Szabó, and which is of global significance both in graph and group theory.



László Pyber

(photo: mta.hu/Tamás Szigeti)

How do you intend to continue your research and how do you see its practical applications?

The European Research Council grants funding for us to find the solution to a mathematical problem that has been long awaited by mathematicians all over the world. This is actually the further elaboration of our product-theorem in a specific direction; we aim to work out the arbitrary dimensional version of the product theorem. Its practical benefits may appear in computer science in the long run, for example in the computer modelling of randomness. In overly simplified terms I would say that the solution of this and other related mathematical problems might significantly reduce computational time, in other words it may accelerate the computers of the future.

To what extent did the NRDIFund bridging fund contribute to giving a new momentum to the research?

It was a great help. This EUR 150 thousand (HUF 45 million) provided by the NRDIFund was also a proof to the European Union of our project being worth investing into. (In 2015–2016 the NRDIFund explicitly invited applications relating to the ERC grant programmes, to provide further, stable assistance from domestic resources for discovery research programmes rated the highest by the ERC. – note by the editor). From the funding provided by the NRDIFund Office I was able to pay the researchers working with me – some had worked by courtesy until then –, I was able to extend post-doctoral grants, so I could involve young researchers in the project. And the fact that I received EUR 150 thousand at home, which I could use to bring in another EUR 2 million, is not to be ignored, either.

The ERC Grant is provided for five years. How will you develop your team, who will be your collaborators?

I usually work with 5 to 10 people, the number varies. I think of Endre Szabó I have already mentioned as my number one “co-author”, let me share with you an example of this close collaboration: once I called him with a mathematical dilemma when he was running the marathon. In five minutes he called me back with the answer, he figured it out while running. A good many of my former and current students have also joined me, but I am also planning to invite foreign researchers. We have close collaboration with international scientific hubs such as the Imperial College in London, the University of Oxford or the Hebrew University in Israel. And let me mention the legacy of my once masters: that of the late Pál Erdős, whom I will always think of as my “intellectual grandfather”, or László Lovász, my university tutor.

In the area of discovery research Hungary has an international reputation of being one of the “great powers” in mathematics. Do you plan to lay the foundations of a new school in the coming five years?

This will inevitably happen, due to the involvement of young researchers in my team: they will start their research careers here, so they will not leave the country to work abroad. Indeed, Hungarian researchers are excellent in mathematics, mostly due to the hundred years of unbroken traditions of this discipline in our country, with a succession of schools, masters. The most important, however, is that thanks to the funding we will be able to continue our work in the forthcoming five years at home, in our own institute, under excellent circumstances to achieve a result that has

been on the minds of mathematicians for a long time, and may open up new perspectives in among other things computer science, which essentially influences the everyday lives of people.

Project details

Funding scheme:

[Call for applications to request national funds in connection with the research funding programmes of the European Research Council \(ERC_HU_15\) ERC_HU_15](#)

Funded project:

Pyber László: Growth in Groups and Graph Isomorphism Now

Amount of funding:

HUF 45 000 000 (EUR 150.000)

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