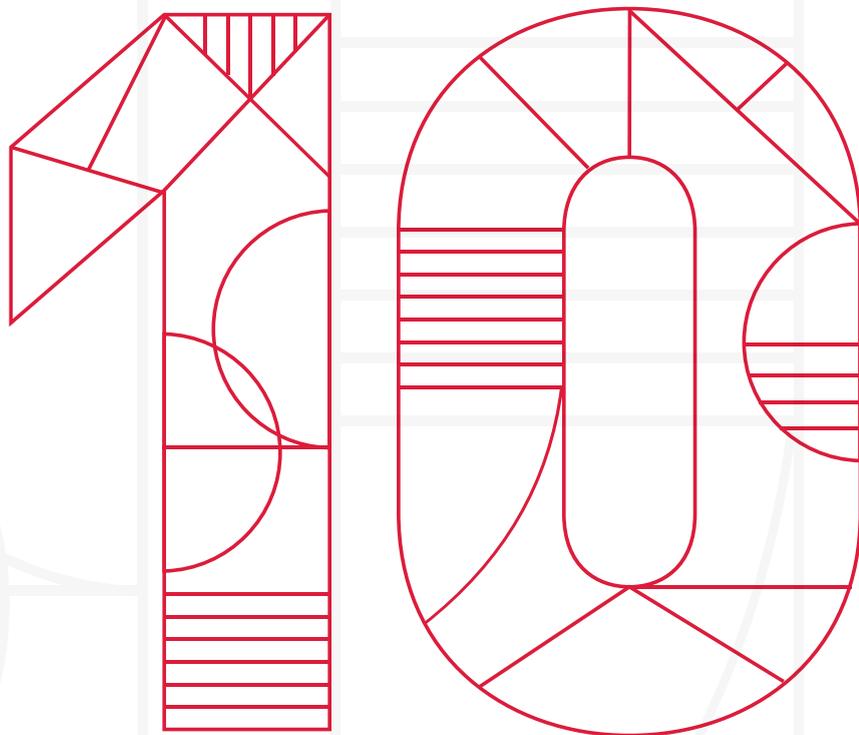




NATIONAL SCIENCE CENTRE  
POLAND



**YEARS OF  
THE NCN**



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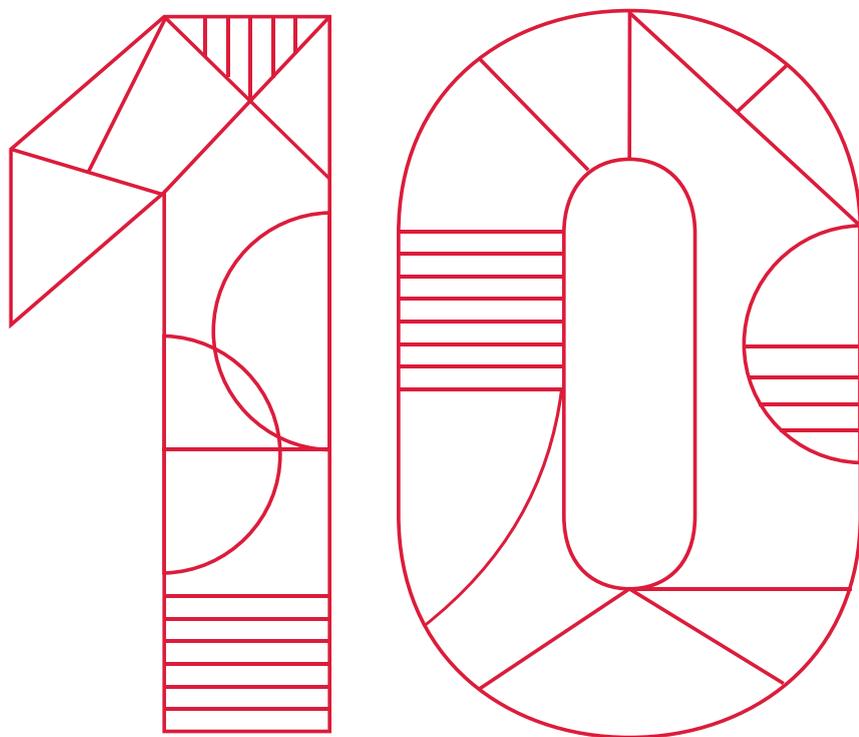
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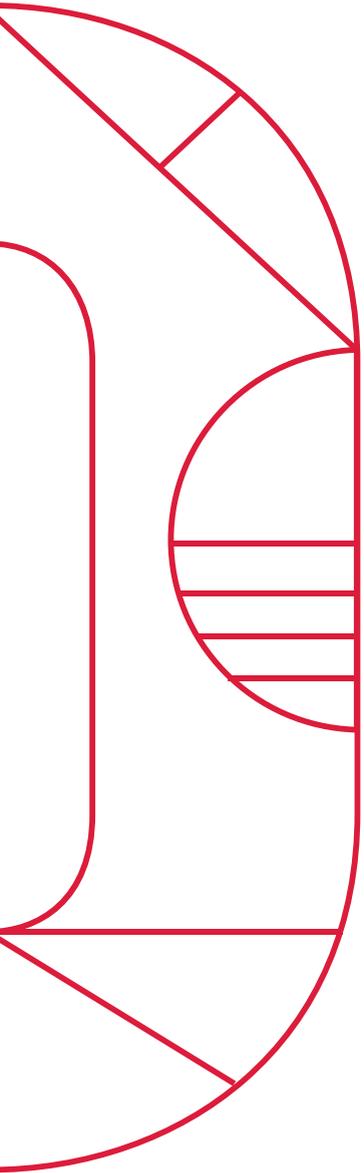
PERFORMING FOR **POLISH RESEARCH**



NATIONAL SCIENCE CENTRE  
POLAND

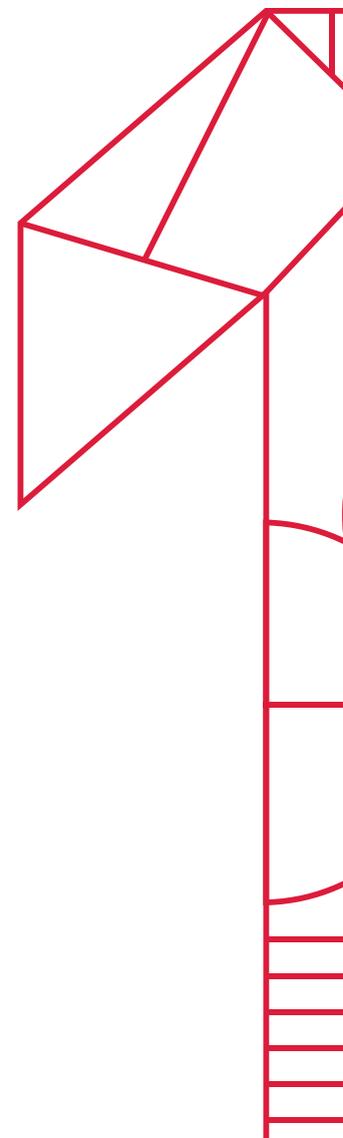


**YEARS OF  
THE NCN**



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# Ten years of work for **scientific excellence**

Ten years ago, an independent granting agency was established in Poland to fund the very best research projects. The most important decisions within the institution are taken by scientists rather than politicians or officials. The National Science Centre was modelled on similar solutions that had already worked for many years in other countries with a high level of research excellence. Another decision, unprecedented in Poland, was to place the seat of the NCN not in the country's capital, but in Kraków, a town with the oldest Polish university and a long research tradition.

I believe that, over these last 10 years, the NCN has fully delivered on the expectations that were set forth at its inception. Most importantly, based on the best models, both international (the European Research Council) and national (the Foundation for Polish Science), we have created a fair and transparent peer review system in which foreign experts take the lead. We fund projects by leading Polish scientists and scholars, in the belief that in order to spur the growth of research in Poland we need to support highly skilled research personnel; this may be even more important than any investment in infrastructure, on which Poland's policy has focused thus far. We run many programmes targeted at early-stage researchers, and a large proportion of resources in projects headed by more experienced scientists is slated for PhD scholarships and postdoctoral programmes. We also actively support gender equality in research, e.g. by special regulations that make it easier for new mothers to resume their research activities.

*(...) based on the best models, both international and national, we have created a fair and transparent peer review system in which foreign experts take the lead.*



Prof. Dr hab.  
Zbigniew Błocki

International cooperation in the broadest sense is also an important element of our mission. We work in close partnership with institutions such as the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) and the Max Planck Society (Max-Planck-Gesellschaft, MPG), the Research Council of Lithuania (Lietuvos mokslo taryba, LMT), the Research Council of Norway (Norges forskningsråd, RCN), the Swiss National Science Foundation (SNSF) and the Austrian Science Fund (Der Wissenschaftsfonds, FWF). As an active member of Science Europe, we have recently joined hands with many other European grant institutions to introduce a new Weave programme, based on the Lead Agency Procedure (LAP). We take part in a variety of multilateral European programmes and coordinate two, QuantERA and CHANSE, a thing unheard-of among the so-called EU-13 countries. As a founding member of cOAlition S and the Polish representative at the European Open Science Cloud, we are also deeply committed to the ideals of open science.

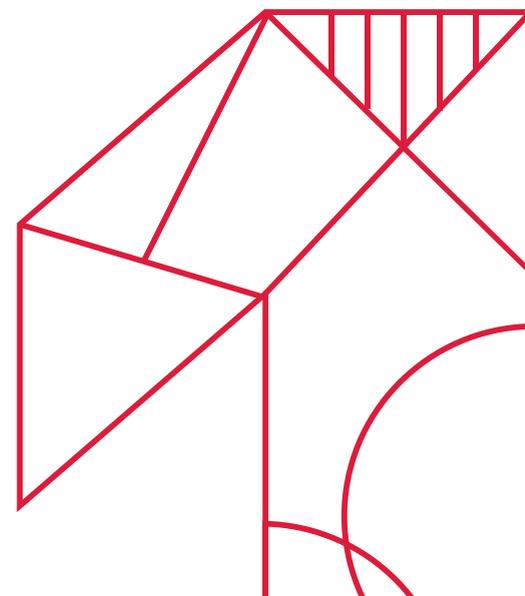
Many factors have come together to help us build an institution like the National Science Centre. One of these, no doubt, is the excellent Act on the NCN, which assigns a central role in the agency to a council composed of 24 researchers. In contrast to other similar institutions in Poland, the tasks of the NCN Council are really crucial; it takes all the major decisions concerning the division of resources, call regulations, expert team appointments, etc. At the turn of 2010 and 2011, even before the official inauguration of the Centre, the NCN Council took all the most important decisions and

created, practically from scratch, a grant system that has successfully worked to this day.

We stand out as real torchbearers, not only because we were the first to introduce a modern grant system in Poland, but also because of our unique mode of operation. As early as 2016, we shifted to a fully electronic office; paper was all but eliminated from our proposal submission, evaluation and implementation process. For several years now, all grant agreements have been signed with the use of electronic signatures. In 2020, this has allowed us to go online almost instantly, without any delays or disruptions in our core activities.

With a philosophy that supports research excellence, bets on the very best researchers and drives the internationalisation of Polish science, the National Science Centre is really well-placed to respond to the challenges of today's world. The recent global experience of the COVID-19 pandemic has clearly showed that science, especially that of the highest quality, is growing in importance and largely determines our success or failure in global competition.

*International cooperation in the broadest sense is also an important element of our mission.*



# By researchers for researchers. **The activities of the NCN Council**



Prof. Dr hab.  
Jacek Kuźnicki

All across the world, research-funding agencies and foundations always face the same challenge: how to select the very best projects that are really worth funding? What criteria should be taken into account during the review procedure? How should applicants be evaluated? More than ten years ago, a group of politicians and masterminds of a new grant system came together to solve this problem in Poland. In a decision that proved particularly fortunate for the future growth of Polish research, they ruled that the final say should always be with the researchers themselves; they should be the ones to draft the rules for the new granting agency and, later on, create grant programmes and decide on their assessment criteria. And thus, based on the Act of 30 April 2010, the National Research Centre finally opened its doors in Kraków.

The NCN consists of two separate, but complementary and cooperating elements: 1) the office, i.e. the administration, headed by the director, and 2) the council with its president. The office is divided into several departments, typical of any institution of this kind, which take care of the finances, legal matters, proposal processing, grant implementation and settlement, auditing, organisation, promotion and international cooperation; it also employs several dozen discipline coordinators. The coordinators are grouped under three different panels: Arts, Humanities and Social Sciences; Physical Sciences and Engineering; and Life Sciences. They all hold at least a PhD degree and can boast a research record of their own, but must also show particular personality traits that are necessary for the job, such as a high degree of ethics and

assertiveness. The discipline coordinators are in charge of organizing and carrying out NCN calls.

The Council is composed of 24 members appointed by the Science Minister from among a list of candidates indicated by the ministerial Identification Team. In accordance with the Act on the NCN, these should include *researchers with a recognised international research record, professionally active and involved in research, representing different disciplines of science and research communities*. The Council consists of eight representatives from each panel.

The tasks of the Council are described in the Act on the NCN and can be divided into three groups. One of its roles is to participate in the appointment of the NCN director and the discipline coordinators, as well as the outstanding Polish and international researchers that join the expert teams responsible for reviewing proposals and the settlement of funds awarded under NCN grants. This role is a practical consequence of the ideal mentioned above, which holds that the researchers themselves should be able to choose other researchers to take on key office roles and assess the quality of grant proposals and their implementation. The members of the Council also sit on the NCN Award Chapter which, every year, rewards early-stage researchers for considerable achievements in basic research projects carried out in Poland.

The second group of the Council's tasks has to do with establishing the types of calls, their terms and conditions,



review criteria and budgets. As a result, the Council has the decisive say in how the NCN budget is used to finance basic research in Poland, which groups are targeted by different programmes, what criteria are employed in the assessment of proposals and how grants are awarded. The main premise that guides the Council in its tasks is the goal of funding research excellence and ensuring the optimal development of various disciplines in a manner that respects the fundamental principles of ethics and avoids conflicts of interest. Importantly, while their term lasts, the members of the Council cannot apply for any NCN grants or other grants, such as the ERA-NET, that the NCN coordinates. They are also excluded from research teams that apply for funds under NCN calls. As a consequence, their decision to sit on the Council seriously restricts the range of opportunities to acquire funds for their own research. The Council members also form different committees, such as the Committee of Appeals, which reviews appeals against the decisions of the NCN Director in the event of any breaches of the call procedure or other formal irregularities.

The third group of tasks is designed to address current needs, such as establishing the principles of cooperation with other Polish agencies, e.g. the The National Centre for Research and Development (NCBR), Polish National Agency for Academic Exchange (NAWA), Medical Research Agency (ABM), as well as foreign organisations, issuing opinions on science-related legislation and carrying out the orders of the Director and the state authorities. The members of the Council are also required to attend meetings with representatives of the research

community and debates on the NCN and its activities, as well as to respond to any critical opinions or improvement suggestions.

Once they have drawn up a call's terms and conditions, established its budget and indicated potential experts for individual panels, the members of the Council step back. At this point, the control of the review process goes over to the office, and in particular, to the coordinators. Ranking lists are drawn up without the participation or knowledge of the Council; funding decisions likewise bypass it. All matters related to grant implementation and settlement are the province of the office. The cycle closes only when the expert team, previously appointed by the Council to settle the research funds, evaluates the implementation of the project and passes it on for merit-based evaluation at the Council. In the end, a Council member from the relevant science panel must decide whether the project has or has not been carried out.

Headed by Michał Karoński, the first Council started its term on 15 December 2010; the first grants were awarded only half a year later. This goes to show the great resolve and commitment of all the Council members, including the then NCN Director, Andrzej Jajszczyk, and other office staff. Importantly, the first Council took a number of key, spot-on decisions on the organisation of panels, limited the number of terms served by coordinators to two terms of four years, transferred the responsibility for ranking lists to expert teams, and introduced transparent grant terms and conditions, which ensured compliance with the most strin-

*The NCN consists of two separate, but complementary and cooperating elements: the office, i.e. the administration, headed by the director, and the council with its president.*

*We strive to maintain our ideals and support research excellence by funding excellent projects and researchers at all levels (...).*

gent ethical standards. The first Council members also decided that the first experts should set an appropriately high standard for the future work of expert teams. To this end, the Council appointed them based not only on their proven research excellence but also a firm commitment to the idea that high research quality should serve as the only unquestionable criterion in the assessment of grant proposals submitted to the NCN. The first members of expert teams were mostly recruited from among Polish researchers, who were forbidden from entering the NCN calls, a rule that is rarely enforced elsewhere in Poland. The first Council also had a decisive say in the choice of key office members and the first coordinators. As it turned out, the choices were often spot-on, such as the appointment of Marcin Liana, who won an open competition for the post of Deputy Director of the NCN after completing his term as a discipline coordinator. Another example is Magdalena Borska, who has served as an excellent head of the Council's chancellery ever since its establishment, ensuring the "historical memory" of the Centre, and Justyna Woźniakowska, who has scored a string of successes as the head of the international cooperation department. As we applaud the achievements of our predecessors on the Council, however, we should also bear in mind that the NCN would not have been founded, or successful, without important political support, especially that provided by the successive Ministers of Science and Higher Education: Barbara Kudrycka, Lena Kolarska-Bobińska, and Jarosław Gowin.

Even though half of the Council is replaced every two years, the experience of the past 10 years has shown that new members successfully continue the mission of their predecessors, making sure that the NCN is renowned for high quality and reliable service for the common good of the entire academic community. I have experienced this directly, first as a member of the Council headed by Małgorzata Kossowska, and, for the last half a year, as its President. We strive to maintain our ideals and support research excellence by funding excellent projects and researchers at all levels, ensure due diligence

and transparency, and eliminate all conflicts of interest from all stages of proposal review and grant settlement. Importantly, we also heed and respond to the opinions of the research community. We discuss the community's postulates during our meetings, meet with representatives of research bodies, and hold special sessions known as the NCN Roundtable. The Council is always open to any changes that can improve the functioning of the Centre and increase its positive impact on the quality of research in the country. After all, we are an organisation run by and for researchers.

In 2020-2022, apart from continuing the mission of the NCN and boosting its prestige, the Council plans to simplify its grant forms, streamline the work of individual panels, increase the NCN's visibility to potential overseas grantees, expand cooperation with other research-funding organisations in Poland, and increase the participation of the NCN in networks of basic research-funding organisations throughout Europe, including the countries of Central and Eastern Europe. The most important (and at the same time the hardest) task we have set before ourselves is to increase our success rate from 16% to 25%. This change will not be possible without a corresponding increase in the NCN budget. All the former and current Council members, as well as many Polish and foreign experts, agree that the quality of research projects submitted to the NCN and their implementation has improved considerably over the past 10 years. This shows that the NCN model has done a great service to the development of research. An annual increase in the budget would be an opportunity for the current government to continue the tradition of support for the NCN in the interest of Polish science and culture. If we could double the budget of the NCN by its 15th anniversary, not only would the success rate rise to 25%, but the indirect costs of our projects would also double, reaching 40%. As evidenced by their sterling achievements in the fight against the SARS-CoV-2 virus, Polish researchers, universities and institutes more than deserve this reinforcement.

# Mission and goals

The National Science Centre is a government executive agency funding basic research, which is defined as empirical or theoretical work seeking to expand knowledge of the fundamentals of phenomena and observable facts without any direct commercial use. NCN is funding research carried out at Polish research institutions as projects and single research activities.

NCN calls are addressed at researchers at every stage of their careers, regardless of age and experience. The call portfolio includes domestic calls as well as calls launched in bilateral or multilateral cooperation with other research-funding agencies and a number of programmes launched by international consortia and networks, such as ERA-NET, of which the National Science Centre is a member.

The funding is awarded to the best proposals, selected in the course of a two-stage peer review. The expert reviewers evaluate both the quality of the research and the applicant's achievements. We monitor the proper implementation of ongoing grants: we accept and verify annual reports on the projects under implementation, and we carry out audits at the host institutions for the projects.

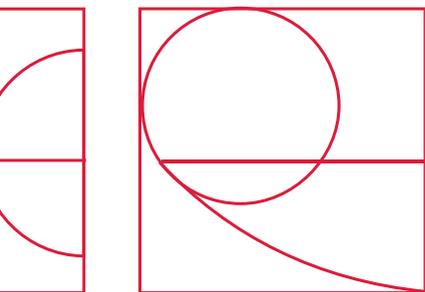
Another area of our activities consists in inspiring funding of basic research from non-state sources, propagating information on the funding opportunities we launch and initiating international cooperation.

## MISSION

*Leveraging the quality and effectiveness of research through a competitive grant system and supporting the development of Polish research on the international stage.*

## GOALS

- Funding excellent research projects in basic research
- Supporting early stage researchers
- Inspiring the creation of large, interdisciplinary research teams which are able to compete internationally
- Fostering international cooperation in research
- Creating new job opportunities in NCN-funded projects



# Event Calendar 2010-2021

## 15 December

First group of 24 researchers appointed to the NCN Council and Prof. Michał Karoński elected President of the NCN Council



## 4 March

**NCN officially starts to operate;  
Prof. Andrzej Jajszczyk appointed  
first Director of the NCN**

## 15 March

First calls launched (OPUS 1, PRELUDIUM 1, SONATA 1 and HARMONIA 1). In the first edition, calls had descriptive names

## 15 June

First MAESTRO call launched for well-established and outstanding researchers

## 15 December

New FUGA call launched for post-doctoral fellowships

## 15 March

SONATA BIS call launched for research projects aiming to create a new research team

## 24 May

**NCN joins Science Europe,  
an association of major  
European Research Funding  
Organisations and Research  
Performing Organisations**

2010

2011

2012

8-9 May

First NCN Days in Silesia



9 May

NCN 2013 Award



16 December

First TANGO call launched in partnership with the National Centre for Research and Development

15 November

SYMFONIA 1 call for cross-domain research projects launched

15 December

ETIUDA 1 call for doctoral scholarships launched

19 February

NCN signs cooperation agreement with the German Research Foundation (DFG)



8-9 April

NCN Days in Lublin



20 May

General Assembly of Science Europe in Krakow



12 September

First BEETHOVEN call launched for Polish-German research projects in Arts, Humanities and Social Sciences

9 October

NCN 2014 Award



2013 — 2014

## 4 March

Prof. Zbigniew Błocki  
appointed NCN Director



## 7 October

NCN 2015 Award



## 13-14 May

NCN Days in Szczecin



## 14 October

10,000,000 EUR awarded by  
the European Commission for  
the international QuantERA  
call coordinated by the NCN to  
support research in the area of  
quantum technologies

## 15 September

POLONEZ 1 call for incoming  
researchers launched

## 4 March

Fifth anniversary of the NCN



## 12 October

NCN 2016 Award



## 11-12 May

NCN Days in Olsztyn



## 16 November

NCN signs cooperation agreement  
with the Research Council of  
*Lithuania* (LMT) to launch a call for  
Polish-Lithuanian research projects

## 1-2 December

Lisbon meeting to launch  
QuantERA

# 2015

# 2016

## 15 December

Prof. Janusz Janeczek appointed new President of the NCN Council

New calls launched (SONATINA 1, UWERTURA 1 and MINIATURA 1), electronic proposal submission system introduced

## 13 January

First QuantERA call launched for research projects in the area of quantum technologies

## 10-11 May

NCN Days in Kielce



## 4 July

NCN signs an agreement with the Max Planck Society (MPG) to establish Centres of Scientific Excellence in Poland

## 15 September

First DAINA call for Polish-Lithuanian research projects launched

## 10 October

NCN 2017 Award



## 7 November

First DIOSCUR! call designated to establish Centres of Scientific Excellence in Poland

## 15 December

Representatives of the scientific community meet with the NCN Management and Council at the NCN offices (the so-called "Round Table")

## 9 April

NCN signs an agreement with the Austrian Science Fund (FWF) to launch a call for Polish-Austrian research projects

## 9-10 May

NCN Days in Gdańsk



## 15 June

SHENG 1 call for Polish-Chinese research projects launched

# 2017

# 2018

## 4 September

NCN joins cOAlition S and signs Plan S

## 10 October

NCN 2018 Award



## 23 October

NCN Director signs the San Francisco Declaration on Research Assessment (DORA)

## 17 December

New offices of the NCN officially opened at ul. Twardowskiego 16; new Council members appointed; Prof. Małgorzata Kossowska appointed new President of the NCN Council



## 4 March

Prof. Zbigniew Błocki re-appointed NCN Director (second term of office)

## 15 March

MOZART 1 call for Polish-Austrian research projects launched

## 15-16 May

NCN Days in Łódź



## 7 June

Agreement for the Research Programme under the third edition of the EEA and Norway Grants, with NCN acting as the operator in charge of basic research

## 17 June

Agreement between agencies associated within the Central *European Science Partnership* (CEUS) to launch a call for research projects carried out by research teams from Poland, Czech Republic, Austria and Slovenia GRIEG and IdeaLab calls launched

## 1 July

ALPHORN call for Polish-Swiss research projects launched

2018

2019

## 4 January

Weave-UNISONO call launched for international research projects in partnership with the foreign research-funding agencies pursuant to the Lead Agency Procedure (LAP)

## 9 March

CHANSE call launched

## 17 June

Conference promoting the Basic Research Programme carried out under the EEA and Norway Grants



## 30 July

NCN, in cooperation with the National Centre for Research and Development, announce the ARTIQ call for proposals aimed at creating three Centres of Excellence in Artificial Intelligence

## 24 February

International CEUS-UNISONO call launched for bilateral or trilateral research projects for research teams from Austria, Czech Republic, Slovenia and Poland

## 16 March

POLS call launched

## 30 March

EXPRESS CALL TO FUND RESEARCH ON COVID-19 launched in response to the Covid-19 global pandemic

## 14 October

NCN 2020 Award winners announced

## 11 December

CHANSE consortium (coordinated by the NCN) created

## 9 October

NCN 2019 Award



## 13 December

Representatives of the scientific community meet with the NCN Management and Council for the second time at the NCN offices (the so-called "Round Table")

## 12 September

NCN signs Cooperation Agreement with the Polish Agency for Academic Exchange (NAWA)

## 16 September

First PRELUDIUM BIS call launched for research projects carried out by PhD students as part of their doctoral dissertations

2020 ————— 2021



On the photos, from the top: Official launch of the National Science Centre, 4 March 2011

First anniversary of the National Science Centre at the International Cultural Centre in Krakow, 9 March 2012

Symposium on the 5<sup>th</sup> anniversary of the National Science Centre: "Best practices in supporting outstanding scientists and helping them successfully apply for ERC grants" at the Collegium Novum of the Jagiellonian University, 6 March 2016



# Former and current **NCN management**

## NCN DIRECTORS

### Prof. Dr hab. inż. Andrzej Jajszczyk

**First NCN Director 2011-2015**

Andrzej Jajszczyk is a professor at the University of Science and Technology in Kraków. He spent many years working at the Poznań University of Technology, as well as abroad, at the University of Adelaide in Australia, the Queen's University in Canada and École Nationale Supérieure des Télécommunications de Bretagne in France. He has authored or co-authored twelve books, more than 300 articles (including over 150 indexed in the Web of Science database) and 19 patents in the fields of telecommutation, fast telecommunications networks and network management, as well as around 100 articles on science and higher education. He has headed Polish teams in seven EU research projects and served as a consultant for producers, operators

and government agencies in Poland, Australia, China, France, India, Canada, Germany and the US. He worked as editor-in-chief of the "IEEE Communications Magazine", deputy president of the IEEE Communications Society, deputy editor-in-chief of "China Communications" and member of the editorial teams of other reputable scientific journals. He is a winner of the Award of the Foundation for Polish Science, a corresponding member of the Polish Academy of Sciences and the head of its Kraków branch. He is also a member of the Polish Academy of Arts and Sciences and the Academia Europaea. He serves as the Deputy Chair of the European Research Council (ERC).

### Prof. Dr hab. Zbigniew Błocki

**Current NCN Director (since 2015), member of the NCN Council 2010-2015.**

He has worked at the Faculty of Mathematics and Computer Science of the Jagiellonian University since 1990. In total, he has spent several years abroad, conducting his research in places such as Sweden, Germany and the United States, also as a Fulbright fellow. He has been invited to lecture at research institutions all over the world. Since November 2015, he has sat on the Management Board of Science Europe, an association that brings together European research-funding organisations. In the past, he also served as the head of the Department of Mathematics at the Jagiellonian University and the deputy chair of the Organisation Committee of the 6th

European Congress of Mathematics, which took place in 2012 in Kraków. In 2010-2015, he coordinated a project conducted within the framework of the International Doctoral Projects programme organised by the Foundation for Polish Science at the Jagiellonian University; he was also a principal investigator in a project carried out under the Ideas Plus programme. He is a winner of the Stanisław Zaremba Award of the Polish Mathematical Society (2007) and the Prime Minister's Award for research achievements (2008). In 2014, he received the "Jagiellonian Laurel" prize.





## PRESIDENTS OF NCN COUNCIL

### Prof. Dr hab. Michał Karoński

**First President of the NCN Council 2010-2016.**



A professor emeritus at the Faculty of Mathematics and Computer Science of the Adam Mickiewicz University in Poznań, he has conducted research in discrete mathematics and theoretical computer science. He has created a research group and seminar devoted to random graphs, and spent many years as the head of the Unit of Discrete Mathematics. He has co-founded and edited the "Random Structures and Algorithms" journal and organised a series of international conferences devoted to random discrete structures. His research record includes more than 60 scientific publications and several dozen papers at international conferences, including many keynote addresses. In the past, he completed a post-doctoral fellowship at the University of Florida

and worked as a visiting professor at the Southern Methodist University, Purdue University, Johns Hopkins University and Emory University in Atlanta. He has conducted research at many international institutions, including universities in Moscow, Lund, Bielefeld and Pittsburgh, as well as research centres in the USA, Denmark, South Korea, Great Britain, Singapore and Sweden. In 2016, he joined the Academia Europaea. In 1993-1999, he served as the dean of the Faculty of Mathematics and Computer Science at the Adam Mickiewicz University in Poznań. He also sat on the Committee of Scientific Research and the Research Council. In 2020, he was appointed by the European Commission as a member of the Identification Committee of the European Research Council (ERC).

### Prof. Dr hab. Janusz Janeczek

**Appointed to the NCN Council in 2010; Head of the Committee of Appeals until 2016. President of the NCN Council 2016-2018.**



A mineralogist and geologist, he graduated from the University of Wrocław (1976) and worked there until 1984. In 1985, he transferred to the University of Silesia. In 1993-1999, he served as the deputy dean of the Faculty of Life Sciences at the University of Silesia, the deputy dean for science, promotion and international cooperation in 1999-2002, and the rector of the University of Silesia in 2002-2008. In 1998-2002, he served as the chairman of the Board of the Polish Mineralogical Society and, in 2008-2015, president of the Committee of Mineralogical Sciences of the Polish Academy of Sciences. He was appointed to the latter role again in 2020-2023. He is the President of the Council of Nuclear Safety and Radiological

Protection at the National Atomic Energy Agency, as well as a member of the Polish Mineralogical Society and the Mineralogical Society of America. He held a British Council fellowship at the University of Manchester in England, a Fulbright fellowship at the University of New Mexico in the US and a fellowship of the Japanese Association for the Promotion of Science at the University of Hiroshima in Japan. He won the Ignacy Domeyko Science Award of the Polish Academy of Sciences in 1986. His research interests centre around the mineralogy of atmospheric particulate matter, the geological aspects of radioactive waste storage and the crystal chemistry of minerals.

## Prof. Dr hab. Małgorzata Kossowska

**NCN Council Member 2012-2022; President of the NCN Council 2018-2020.**

Psychologist, humanities professor, head of the Unit of Social Psychology and Centre for Social Cognitive Studies at the Department of Psychology of the Jagiellonian University. She has authored more than 80 articles in Polish and international journals, and authored or co-authored eight books. She investigates the cognitive and motivational processes that underlie complex social phenomena, such as radical political views, prejudices and social conflicts. She has won many awards for outstanding research achievements, including the Tadeusz Tomaszewski Award for the best psychology publication, the medal of the Polish Society of Social Psychology for lifetime achievement, and the "Jagiellonian Laurel" prize. She was a holder of a scholarship under the "Stay

with Us" programme sponsored by "Polityka" magazine (2001). In 2008-2012, she headed the Department of Psychology at the Jagiellonian University and in 2012-2020 served as the deputy dean of the Faculty of Philosophy of the Jagiellonian University. She was a President of the Polish Society of Social Psychology (2008-2014), a member of the board of the European Association of Social Psychology. She is a corresponding member of the Polish Academy of Sciences and a member of the interdisciplinary COVID-19 Advisory Team to the President of the Polish Academy of Sciences.

## Prof. Dr hab. Jacek Kuźnicki

**NCN Council Member since 2018; President of the NCN Council since 2020.**

A neuroscientist and biochemist, full member of the Polish Academy of Sciences, head of the Laboratory of Neurodegeneration at the International Institute of Molecular and Cell Biology in Warsaw (MIBMiK). He has authored more than 150 articles available through the Web of Science database and supervised 16 PhD dissertations. In 2008, he was decorated with the Officer's Cross of the Order of Polonia Restituta by the President of Poland. He has won many awards, including the individual Crystal Brussels Sprout Prize for his achievements under the 7th EU Framework Programme (2013), the Jerzy Konorski Award for the best Polish neurobiology

research paper (2011), the professorial subsidy of the Foundation for Polish Science (2004-2007) and the Prime Minister's Award for outstanding research achievement (2003). He co-founded and headed the International Institute of Molecular and Cell Biology (2001-2018), sat on the Research Policy Committee (2011-2014) and the Board of the European Calcium Society (since 2008); he is the honorary head and co-founder of the BioEducation Foundation, as well as the organiser and director of the Polish Centenarians Programme. He was a visiting professor (1992-1995) and post-doctoral fellow (1981-1984) at the National Institute of Health in Bethesda, USA.



# A kaleidoscope of change. **NCN calls over the past 10 years**

*A series of successful proposals under the OPUS call have allowed me to accelerate my own growth and the development of my research team.*

*The HARMONIA project opened up many international cooperation opportunities (...).*

Ever since the beginning, the call portfolio of the National Science Centre encompassed programmes targeted at researchers at all levels of seniority, specialised in any discipline of science. The first NCN Council, made up of 24 brilliant scientists, worked intensively to draw up the call conditions and prepare the list of discipline panels under which proposals are submitted to cover all fields of research. Time was of the essence; the NCN was taking over the responsibility for grant funding from the Ministry of Science and Higher Education and any pause in the calls would have had a negative impact on research in Poland. The first NCN Council was established on 15 December 2010; as early as March 2011, Discipline Coordinators announced the first four calls for proposals, under which nearly 8 thousand applications were soon submitted.

At first, the calls were organised under different names, mostly borrowed from the Act on the NCN. These were often long and complicated, so a contest to come up with a better alternative was announced. Many submissions came in and in the end, the NCN picked one that alluded to the world of music. Since then, it has performed for Polish research, funding PRELUDIUMs, OPUSes, SONATINAs, SONATAs, SONATA BISes, MAESTROs and SYMFONIAs.

Announced twice per year, **OPUS** is the largest and the most important among NCN calls. The scheme is targeted at researchers at any stage of their careers who can demonstrate a solid publication track record and have an idea for a globally innovative research

project in any discipline of science. The terms and conditions of OPUS have changed over the years. Currently, the projects can take up to 4 years to complete; the funding may go toward the costs of research, the full-time employment of the principal investigator and post-docs, and scholarships for PhD students. It can also be used to purchase research equipment and cover conference fees.

In its first years, the NCN also announced regular **HARMONIA** calls for projects carried out in cooperation with international partners. The data of the foreign partner had to be indicated in the proposal, but funding under the joint project was only available to the Polish team. The grant could not be used to purchase research equipment, offer scholarships or full-time employment. The NCN Council later decided to include HARMONIA as an extra track within the OPUS call, which offered much better opportunities to fund research tasks and related purchases, also those associated with international cooperation. Thanks to this move, OPUS was enriched with additional options, while HARMONIA got extra funding opportunities that had, until then, only been available under OPUS. Over the past 10 years, the NCN has completed **19 editions** of the OPUS call; nearly **42 thousand proposals** have been submitted and more than **8.6 thousand** have received a total of almost **6 billion PLN** in funding.

The NCN also announces calls intended for researchers who are just starting out on their career and have not yet earned a PhD degree.

Organised once per year, **PRELUDIUM** is targeted at applicants who are not PhD holders and are planning to conduct their research project with the support of a mentor. PRELUDIUM projects may take up to 3 years and the maximum available funding equals 210 thousand PLN. In the **19 editions** of the call, more than **28 thousand proposals** have been submitted; over **6 thousand** have won funding to a total amount of **722.6 million PLN**.

**ETIUDA** was active until 2019 and offered annual scholarships to PhD students far advanced in their doctoral programme, as well as covered the costs of their foreign fellowships. The **8 editions** of the call attracted almost **3 thousand proposals**, **900** of which received funding to a total amount of nearly **90 million PLN**.

**PRELUDIUM** was organised twice and ETIUDA once per year. When a new model of PhD education was introduced in doctoral schools, the second round of PRELUDIUM was replaced with another call, **PRELUDIUM BIS**, under which ETIUDA was also subsumed. In PRELUDIUM BIS, the funding proposal is submitted by the mentor of the future PhD student who are selected within the framework of the call and embark on a PhD programme will receive a high scholarship and a special budget specifically slated for research purposes. They will also be able to pay for a foreign research fellowship, an invaluable opportunity at this level, which is funded by the National Agency for Academic Exchange (NAWA), in cooperation with the NCN (more about our cooperation with the NAWA on p. 30).



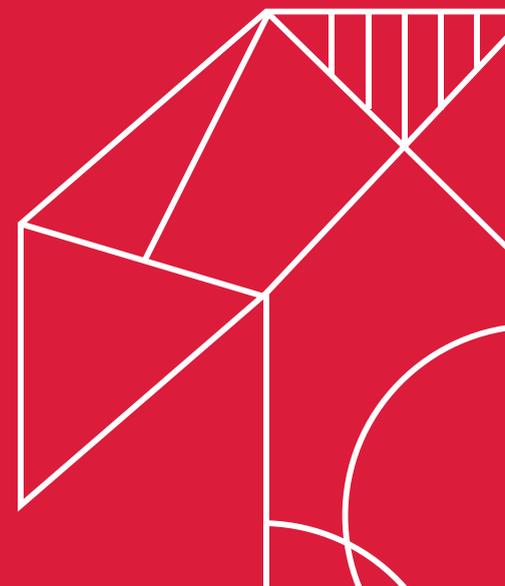
*A series of successful proposals under the OPUS call have allowed me to accelerate my own growth and the development of my research team. Having to go through the highly formalised process of preparing the project and settling its results, I learned how to plan, organise and conduct research, and then publish its findings. But what matters much more than the funds and the equipment is the grant's overall impact on people and their growth – my OPUS projects have given me a wonderful opportunity to get PhD students and students involved in our research. Inspired by our joint endeavours, these early-stage researchers then began to file proposals of their own, for PRELUDIUMs, ETIUDAs, and SONATAs, which were often successful. With the perspective of hindsight, I can say that the upsides of the OPUS projects include not just a better research track record, but also the satisfaction of watching the progress of my past and present students and PhD students.*

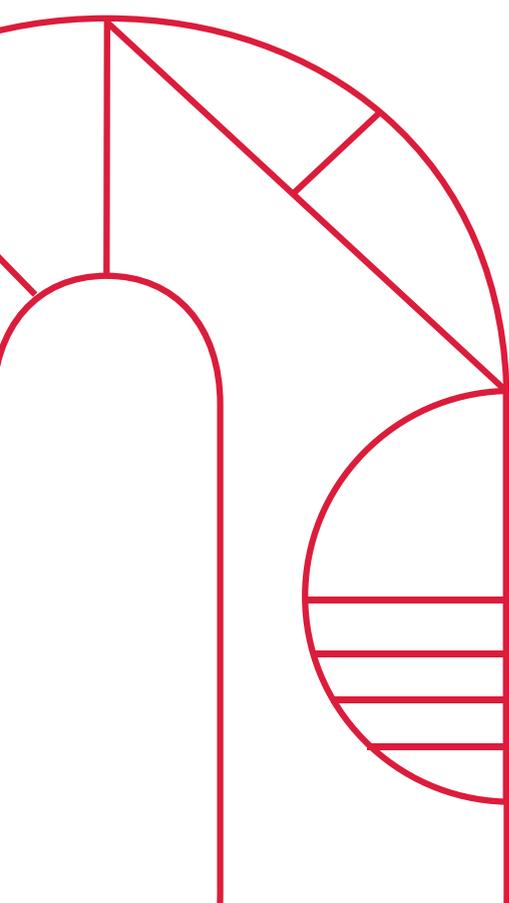
**Prof. Dr hab. inż. Tomasz Kubiak**  
**Łódź University of Technology**  
**Winner of OPUS 2, 9, 13 and 17**



*The HARMONIA project opened up many international cooperation opportunities, allowing me to include research groups from Spain, Germany, Austria, Japan and the US in my field of interest. This enabled us to achieve ground-breaking results in the spin orbitronics of high-electron mobility materials.*

**Prof. Dr hab. Vitalii Dugaev**  
**Rzeszów University of Technology**  
**Winner of HARMONIA 3 and OPUS 14**





In partnership with the European Research Council (ERC), the NCN also organised four rounds of the **UWERTURA** call. The call was open to PIs working in other NCN projects who were getting ready to apply for an ERC grant. Winners could complete a fellowship under the supervision of a researcher involved in an ERC-funded project and use that opportunity to improve the quality of their own proposal. **24 applicants** were funded in the call's **4 editions**. In the end however, the call attracted too little interest and had to be suspended. The NCN is currently working to develop other incentives to promote ERC proposals.

The National Science Centre also offers a variety of calls for post-docs at all levels. These include SONATINA, SONATA and SONATA BIS. **SONATINA** is targeted at those who earned their PhD up to three years prior, **SONATA** – between 2 and 7 years, and **SONATA BIS** – between 5 to 12 years before the proposal submission dates. These calls are intended for brilliant young people ready to conduct their own research projects. Under SONATINA, principal investigators receive enough funding to secure their full-time employment at an institution other than the one that awarded their PhD degree and can complete a fellowship at a foreign research centre of their choice.

SONATA provides funding to cover the costs of the full-time employment of the PI and the post-docs, as well as to involve scholarship holders in the research project.

Also known as the “little MAESTRO”, SONATA BIS is targeted at outstanding early-stage researchers with leadership potential who wish to set up their own research team. The projects, which can last up to 5 years, may receive funding to cover the full-time employment of the principal investigator, post-docs and auxiliary staff (e.g. technicians). At least one scholarship holder must be hired.

*The fellowship gave me an opportunity to work with one of the top experts in molecular dynamics and statistical physics (...).*

*I am particularly happy about getting access to the frequent meetings of an international group of experts, which were conducted in an atmosphere of mutual support and free exchange of ideas.*



*In 2016, I won an ETIUDA grant to pay for my research fellowship at the Max Planck Institute for Biophysical Chemistry (Göttingen, Germany). The fellowship gave me an opportunity to work with one of the top experts in molecular dynamics and statistical physics, Professor Helmut Grubmüller. The experience helped me forge international contacts and run my own research group. Professor Grubmüller's observations about the workings of the research community, as well as publishing and research integrity proved really priceless. Our research into computation methods for the study of protein-ligand systems were published as "Kinetics of Huperzine A Dissociation from Acetylcholinesterase via Multiple Unbinding Pathways" [J. Chem. Theory Comput. 14(6), 2843-2851, 2018].*

**Dr inż. Jakub Rydzewski**  
**Nicolaus Copernicus University in Toruń**  
**Winner of ETIUDA 4 and PRELUDIUM 10**



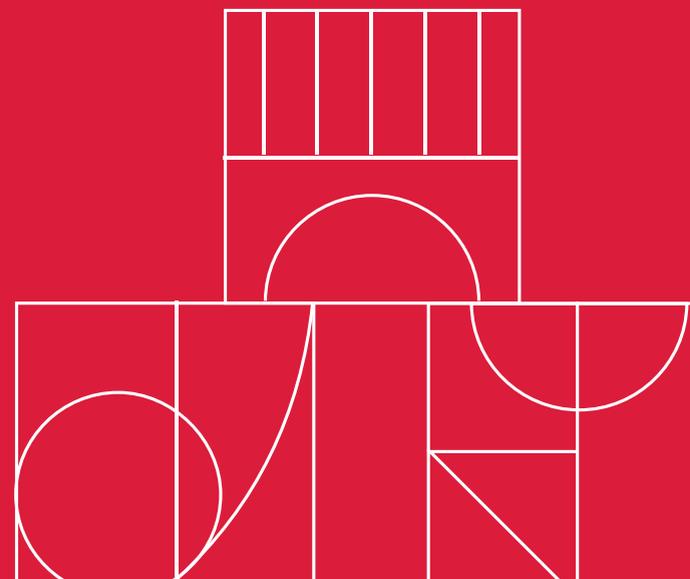
*Winning the UWERTURA grant allowed me to grow in an "environment of direct access" – and not only to the rich collections and databases of a renowned research centre, which shifted the focus in my research from fighting against limitations to taking joy in the process. I am particularly happy about getting access to the frequent meetings of an international group of experts, which were conducted in an atmosphere of mutual support and free exchange of ideas.*

**Dr Anna Klimaszewska**  
**University of Gdańsk**  
**Winner of UWERTURA 4, OPUS 5, SONATA BIS 5**



*The SONATINA grant allowed me to develop my research passion in Poland and opened the doors to inspiring experiences, as well as new and precious contacts, which I established during my fellowship at a foreign research centre.*

**Dr Katarzyna Taylor**  
**Adam Mickiewicz University in Poznań**  
**Winner of SONATINA 1 and SONATA 16**





*For me, the SONATA call was, above all, immensely helpful at the outset of my career – both directly, by funding a specific project, and indirectly, by allowing me to gain the experience I needed to win and carry out further grants.*

Dr Rafal Banka  
Jagiellonian University  
Winner of SONATA 12 and OPUS 16

In total, past calls have attracted more than **17.5 thousand proposals, 3325** of which have been awarded over **2.2 billion PLN**.

The most prestigious call in the portfolio is **MAESTRO**. This is intended for experienced researchers who have an idea for basic research likely to bring globally innovative and ground-breaking results. Applicants are expected to demonstrate an excellent international publication record, experience in the role of PI, and other important research achievements, while their projects must be pioneering in nature. The grant may go toward funding the full-time employment of the PI, post-docs, technicians and scholarship holders. The opportunity to secure funding under this prestigious call is available only to the very best researchers. In the **11 editions** concluded before the end of 2020, **1852 proposals** were submitted, **252** of which won grants to the amount of **671 million PLN in total**.

Another important call in the NCN portfolio is **MINIATURA**. The scheme is targeted at researchers who have earned their PhD up to 12 years earlier and have not had much luck in other NCN projects thus far. The programme offers funding for all sorts of research activities: preliminary/pilot studies, library and archive research, research fellowships, research or consultation trips. These are meant to help the researchers refine and submit a project under another call for research proposals. The MINIATURA programme is very widely appreciated; it provides assistance to researchers who have not yet won a grant and need just a little push to succeed. Over the first 4 years, MINIATURA attracted nearly **10.3 thousand proposals, 2.6 thousand** of which were funded with a total of over **96 million PLN**.

In creating its call portfolio, the National Science Centre closely heeds voices coming from the Polish research community. It also takes into account the opinion of

*I am happy my PhD students can now visit the labs of top researchers involved in similar research (...). This would have never been possible without our project and the support of the NCN.*



*Thanks to a SONATA BIS project, I was able to set up my own research team, from scratch, and provide it with good equipment. This is a young team studying the present-day processes of lake deposit sedimentation and the possibilities for reconstructing past climate fluctuations. I am happy my PhD students can now visit the labs of top researchers involved in similar research and, thanks to several years of cooperation, be received as good friends. This would have never been possible without our project and the support of the NCN.*

**Prof. Dr hab. Wojciech Tylmann**  
University of Gdańsk  
Winner of SONATA BIS 5, and OPUS 7 and 19



*My MAESTRO project, of course, resulted in new research achievements – I developed and described a novel hypothesis concerning the pathogenesis of uterine fibroids in mares, a disease that often leads to infertility; my findings have been detailed in more than 20 publications thus far. But another, no less important, effect of the project had to do with setting up an international team of early-stage researchers, who now continue our work under their own grants. Thanks to the project, foreign researchers from Europe, Japan and the US today represent 50% of my unit.*

**Prof. Dr hab. Dariusz Skarzyński**  
Institute of Animal Reproduction and Food Research, Polish Academy of Sciences, Olsztyn  
Winner of MAESTRO 1, and OPUS 2 and 15



*The MINIATURA grant allowed me to produce research materials, so-called tactile maps, which then enabled me to carry out a comparative study of how visually normal and impaired subjects scale these maps. I also established a cooperation with Dr Wenke Möhring from the University of Basel. Our pioneering (pilot) study of map scaling by visually normal people under different perceptual conditions laid the basis for the Polish-Swiss project “Spatial scaling in children and adults: the role of perceptual modality, visual experience and cognitive style”, which is funded by the NCN and the Swiss National Science Foundation (SNSF) and is currently underway within the framework of the ALPHORN call.*

**Dr Magdalena Szubielska**  
John Paul II Catholic University of Lublin  
Winner of MINIATURA 1 and ALPHORN



*Thanks to FUGA, I was able to learn about other researchers and their perspective on how to conduct research.*

*I improved my methodology and viewed my subject from another angle. Overall, changing the research environment did me a world of good.*

**Dr Katarzyna Cantarero**  
**SWPS University of Humanities**  
**and Social Sciences, Faculty of**  
**Psychology in Wrocław**  
**Winner of FUGA 4, PRELUDIUM 1**  
**and SONATA 14**

*Overall, changing the research environment did me a world of good.*

experts who review the proposals. Both the portfolio as such and the terms and conditions of individual calls are often modified. The HARMONIA and ETIUDA calls mentioned above, for instance, were subsumed under other NCN programmes. Another case in point is FUGA, which originally funded research fellowships at Polish research centres. Once the terms and conditions of the SONATINA call were drawn up, it turned out they largely overlapped with those of **FUGA**. At the same time, they offered more benefits, e.g. a longer funding period or an opportunity to go abroad. As a consequence, FUGA was discontinued after only **5 editions**. In total, **1107 proposals** were submitted to the call, out of which **276** received a total amount of **124.3 million PLN**.

One call that was eliminated from the NCN portfolio is **SYMFONIA**. It was intended to fund large interdisciplinary projects carried out by outstanding researchers who boldly cross the borders of scientific disciplines and open up new research perspectives. Four editions were organised, but because of reported difficulties in proposal preparation and review, the call was eventually suspended. The **four rounds** attracted **199 proposals**, **23** of which got funded with a total of nearly **120 million PLN**.

It is a source of great joy for us to see the great achievements of researchers supported by the NCN, as reflected by the rise in the quality of Polish research and the number of Polish publications in top research journals in the world.

The Council of the National Science Centre has defined 25 disciplines, or NCN panels, that cover all fields of research, ranging from the humanities and social sciences, through life sciences and medicine, all the way to physical sciences, engineering and earth science. Each call is open to proposals from all panels. Right from the get-go, the NCN decided to implement a bottom-up model, where it is the researchers themselves who define the subject matter of their projects,

while other researchers, in their capacity as experts, select proposals for funding based on the crucial criterion of research excellence.

The exceptional events of 2019 and 2020, related to the COVID-19 pandemic caused by the SARS-CoV-2 virus, impelled the NCN Council to announce a special call dedicated to this particular problem. The terms and conditions were drawn up very quickly, and on 30 March 2020, the NCN announced the **EXPRESS CALL TO FUND RESEARCH ON COVID-19**, with a submission deadline of just two weeks. The purpose of the call was to expand our knowledge of the mechanism of action of the SARS-CoV-2 virus, develop methods to diagnose, treat and prevent the disease, and study the social and psychological effects of the pandemic. Despite the short deadline, as many as **262 proposals** were filed. An equally fast peer review process, which still respected the high standards set by the NCN, allowed **19** projects to be selected, which were awarded c. **12 million PLN** in funding. In accordance with the call's terms and conditions, the results of the projects must be published in open access journals so that they may contribute to the global effort to rein in the pandemic and restore normality.

When working on call terms and conditions, the NCN Council introduced important changes into the Polish higher education system. One was to introduce the option to create full-time jobs and post-doc positions (for people up to 7 years after their PhD defence, who are selected in a competition to carry out project

*This was a fascinating adventure for us all, it's a pity that the call has been discontinued.*

tasks), which may be funded from the grant. The opportunity to hire post-docs is very beneficial not only for the post-docs themselves, but also for the research teams that they join. These researchers draw from the experience of the principal investigator and, at the same time, as qualified outsiders, bring a fresh perspective to the research problem.

Another important change came with NCN's accession to Plan S, which resulted in a requirement that NCN-funded research results should be made publicly available. Articles must now be submitted to open access journals and raw data obtained during the project must be published. This means that both the research community and the general public can enjoy access to publications that outline research results (more on p. 56-58).

## Joint grants in cooperation with the NCBR and NAWA

The National Science Centre also organises programmes in cooperation with other Polish and international research-funding institutions.

The origins of the first cooperation with a domestic institution, the National Centre for Research and Development (NCBR), go back to 2013. In order to provide for the carry-over from basic research to its implementation, the NCN and the NCBR joined hands to launch a joint TANGO call, under which principal investigators of NCN-funded projects can now submit R&D and implementation proposals, which originated during their basic research. This makes it possible to implement their results.



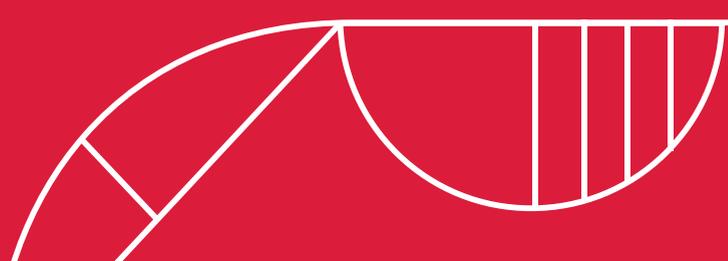
*I carried out an interdisciplinary SYMFONIA project in cooperation with Professor Joanna Trylska; the project allowed us to discover that vitamin B12 transports oligonucleotides with antibacterial properties into prokaryotic cells, but also changed my overall view of research conducted on the borderline between biology, physics, and chemistry. It also had a huge impact on the thinking of early-stage researchers, who got involved in interdisciplinary research right at the outset of their career and could expand their research horizons. This was a fascinating adventure for us all; it's a pity that the call has been discontinued.*

**Prof. Dr hab. Dorota Gryko**  
Institute of Organic Chemistry,  
Polish Academy of Sciences  
Winner of SYMFONIA 2, OPUS 4, 11, 18, 20 + LAP  
and MAESTRO 12



*The EXPRESS CALL TO FUND RESEARCH ON COVID-19 inspired us to develop a research plan firmly rooted in the scientific literature, but also with important political implications. This meant that our preliminary, partial results already got a lot of coverage in national media and were even discussed in German press and TV. The first of a series of articles based on our research project is currently under review in the prestigious "Proceedings of the National Academy of Sciences".*

**Dr hab. Michał Krawczyk,**  
Professor at Faculty of Economics,  
University of Warsaw  
Winner of EXPRESS CALL TO FUND RESEARCH  
ON COVID-19, SONATA 1, OPUS 7, and OPUS 14



Another domestic agency cooperating with the NCN is the National Agency for Academic Exchange (NAWA). The idea behind the partnership was to give researchers at all levels a much broader scope of opportunity in research activity. The two agencies agreed to contribute to the programme in a complementary manner: the NCN would provide funds for research, while the NAWA would sponsor mobility. The cooperation was meant to ensure a more coordinated and sustainable use of public resources. In September 2019, the two agencies signed an agreement, in which they committed themselves to creating joint funding instruments and other mechanisms to ensure research continuity, as well as support mobility, internationalisation and the promotion of Polish science. The call portfolios of the two agencies were to complement each other.

Today, the cooperation between the NCN and the NAWA is conducted within the framework of:

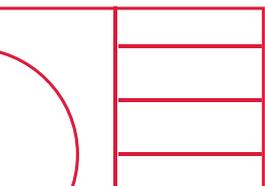
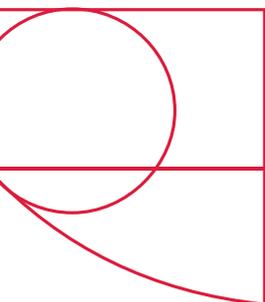
- the PRELUDIUM BIS call, targeted at experienced researchers planning to take PhD students under their wing (more about the call on p. 23);
- the Polish Returns call (starting from the third edition), targeted at Polish researchers working abroad, who wish to come back to Poland and work in Polish research centres;
- NAWA Chair programme, which allows universities and research institutions to invite eminent specialists from their priority fields;
- the Covid-19 edition of the Polish Returns call, which allows Polish research institutions to hire Polish researchers who are currently employed abroad and whose research could contribute to expanding our knowledge of the SARS-CoV-2 virus and solving major problems related to the Covid-19 pandemic.

Under these calls, the NAWA covers the costs of employment for researchers and project team members, their adaptation, workplace organisation and relocation to Poland. The NCN funds the so-called research components carried out in the first 18 months from the

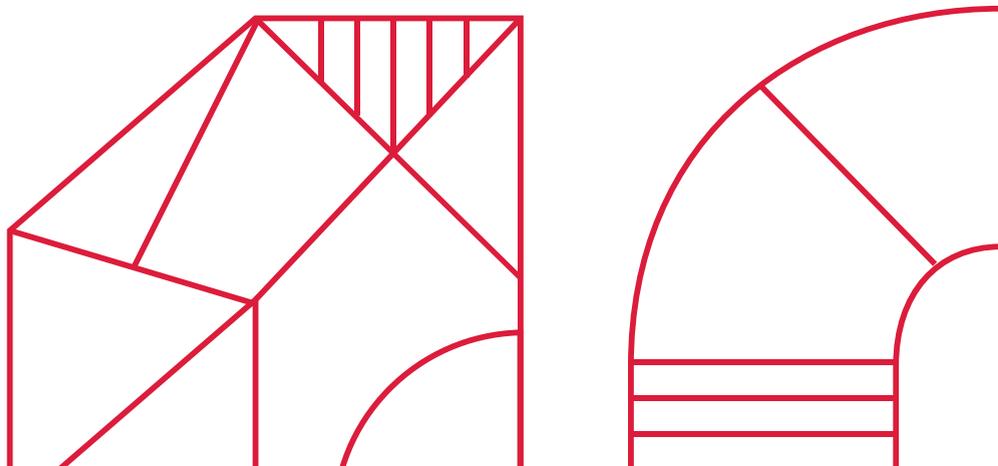
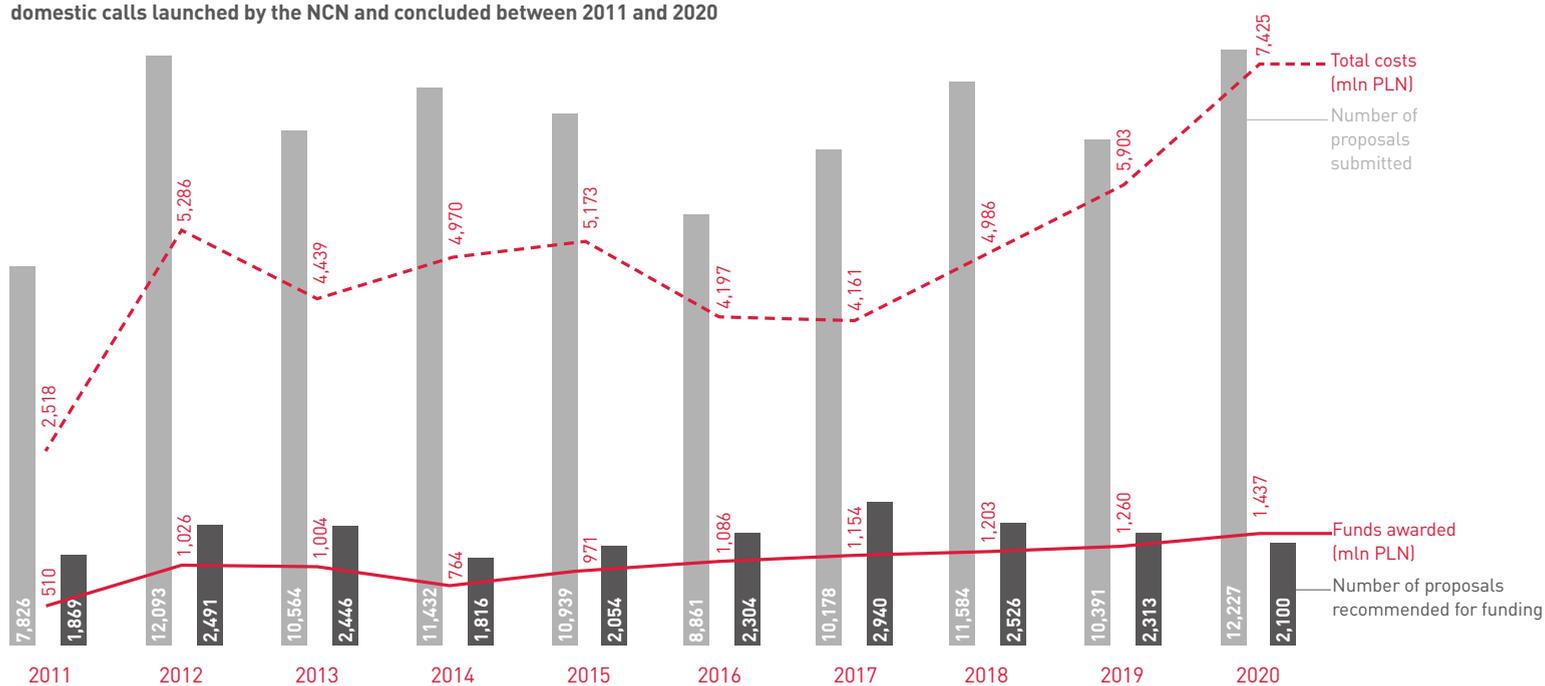
project start date. The funding covers basic research, which can then be continued in the framework of larger research projects.

Through its comprehensive call portfolio and cooperation with other agencies, the National Science Centre creates excellent conditions for Poland-based researchers to carry out their research projects, and thus contributes to a steady rise in the quality of Polish research.

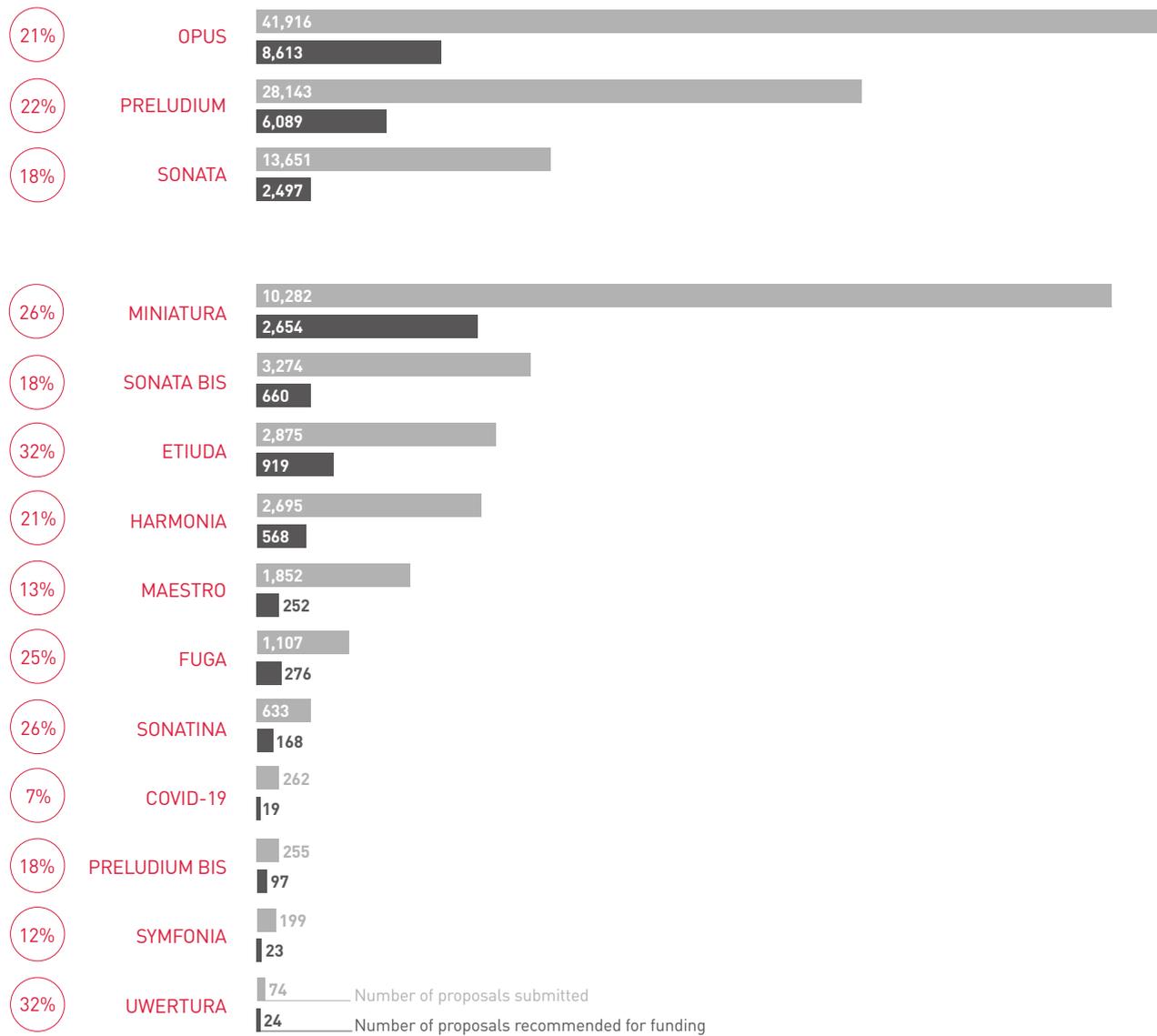
**Dr Marcin Liana**



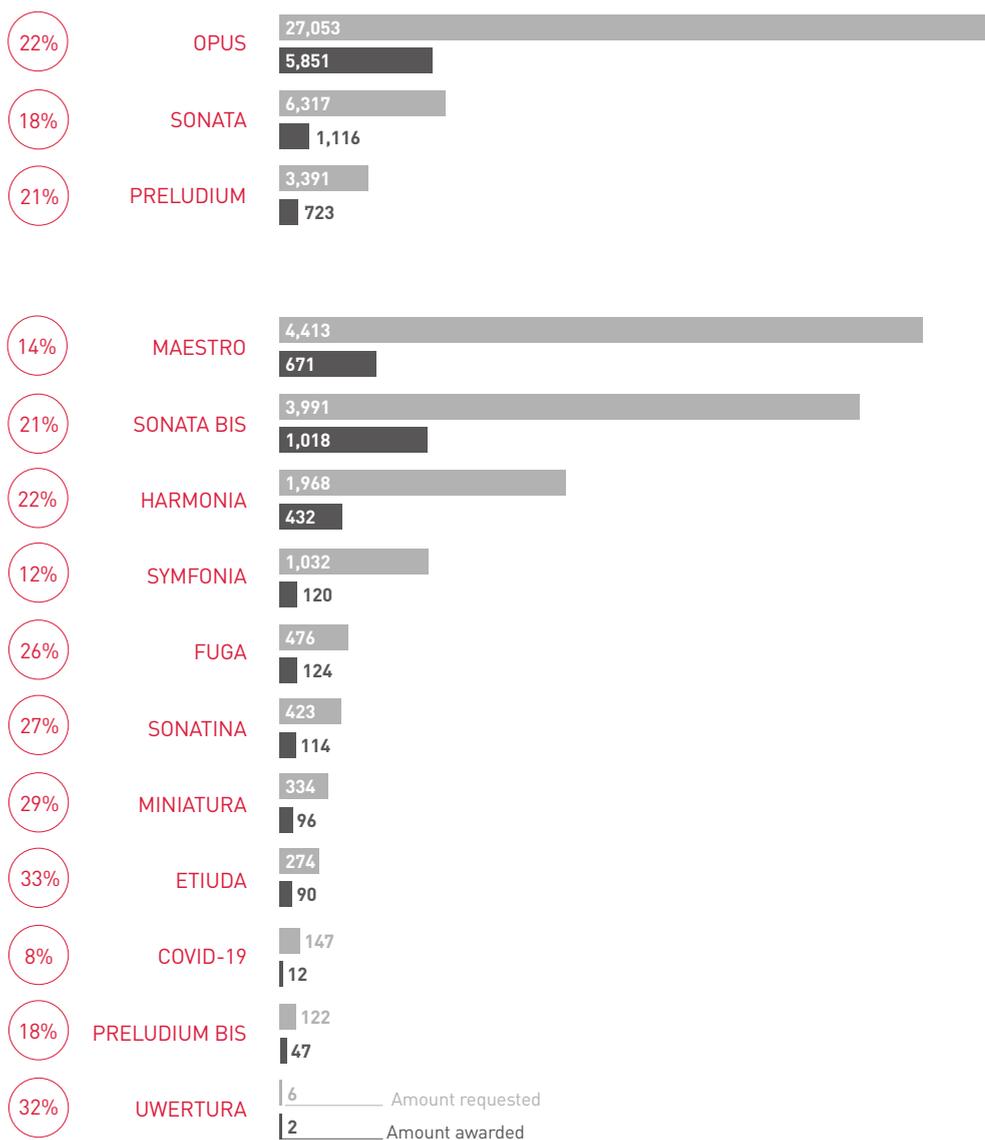
**Fig. 1. Number and financial value of proposals submitted and recommended for funding under domestic calls launched by the NCN and concluded between 2011 and 2020**



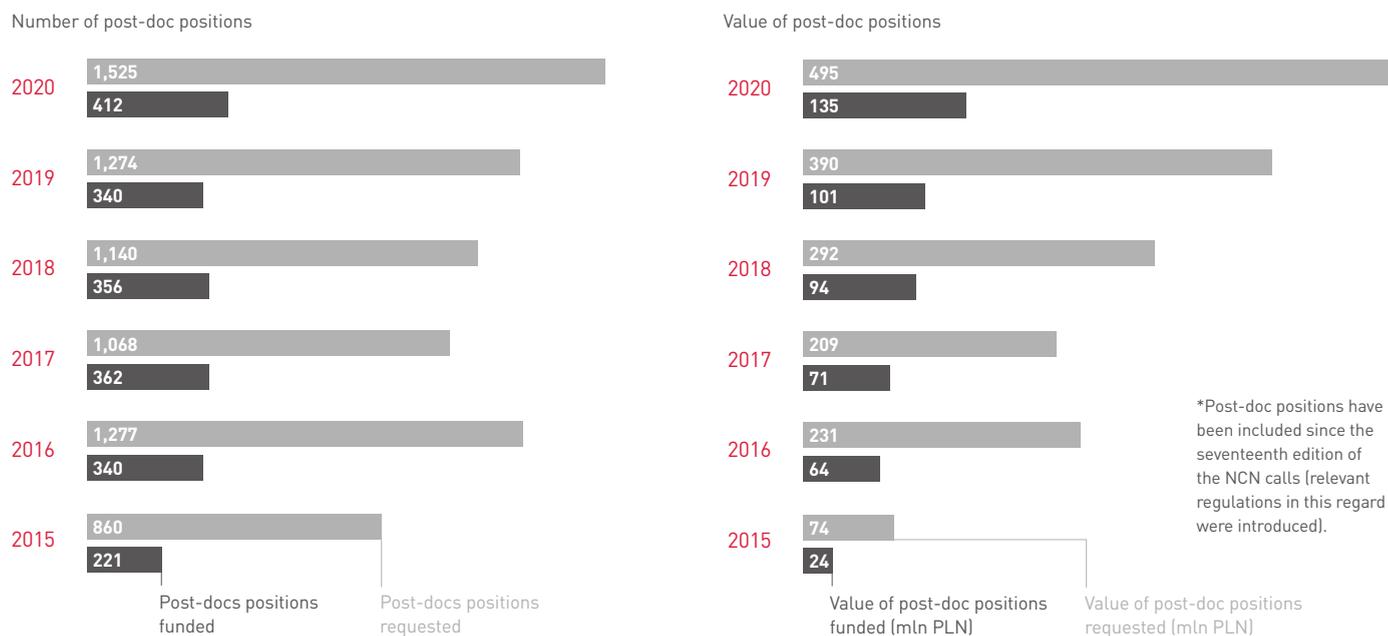
**Fig. 2. Total budget of proposals submitted and qualified for funding under NCN calls in 2011-2020, along with the numerical success rate**



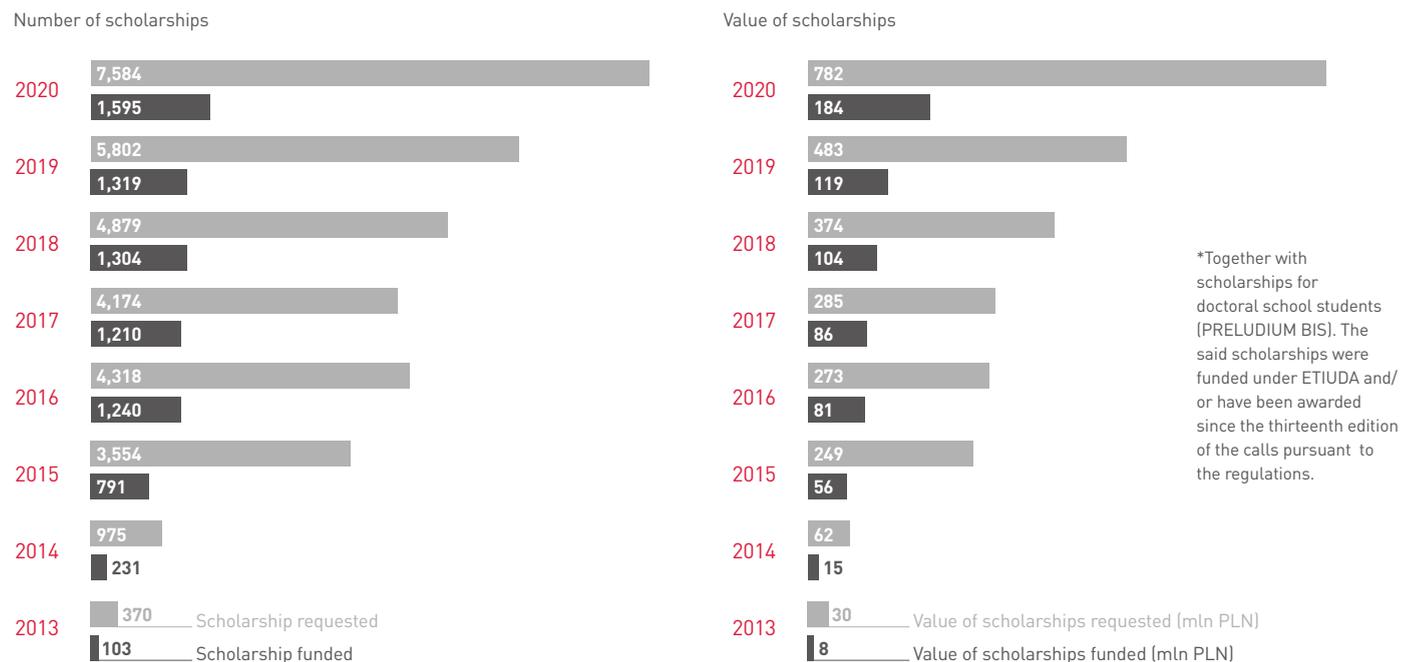
**Fig. 3.** Total budget of proposals submitted and qualified for funding under NCN calls in 2011-2020, along with the financial success rate



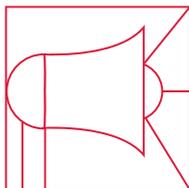
**Fig. 4. Number and total budget of post-doc\* positions applied for and funded under NCN calls**



**Fig. 5. Number and total budget of scholarships\* applied for and funded under NCN calls\***



## Domestic calls 2011-2020\*



**125**

calls launched



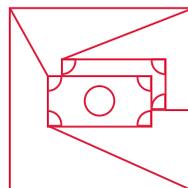
**114**

calls concluded\*\*



**22,859**

grants awarded



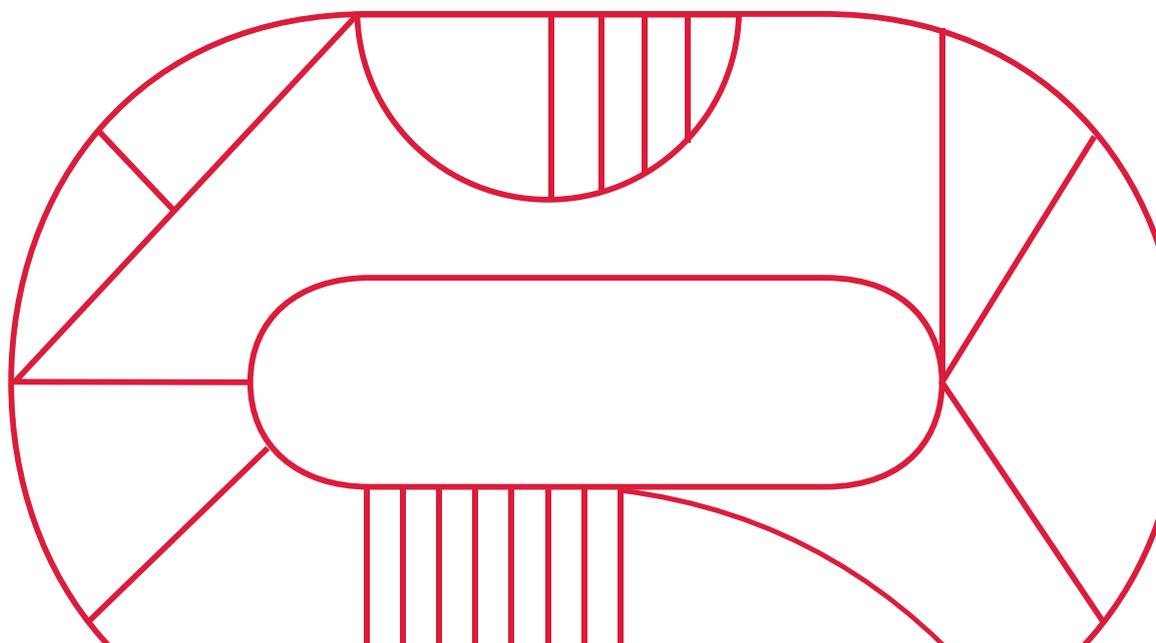
**10.42**

billion PLN

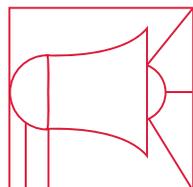
funds awarded  
(according to  
decisions)

\* The data correspond to domestic calls currently offered by the NCN, as well as suspended calls.

\*\* The figure does not include TANGO calls concluded by the National Centre for Research and Development and calls launched jointly with Polish National Agency for Academic Exchange NAWA.

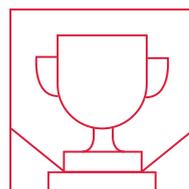


## International calls 2011-2020 \*



**75**

calls launched



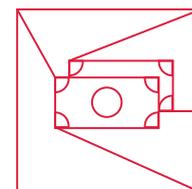
**67**

calls concluded



**436**

grants awarded



**543.98**

million PLN

funds awarded  
(according to  
decisions)\*\*

\* The data correspond to bilateral and multilateral calls organized within the framework of international cooperation, the POLONEZ call co-funded within the „Horizon 2020” EU Framework Programme for Research and Innovation under the „Marie Skłodowska-Curie” grant agreement no. 665778, calls within the framework of the EEA and Norway Grant and DIOSCURI call.

\*\* The figure includes the contribution of the NCN, the funds provided by the European Commission and grants awarded under DIOSCURI call.



Funded under the "Horizon 2020" EU Framework Programme for Research and Innovation: CHIST-ERA IV – grant agreement no 857925, JPcofuND2 – grant agreement no 825664, BiodivRestore – grant agreement no 101003777; CHANSE – grant agreement no 101004509, EN-UTC – grant agreement no 101003758, JPIAMR-ACTION – grant agreement no 963864; M-ERA.NET 3 – grant agreement no 958174, QuantERA II – grant agreement no 101017733, ForestValue – grant agreement no 773324, POLONEZ BIS – grant agreement no 945339.

# NCN's priority: the internationalisation of Polish research

Ever since its foundation, the National Science Centre has made it part of its mission to establish and develop all kinds of international cooperation, so as to successfully support research projects conducted by Polish teams together with foreign partners and boost the global importance of Polish research. In the first 10 years of its existence, the NCN has shown impressive involvement in various international initiatives. In 2011, we only offered one call open to international projects, HARMONIA, in which foreign partners had to secure their own funding independently. This year, we are coordinating as many as five large programmes co-funded under the Horizon 2020 – EU Framework Programme for Research and Innovation. We are part of more than 20 initiatives carried out by European networks of research-funding institutions, often in collaboration with partners from all over the world, and operate the Basic Research Programme under the EEA and Norway Grants. We also announce regular bilateral calls, in accordance with terms and conditions developed together with our partner agencies. In 2020, international project funding was permanently included in our regular activities. We opened our largest call, OPUS, to proposals prepared in partnership with foreign teams, which can now receive funding from their respective national agencies provided that they pass a merit-based evaluation by NCN experts. The great success we experience today is the result of several fundamental factors that deserve to be mentioned as we celebrate the tenth anniversary of the National Science Centre.

## Internationalisation – a strategic goal

Successive members of the NCN Council, as well as NCN Directors, have prioritised measures that seek to internationalize research conducted by Polish institutions. To this end, they have worked to forge cooperation with other agencies and announce joint calls open to teams from Poland and beyond. This goal is also promoted by hiring an increasing number of foreign experts to perform the peer review of proposals submitted under NCN calls (see p. 48-55).

The NCN has earned its image as a reliable partner by getting actively involved in projects championed by Science Europe, which brings together different European organisations specialised in funding and conducting research; another contributing factor has had to do with the appointment of several NCN directors to the management board of the association.

## Boldness and persistence in the face of challenge

The basic factor that allowed the NCN to develop its links of international cooperation was our readiness to take risks and participate in new, ambitious projects based on mechanisms that had never before been implemented in Poland or had only been used on a much smaller scale. Importantly, the leadership of the NCN

Conference to promote the Basic Research Programme under the third edition of the EEA and Norway Grants, 17 June 2021. Due to the COVID-19 pandemic, the event was held online.

**Photo by Michał Łepecki.**



Launch of the first two Dioscuri Centres at the Nencki Institute of Experimental Biology in Warsaw. On the photo: Aleksandra Pękowska.

**Photo by Agnieszka Ziobro, Nencki Institute of Experimental Biology.**



Network representatives  
meeting the winners  
of the QuantERA Call 2017,  
Bucharest,  
24 and 25 April 2018



The Second Polish-  
-German Science Meeting,  
26 and 27 February 2019.  
Photo by Michał Niewdana/NCN.



*As a winner of several NCN calls, I was able to complete interesting, but also expensive research that I would have never been able to carry out without external financial support. This support allowed me to develop and modernize research at the Department of General Biophysics of the University of Łódź, become a more attractive partner for foreign teams, exchange know-how with international partners and use their equipment and, above all, cement and intensify staff exchange, which is especially valuable for early-stage researchers, PhD students and the students of the Department. Being able to complete my research also allowed me to apply for more grants based on the international contacts I had forged, continued and expanded, as well as to publish many excellent articles in leading research journals.*

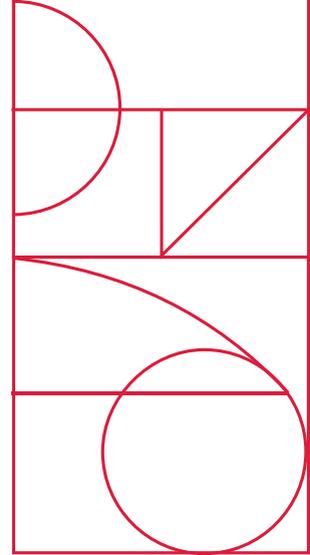
**Prof. Dr hab. Maria Bryszewska**  
**University of Łódź**  
**Winner of M-ERA, HARMONIA 2,**  
**BEETHOVEN LIFE 1, and OPUS 1**

has always firmly believed in the value of internationalisation as a way to enhance research quality in our country. The strength of the NCN, which flows from the energy of its staff and their sense of mission, as well as their joy in creating a new organisation, has allowed us to blaze new trails and acquire valuable experience along the way. Over several years, we have joined hands with a wide group of partners to launch a number of initiatives that require great commitment and an ability to quickly acquire new skills.

## EU-funded programmes

A programme that deserves a special mention in this context is QuantERA, an initiative coordinated by the National Science Centre that, as of today, brings together 39 organisations from 31 countries, all of which fund research in quantum technologies. The NCN has won two grants to the total sum of 26.5 million euro from the European Commission to carry out projects such as ERA-Net, aimed at supporting the activities of the network, and especially to launch joint grant calls. The total budget of the programme equals 85 million euro, 95% of which is slated by the Commission and the agencies for funding international research projects in quantum technologies. The rest of the budget goes toward the coordination of their activities, as well as additional tasks that build on European research potential, such as drawing a map of programmes that fund quantum technology research across Europe, monitoring public policies in the area, and formulating guidelines on ethical and responsible research and innovation. During a conference held to inaugurate EU's Horizon Europe Framework Programme for 2021-2027 in April 2021, Julien Guerrier, Director of the Common Policy Centre at the Directorate-General for Research and Innovation of the European Commission, mentioned QuantERA as an example of a Polish achievement in Horizon 2020.

*Being able to complete my research also allowed me to apply for more grants based on the international contacts I had forged, continued and expanded (...).*



Importantly, efforts to build the QuantERA network began only three years after the NCN opened. It was not long before we submitted our first successful proposal to secure funds for the initiative. Thanks to the next grant, which we won in 2020, the activity of the network has become a permanent fixture in the EU's strategic programme, *Quantum Flagship*, which, with a subsidy of a billion euro (2018-2028), is designed to turn Europe into a leader in this research area and attract innovation and investment in the field. The NCN is also involved in InCoQFlag, a project that also forms part of the flagship programme and focuses on identifying possible new areas of cooperation between Europe and partners from other continents.

In 2021, the experience we had gained in building, consolidating and expanding the QuantERA network allowed us to take on a new challenge and coordinate yet another programme of the ERA-Net type. CHANSE (Collaboration in Humanities and Social Sciences in Europe) emerged as an initiative founded by two research-funding organisation networks: HERA (specialised in the humanities) and NORFACE (specialised in the social sciences). HERA was the first network of this type; the NCN joined in its activities in 2011, followed by NORFACE a year later. Today, the trust our partners have put in us allows us not only to coordinate the activities of the consortium, but also carry out the peer review proposals submitted to the first call devoted to the social and cultural dynamics of the digital era, which will be concluded in 2022.

In highlighting the achievements of the NCN in the European grant system, it is important to emphasise one more element, which ranks us fourth among the Polish institutions in terms of the amount of funding obtained under Horizon 2020: our resilience and resistance to failure. From the perspective of 2021, a year in which we have launched three new programmes based on grant agreements that subsidise the NCN with a total of nearly 34 million euro, the history of the NCN may look like a long,

uninterrupted streak of successes. However, the first proposal we submitted in 2012 under the Horizon 2020 programme – Marie Skłodowska-Curie Actions COFUND (MSCA) – was rejected. We modified it based on the reviewers' feedback and finally secured the grant, which, in 2015, allowed us to launch POLONEZ, a programme targeted at international researchers who wanted to carry out their research projects in Poland. Encouraged by this success, in 2017, we applied for more funds from the same source to continue the programme, but our project failed to make the cut and was not included in the list of recommended initiatives. It came as a solace to know that we had lost out in a fierce competition with other European institutions. However, we soon returned to the drawing board and rewrote our project until, in 2020, we finally received a new MSCA grant.

## Cooperation with the Max Planck Society

Among the initiatives carried out by the NCN, a special place is taken by the DIOSCURI programme, aimed at creating Centres of Scientific Excellence, which was established on the initiative of the Max Planck Society (Max-Planck-Gesellschaft, MPG), in cooperation with the NCN. DIOSCURI has always been a priority of the NCN, the fruit of cooperation between the Polish and the German institution, as well as the respective ministries of the two countries. Its objective is to support high-quality basic research in Central and Eastern Europe.

The initiative is funded on a complementary basis by the Polish Ministry of Education and Science and the German Federal Ministry of Education and Research. The MPG and the NCN have worked together to draw up the terms and conditions of the call and continue to cooperate in the exchange of good practices in terms of research evaluation standards.

Once they have chosen a Polish host institution, the



*Participating in QuantERA 1 within the framework of the QTFLAG (Quantum Technologies for Lattice Gauge theories) project allowed me to tighten my cooperation with leading European groups in the field. Direct contacts helped speed up my progress and the opportunity to recruit brilliant researchers from other centres directly contributed to what I not so humbly consider as my significant results in the project.*

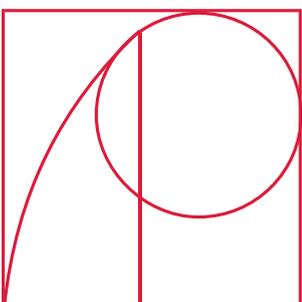
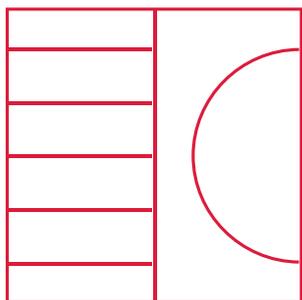
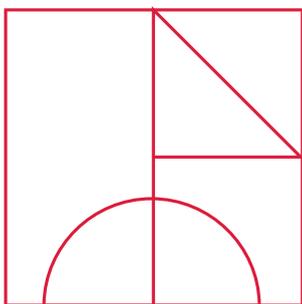
**Prof. Dr hab. Jakub Zakrzewski**  
**Jagiellonian University**  
**Winner of QuantERA, HARMONIA 2,**  
**OPUS 1, OPUS 18**

leaders of Dioscuri centres, regardless of their previous affiliation and nationality, transfer the centre of their research to Poland; at the same time, they must collaborate with a prominent research partner from Germany. This model ensures the integration of the NCN and its team with research networks and encourages Polish research centres to deepen and expand their international cooperation links.

Thanks to the DIOSCURI programme, which draws on our 10 years of experience, we are able to offer a stimulating package for innovative research projects: significant financial support, decision-making leeway and freedom for brilliant Dioscuri Centre leaders, as well as the rich infrastructure of Polish research institutions, which provide them with their resources, offering not only a financial contribution but also a constructive environment in which to conduct the very best research projects.

On the one hand, the formula of the programme is designed to support research in Central and Eastern Europe by promoting outstanding researchers; on the other, its bottom-up strategy creates an opportunity to develop the most future-oriented research areas, promote international standards of scientific excellence and strengthen the European Research Area.

The three DIOSCURI calls we have carried out thus far have selected five out of the total of ten Dioscuri centres envisioned by the programme. The centres were established at Polish research institutions and conduct research in the most innovative areas of the life sciences, physical sciences and engineering. The NCN and the MPG happily look forward to future joint calls, new Dioscuri Centres of Scientific Excellence in all fields of basic research, as well the fruits of their labours.



## EEA and Norway Grants

Another important challenge faced by the NCN was to obtain funding under the EEA and Norway Grants, for which it applied in 2017 with the assistance of the Ministry of Science and Higher Education. Consistent measures, together with arguments about the need to enhance the quality of Polish research and further its internationalisation, led to the appointment of the NCN as the operator of the Research Programme. International agreements between Poland and the donor countries (Norway, Iceland, Liechtenstein) were signed in 2017. With a budget of 110 million euro, 48.77 million of which are slated for basic research, the Research Programme is the second largest in terms of funding among all the eleven programmes under the 3rd edition of the EEA and Norway Grants. Its purpose is to fund excellent research projects from all areas of science, with a special emphasis on polar research and social sciences. In cooperation with the Norwegian partner of the Research Programme, the Research Council of Norway (Norges forskningsråd, RCN), we have worked to promote early-stage researchers and ensure gender parity in all disciplines of science.

## Cooperating with experienced partners and adopting good practices

We would not have been able to grow and succeed had we not sought inspiration in models that had been previously tried and tested both on the European level and in different countries with more mature and advanced systems of funding research and innovation. The Max Planck Society was just one of many major institutions that allowed us to draw from their experience and hone our procedures and call conditions in the process of designing joint initiatives.

In 2010 and 2011, as we laid the foundations for the NCN, a key role in our growth was played by the European Research Council (ERC). From the first call onward, we modelled our proposal review procedure on that used in the ERC, introducing a standard hitherto unknown in the Polish research-funding system. Between 2011 and 2013, NCN staff travelled to Brussels to take part in ERC courses and workshops. Since 2012, we have also enjoyed the privilege of drawing on the experience of other research-funding agencies in Poland and beyond thanks to trainings, study visits and fellowships organised by the Foundation for Polish Science with the resources of the European Social Fund.

In parallel, we have learned the forms and principles of international cooperation, joining in as partners in new initiatives, especially those advanced by networks of institutions that announced joint calls for research proposals. Initially, our contribution to these programmes was limited to funding research carried out by Polish teams within the framework of international projects. Over time, however, we began to get increasingly involved with these consortia; we organised meetings and workshops in Kraków, promoted their programmes to potential new network members, ensured the operation of the secretariat of international calls and organised the sessions of expert teams. This growing involvement, which has facilitated closer collaboration with the most experienced European agencies, has allowed us, step by step, to gain the skills that today enable us to rise to the challenge of coordinating initiatives such as CHANSE and QuantERA.

Science Europe, an initiative that brings together 38 research-funding organisations from 28 countries, has served as an invaluable platform for the exchange

of knowledge and good practices; the NCN has been a member since 2012. In 2014, we had the pleasure of hosting the General Assembly of the association in Kraków, which allowed us to present the NCN as an active member committed to its further growth and activity. As mentioned before, NCN Directors were involved in the management board until 2014, but NCN representatives also sit on the working groups of the association. Thus far, we have joined teams focused on initiatives conducted in partnership with non-European countries, as well as research careers, peer review, research-funding programmes and their evaluation, research infrastructure, and open access to science. In the future, we are planning to work in more groups, which would take up the questions of research culture in the broadest sense, tackle communication and promotion, as well as climate action. Thanks to this activity, we have been able to maintain close contacts with other agencies and regularly exchange experiences and specific solutions.

Apart from cooperation with other similar agencies, a key role in the growth of the NCN has been played by its ongoing dialogue with the research community in Poland and Europe. The QuantERA network, for instance, was established on the popular initiative of researchers, who turned to the National Science Centre as a potential coordinator of the enterprise, and then, in tandem with the NCN, applied for funding from the resources of the framework programme of the European Commission. If it hadn't been for the huge commitment, motivation and resolve of our researchers, who held out through the long years of preparing the programme's launch, as well as their cooperation with the NCN, we would not be celebrating the success of QuantERA today. A similar scenario of consultations with stakeholders from the research community, business people interested in



*Thanks to the DIOSCURI programme, I was able to return to Poland after more than 15 years abroad; the funding offered to my group means that I can continue my research in an international environment and maintain my previous forms of cooperation. In addition, the establishment of the Scientific Advisory Board (SAB) at my centre has provided us not only with merit-based support, but will also contribute to strengthening international science exchange, creating a broader contact network and increasing the visibility of our group.*

**Dr Grzegorz Sumara**  
**Marceli Nencki Institute of Experimental Biology, Polish Academy of Sciences**  
**Winner of DIOSCURI 1 and SONATA BIS 10**



*The funds I received under the GRIEG and OPUS schemes allowed me to set up a new research team composed of scientists from Poland and beyond. I was also able to purchase equipment such as a high-performance computer system, which enabled me to expand the scope of research methodologies that we could use. We have now become a centre that attracts international collaborators for more and more new research projects. There is not enough time in a week to carry out all the research we would like.*

**Dr hab. Konrad Talmont-Kamiński,**  
professor at the University of Białystok  
Winner of GRIEG, HARMONIA 2 and  
OPUS 14

implementing research results, NGOs and the administration, played out in the process of creating the conceptual basis of the Basic Research programme, funded from the resources of the EEA and Norway Grants. This dialogue, inspired and amiably supported by the Research Council of Norway, allowed us to clearly define the expectations and needs of early-stage researchers and pay close attention to the questions of researcher mobility, cooperation between science, business and administration, as well as the social importance of research.

## Openness to new forms of cooperation

Because we are open to new forms of cooperation and flexible in our grant process, we have often been able to quickly and effectively establish collaboration with new partners and launch many projects, while maintaining the most stringent standards of peer review.

We have already briefly mentioned several programmes operated by networks of agencies committed to funding research in a selected field. The NCN coordinates initiatives such as QuantERA and CHANSE, and actively participates in networks focused on biodiversity, the development of cities and urbanised areas, forestry, neurodegenerative diseases, antibiotic resistance, IT and communication technologies, materials science, photochemical processes in sunlight and many other subjects. A total of around 100 projects conducted by partners supported by the NCN have been qualified in calls organised by such networks. The procedural framework of multilateral calls has been largely laid down by the grant agreement signed with the European Commission. Bilateral calls, on the other hand, are much more diverse in terms of their selection and assessment processes. The first bilateral agreement, signed by the NCN in 2014 with a German agency, Deutsche Forschungsgemeinschaft

(DFG), resulted in the creation of the BEETHOVEN call, which has already been organised four times as a joint call, based on the selection and evaluation criteria developed by the two agencies and implemented by a jointly appointed Polish-German expert team.

We organised the first call under DAINA, a Polish-Lithuanian programme organised in partnership with Lietuvos mokslo taryba (LMT), in a similar way in 2017. The second time around, however, in 2020, we introduced a new parallel evaluation procedure, first employed in the Polish-Chinese SHENG programme, organised together with the National Natural Science Foundation of China (NSFC) two years earlier. In both programmes, evaluation is performed independently in each agency, and funding goes to the top projects on the ranking lists drawn up by both institutions.

Announced in 2019 and funded from Norway Funds, the GRIEG call for bilateral Polish-Norwegian projects, on the other hand, was based on the principles defined in the call documents prepared in accordance with the Regulations on the implementation of the Norwegian Financial Mechanism 2014-2021, along with other guidelines specified by the donors. From the start, our cooperation with Austria relied on the Lead Agency Procedure (LAP); the same was true for the ALPHORN call, announced in the same year, in which Polish-Swiss projects were evaluated by the Swiss National Science Foundation (SNSF).

The Lead Agency Procedure relies on domestic calls, launched by the cooperating institutions, to assess international projects. Proposals undergo merit-based evaluation in only one institution, known as the lead agency, appropriate for one of the partner teams in the project, and compete against other proposals submitted under the call, which are not international in nature. In 2020, the LAP procedure was also used for multilateral cooperation under the Central European Science Partnership (CEUS), joined by the NCN, as well as agencies

from Austria (FWF), Czech Republic (GACR), and Slovenia (ARRS). The procedure is also employed by the Weave initiative, launched in 2021 with the support of Science Europe, within the framework of which we will now cooperate with most of our partners. From 2020 onward, the autumn edition of the OPUS call has also been open to international proposals. The Weave initiative, like the CEUS previously, allows projects that involve teams from two or three different countries to be carried out.

We have also worked with an innovative solution designed to develop and evaluate ground-breaking, socially important research projects funded from the EEA Financial Mechanism 2014-2020 through the IdeaLab call. In cooperation with the NCN Council, the Programme Board has defined the subject theme, "Managing Threats"; the projects were prepared in accordance with the sandpit formula developed by the UK's *Engineering and Physical Sciences Research Council* and implemented by the Research Council of Norway under the name of Idélab. During a five-day workshop, participants, who represented research institutions, NGOs and other public and private organisations, came up with research ideas, which were then assessed by dedicated mentors. The highest-rated project teams submitted full-length proposals, from among which three Polish-Norwegian interdisciplinary projects were selected for funding by the Programme Board.

## Successfully attracting talent

A *sine qua non* of the growth of Polish science is to have talented researchers in domestic institutions. At the same time, there is so much global competition for talent that many Polish scientists decide to work abroad. We have been trying to counteract the effects of this brain drain by offering good conditions to foreign and Polish researchers who wish to do research in Poland. Hosting foreign researchers may serve as a stepping-stone to further cooperation with their future research institutions abroad. These scientists, however, may also decide to stay in Poland and take advantage of the offer of other Polish granting agencies.

With that in mind, in 2015, the NCN launched the POLONEZ programme, co-funded from the Marie Skłodowska-Curie Actions (MSCA), which made it possible for 109 researchers to undertake projects in Poland in 2016-2021. Thirty-eight of these have later gone on to win other NCN calls open to international researchers regardless of origin and citizenship. Thirty-nine more have obtained a total of 7 million euro in funding from the Norwegian Financial Mechanism within the framework of the POLS call, the results of which were announced in December 2020. It is worth noting that even though the call was held during the pandemic, it attracted proposals from as many as 99 researchers from Europe, Asia and Africa, and their research quality was very high, as emphasised by the experts and the Programme Board alike. In the autumn of 2021, on the other hand, we will begin to accept proposals under POLONEZ BIS, the budget of which will be enough to invite 120 researchers to work at Polish research institutions. Not unlike the beneficiaries of the first round of the programme, the winners of POLONEZ BIS will benefit not only from an opportunity



*The NCN projects funded under calls for early-stage researchers allowed me to achieve independence, develop my own research interests and cooperation with researchers at home and abroad. Now, the time has come for another grant – an international project which, I hope, will let me draw upon the experience of my Lithuanian partner. I am convinced that our collaboration will lead to high-quality research.*

**Dr hab. Emilia Witkowska**  
**Institute of Physics, Polish Academy of Sciences**  
**Winner of DAINA 2, SONATA 2, SONATA BIS 5, PRELUDIUM BIS 1**

*Without POLONEZ, I would find it more difficult to prove myself, get an opportunity to set up my own laboratory (the Emotion Cognition Lab) and take on the role of director at the Department of Psychology.*

to conduct two-year research projects in Poland, but also from a rich agenda of courses and secondments.

Importantly, it is thanks to POLONEZ and POLONEZ BIS that we have obtained the largest sums for Polish centres under the Horizon 2020 programme (the total EU funds awarded to both programmes equalled more than 13 million euro). We also support researchers arriving in Poland through programmes organised in cooperation with the National Agency for Academic Exchange. These include Polish Returns and the NAWA Chair programme (see p. 30).

## Research policy involvement

An important part of our mission is to influence the research policy developed on an international level. The NCN Director attends the annual meetings of the Global Research Council, during which leaders of research-funding agencies from all over the world debate issues of key importance for the entire research community. Participation in events such as the World Science Forum or Science and Technology Forum also allows the NCN management to join in the global research policy discussion.

Science Europe, however, is the most important arena of our activities; the NCN Director sits on its management board, while other representatives of the NCN have joined its working groups in order to help formulate recommendations and develop the standards promoted by the association. The debates devoted to research integrity, in which we took an active part, have laid the foundations for the ethical principles implemented by our centre. Today, the NCN is also a member of the European Network of Research Integrity Offices.

Another working group of Science Europe that involved NCN representatives focused on the issue of

open access to research data and drew up an exhaustive list of recommendations now adopted as a golden standard by most of its member organisations. We have also actively joined in the activities of cOAlition S, aimed at ensuring open access to research publications, set up by some of the member organisations of Science Europe, including the NCN (see: p. 56-58).

In the Science Europe group delegated to address the issues of framework programmes, we comment on and help create the theoretical underpinnings and practical principles of programmes such as Horizon 2020 or Horizon Europe from the perspective of the *widening countries*, i.e. a group of countries where the Composite Indicator of Research Excellence is lower than 70% of the EU average. At the moment, the group includes the EU-13 countries, Portugal, Greece and the 12 associated countries that are not yet member states of the EU.

It is also worth mentioning the forum of Polish-German dialogue founded by the NCN, the Foundation for Polish Science, and Deutsche Forschungsgemeinschaft, as a regular Polish-German Science Meeting (PGSM), which provides an opportunity to hold an in-depth debate on issues important for the Polish and the German research communities. The PGSM serves as a platform where research-funding agencies can meet university officials and representatives from the key research organisations of both countries.

Also important for Poland and other countries with less mature research-funding systems are other initiatives aimed at reducing disproportions in the use of framework programme resources by their dominant beneficiaries and those who fare worse in the European competition. With that in mind, we joined the ERA-LEARN programme. Our task is to promote a broader and more active participation of research-funding institutions from the *widening countries* in European partnerships funded from EU resources.

The NCN's involvement has allowed us to create a catalogue of good practices and recommendations concerning specific procedures that could help activate communities inside the *widening countries*.

As a still young granting agency, the NCN is actively looking for new cooperation opportunities and falls back on the contacts it has established over the past 10 years to enable Polish researchers to exchange ideas with foreign partners. The result is a sizable group of more than 400 projects conducted by the winners of international calls co-organised by the NCN, which provide new knowledge and are promoted in the international arena, both in the academia and among the general public.

Justyna Woźniakowska,  
Dr Marzena Oliwkiewicz-Mikłasińska,  
Dr Małgorzata Jacobs-Kozyra



*The first project I completed thanks to the NCN was POLONEZ 2. This incredibly valuable experience allowed me to use the contacts I had established during my time at the University of Lille, sound out the Polish research community and find Polish partners which, in the end, made me decide to stay and continue my research at the institution where I carried out my project – the SWPS University of Humanities and Social Sciences. Without POLONEZ, I would find it more difficult to prove myself, get an opportunity to set up my own laboratory (the Emotion Cognition Lab) and take on the role of director at the Department of Psychology. Importantly, the secondments I completed within the framework of the project allowed me to establish international cooperation not only with academic partners, but also the business community. The experience and research results of my POLONEZ project also helped me continue my research thanks to a new grant I won under another NCN call, SONATA 15, this time in partnership with the University of Grenoble, and to further expand*

*my international network thanks to the funding acquired from the National Agency for Academic Exchange.*

**Dr Monika Kornacka**  
**SWPS University of Humanities and Social Sciences, Faculty of Psychology in Katowice**  
**Winner of POLONEZ 2 and SONATA 15**



# Proposal review procedure and experts

*Importantly, the research track record of the principal investigator is evaluated with merit-based, rather than quantitative, criteria.*

From the very outset, we have implemented a system of peer review, in which proposals submitted by researchers are evaluated by other members of the research community. Over the last 10 years, the NCN has changed its call portfolio, its proposal forms and the scope of merit-based evaluation, but the peer review procedure as such has remained intact. The proposals are evaluated by both Polish and international experts and reviewers.

Experts are appointed by the NCN Council. The process begins after the end of the call's proposal submission period. Candidates are selected in a way that ensures their research interests match the subject matter of proposals submitted under each panel. Before they qualify, their overall research record is assessed, including their experience in research projects and on other peer review bodies. Anyone who takes on the role of principal investigator, research supervisor, or research team member in a given call cannot serve as an expert. Likewise, experts cannot join the team if a family member of theirs has submitted a proposal under the call in question.

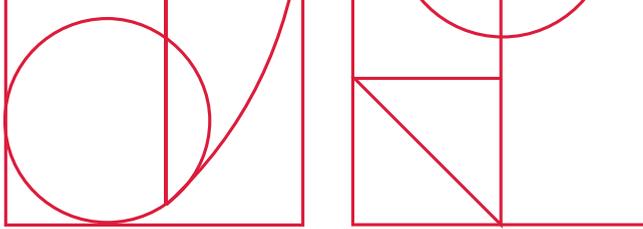
Experts are put in charge of evaluating a group of proposals in a given call and panel, e.g. OPUS 21 ST9 *Astronomy and Space Research*. In some calls, such as SONATA BIS or MAESTRO, they may form so-called super-panels that encompass proposals from broader research fields, e.g. HS (Arts, Humanities and Social Sciences). Any one expert can join the team in no more than three consecutive calls of the same type

(e.g. OPUS 17, OPUS 18, OPUS 19). In addition, in any two-year period, they can only be appointed to a maximum of five expert teams.

The expert team is headed by the chairman, whose fundamental role is to assign the proposals to be reviewed by each expert and then conduct the team's sessions. The chairman also decides whether an additional evaluation is required for interdisciplinary proposals.

Proposal review is divided into two stages. Initially, experts receive a pool of proposals, which they are asked to evaluate individually. Each proposal is evaluated by two different experts. At this stage, experts do not know who else is on the team; the identity of the other peer reviewer assigned to the same proposal is also not revealed. Only the name of the chairman is made public.

In all calls, no matter their type, experts assess the same aspects of the proposal: its research quality (the innovative nature of the project and its potential impact on the research discipline, its research plan and feasibility), the research track record of the principal investigator, the composition of the research team and the budget. The relative importance of these criteria, however, may vary from one call to another. Importantly, the research track record of the principal investigator is evaluated with merit-based, rather than quantitative, criteria. The PI's research achievements are judged primarily with an eye to their originality and influence in the field, not just by metrics such as the journal's impact factor.



Six to eight weeks after they receive the proposals, experts meet in session at the seat of the NCN in Kraków or hold a conference via an online platform. During the team session, they discuss each proposal submitted under a given call and panel, compare their independent reviews, and agree on a final score for the proposal at this stage. By their joint decision, the best proposals are passed on to the second stage of merit-based evaluation. Rejected proposals, in turn, receive a justification note, in which the experts outline the weaker sides of the project.

Proposals that make the cut and advance to the second stage are then evaluated by reviewers, who are recruited from among experts in the specific subject matter at hand. Their names are suggested by the experts and they are individually assigned to each proposal. Once all the reviews are ready, expert teams meet once again to discuss the proposals and their reviews and, on this basis, either reject them or recommend them for funding.

Ever since its inception, it has been one of the NCN's priorities to make sure that the proposals are evaluated by an international community of experts and reviewers. Initially, the first stage of merit-based evaluation was carried out by Polish scientists. In June 2017, however, the NCN Council decided that proposals submitted under the MAESTRO call should be presented in English and international experts were included in the first review stage. Since March 2018, proposals in all NCN calls must be submitted in English. This

means that expert teams at the first stage of merit-based evaluation are now primarily composed of foreign experts.

Foreign researchers have been involved in the second stage of the review process from the outset. Today, reviews prepared by international experts represent as much as 95% of all external reviews.

The entire review process is organised by Discipline Coordinators. These must hold a PhD degree and demonstrate research experience of their own. Their duties include running formal eligibility checks on proposals, communicating with experts, organising the work of expert teams at both stages of the review process and ensuring its due diligence and impartiality.

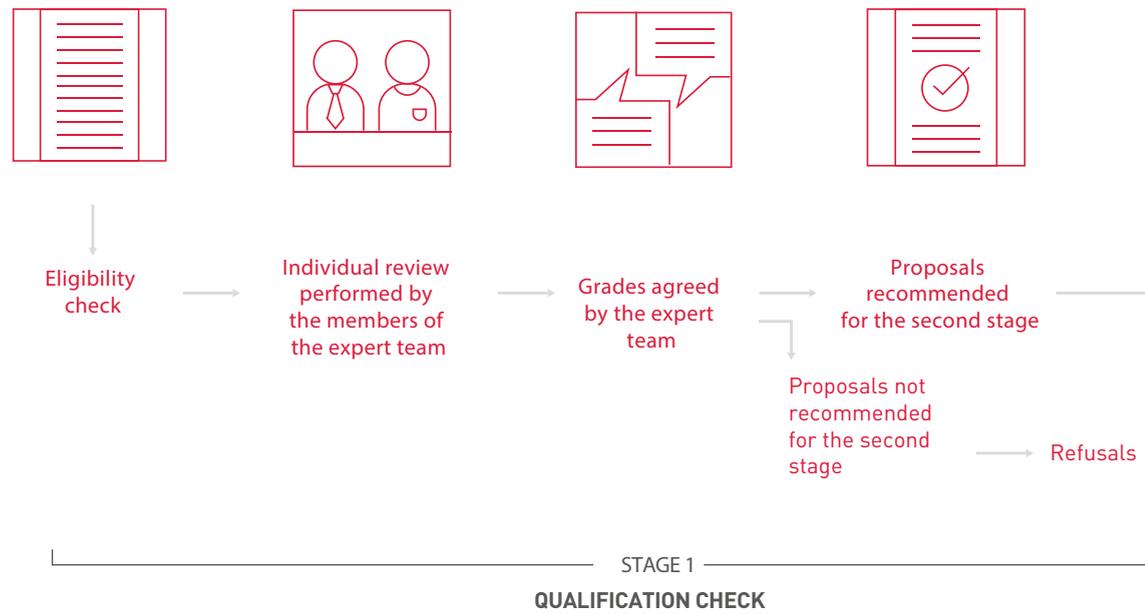
The mission of the NCN is to fund innovative and original projects of the highest quality. To achieve this goal, the NCN Council has spared no efforts in enhancing the peer review process and ensuring the most stringent standards in the criteria of project selection.

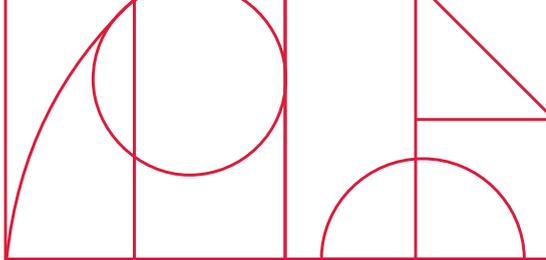
Dr Marta Buchalska

*Today, reviews prepared by international experts represent as much as 95% of all external reviews.*



# Proposal evaluation diagram





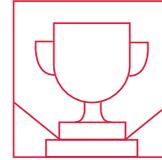
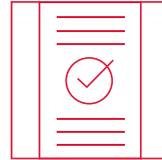
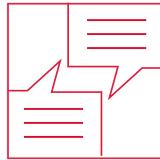
SONATINA, SONATA BIS,  
MAESTRO, POLONEZ BIS

Evaluation by external experts and  
interview with the principal investigator



OPUS, PRELUDIUM,  
PRELUDIUM BIS, SONATA

Evaluation by external experts



Grades agreed  
by the expert  
team

Projects  
recommended  
for funding

Announcement  
of results

Proposals not  
recommended  
for funding

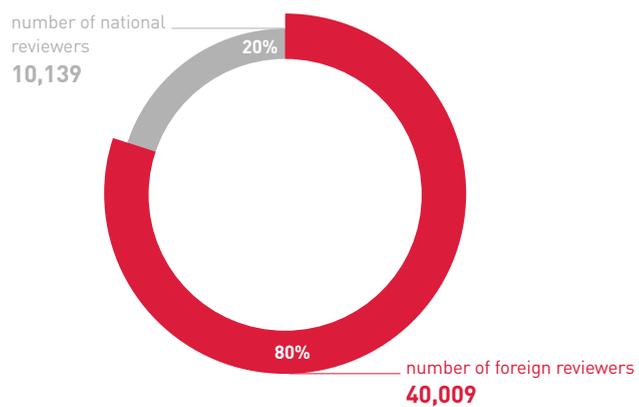
Refusals

STAGE II

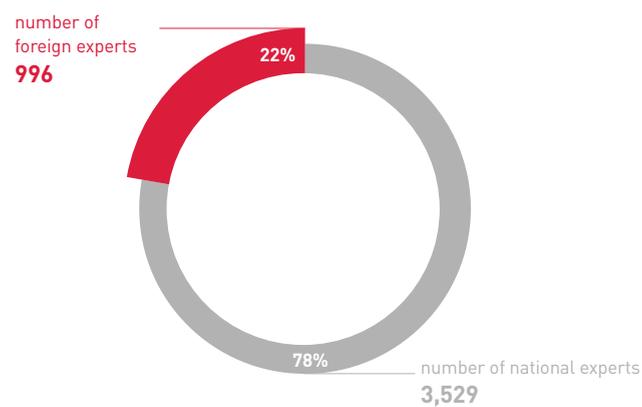
**SPECIALIST EVALUATION**

**Fig. 6. Proportion of foreign experts and reviewers in the proposal evaluation process 2011-2020**

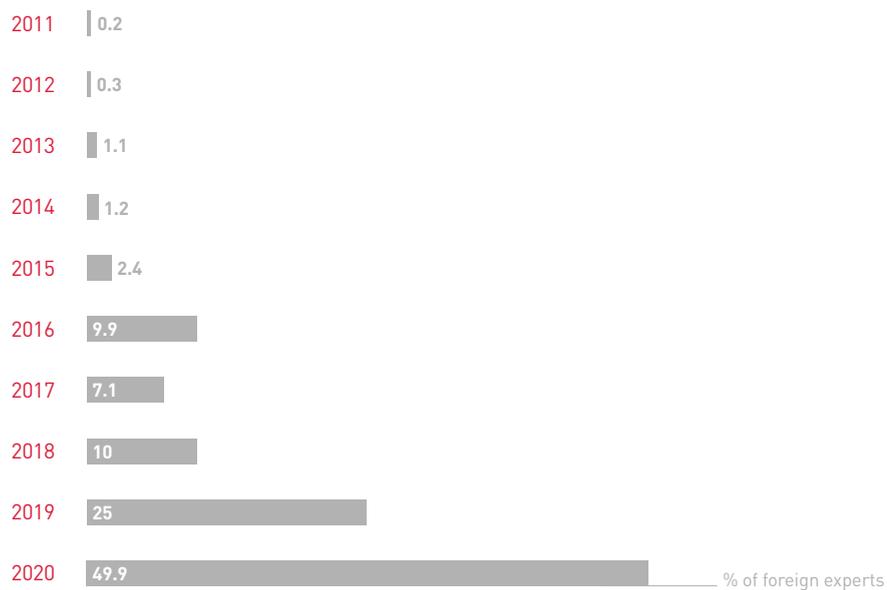
Proportion of foreign reviewers in proposal evaluation process



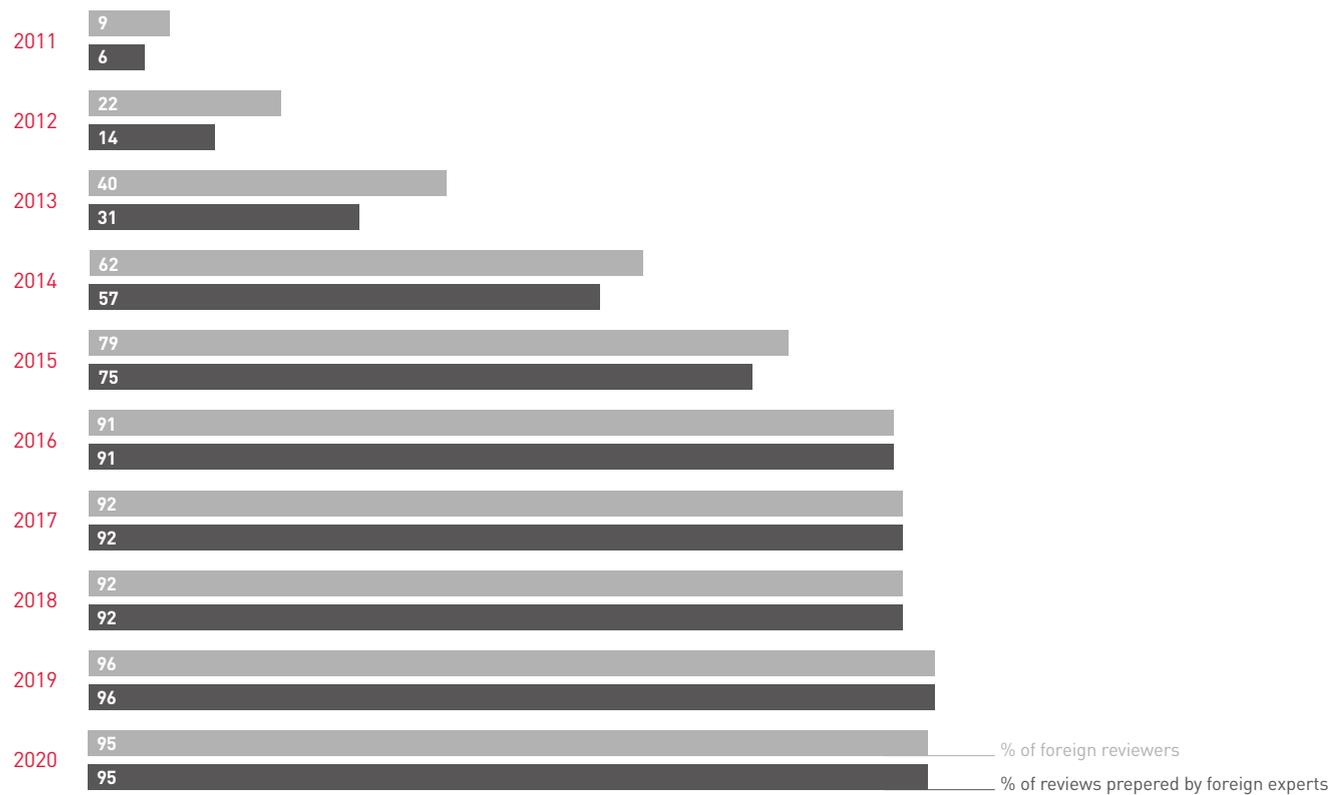
Proportion of foreign experts in proposal evaluation process



**Fig. 7. Proportion of foreign experts involved in peer review in 2011-2020 among all experts involved in the second stage of proposal evaluation in a given year**



**Fig. 8.** Proportion of foreign experts involved in peer review in 2011-2020, along with the proportion of reviews prepared by foreign experts among all external reviews in a given year



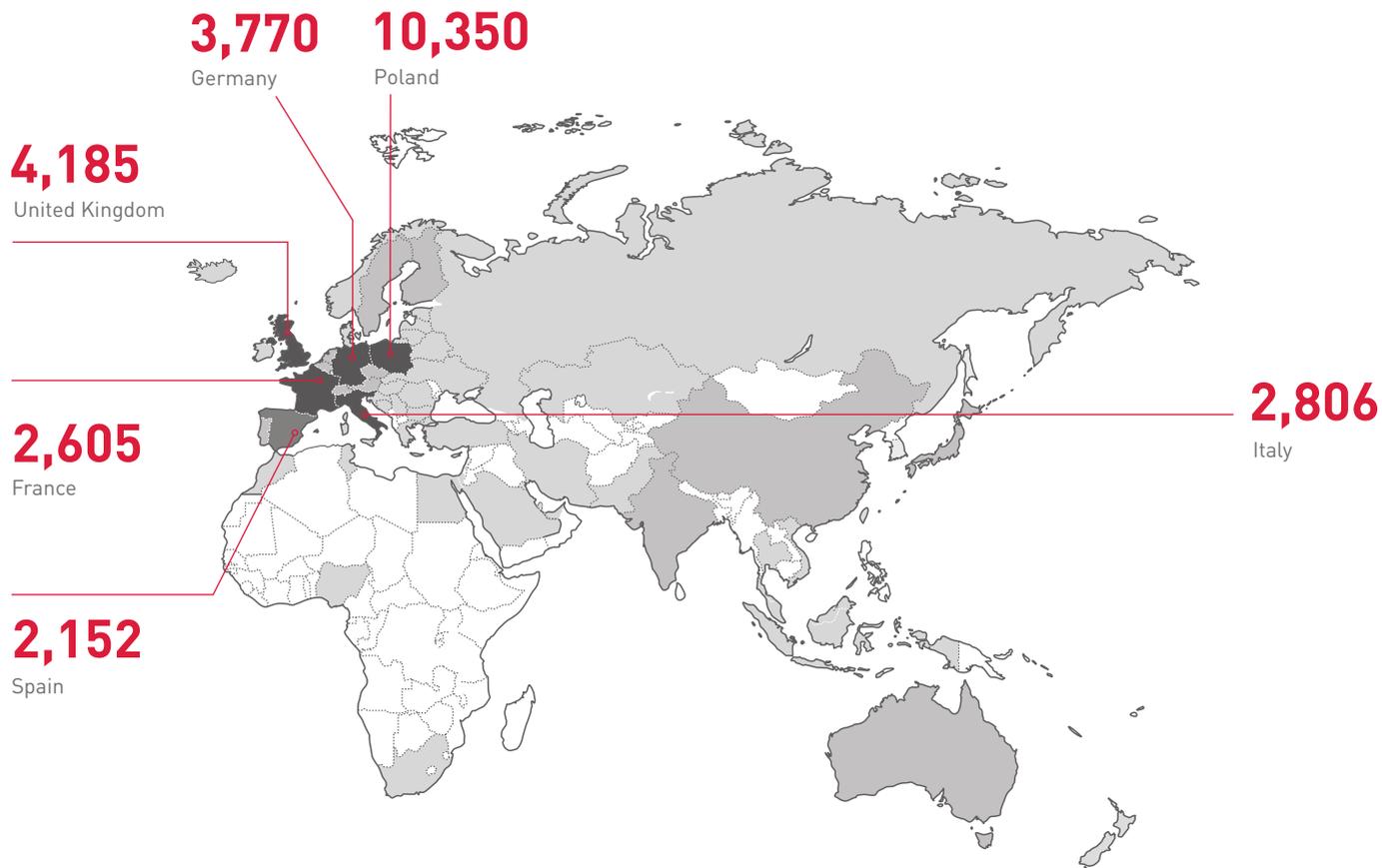
Number and share of reviewers in NCN's calls  
concluded in 2011-2020 by country of affiliation

1,507	China	116	Estonia
1,286	Canada	106	Chile
1,044	Netherlands	103	Malaysia
1,015	Australia	86	Bulgaria
868	India	57	Latvia
752	Sweden	50	Egypt
747	Belgium	49	Iran
719	Czech Republic	45	Luxembourg
649	Austria	44	Saudi Arabia
649	Portugal	40	Pakistan
643	Switzerland	36	Thailand
594	Japan	32	Cyprus
512	Finland	27	United Arab Emirates
500	Brazil	26	Columbia
472	Denmark	25	Iceland
430	Greece	19	Belarus
399	Hungary	15	Uruguay
361	Norway	14	Indonesia
337	Russia	13	Nigeria
325	Israel	13	Tunisia
272	Turkey	13	Vietnam
260	Ireland	11	Malta
227	Romania	10	Kazakhstan
211	Slovakia	10	Lebanon
192	South Korea	10	North Macedonia
179	Singapore	10	Macao
177	Argentina	10	Peru
175	Taiwan	9	Morocco
168	New Zealand	8	Armenia
158	Mexico	8	Qatar
153	Slovenia	7	Kuwait
142	Ukraine	6	Algeria
135	South Africa	6	Bangladesh
129	Croatia	6	Kenya
125	Lithuania	6	Oman
124	Serbia	4	Bosnia and Herzegovina

- less than 1%
- 1% to 3%
- 3,1% to 5%
- more than 5%



4	Sri Lanka
3	Montenegro
3	Ecuador
3	Jordan
3	Costa Rica
3	Puerto Rico
3	Reunion
2	Albania
2	Barbados



2	Botswana	2	Trinidad and Tobago	1	Lesotho
2	Brunei	2	Uganda	1	Monaco
2	Ethiopia	1	Bahrain	1	Mongolia
2	Ghana	1	Bolivia	1	Panama
2	Georgia	1	Grenada	1	Saint Christopher i Nevis
2	Guatemala	1	Iraq	1	Somalia
2	Mauritius	1	Yemen	1	Sudan
2	Moldova	1	Cameroon	1	Uzbekistan

# Open Access – NCN's commitment to open science

Next to Open Data, Open Access to research publications is one of the two main pillars of the Open Science strategy implemented by the NCN. The NCN has been committed to actively promoting open access since 2015, with the aim of ensuring that both researchers and the general public can access the results of all research projects funded by the NCN, i.e. from public sources. This approach rests on the assumption that open science provides the most effective tools to promote the growth of research and knowledge, and delivers the mechanisms that enhance research quality. Implementing open access is also an opportunity for researchers affiliated with Polish research centres to increase their international visibility and make their voice better heard in international scientific discourse.

Specific measures that the NCN has taken to foster open access include its accession to international organisations that draw up relevant strategies and specific solutions. In this way, the NCN contributes to harmonizing open science endeavours across Europe.

## Beginnings – cooperation within Science Europe

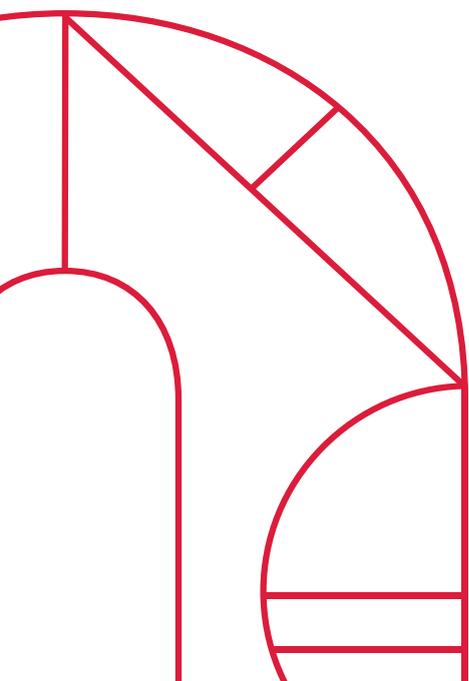
Efforts to promote open access in Europe picked up momentum after 2013. That year, Science Europe, an organisation that the NCN had joined a year before, published its *Principles on Open Access to Research Publications*. Its members declared their readiness to create instruments to ensure the broadest possible

impact of publicly funded research in Europe, so as to promote new discoveries and solutions that could serve society at large. The document stressed that the publication and dissemination of research results formed an integral part of the research process, and Open Access meant not only the right to access but also to use published data productively. The members of Science Europe declared that they would advocate that research papers should be published in Open Access (OA) journals or deposited in repositories and made available no later than 6 months (or 12 months in the humanities and social sciences) after their publication in a journal.

These principles were soon reiterated in the Science Europe Roadmap, which specified several priorities, such as open access to research data and open access to publications.

These concepts were further developed in 2015: the journals must be indexed in standard databases, authors must retain unlimited copyright, and publishers should archive publications upon their release in repositories registered by third parties. In addition, the text of the work and its associated metadata should be published in a machine-readable standard.

That same year, the NCN began to publicly campaign for open access to research publications. Zbigniew Błocki, NCN Director, announced that the NCN would require all NCN-funded research project results to be deposited and publicly available..



## Membership in cOAlition S

In 2016, the Council of the European Union announced that all research results should be made universally available by 2020; access should be immediate, with a very short embargo period or none at all. As a consequence, in 2018, a group of research-funding agencies came together to form cOAlition S, which now operates with the support of the European Commission. Its foundational document, Plan S, specified that the results of publicly funded research should be published under an open licence by 2021. The NCN joined cOAlition S as one of its founding members. Accession was an important step toward developing solutions to support open access and coordinating activities with other European research-funding organisations. When commenting on NCN's accession to cOAlition S for the Polish Press Agency, Zbigniew Błocki, NCN Director, said that *"In order to implement the vision of open access to research results, research-funding agencies must join forces; this is the idea behind the Plan announced in September"* [Błocki: w walce o otwarty dostęp do wyników badań musimy przyjąć wspólny front, 2018]. The goal of the process, he emphasised, was to ensure that all publications created thanks to public sources would become publicly available.

The NCN then went on to develop specific solutions, which were later included in the terms and conditions of individual calls and grant agreements.

## Introducing an open access policy for publications created within research projects

In 2020, as a result of the processes described above, the NCN introduced a policy of open access to publications created within the framework of NCN-funded research projects ("Polityka Narodowego Centrum Nauki dotycząca otwartego dostępu do publikacji"); the policy was endorsed by the Council of the National Science Centre. It requires the beneficiaries of NCN calls to publish all materials created within the framework of the project (except monographs, monograph chapters and peer-reviewed collected works) under an open licence.

## Open access and research quality assessment

Plan S puts an important emphasis on research quality rather than journal metrics. In its campaign for open access, the NCN considered it necessary to adjust its own assessment criteria to accord with that principle. For this reason, in 2018, the NCN Director, endorsed by the NCN Council, signed the *San Francisco Declaration on Research Assessment* (DORA). The signatories of the declaration agreed that researchers should be judged in terms of their originality and impact on the

*In order to implement the vision of open access to research results, research-funding agencies must join forces; this is the idea behind the Plan announced in September*

development of the discipline rather than exclusively in terms of metrics such as, e.g. the impact factor.

## Research data in publications

Along with supporting open access to publications, the NCN acts to ensure open access to all data associated with NCN-funded research. In 2020, the proposal form was expanded to include a Data Management Plan (DMP), which is also subject to expert review. The form was created in accordance with the guidelines of Science Europe.

In addition, wherever possible, any associated data (the basic data set) linked to published articles should be made available in an open repository, in accordance with the terms and conditions specified in NCN's open access policy.

## The future of Open Science

The NCN is committed to continuing its efforts for open science, understood as open access to research data and publications. In tandem with its partners from cOAlition S, it will soon take measures to expand the principles of Plan S to also cover monographs. In addition, the NCN is involved in the European Open Science Cloud (EOSC) partnership, supervised by the European Commission in cooperation with the EOSC Association, which aims to create and develop one of the largest open science projects in the world. The purpose of EOSC is to create a federational, virtual, trust-based environment extending across the borders of states and disciplines to store, publish, use and process digital items (e.g. data, publications) in accordance with FAIR principles (*Findability, Accessibility, Interoperability, Reusability*, see: <https://www.nature.com/articles/sdata201618>).

# NCN Award

The National Science Centre Award was introduced in 2013 by the NCN Council. It is a prestigious distinction given to the most outstanding early-stage researchers for their scientific achievements in the field of basic research. During an official ceremony, three winners representing various research fields (Arts, Humanities and Social Sciences, Life Sciences and Physical Sciences and Engineering) are presented with a statuette and financial award donated by private enterprises. By funding the award, enterprises may actively participate in the development of potential and innovation in Polish science. The award is very popular and respected among scientists, and the winners regard it as true honour and huge motivation for future work.

The award is conferred once a year, based on the decision of the Committee comprising the NCN Director, NCN Council and representatives of the donor companies. Since 2014, the award ceremony has been traditionally held in the Gallery of 19th-Century Polish Art at the Sukiennice, a branch of the National Museum in Krakow. The idea behind the National Science Centre Award is to promote researchers who have made outstanding discoveries under the age of 40 and to promote Poland as a country where one can carry out pioneering research at the highest international level.

## NCN AWARD WINNERS



2013



Arts, Humanities and Social Sciences

**Dr hab. Anna Matysiak**

Warsaw School of Economics

**Achievement:** *Integration of research perspectives (micro, macro, quantitative and qualitative) in the study of family transformations in Europe and their determinants using advanced social process modelling methods*



Life Sciences

**Prof. Dr hab. Andrzej Stanisław Dziembowski**  
Institute of Biochemistry and Biophysics, Polish  
Academy of Sciences; University of Warsaw

**Achievement:** *discovery of the mechanism of action of the main eukaryotic ribonuclease, the exosome complex, and the function of the C16orf57 gene, mutations of which cause poikiloderma with neutropenia (PN).*



Physical Sciences and Engineering

**Prof. Dr hab. Piotr Garstecki**

Institute of Physical Chemistry, Polish Academy  
of Sciences

**Achievement:** *innovation in research on the dynamics of complex fluids and their potential use in microbiology and biochemistry*

On the photo, from left to right:  
Andrzej Dziembowski, Anna Matysiak,  
Piotr Garstecki.

Photos on p. 59-62 by  
Michał Niewdana/NCN.



2014

### Arts, Humanities and Social Sciences

**Dr hab. Marcin Miłkowski, Prof. at IFiS PAN**

Institute of Philosophy and Sociology, Polish Academy of Sciences (IFiS PAN)

**Achievement:** putting forward an original version of the computational theory of the mind, which he discusses in *Explaining the computational mind*, a book published by MIT Press.



### Life Sciences

**Prof. Dr hab. Janusz Bujnicki**

International Institute of Molecular and Cell Biology in Warsaw

**Achievements:** 1) designing innovative bioinformatic methods for the research of RNA-protein complexes; 2) determining the structure and mechanics of the human enzymes responsible for synthesis of RNA



### Physical Sciences and Engineering

**Prof. Dr hab. Michał Horodecki**

Faculty of Mathematics, Physics and Informatics, University of Gdańsk

**Achievement:** discovery of the quantum state of bound entanglement and for his investigations into the non-additiveness of quantum channels' capacity

On the photo, front row, from left to right:  
Janusz Bujnicki, Marcin Miłkowski, Michał Horodecki



2015

### Arts, Humanities and Social Sciences

**Dr hab. Michał Bilewicz, Prof. at UW**

Faculty of Psychology, University of Warsaw (UW)

**Achievement:** presentation of the three-factorial structure of contemporary anti-Semitism and its psychological consequences



### Life Sciences

**Prof. Dr hab. Wiesław Babik**

Institute of Environmental Sciences, Jagiellonian University

**Achievement:** a study of the adaptive evolution of animals with special emphasis on the MHC gene variability.



### Physical Sciences and Engineering

**Prof. Dr hab. Piotr Śniady**

Faculty of Mathematics and Computer Science, Adam Mickiewicz University and Polish Academy of Sciences

**Achievements:** 1) Numerous significant results in representation theory and non-commutative probability; 2) Examination of probability structures in the asymptotic theory of permutation groups representation and their application in quantum algorithms theory

On the photo, front row, from left to right:  
Michał Bilewicz, Piotr Śniady, Wiesław Babik



2016

### Arts, Humanities and Social Sciences

**Dr hab. Marcin Szwed, Prof. at JU**

Institute of Psychology, Jagiellonian University (JU)

**Achievements:** large-scale research on the plasticity of the human brain in people with impaired eyesight and hearing, disproving some long-standing theses on the division of the brain into separate sense-related parts



### Life Sciences

**Prof. Dr hab. Katarzyna Starowicz-Bubak**

Institute of Pharmacology, Polish Academy of Sciences

**Achievements:** determining the role of the endo-cannabinoid system in the development and therapy of chronic pain; developing a new pharmacological approach to the therapy of osteoarthritis-related pain



### Physical Sciences and Engineering

**Prof. Dr hab. Mikotałaj Bojańczyk**

Institute of Informatics, University of Warsaw

**Achievement:** outstanding contribution to automata theory and logic

On the photo, from left to right: Marcin Szwed,  
Katarzyna Starowicz-Bubak, Mikotałaj Bojańczyk



2017



#### Arts, Humanities and Social Sciences

**Prof. Dr hab. Anna Brożek,**

Institute of Philosophy, University of Warsaw

**Achievement:** *devising original theories on the function of interrogative and imperative sentences and a vital contribution to the studies on the history of the Lvov-Warsaw school of logic, preceded by meticulous archival research*



#### Life Sciences

**Dr Szymon Świeżewski, Prof. at IBB PAN**

Institute of Biochemistry and Biophysics, Polish Academy of Sciences (IBB PAN)

**Achievement:** *identifying the functions of long non-coding RNA (LncRNA) in regulating the key stages of plant growth: sprouting and flowering*



#### Physical Sciences and Engineering

**Prof. Dr hab. Adam Rycerz**

Institute of Physics, Jagiellonian University

**Achievement:** *theoretical analysis of quantum charge transport in grapheme nanoparticle systems, specifically the description of a mechanism of valley polarisation control through electrostatic fields.*

On the photo, from left to right: Anna Brożek, Szymon Świeżewski, Adam Rycerz



2018



#### Arts, Humanities and Social Sciences

**Prof. Dr hab. Bartosz Brożek**

Faculty of Law and Administration, Jagiellonian University

**Achievement:** *developing an innovative concept of normativity, applicable in law and other normative systems, based on philosophical reasoning and the achievements of cognitive and evolutionary sciences*



#### Life Sciences

**Dr hab. Joanna Sułkowska, Prof. at UW**

Centre of New Technologies of the University of Warsaw (UW)

**Achievement:** *pushing the boundaries of medical knowledge to develop new drugs – research into the structure and dynamics of proteins with non-trivial topologies*



#### Physical Sciences and Engineering

**Dr hab. Piotr Sankowski, Prof. at UW**

Institute of Informatics, University of Warsaw (UW)

**Achievement:** *fundamental results in the area of graph algorithms, especially finding associations in graphs*

On the photo: Joanna Sułkowska, Piotr Sankowski (third from left), Bartosz Brożek



2019



Arts, Humanities and Social Sciences

**Dr hab. Michał Wierchoń, Prof. at JU**  
**Institute of Psychology, Jagiellonian University (JU)**

**Achievement:** *interdisciplinary research into consciousness, proposing an original theoretical model of consciousness*



Life Sciences

**Dr hab. Roman Szczęsny**  
 Institute of Biochemistry and Biophysics.  
 Polish Academy of Sciences

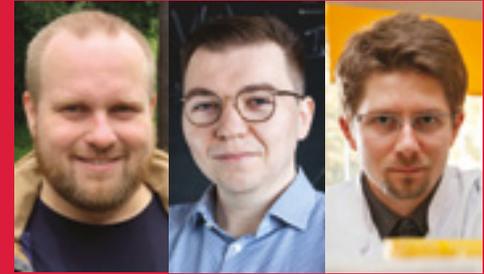
**Achievement:** *discovering the mechanism of mitochondrial RNA degradation in human cells indicating the role of mitochondria in regulation of innate immune response*



Physical Sciences and Engineering

**Dr hab. Dawid Pinkowicz**  
**Faculty of Chemistry, Jagiellonian University**  
**Achievement:** *research into multifunctional molecular magnet and quantum nanomagnets – design, synthesis and structural and physiochemical characteristics*

On the photo, from left to right: Michał Wierchoń, Dawid Pinkowicz, Roman Szczęsny.



2020



Arts, Humanities and Social Sciences

**Prof. Dr hab. Jakub Growiec**  
 Collegium of Economic Analysis of Warsaw School of Economics

**Achievement:** *significant contribution to research on technological change and human capital as key determinants of economic growth*



Life Sciences

**Prof. Dr hab. Wojciech Fendler**  
 Department of Biostatistics and Translational Medicine, Medical University of Lodz

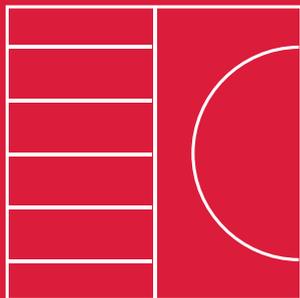
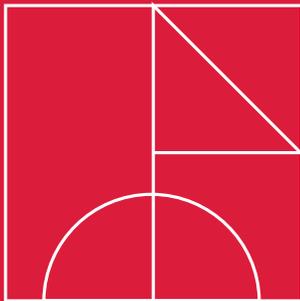
**Achievement:** *significant findings in research into microRNAs as biomarkers of accidental exposure to ionising radiation and the side effects of radiotherapy*



Physical Sciences and Engineering

**Dr hab. Michał Tomza**  
 Faculty of Physics at the University of Warsaw  
**Achievement:** *theoretical description of interactions and collisions between ultracold atoms, ions and molecules*

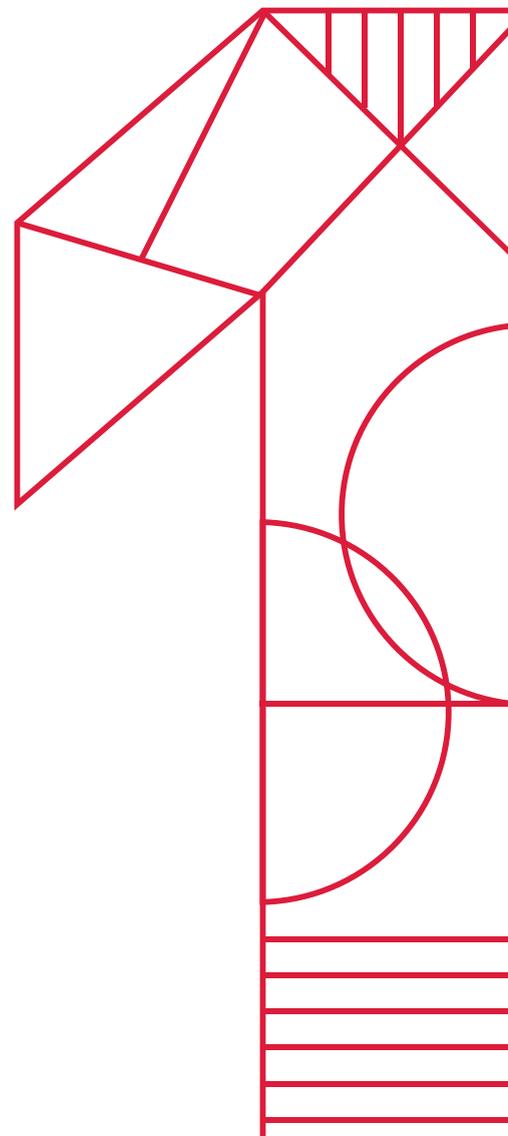
Photos from private collections. From left to right: Jakub Growiec, Michał Tomza, Wojciech Fendler.



# National Science Centre **Days**

The idea of the National Science Centre Days is to present and promote the whole of a wide range of NCN calls. Every year, the event is held in another location in Poland with the support of various research institutions making it possible for the NCN to present its grant portfolio to a wide variety of researchers from all over Poland. The event consists of meetings and discussions with the participation of local research communities as well as workshops for applicants and administrative staff of academic and research organisations. The event provides a great opportunity for funded projects in progress to be presented.

*The event consists of meetings and discussions with the participation of local research communities (...).*





Photos by Kamila Buturla



## *National Science Centre Days 2013 in Silesia*

Co-organisers: University of Silesia in Katowice, Silesian University of Technology, University of Economics in Katowice, Medical University of Silesia, Karol Szymanowski Academy of Music in Katowice, Regional Conference of Rectors of Academic Schools in Poland and Young Scientists Council.



## *National Science Centre Days 2014 in Lublin*

Co-organisers: Maria Curie-Skłodowska University, Lublin University of Technology, The John Paul II Catholic University of Lublin, Medical University of Lublin, University of Life Sciences in Lublin



Photos by Michał Niewdana/NCN

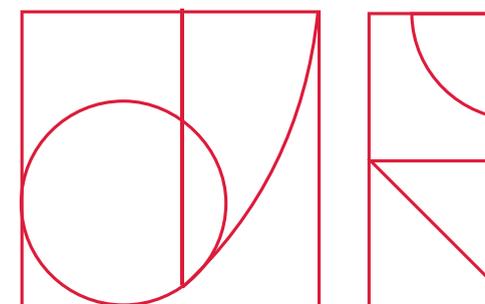


## *National Science Centre Days 2015 in Szczecin*

Co-organisers: University of Szczecin, Pomeranian Medical University in Szczecin, West Pomeranian University of Technology in Szczecin, Maritime University of Szczecin, Academy of Art in Szczecin, Koszalin University of Technology

## National Science Centre Days 2016 in Olsztyn

Co-organiser: University of Warmia and Mazury  
in Olsztyn



Photos by Michał Niewdana/NCN



*National Science Centre  
Days 2017 in Kielce*

Co-organiser: Jan Kochanowski University of Kielce



## *National Science Centre Days 2018 in Gdańsk*

Co-organisers: Gdańsk University  
of Technology, University of Gdańsk,  
Medical University of Gdańsk



Photos by Michał Niewdana/NCN



Photos by Michał Niewdana/NCN



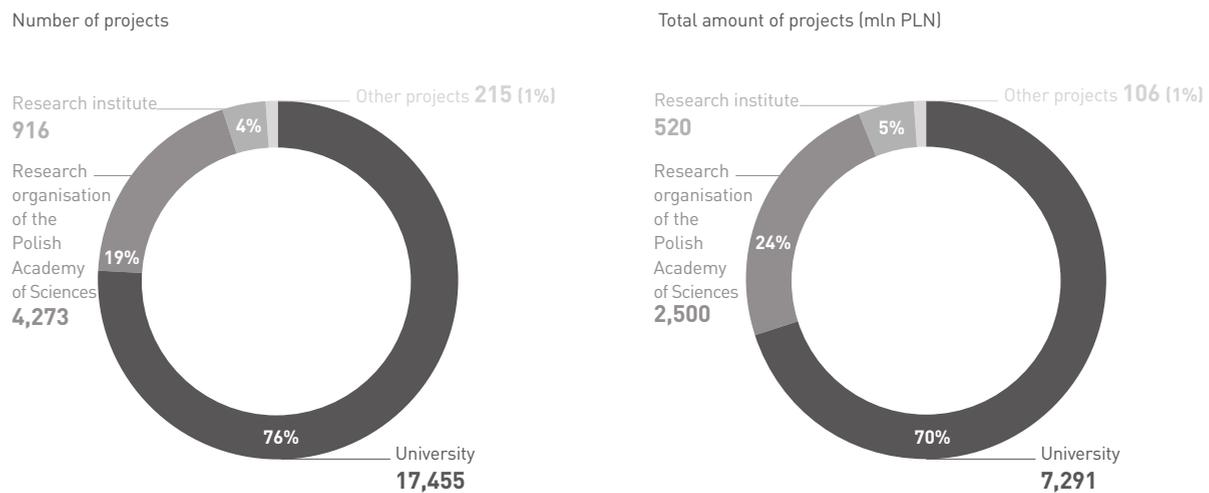
## *National Science Centre Open Days 2019 in Łódź*

Co-organisers: University of Lodz, Lodz University of Technology, Medical University of Lodz, Lodz Film School, University of Music in Lodz, Strzeмиński Academy of Fine Arts Łódź, Institute of Medical Biology of PAS, Centre of Molecular and Macromolecular Studies in Łódź

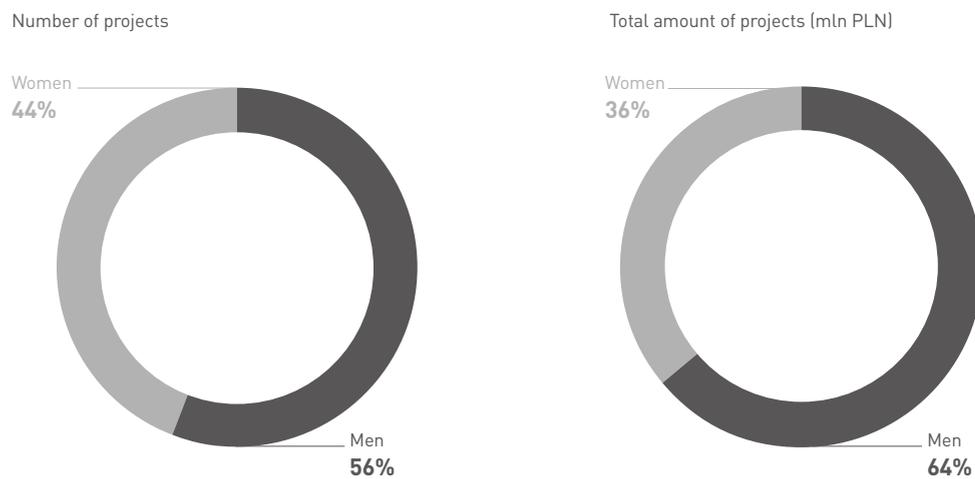
NCN in figures  
**2011-2020**



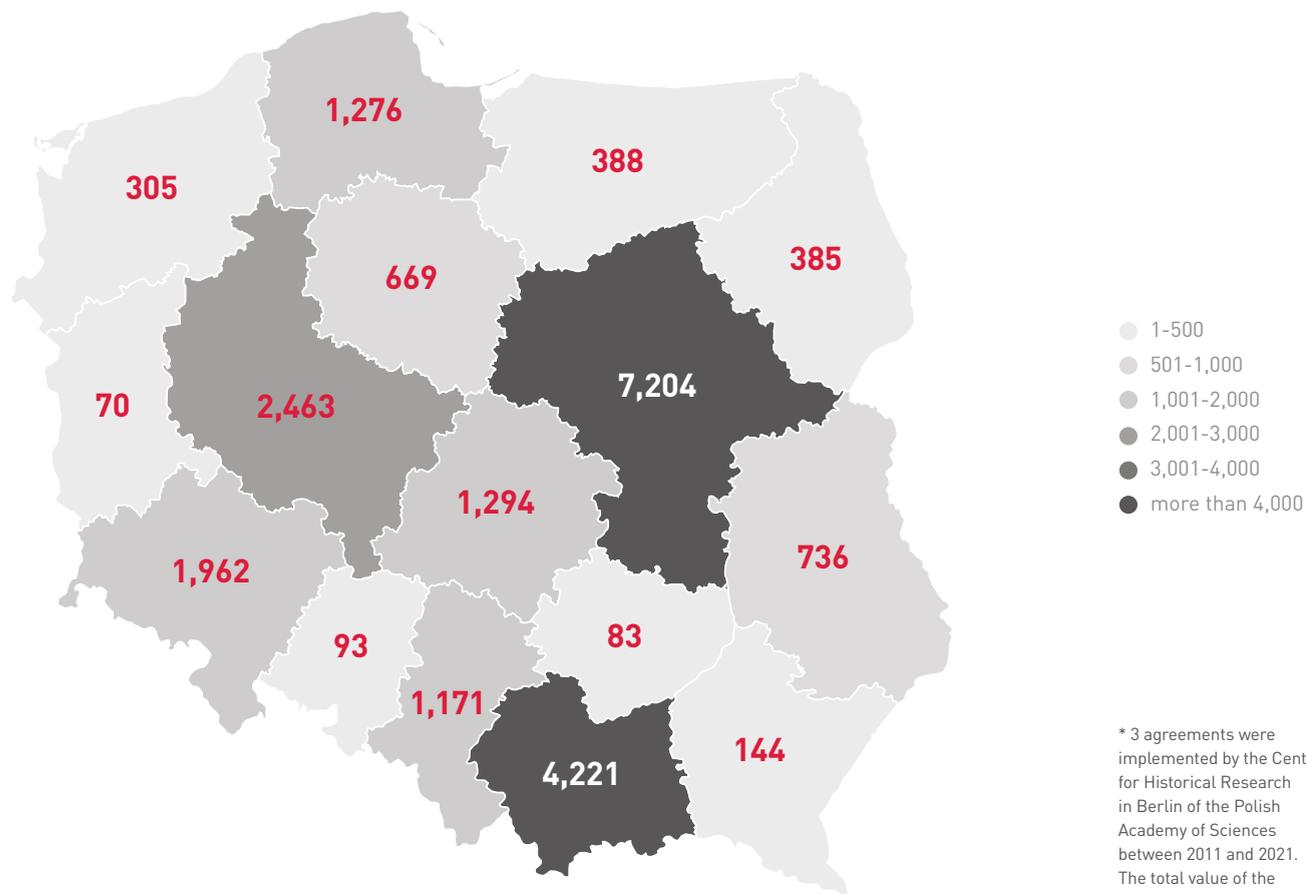
**Fig. 9. NCN beneficiaries broken down into entity type: number and amount of proposals recommended for funding between 2011 and 2020**



**Fig. 10. Men and women in NCN calls: number and amount of proposals recommended for funding between 2011 and 2020**

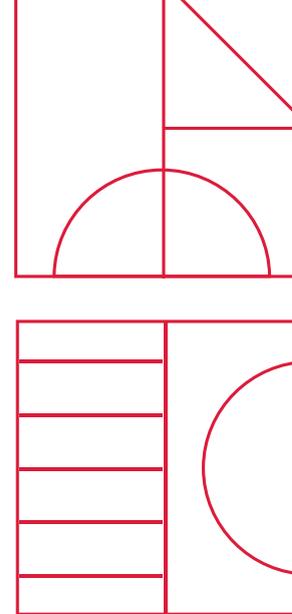


**Fig. 11.** Number of agreements\* funded by the NCN and completed between 2011 and 2020, broken down into the voivodeships of research affiliation of the principal investigator

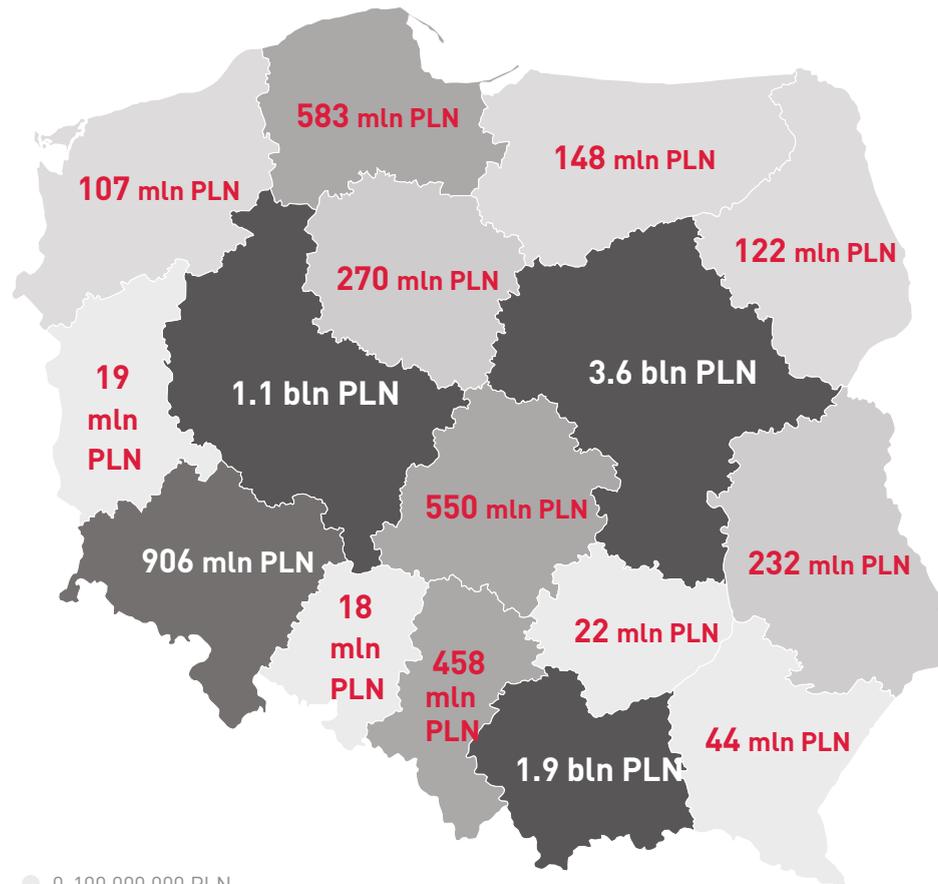


- 1-500
- 501-1,000
- 1,001-2,000
- 2,001-3,000
- 3,001-4,000
- more than 4,000

\* 3 agreements were implemented by the Centre for Historical Research in Berlin of the Polish Academy of Sciences between 2011 and 2021. The total value of the agreements was 0.5 mln PLN



**Fig. 12.** Amount of agreements\* funded by the NCN and completed between 2011 and 2020, broken down into the voivodships of research affiliation of the principal investigator

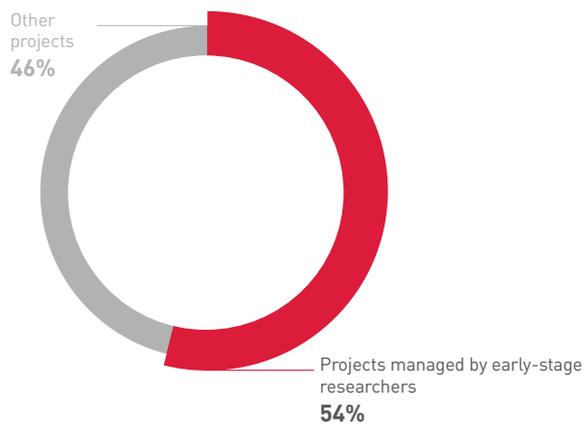


\* 3 agreements were implemented by the Centre for Historical Research in Berlin of the Polish Academy of Sciences between 2011 and 2021. The total value of the agreements was 0.5 mln PLN

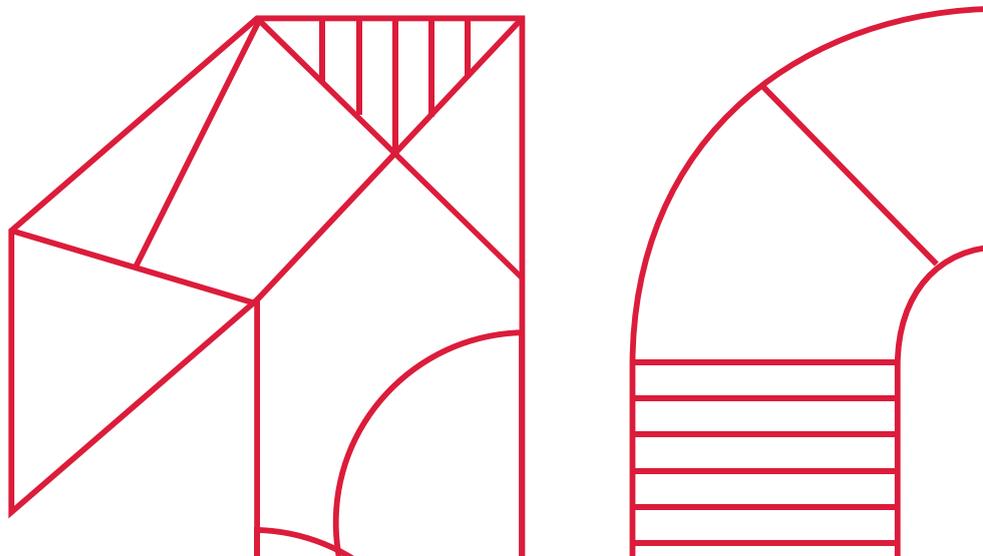
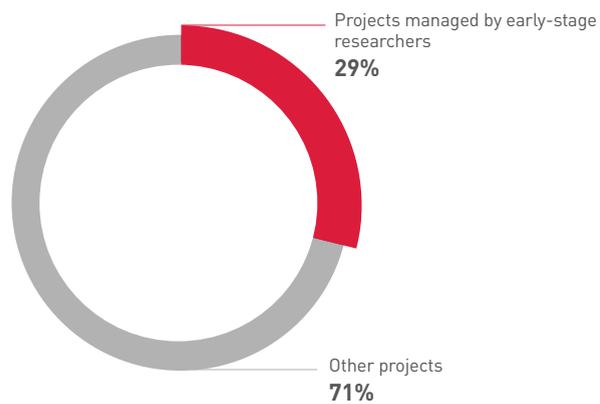
- 0-100,000,000 PLN
- 100,000,001-200,000,000 PLN
- 200,000,001-400,000,000 PLN
- 400,000,001-600,000,000 PLN
- 600,000,001-800,000,000 PLN
- 800,000,001-1,000,000,000 PLN
- more than 1,000,000,000 PLN

**Fig. 13.** Share of the number and amount of proposals recommended for funding under NCN calls conducted under the leadership of early-stage researchers among all proposals recommended for funding between 2011 and 2020

Number of projects



Total amount of projects



**Fig. 14. Share of the number and amount of proposals recommended for funding under NCN calls conducted under the leadership of early-stage researchers among all proposals recommended for funding in particular years**

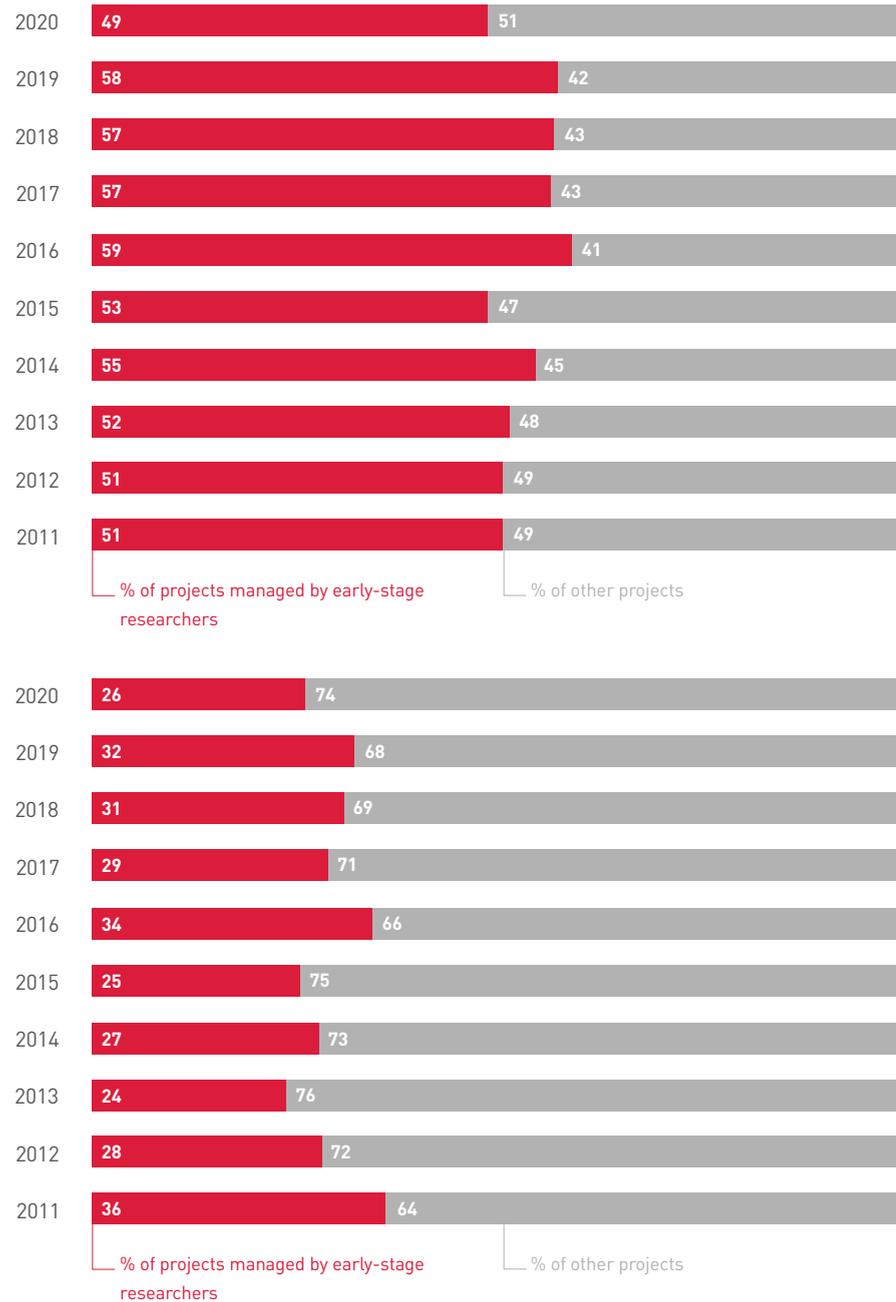
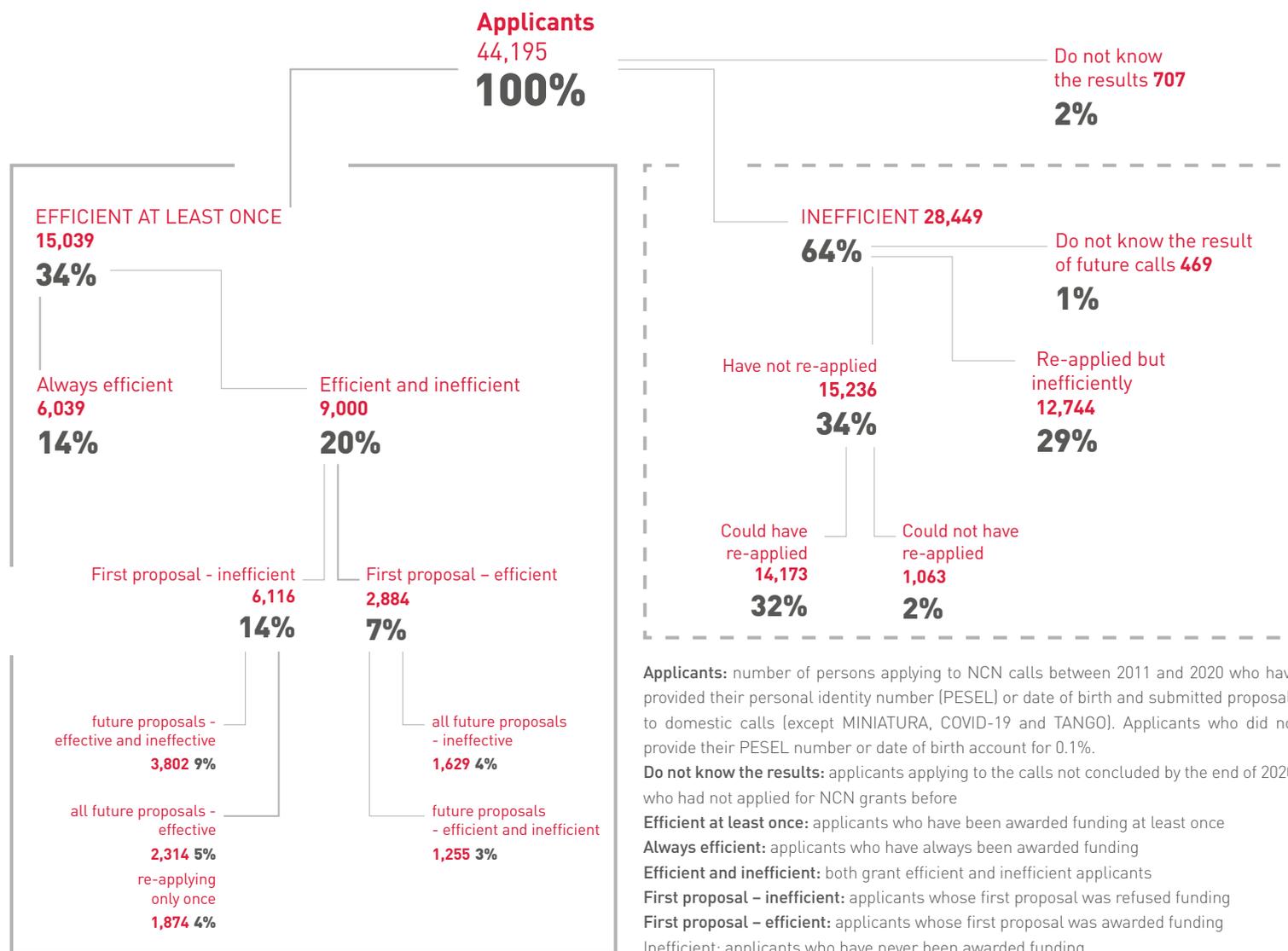


Diagram. Applicants of NCN calls between 2011 and 2020, broken down into grant efficient groups



**Applicants:** number of persons applying to NCN calls between 2011 and 2020 who have provided their personal identity number (PESEL) or date of birth and submitted proposals to domestic calls (except MINIATURA, COVID-19 and TANGO). Applicants who did not provide their PESEL number or date of birth account for 0.1%.

**Do not know the results:** applicants applying to the calls not concluded by the end of 2020, who had not applied for NCN grants before

**Efficient at least once:** applicants who have been awarded funding at least once

**Always efficient:** applicants who have always been awarded funding

**Efficient and inefficient:** both grant efficient and inefficient applicants

**First proposal - inefficient:** applicants whose first proposal was refused funding

**First proposal - efficient:** applicants whose first proposal was awarded funding

**Inefficient:** applicants who have never been awarded funding

**Do not know the result of future calls:** applicants who have never been awarded funding but submitted another proposal to the calls not concluded by the end of 2020

**Have not re-applied:** applicants whose only proposal was refused funding and have not re-applied

**Could have re-applied:** applicants who have not re-applied regardless of other open calls

**Could not have re-applied:** applicants who have not re-applied because no other call has been launched since their last application

**Re-applied but inefficiently:** applicants who have applied more than once yet still inefficiently

# NCN Office

*In its first year, the NCN managed, in very little time, to build its own organisational structure, prepare and announce the calls, review the proposals and pay out the money awarded for the implementation of projects to the host institutions.*

Pursuant to the Act on the National Science Centre, the administration of the National Science Centre is carried out by its Office, headed by the Director, who is in charge of its statutory activities and financial organisation. The Director is appointed by the NCN Council. The Council also selects the discipline coordinators, sets the priority areas for basic research in accordance with the national development strategy, defines the terms and conditions of calls for proposals and their budgets, and announces calls for PhD scholarships and post-doctoral fellowships. The Council is also responsible for appointing members of expert teams that review research proposals.

When the Act on the National Science Centre went into force on 1 October 2010, the institution as such did not yet exist. However, we got down to working on upcoming calls even before the end of that year, which meant that they could be launched just two weeks after the official opening of the NCN. The official inauguration of the NCN, in the presence of Prime Minister Donald Tusk, was held on 4 March 2011. The Director was appointed on the same day. In its first year, the NCN managed, in very little time, to build its own organisational structure, prepare and announce the calls, review the proposals and pay out the money awarded for the implementation of projects to the host institutions. This task could only be achieved thanks to the involvement of Professor Szczepan Biliński, the proxy for the establishment of the NCN, Professor Andrzej Jajszczyk, NCN Director, and a small group of newly hired employees. Headed by Professor Michał Karoński,

*A month since its foundation, the NCN had fewer than fifty employees.*



NCN staff on the first anniversary of the National Science Centre

the NCN Council took three months, from 15 December 2010 until 15 March 2011, to prepare open competitions for the positions of the NCN Director and the discipline coordinators, and laid down the terms and conditions of the first four calls announced by the NCN.

A month since its foundation, the NCN had fewer than fifty employees. The number grew successively as the institution's activities took on momentum. Today, the Office consists of several departments, more than a dozen teams and two independent positions under three divisions dedicated for projects, organisation and finance. Several cells and independent roles are excluded from this tripartite structure and supervised directly by the director. In total, the NCN currently employs c. 190 people. The Office coordinates the implementation of nearly 10 thousand funding agreements per year. The number of proposals submitted is likewise growing; a total of nearly 12 thousand were submitted under domestic and international calls in 2020 alone.

Office employees launch and handle calls for research proposals, PhD scholarships, postdoctoral fellowships and research activities, organise the meetings of peer-review expert teams, provide information and training to potential applicants, lend administrative support to grant holders and communicate with external experts. The Office is also involved in eligibility checks, dispatches the funding decisions of the Director, manages the agreement signing process, supervises the implementation of agreements and settles the completed projects. A lot of effort is taken to inspire, forge and develop international cooperation, e.g. by participating in networks such as ERA-Net, engaging in joint activities by foreign research-funding agencies and coordinating networks created on the initiative of the NCN. The NCN also evaluates its grant programmes and drafts project implementation and funding analyses and statistics. We also cooperate closely with the Information Processing Centre in the running of the ZSUN/OSF proposal submission system.

An important part of our mission is also to disseminate the calls in the research community via our website, printed and online publications, as well as traditional and social media.

The tasks described here are but some of the many activities of the Office that ensure that the National Science Centre works effectively. At every stage, we do our utmost to make sure the basic research funding process is smooth, transparent and friendly to our current and potential grant holders.

Agnieszka Rajda



Official unveiling of the NCN plaque by Minister Barbara Kudrycka and first director of the National Science Centre Professor Andrzej Jajszczyk, 4 March 2011.

# People, not buildings. **Projects of the NCN call winners**

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- Mechanisms of mitochondrial RNA degradation / **84**
- New luminescent materials for biomedical applications / **86**
- The self-education practices in 16th-century Central Eastern Europe.  
The way from MINIATURA to ERC grant / **88**
- Development of new biodegradable elastomeric templates for heart tissue engineering / **90**
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# AGAINST ALL ODDS.

## BROWN BEAR MOVEMENT IN AN ENVIRONMENT TRANSFORMED BY HUMANS



**Principal investigator:**  
Dr hab. Nuria Selva  
Fernandez, Institute of  
Nature Conservation, Polish  
Academy of Sciences

**Project title:**  
*BearConnect. Functional  
connectivity and ecological  
sustainability of European  
ecological networks- a case  
study with the brown bear*

**Funding scheme:**  
BiodivERsA

**Panel:** NZ8

The movement of animals across landscapes is crucial for many ecological processes, from individual survival to the persistence of populations. The expansion of human infrastructure, such as roads and urban settlements, creates barriers to animal movement and alters both the physical structure of the landscape and the way animals move. In this project, we have focused on brown bears in order to investigate the functional connectivity of European landscapes, i.e. the degree to which landscapes in Europe facilitate or impede the movement of individual bears and associated genes.

In humanised landscapes, long-distance movement is particularly important for maintaining gene flow between isolated populations but, at the same time, is challenging for the animals. In brown bears, usually young males are taking long trips from their place of birth to new sites in order to find a partner and reproduce. We reported the longest dispersal distance for a brown bear in central Europe (360 km straight distance), starting in the Tatra Mountains in Poland up to the Gorgany Mountains in Ukraine, thus potentially connecting the western and eastern Carpathian population segments. During his dispersal, this bear kept away from built-up areas and had to make 21 road crossings per month on average. He was the only tracked bear crossing highways successfully, with the help of wildlife passages. He moved through four countries and crossed a border once per week, each time falling under different legislation. We reviewed 29 cases of long-distance dispersal reported for

large carnivores in Europe and found that 96% were transboundary. Most cases of long-distance dispersal ended with the animal's death before it could reproduce and, thus, could not support population connectivity. Eighty-two per cent of the confirmed deaths were human-caused; almost half of them were legal killings. Our study emphasised the high conservation value of long-distance dispersers in large carnivore populations, as well as the urgent need to consider them as mobile conservation targets and to include wide-ranging movements in conservation policies.

A fundamental ecological process that also relies on animal movement is seed dispersal. Worldwide, bears dispersed seeds from over hundred fleshy-fruited plant species. Fleshy fruits represented on average 24% of the food items consumed by bears across their distribution range. For fleshy fruits, it was good to be eaten by bears, as seeds germinated better after passing through bears' gut than when embedded within the whole fruit, and bears did not damage most seeds while eating them. We found that brown bears dispersed the vast majority of bilberry (*Vaccinium myrtillus*) seeds in the Tatra Mountains. Together with two species of thrush and red foxes, they were the most efficient bilberry dispersers. We marked and monitored the fate of bear scats and detected bilberry germination in all of them. On average, we counted 154 bilberry seedlings/m<sup>2</sup> in bear scat locations. This number doubled at scats in bear beds, suggesting that bear resting behaviour, which involves digging the soil, clearly enhanced the recruitment of bilberry.



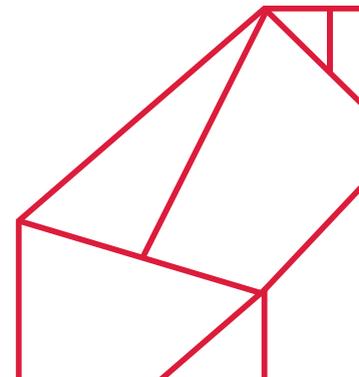
Bear family (female with cubs) feeding on blueberries in the Tatra National Park.

Photos by Adam Wajrak

Fleshy fruits, in particular the bilberry – detected in 56% and 42% of the bear scats, respectively – play a pivotal role in the feeding ecology of Tatra brown bears. In total, we identified 173 different food items in the diet of brown bears in Tatra, most of them of natural origin. Despite the high levels of human pressure in the region, bears still provide important seed dispersal services. We showed that brown bears are legitimate seed dispersers and highlight that the decline of brown bears may compromise seed dispersal services and plant regeneration processes, as bears are among the few megafauna species still dispersing large amounts of seeds over long distances in temperate and boreal regions.

**Dr hab. Nuria Selva, Prof. at the Institute of Nature Conservation, PAS**

Animal ecologist and conservation biologist with a focus on mammals and large carnivores in particular. She has led brown bear research at the Institute of Nature Conservation, Polish Academy of Sciences (PAS) since 2007 and is currently the head of the Integrative and Applied Ecology Research Group. She has co-authored more than 100 scientific publications and participated in over 20 projects. In 2018, she received the scientific award of the President of the Polish Academy of Sciences.



# MECHANISMS OF MITOCHONDRIAL RNA DEGRADATION



**Principal investigator:**  
Prof. Dr hab. Marcin  
Nowotny, International  
Institute of Molecular and  
Cell Biology

**Project title:**  
*Mitochondrial RNA  
decay and surveillance  
- comprehensive  
interdisciplinary studies*

**Funding scheme:**  
SYMFONIA 2,  
announced on 16 December  
2013

**Panel:** NZ1

Mitochondria are structures responsible for many key processes in the living cell, including the production of energy that the cell needs to survive. In people, defects in mitochondria may lead to very serious disorders, such as neurological diseases. A unique feature of mitochondria is that they have their own genetic material (deoxyribonucleic acid, DNA), as well as the machinery to read it. At the first stage, DNA is transcribed into ribonucleic acid, RNA, which is then read during the protein synthesis process. To function properly, mitochondria need an adequate supply of proteins and the main way to ensure their desired quantity is to regulate the levels of protein-coding RNA. This happens primarily through the process of RNA degradation. As a consequence, degradation plays an immensely important role in healthy mitochondrial function.

The purpose of our project was to arrive at a comprehensive understanding of the mechanisms of mitochondrial RNA degradation. We wanted to study them both on a more general level, in the context of the mitochondria as a whole, and in much closer detail, on the level of the individual atoms that make up the proteins involved in the process.

The project allowed us to identify new proteins that participate in regulating RNA levels. One is the human MTRES1 protein, which plays a protective role, preventing a decrease in functional RNA levels in the mitochondria under harsh conditions. Another protein, known as GRSF1, was shown to cooperate with the degradosome, the main mitochondrial machinery responsible for RNA

breakdown. This applies particularly to guanosine-rich RNA sequences (composed of many G letters of the genetic code). Such RNA molecules fold into a very special, stable spatial structures. We demonstrated that the specific role of GRSF1 is to destabilize these structures to facilitate their degradation (article published in "Nature Communications" in 2018).

The machinery of the degradosome consists of two proteins. One, known as helicase, moves the RNA chain; the other, nuclease, cuts individual nucleotides (letters of the genetic code) off one end of the chain. To arrive at an in-depth understanding of this process, we used protein crystallography to determine the atomic structure of the yeast degradosome. Helicase and nuclease were shown to bind together to form a compact machinery in which the role of the former is to push the RNA into a tunnel inside the latter. At the end of the nuclease tunnel, there is a site where the chemical reaction of nucleotide excision takes place. Therefore, the two proteins form a strictly coordinated, effective machinery to break down RNA (article published in "Nature Communications" in 2018). We also studied the functioning of the yeast degradosome in more general context and showed that its role is to ensure that functional RNA (including protein-coding RNA) continues to be present in the mitochondria, while non-functional RNA is removed.

An important part of the project involved developing computer methods to analyse data on mitochondrial RNA sequences, as well as to examine those RNA

regions that interact with proteins. The advantage of these new tools is that they can be employed even with difficult data sets, including those with a great sequence diversity.

The project unveiled important information about RNA processing in human mitochondria and the mitochondria of simpler organisms (yeast). This has allowed us to better understand the functioning of these key cell structures. The data on human cells will also provide a basis for understanding a variety of serious disorders associated with mitochondrial defects and creating effective treatment strategies.

**Prof. Dr hab. Marcin Nowotny**

Since 2008, he has headed a lab at the International Institute for Molecular and Cell Biology. He is a winner of the ERC Starting Grant (2011). Between 2003-2008, he completed a postdoctoral fellowship at the National Institutes of Health, USA. He earned his PhD in 2002 at the Institute of Experimental Biology of the Polish Academy of Sciences.

**Dr hab. Roman Szczęsny**

Since 2017, he has headed a group at the Institute of Biochemistry and Biophysics of the Polish Academy of Sciences. Between 2010-2018, he completed a postdoctoral fellowship at the University of Warsaw and the Institute of Biochemistry and Biophysics of the Polish Academy of Sciences. He earned his PhD in 2009 at the Institute of Biochemistry and Biophysics of the Polish Academy of Sciences.



**Prof. Dr hab. Paweł Golik**

Head of the Department of Genetics and Biotechnology at the Faculty of Biology of the University of Warsaw. Between 2000 and 2002, he completed a postdoctoral fellowship at Emory University in Atlanta, USA. He earned his PhD in 1999 at the Faculty of Biology of the University of Warsaw, in cooperation with the Centre de Génétique Moléculaire, CNRS in Gif-sur-Yvette, France.

**Dr hab. Bartosz Wilczyński, prof. UW**

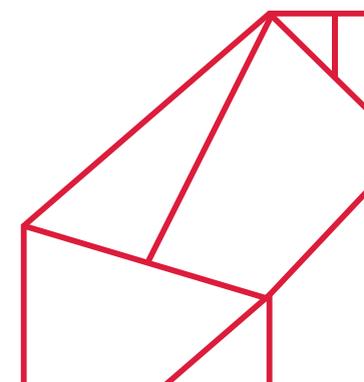
Since 2021, he has been employed as a professor at the Faculty of Mathematics, Computer Science and Mechanics of the University of Warsaw (he became an Assistant Professor in 2011). Between 2008 and 2011, he completed a postdoctoral fellowship at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany. He earned his PhD in 2008 at the Institute of Mathematics of the Polish Academy of Sciences.

Laboratorium Struktury Białka w MIBMiK.

**Photo by Marcin Nowotny**

On the photo on p. 84 – Right to left: Marcin Nowotny, Bartosz Wilczyński, Roman Szczęsny, Paweł Golik.

**Photo by Daria Goś.**



# NEW LUMINESCENT MATERIALS FOR BIOMEDICAL APPLICATIONS



**Principal investigator:**  
Prof. Dr hab. inż. Artur  
Bednarkiewicz, Institute  
of Low Temperature and  
Structure Research

**Project title:**  
*Lanthanide co-doped  
nanocolloidal core-shell  
nanostructures: synthesis  
and active modulation of  
spectral properties*

**Funding scheme:**  
SONATA BIS 1,  
announced on 15 March 2012

Panel: ST5

The main purpose of the project was to develop a method of obtaining lanthanide-doped nanocrystals with a diameter of ca. 25 nm ( $1 \text{ nm} = 10^{-9} \text{ m}$ ), which, thanks to appropriate surface modifications, could be suspended in any fluid. Such materials have a variety of potential applications as luminescent labels in medicine and life sciences. When the surface of these nanoluminophores is modified with appropriate biomolecules, they can be used for diagnosis (e.g. detecting cancer markers), imaging (e.g. labelling certain compounds in the cell membrane, tumour visualization), or treatment (e.g. hyperthermia or photodynamic cancer therapy). Before they can be employed for biomedical purposes, however, we need to develop reliable and reproducible methods that would allow us to synthesize them and intentionally modify their properties to match specific applications. This becomes possible with an “onion” like nanocrystals, in which the ion-doped core is surrounded by another layer (or layers) of a different composition.

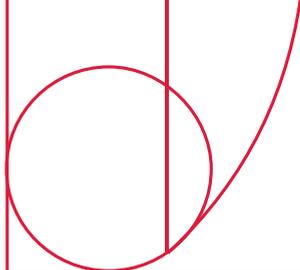
In our project, we examined the way in which the type and concentration of lanthanides, their distribution (in the core or in the shell) and shell thickness affect the properties of these materials. It turned out that the distribution of lanthanide ion dopants determines not only their spectroscopic behaviour and properties (e.g. light colour, emission lifetime), but also the purpose for which the materials can ultimately be used [ACS *Photonics*, 2017, 4 (8), pp 1993–2002; *Nanoscale*, 2017, 9(24), pp. 8288–8297; *Small*, 2017, 10, 1701635). This is of crucial importance for our un-

derstanding of the fundamental processes of energy absorption and transfer between lanthanide ions, and this new knowledge will allow us to design new luminescent materials for biomedical applications.

An excellent example of such research and its potential applications was our success at designing nanomaterials which, functionally speaking, can convert red light ( $\sim 800 \text{ nm}$ ) to heat (local temperature increase by  $20^\circ\text{C}$ ), and at the same time permit remote temperature measurements on a nanometric scale with a precision of ca.  $1^\circ\text{C}$ . Materials of this kind can be used in cancer treatment known as hyperthermia; while contactless temperature control means that overheating does not harm the surrounding healthy tissue.

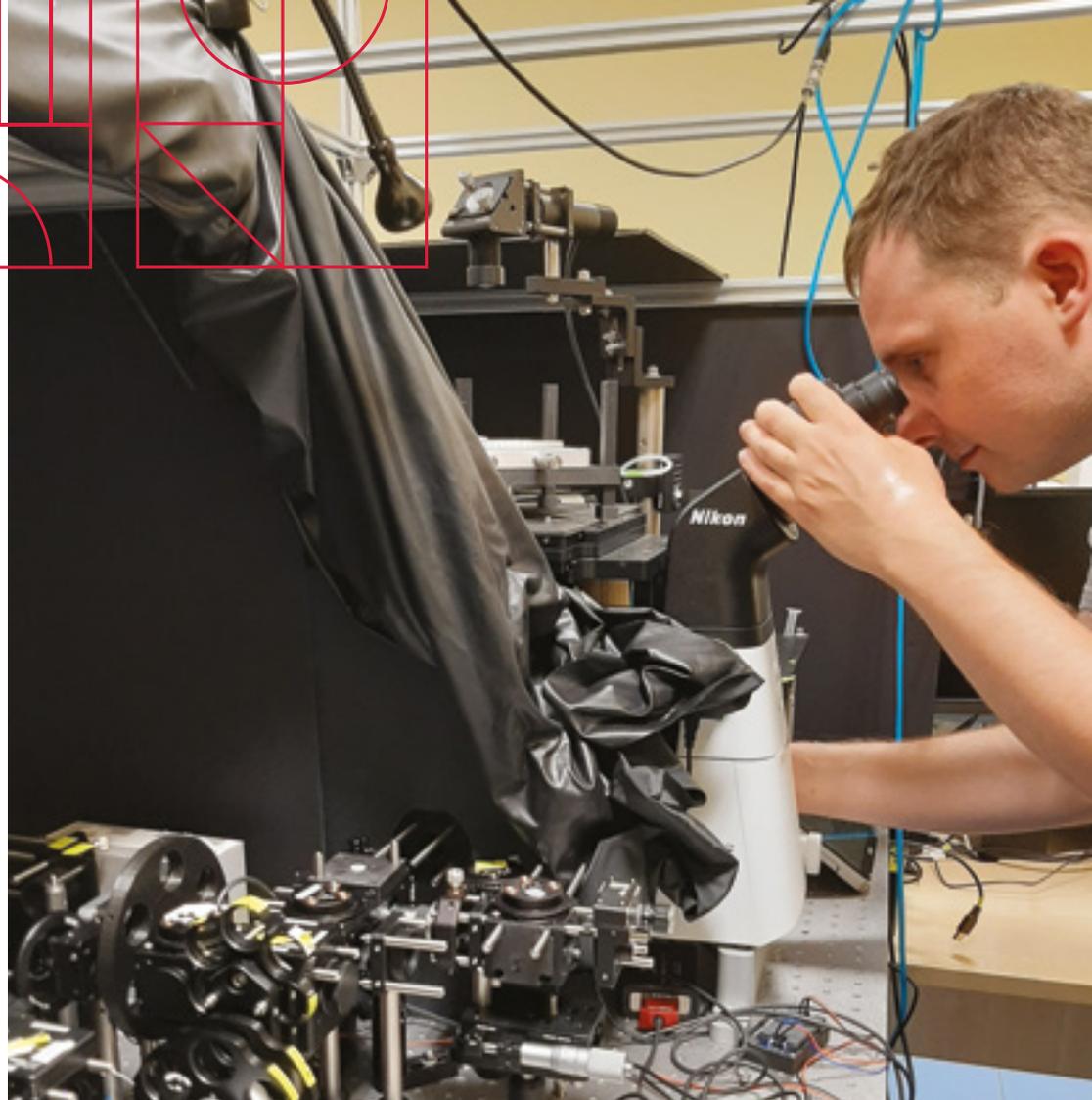
Besides synthesizing nanocrystals and examining their luminescence, we also carried out a number of tasks to enable reliable comparisons between their properties. To this end, we constructed two unique measurement systems, one to test quantum efficiency and another to study their dynamic properties. The basic research, synthesis and description tasks performed within the framework of the project were widely disseminated at international conferences in the hope that they might help create more effective and more sensitive diagnosis and treatment methods.

The results of the project were presented in eight articles published in leading journals such as “Chemical Society Reviews”, “Nanoscale”, “Nature Asia Mate-



rials”, “Progress in Material Science”, “ACS Photonics”, “Small”, and in a chapter of a book devoted to light upconverting nanomaterials. They were also discussed in various lectures and keynote addresses at international conferences in Spain (Shift’17), Brasil (ICL’18), Portugal (2017), Lithuania (CTCT’16), Germany, and Poland.

Our project has also allowed us to establish links of international cooperation (e.g. within the framework of European COST projects, as well as FET OPEN, Berkley Foundry, and domestic programmes such as NCN’s OPUS), organise the first UPCON’16 conference in Wroctaw, and carry out further projects (NCN OPUS) to expand basic research on lanthanide-doped nanomaterials into the field of so-called photon avalanching (*Nature*, vol 592, no.7841). The project also allowed me to broaden my research interests and build an interdisciplinary team of early-stage researchers fascinated with science.



**Prof. Dr hab. inż. Artur Bednarkiewicz**

He graduated from the Wroctaw University of Technology and earned his PhD, habilitation and professorial degree in physical sciences at the Institute of Low Temperatures and Structural Research of the Polish Academy of Sciences in 1998, 2013, and 2020, respectively. He completed a postdoctoral fellowship at the European Commission’s Joint Research Centre in Italy in 2005-2008. His research interests focus on the synthesis, characterisation and application of colloidal luminescent lanthanide-doped nanomaterials.

Dr inż. Marcin Szalkowski carrying out spectroscopic measurements.

**Photo: private collections**

# THE SELF-EDUCATION PRACTICES IN 16TH-CENTURY CENTRAL AND EASTERN EUROPE. **THE WAY FROM MINIATURA TO ERC GRANT**



**Principal investigator:**  
Dr hab. Valentina Lepri,  
Institute of Philosophy and  
Sociology, Polish Academy of  
Sciences

**Project title:**  
*Aristotelianism and self-  
education practices in  
16th-century Central and  
Eastern Europe: Preliminary  
studies on a selection of  
miscellaneous manuscripts  
written by students during  
their studies abroad*

**Funding scheme:**  
MINIATURA 2,  
announced on 17 April 2018

Panel: HS1

In 2018, I was awarded the MINIATURA 2 grant from the National Science Centre. The name evokes something small, as if it were of little help to scholars but the truth is rather the opposite, and my experience testifies to this very well.

That year, I was completing a very challenging piece of research focused on the teaching activities of the Zamoyska Academy in the Renaissance period. I was satisfied but the work, as always happens in research, had opened a new avenue of investigation, thanks to some documents that had caught my attention. These were a series of manuscripts written by students in the 16th century during their studies abroad and now stored in important libraries in Central and Eastern Europe.

These documents could open a novel chapter in studies into early modernity, as they had enormous potential for exploring the history of knowledge from a new angle; I was eager to see them, but they were scattered across the map of half of Europe. I looked around for a way to fund this idea and discovered the existence of Miniatura programme, designed expressly to support research projects in their early stages. What a surprise, in the country I come from, Italy, a grant so tailored to the needs of scholars does not exist and has never existed.

Luckily, my proposal was successful (its title was "Aristotelianism and self-education practices in 16th-century Central and Eastern Europe: Preliminary studies on a selection of miscellaneous manuscripts written by students during their studies abroad" ID: 417007) and for a year I travelled a lot, discovering a treasure trove of documents in various Polish, Czech and Hungarian archives.

This preliminary study clearly showed that students' learning did not correspond to the neutral recording of the subjects of study, opening an important window onto how students migrating westwards re-elaborated knowledge, and especially the Aristotelian tradition. Such promising results also called for an in-depth study into the contribution of students to the history of European intellectual thought.

Let's now go back to what I was arguing at the beginning about Miniatura not meaning "small" at all to a scholar. By carrying out such a preliminary study financed by this grant, I had the opportunity to pave the way for the development of a broader and more ambitious research project. Starting from these results, I prepared and submitted an ERC Consolidator Grant proposal to the European Research Council under the title "From East to West and Back Again: Student Travel and Transcultural Knowledge Production in Renaissance Europe (c. 1470 – c. 1620)". I was awarded the grant, which guaranteed



# DEVELOPMENT OF NEW BIODEGRADABLE ELASTOMERIC TEMPLATES FOR HEART TISSUE ENGINEERING



**Principal investigator:**

Prof. Dr hab. inż. Mirosława El Fray, West Pomeranian University of Technology in Szczecin

**Project title:**

*Development of new biodegradable elastomeric templates for heart tissue engineering*

**Funding scheme:**

HARMONIA6, announced on 16 June 2014

Panel: ST8

Heart disease remains as one of the most frequent lifestyle diseases and its treatment represents one of the greatest challenges for contemporary medicine. Myocardial infarction, which weakens myocardial contractility and causes a number of complications, is one of the most common causes of sickness and death. Modern tissue engineering tools, which aim to grow tissue substitutes with the use of cells and substrates, is an extremely promising direction in regenerative medicine. A well-constructed substrate, usually made up of polymers, should biodegrade along with the proliferation of cells.

The purpose of my research was to create biodegradable polymer structures with a specific, coiled shape that would closely mimic the structure of muscle fibres and myocardial contractility to serve as a cellular substrate. A key element of the project involved the use of non-toxic monomers and enzymes as natural catalysts to obtain new biodegradable polymers based on *polybutylene succinate* (PBS). Equally important, we developed a new modification of the electrospinning process, which was not originally envisioned in the proposal, i.e. the so-called “wet” electrospinning, to produce structures with a pre-defined architecture that mimics the structure of coiled fibres. This represents a major step in the development of new, cutting-edge methods for obtaining functional materials.

My team collaborated with several renowned international centres, such as the Weizmann Institute of Sciences (IL), University of Akron (USA) and Rutgers University – New Jersey Center for Biomaterials (USA). Staff and PhD students involved in the project used their state-of-the-art infrastructure to carry out detailed physical, chemical, structural, thermal, mechanical and biological tests on the new materials. We also managed to significantly expand our knowledge in better understanding how new polymers interact with biological structures.

This multidisciplinary team collaboration has been translated into a series of articles published in reputable journals, such as “Langmuir”, “ACS Sustainable Chemistry & Engineering”, “Materials Science and Engineering: C”, “RSC Advances”, “Polymers”, as well as papers presented at prestigious international conferences, including the World Biomaterials Congress in Montreal, the European Society for Biomaterials Conference in Athens, the Bio-Inspired Materials in Potsdam, the World Forum on Advanced Materials POLYCHAR in Naples, and many others.

Thanks to the new knowledge and the results I obtained in my project, I was able to secure a prestigious fellowship awarded by the Polish-American Fulbright Commission, the STEM Impact Award



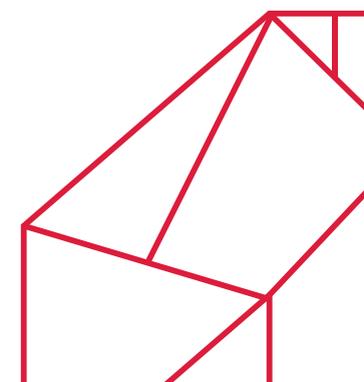
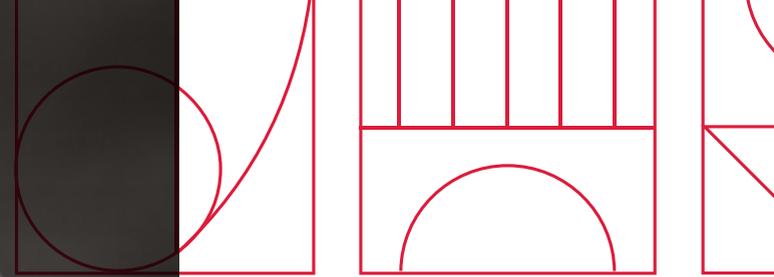
SEM microphotograph showing L929 cells grown for 144 hours on fibres obtained using the “wet” electrospinning method

Photo on p. 90 by Michał Niewdana/NCN.

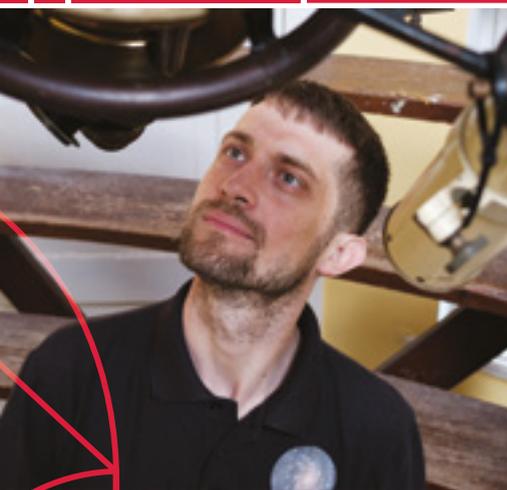
2019, to carry out research into “green” polymers synthesised with the use of enzyme catalysts at Ohio State University (USA). The biodegradable polymers developed under the HARMONIA 6 project are now being studied within the framework of a new project I coordinate under Horizon 2020 H2020-MSCA-RISE, in cooperation with academic and industry partners from four European countries and the US.

**Prof. Dr hab. inż. Mirosława El Fray**

A graduate of the West Pomeranian University of Technology (MSc – 1991, PhD – 1996), she earned her habilitation at the Warsaw University of Technology (2004) and completed a postdoctoral fellowship at the Hamburg-Harburg University of Technology and the University of Bayreuth (2000-2003) in Germany. She has won a Royal Society fellowship at Imperial College London, UK (2005), and a fellowship at Ohio State University, US, awarded by the Polish-American Fulbright Commission (2019). She is also a winner of the “West Pomeranian Nobel Prize” (2016), member of various scientific societies, author of more than 130 publications in JCR journals, and holder of 10 patents, including 2 granted by the United States Patent and Trademark Office (USPTO). She has supervised 10 PhD dissertations and more than 70 MSc and MEng theses. She is a member of the International Research Council of the Institute of Experimental Medicine of the Czech Academy of Science.



# GAMMA-RAY BURSTS AND SUPERNOVAE SHED LIGHT ON HOW GAS IS ACQUIRED BY GALAXIES



**Principal investigator:**  
Dr hab. Michał Michałowski,  
Adam Mickiewicz University

**Project title:**  
*Gamma-ray bursts and  
supernovae shedding light  
on how galaxies acquire gas*

**Funding scheme:**  
SONATA BIS 8,  
*announced on 15 June 2018*

**Panel:** ST9

The purpose of the project is to study the formation of massive stars that eventually explode as supernovae. The subject is important from the point of view of the evolution of stars and galaxies, since massive stars produce heavy elements and their explosions may halt the formation of other stars.

To date, we have discovered large quantities of atomic gas in the vicinity of the explosion site of an IcBL supernova (Michałowski et al. 2020a, A&A). Explosions of this kind occur at the death of the most massive stars in the universe. In this particular case, the concentration of gas with low heavy-element content suggested that the star in question was formed after gas from intergalactic space had seeped into the galaxy. This illustrates the specific conditions under which such massive stars arise. The discovery will allow us to use supernovae to study the influx of gas into galaxies, an important process supplying galaxies with fuel to create new stars.

We also studied the properties of a galaxy which is known as the “SN Factory” because as many as four supernovae have exploded there over the past 20 years. This large number was shown to be related to the higher pace at which the stars were formed, which in turn was caused by the galaxy’s interaction with smaller nearby galaxies (Michałowski et al. 2020b, A&A).

As part of an international team, I also observed the

gamma-ray burst (the explosion of a massive star) (Izzo et al., 2019, Nature). The general theoretical model of the phenomenon predicts the presence of three components: a stream of particles concentrated in a narrow cone, a heated up cocoon of matter surrounding the star, and the emission of light related to the SN explosion. While the simultaneity of the gamma-ray burst and the SN explosion has already been demonstrated on many occasions, the existence of a cocoon of matter predicted by the theoretical model was still unproven. Our project confirmed that the supernova is indeed surrounded by a cocoon of matter and its explosion is related to the gamma-ray burst. This opens up avenues for the study of new processes linked to the explosion of the most massive stars and allows to study the formation of heavy elements ejected as the newly-discovered cocoon. The observations were made with the use of the Roman Baranowski Telescope, owned by the Adam Mickiewicz University in Poznań and located in Arizona, USA.

The international team of astronomers that I am part of was also the first to observe the highest-energy gamma radiation yet recorded from a gamma-ray burst (MAGIC et al. 2019, Nature). The radiation was in the so-called teraelectronvolt (TeV) range, i.e. it was a trillion times more energetic than the visible light captured by the human eye. This had been predicted by the model, but was now recorded for the first time. The gamma-ray burst was also the brightest TeV source to be observed. We showed that



the radiation is formed through a process known as inverse Compton scattering, in which radiation becomes more energetic through collisions with higher-energy electrons. This discovery brings us closer to understanding the death of massive stars.

**Dr hab. Michał Michałowski**

I am an astronomer at the Astronomical Observatory Institute at the Adam Mickiewicz University in Poznań. I earned my PhD at the University of Copenhagen under the supervision of Jens Hjorth and Darach Watson and completed a post-docship at the University of Edinburgh with James Dunlop. Subsequently, I won a Pegasus Marie-Curie grant, which I carried out at Ghent University with Maarten Baes. Afterwards, I returned to Edinburgh and then moved to Poznań with the POLONEZ Marie Skłodowska-Curie grant.

Neighbourhood of the NGC 2770 galaxy, where as many as 4 supernovae have exploded over the past 20 years. The interaction with smaller galaxies (marked in the picture) caused an increase in star formation in NGC 2770, and, consequently, a greater number of supernovae.

**Photo by Christina Thöne**

On the photo on p. 92: Michał Michałowski next to a historic Zeiss telescope. **Photo by Adrian Wykrota/"Życie Uniwersyteckie"**.

## FAR OFF THE BEATEN TRACK... OF A RESEARCH CAREER



**Principal investigator:**  
Dr hab. Artur Obłuski, Polish  
Centre of Mediterranean  
Archaeology, University of  
Warsaw

**Project title:**  
*Nubian Monasticism. The  
role of religious institutions  
in the peripheries of the  
Byzantine world*

**Funding scheme:**  
SONATA 7,  
announced on 17 March 2014

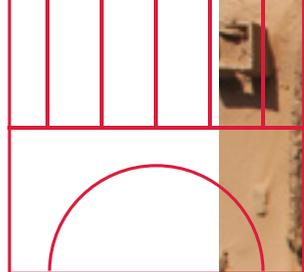
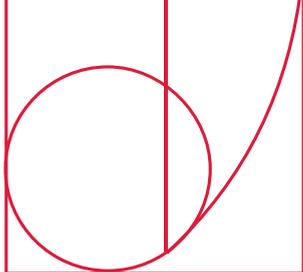
**Panel:** HS3

I would like to start off by describing the impact of the project on my research career, which has not taken a very typical path. I was never hired by an university after my MA defence, not even after my PhD; I conducted research without a formal affiliation with any academic institution. Getting a university position as part of the grant allowed me to fully devote myself to my studies and served as an incredibly important catalyst for my academic career. After winning the NCN call, I went on to secure more grants, first from the Qatar Museum Authorities, and finally, the European Research Council (ERC). This shows that creating funding opportunities for people from outside the university system contributes to increasing the competitive edge of research and improves its quality. People who cannot, for different reasons, carry out their research at an university, do not need to fall through the cracks and look for jobs outside the field of research, but can compete with colleagues who were more fortunate at the beginning of their careers.

Another important advantage of the Polish granting system is its similarity to that employed by the ERC. This allows researchers to gain considerable experience in preparing projects intended for the most prestigious European funding schemes. For me personally, taking part in the NCN call served as a stepping stone to an ERC Starting Grant and my subsequent habilitation. This personal story demonstrates that the introduction of an open granting system and the foundation of the NCN were among the most important, positive changes in 21st-century Polish research.

There is a fly in this ointment as well, however. The system works too well – in many fields, NCN grants almost completely satisfy the demand for research projects. This is one of the reasons why so few Polish researchers apply for ERC grants.

My project was devoted to the role of religious institutions in ancient Nubia. Polish scholars, such as Professor Ewa Wipszycka, have long been in the vanguard of research into monasticism in the Nile Valley. We have excavated and participated in archaeological digs in various monasteries, both in Egypt and Nubia. However, while the Polish school published excellent monographs on monasticism in Egypt, which have since made it into the canon of the field, there was a lack of similar sources on Nubia. My archaeological research at the Ghazali monastery was designed to fill this gap and enrich the synthesis with a comparative perspective. I wrote the first comprehensive study of Nubian monasticism, entitled “Monasteries and Monks of Nubia”, to complement Professor Wipszycka’s “The Second Gift of The Nile, Monks and Monasteries in Late Antique Egypt”. Thanks to this monograph and the articles I published in the renowned Monastic Institute of the Pontifical Athenaeum of Saint Anselm in Rome, as well as in journals such as the “Journal of Archaeological Science”, “Archaeometry”, or the “The Encyclopedia of Ancient History: Asia and Africa”, and the Routledge series, information about the phenomenon can now be included in further syntheses and bring the discipline, until now dominated by Polish researchers, into the international arena.



My research shows that all monastic forms, from individual asceticism to coenobitism, were present in Nubia. Archaeological sources also suggest that the relationship between the monastic movement and the elites of Makuria was extremely strong. Monks were employed in royal administration and it is mainly from their ranks that bishops were usually recruited; there are also reports of kings who abdicated to take up an ascetic life. Nubian monasticism, not unlike Christendom at large, was inspired by Egypt, but Nubians also looked for new ideas further up north, in Palestine, Syria and Constantinople. Monasteries played an important role as centres of education and royal administration offices. They also had a major economic function as one of the greatest institutional consumers at the local level. Monks engaged in charitable work and medicine, and contributed to the growth of civilization, e.g. by promoting the knowledge of iron manufacturing.

The monograph “Monasteries and Monks of Nubia” was published in open access and has been downloaded by nearly 3000 people thus far. This is yet another success of the granting system to which the NCN contributes.

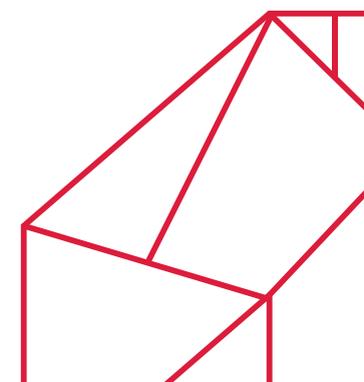
**Dr hab. Artur Obtuski**

Archaeologist, expert in Nubiology, particularly interested in Nubian monasticism and social and religious transformations in Northeast Africa and the Near East. He has headed an archaeological expedition to Old Dongola and Ghazali in Sudan. He is the first Polish archaeologist to receive a grant from the European Research Council (ERC Starting Grant), the President of the International Society for Nubian Studies and Head of the Polish Centre of Mediterranean Archaeology, University of Warsaw. He promotes the idea of socially responsible archaeology and the engagement of local communities in cultural heritage management.

**Churches in Ghazali.**

**Photo by Miron Bogacki**

**Photo on p. 94 by Mirosław Kaźmierczak/UW**



# MACROMOLECULAR MACHINES AND THEIR MECHANISMS OF ACTION



**Principal investigator:**  
Dr Michał Szymański, Prof.  
at UG, University of Gdańsk  
(UG)

**Project title:**  
*Unraveling the molecular  
basis of DNA damage  
recognition and processing  
in human mitochondria*

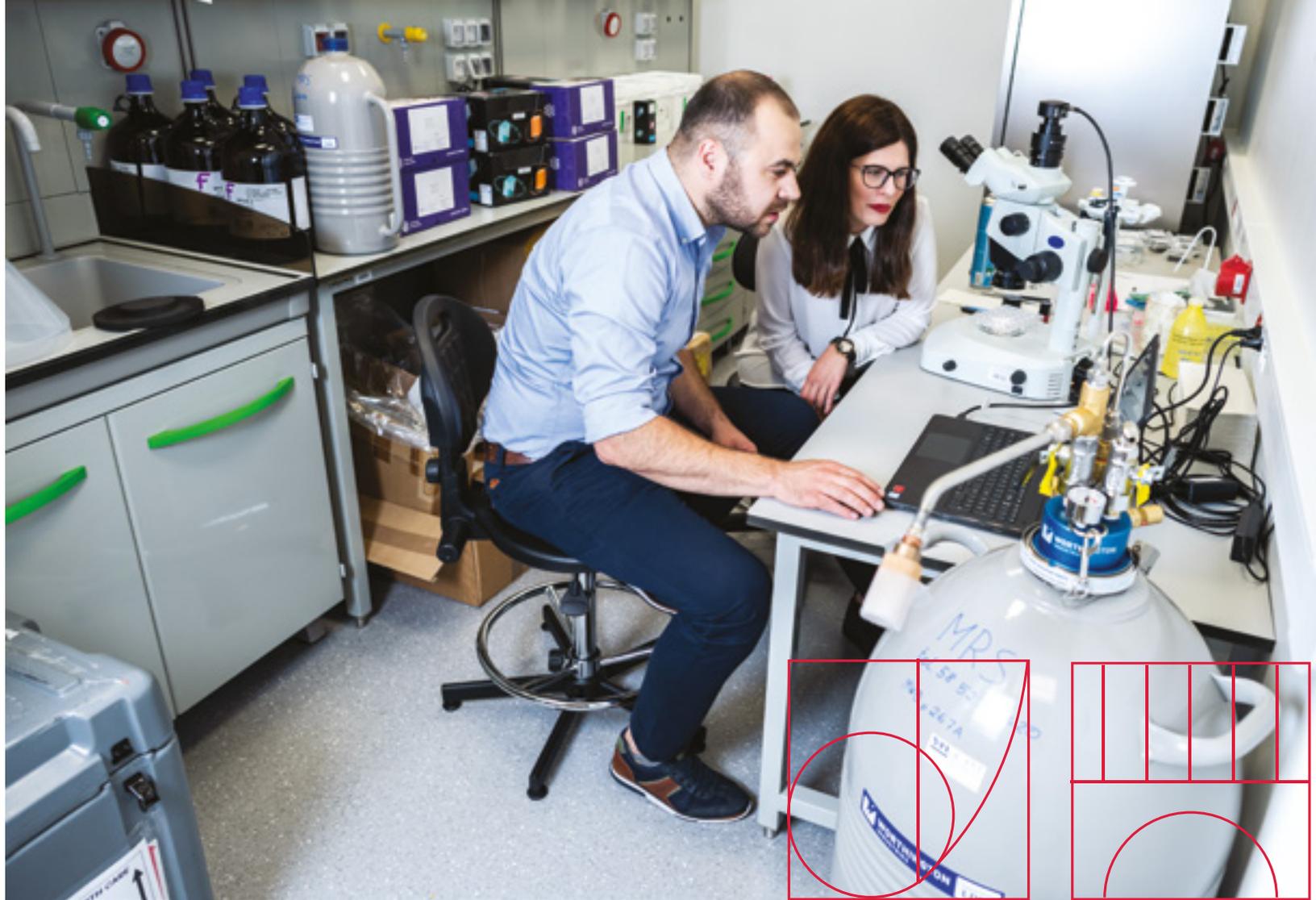
**Funding scheme:**  
POLONEZ 2,  
announced on 15 March 2016

Panel: NZ1

DNA replication, recombination and repair are the most basic, strictly regulated processes coordinated by highly specialized nucleoprotein complexes, also known as “molecular machines” and made up of enzymes with different functions. Our group’s research interests centre on understanding the basic principles that underlie the formation of such multi-protein complexes, describing their structure, and determining their mechanism of action. Knowing how molecular machines copy and repair DNA will allow us to explain how errors in these key processes may lead to cell dysfunction and cause disease.

Mitochondria, often described as the “cell’s power plant”, generate the energy that each cell needs to survive and that our body requires for normal function. They have their own genetic material, known as mitochondrial DNA, which provides a set of precise instructions according to which the building blocks of the “power plant” are made. Any damage to mitochondrial DNA that results in mutation may contribute to mitochondrial dysfunction. Mitochondrial dysfunction, on the other hand, is linked to the processes of aging, as well as many medical conditions, including cancer, metabolic disease (e.g. diabetes), and various neurodegenerative disorders (e.g. Alzheimer’s disease). It turns out that mitochondria have their own set of repair tools, including specialized enzymes that identify and repair damaged mitochondrial DNA. Their mechanism of action, however, is still largely unknown.

The purpose of our project was to provide basic structure–function data to discover the mechanism by which damaged genetic material is identified by enzymes involved in mitochondrial DNA repair. We showed that the enzymes involved in identifying and eliminating DNA damage cooperate with one another, and that the process of identification and repair is stimulated by other proteins still. In addition, the POLONEZ grant allowed us to continue our international cooperation with a group run by Professor Andrew Fire from Stanford University, USA, which led to an article entitled “Transcription polymerase-catalyzed emergence of novel RNA replicons”, published in “Science”. In cooperation with teams from Poland and Slovakia, we described the first case of a homozygous variant of the POLG2 gene in an adult patient. Entitled “Whole exome sequencing identifies a homozygous POLG2 missense variant in an adult patient presenting with optic atrophy, movement disorders, premature ovarian failure and mitochondrial DNA depletion”, our joint article was published in the “European Journal of Medical Genetics”. In addition, the POLONEZ grant helped to generate the preliminary data and ideas for my ERC Starting Grant proposal.



**Dr hab. Michał Roman Szymański, professor of the University of Gdańsk**

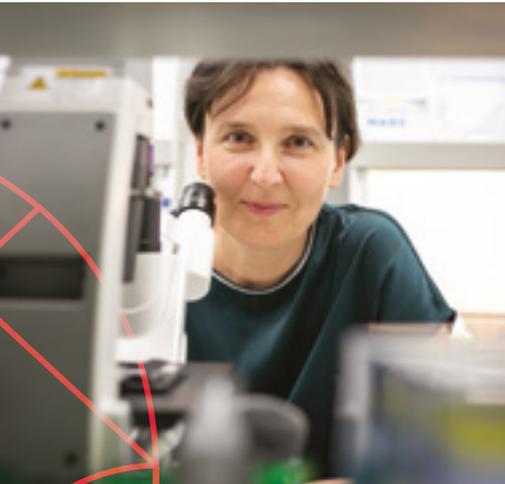
He graduated in Biochemistry and Biophysics from the University of Houston (2007), and earned his PhD in Biochemistry and Molecular Biology at the University of Texas (2011). Carried out a Postdoctoral Fellowship at the Department of Biochemistry and Molecular Biology (2011-2013) and Department of Pharmacology (2013-2016), UTMB, USA. In 2017, as a winner of POLONEZ (NCN) and FIRST TEAM (FNP) grants, he moved to the Intercollegiate Faculty of Biotechnology UG and GUMed (MWB UG-GUMed). Apart from domestic and

international grants and fellowships, he has also won the prestigious EMBO Installation Grant and a grant from the European Research Council (ERC). In 2019, he earned his habilitation degree and was appointed as the Head of the Structural Biology Laboratory at MWB UG-GUMed. He has authored more than 25 original articles published in prestigious research journals, such as "Science", "Nature Communications", "Proceedings of the National Academy of Sciences of the United States of America (PNAS)", "EMBO Journal", "Journal of Biological Chemistry", and more than 50 conference papers.

Michał Szymański with Marta Grzelewska.

**Photo by FNP/One HD.**

# ANTI-CANCER EFFECTS OF ANTI-CD20 ANTIBODIES



**Principal investigator:**  
Dr hab. Magdalena  
Winiarska, Medical  
University of Warsaw

**Project title:**  
*Influence of the B cell  
receptor (BCR) signaling  
pathways on CD20 levels in  
tumor cells and antitumor  
activity of anti-CD20  
monoclonal antibodies*

**Funding scheme:**  
OPUS 4, announced  
on 15 September 2012

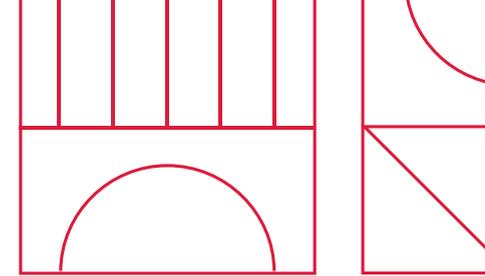
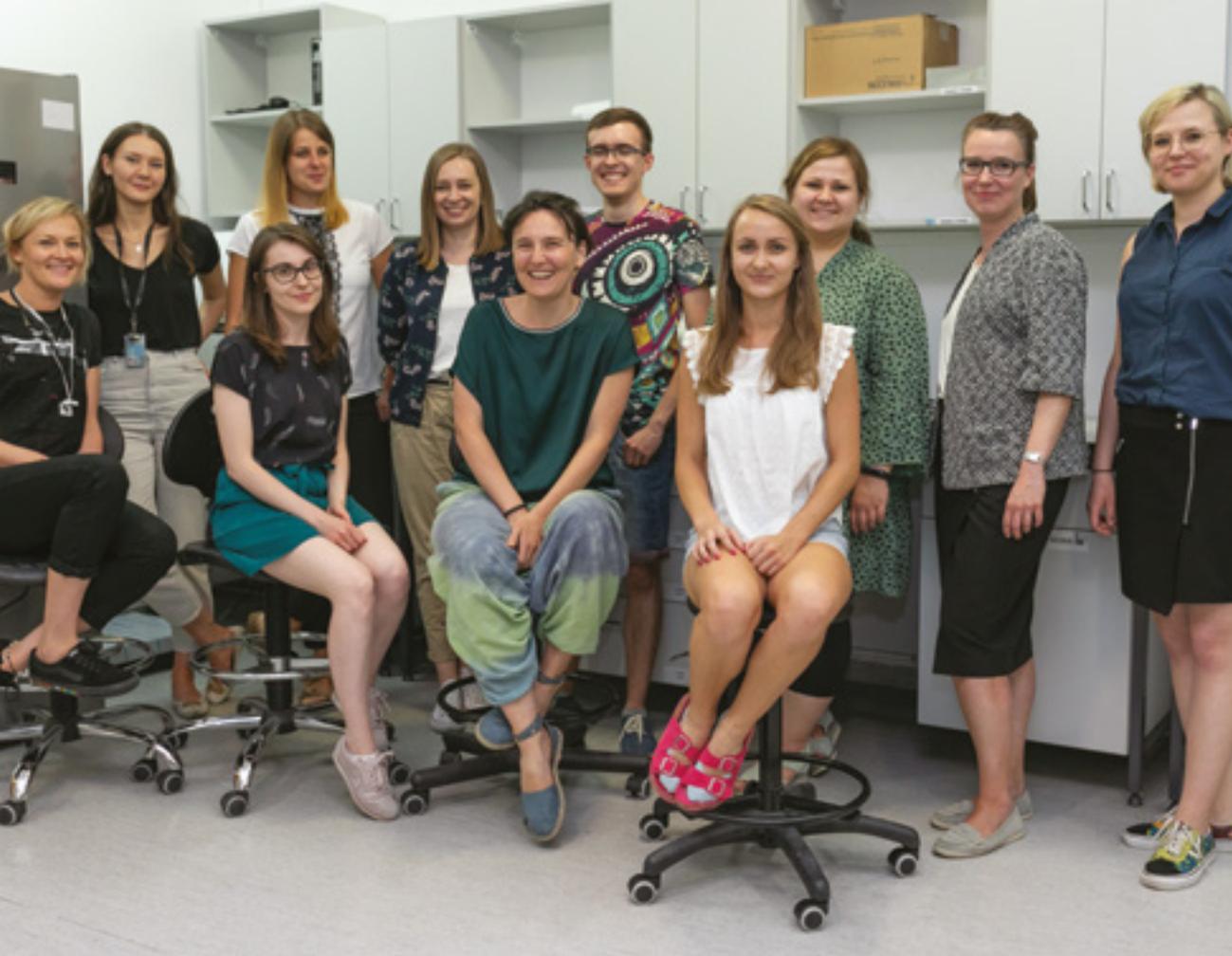
**Panel:** NZ6

I first took an interest in anti-CD20 monoclonal antibodies and their effects during my PhD programme. Immunotherapy with the use of such antibodies has been widely employed in the treatment of B-cell tumours, in which neoplastic cells display a CD20 molecule on their surface.

My research has focused primarily on the clinically significant processes that regulate the anti-tumour effects of anti-CD20 antibodies in mechanisms associated with the activation of complement-dependent cytotoxicity and antibody-dependent cellular cytotoxicity. Within the framework of the project funded under OPUS 4, I looked for new pathways participating in the regulation of the quantity of CD20 molecules in neoplastic cells. In recent years, we have seen the arrival of many drugs with important anti-cancer benefits, in the form of small-molecule inhibitors of kinases that take part in BCR signalling. BCR activation plays a very important role in normal B-cell growth and proliferation. Our research revealed that the inhibition of the BCR signalling pathway reduces the amount of CD20 on the surface of tumour cells and thus impairs the action of anti-CD20 antibodies. We demonstrated the existence of new BCR-associated pathways that regulate CD20 concentration in cancer cells. Our findings were published in two prestigious journals: "Leukemia" and "mAbs", delivering clear evidence to suggest that a combined therapy with BCR signalling inhibitors and anti-CD20 antibodies should be used with great skill and caution in patients with B-cell cancers.

In clinical trials currently underway, anti-CD20 antibodies, rituximab and ofatumumab, are being tested together with BCR signalling inhibitors in patients with blood cancers. It seems that because of the negative impact of these inhibitors on CD20 concentration in cancer cells and their blocking effect on NK cell activity, drugs from this group should be administered in an appropriate sequence to guarantee the best therapeutic results. It is worth emphasizing that our findings, the first to be published in prestigious oncological journals, have since been confirmed by other research teams, as well as several clinical trials. Importantly, they have also contributed to a search for new, more selective BCR pathway inhibitors.

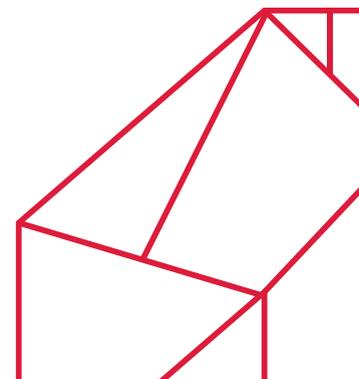
The project in question was my first funded by the NCN. I carried it out in tandem with a wonderful and brilliant PhD student, Kamil Bojarczuk, who unfortunately passed away in 2020. Together with Kamil, based on this first project, we created a vibrant team that has since continued successful immunotherapy research. For a while now, we have studied the modification of NK cells and T cells by chimeric antigen receptors (CARs). We are interested both in finding new treatment goals and optimizing CAR coding vectors to enable the selective action of effector cells in the tumour environment. The research is partially funded by the European Research Council within the framework of an ERC Starting Grant.



Dr hab. Magdalena Winiarska with her team. Standing from left: Katsiaryna Marhelava, Dr Iwona Baranowska, Dr Małgorzata Bajor, Kuba Retecki, Dr Marta Kłopotowska, Dr Agnieszka Graczyk-Jarzynka, Dr Klaudyna Fidył. Sitting from left: Dr Zofia Pilch, Marta Krawczyk, Dr hab. Magdalena Winiarska, Aleksandra Kusowska.

**Dr hab. Magdalena Winiarska**

I started independent research in 2010, heading a small research team at the Department of Immunology of the Medical University of Warsaw. Since then, my research has been funded under eight grants in which I have served as a principal investigator. My current team consists of seven postdoctoral fellows, one technician, three PhD candidates, and four students. I also cooperate with other centres, both in Poland and beyond. An important part of my mission is to promote young researchers – students, PhD candidates and young postdoctoral fellows.



# TERRORISTS, MERCENARIES, CIVILIANS. LEGAL AND ETHICAL CHALLENGES OF THE RECENT METHODS AND CIRCUMSTANCES OF WARFARE



**Principal investigator:**  
Dr hab. Tomasz Żuradzki,  
Jagiellonian University in  
Kraków

**Project title:**  
*Terrorists, mercenaries,  
civilians: some legal and  
ethical challenges of  
the recent methods and  
circumstances of warfare*

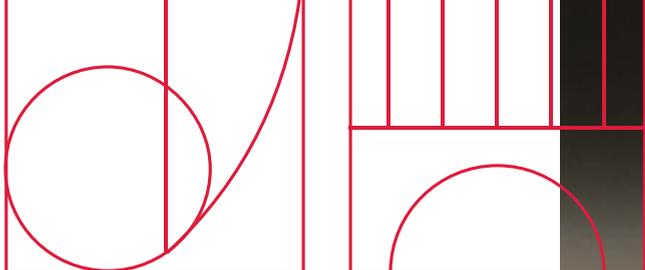
**Funding scheme:**  
SONATA 2, announced  
on 15 September 2011

**Panel:** HS5

Before I present my NCN-funded project on the ethics of war, I would like to start off with a short anecdote that illustrates why I decided to take up the subject a few years ago. Ludwig Wittgenstein, one of the best known 20<sup>th</sup>-century philosophers, left his hometown of Vienna to study at Cambridge briefly before WWI. Soon after the war broke out, he decided to enlist in the Austrian army, i.e. serve the very country that sparked this cruel conflict in the first place. He even used his family connections to be sent to the front line, without any concern for the fact that some of his close British friends were fighting in the trenches on the other side. In his diaries from that period, Wittgenstein confessed that the war and the constant risk of death enriched him spiritually. "Now I have the chance to be a decent human being", he wrote on the day he first saw the enemy<sup>1</sup>. On the one hand, he was a brilliant intellectual, who only published one book in his lifetime because he was not sure whether his arguments were correct. On the other, he had no qualms about participating in the killing of people he did not even know. More than that – he believed his British mentor, Bertrand Russell, who was put in prison for his pacifism, was wrong not to support the British war effort.

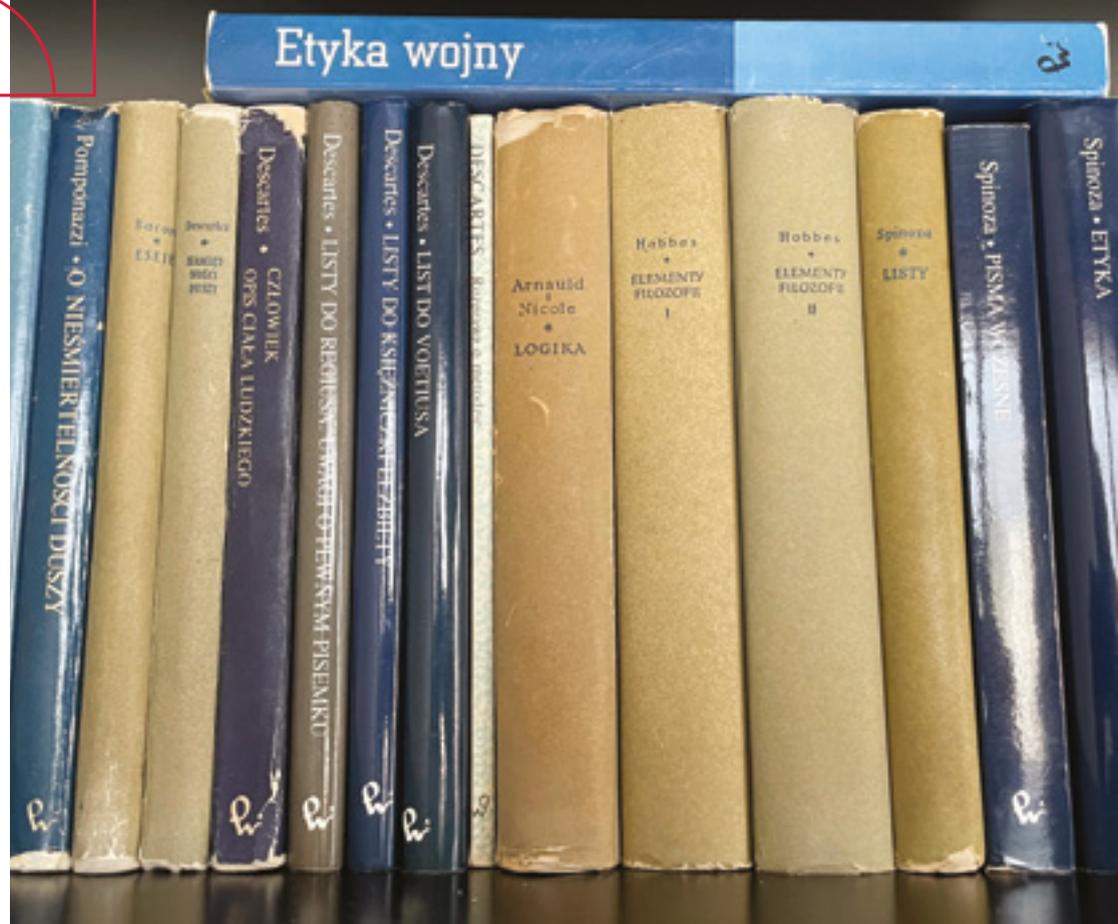
The primary purpose of the project carried out in 2012-2015 under SONATA 2 was to examine to what extent the legal and ethical norms that regulate the permissibility and methods of armed conflict differ from the norms on the use of violence in ordinary situations. In other words, the project proposed to analyse the arguments in support of the view that doing harm during war is somehow "less evil" (as illustrated by the anecdote above). My theoretical analysis took its point of departure from changes in how armed conflicts were waged and justified in the context of recent wars in Iraq and Afghanistan. I was interested in phenomena such as the application of the provisions of criminal law, rather than war conventions, against so-called unlawful combatants; kidnappings and prolonged detentions, where subjects suspected of terrorism were held captive for many years without a right to trial or defence (e.g. in the American military base in Guantanamo Bay); the so-called policy of targeted killings that various countries implemented against persons suspected of terrorist activities, including their own citizens; the use of torture or enhanced interrogation techniques to extract confessions; and the privatization of military services.

<sup>1</sup> Quoted from: Jeff McMahan, *Killing in War*, Oxford University Press, Oxford 2009, p. 2.



For instance, I analysed the arguments in favour of targeted killings, which had to do with law enforcement, the rules of armed conflict, just retribution, and the right to self-defence. Using the example of the first Iraq war in 1991, NATO's intervention in Kosovo in 1999, and Israel's Gaza Strip operation in 2008/2009, I looked at different dimensions of the rule of proportionality in the context of starting and waging an asymmetric military conflict. I also relied on international conventions to analyse situations of normative uncertainty, i.e. situations in which the combatants are not sure which norms are binding in their case, and tried to determine to what extent normative uncertainty could be treated as analogous to empirical uncertainty. These reflections led to a series of articles published in English and Polish in various journals (e.g. "Diametros", "Ethos") and conference volumes (e.g. 1st European Conference on Argumentation, XXVI World Congress of Philosophy of Law and Social Philosophy).

Also funded by the NCN (OPUS 9), my next project dealt with the philosophical problems of ethical decisions taken by public and private persons in various situations of risk or uncertainty. An UWERTURA 1 grant, on the other hand, enabled me to prepare a proposal for the European Research Council, which was awarded funding under the ERC Starting Grants.



**Dr hab. Tomasz Żuradzki, Professor of the Jagiellonian University**

I am a philosopher working as a Professor at the Institute of Philosophy of the Jagiellonian University in Kraków. I head the Interdisciplinary Centre for Ethics of the Jagiellonian University. I am also a member of the editorial board of "Diametros" and the editor-in-chief of "Filozofia w Praktyce". At present, my research focuses primarily on metaethics, moral psychology, and bioethics. I serve as the principal investigator in the BOUNCERTAINTY project funded within the framework of an ERC Starting Grant.

The Ethics of War anthology (Polish Scientific Publishers PWN, Warsaw 2010) co-authored by Tomasz Żuradzki and books from the Philosophy Classics Library series.

**Photo by Tomasz Żuradzki.**

# WIDE-EYED WITH FEAR, OR HOW WE LEARN TO BE AFRAID THROUGH OBSERVATION



**Principal investigator:**  
Dr hab. Ewelina Knapska,  
Nencki Institute of  
Experimental Biology

**Project title:**  
*Neural correlates of  
emotional contagion in  
humans*

**Funding scheme:**  
OPUS 10, announced  
on 15 September 2015

**Panel:** HS6

A surprising amount of the information we have comes not from our own experience but from our observation of other people. This is possible because their emotions and behaviours serve as a source of valuable clues about the environment. The ability to learn through observation is widespread in the animal kingdom; we can observe it in our close and distant relatives, the apes, but also in rodents, mice and rats.

Our research project aims to investigate the mechanisms of human observational learning with the use of observational fear conditioning. In the process, one person is asked to watch another undergo the classical conditioning procedure, during which subjects learn to associate a given stimulus (e.g. a blue square on the computer screen) with an aversive event (a weak but unpleasant electric shock). After a certain time, the sight of the blue square elicits unpleasant sensations even when it is no longer accompanied by an electric shock. We are interested not so much in the process of direct learning about the meaning of the blue square from one's own experience, as from the observation of another person, i.e. a process based only on social stimuli, such as facial expressions.

Our experiments showed that socially transmitted fear can cause a clear physiological response in observers. Interestingly, not all subjects learned to associate the shock with the blue square. This suggests that observational conditioning rests on two independent mechanisms: the perception of the emotion experienced by another person and its conscious association with the co-occurring stimulus.

Our fMRI studies showed that the brain regions of key importance for direct fear conditioning were also activated by socially transmitted fear. In particular, we observed enhanced activity in the amygdala, the anterior insula and the anterior cingulate cortex. We also looked at brain activation patterns to see if they depend on whether the subject witnesses a friend or a stranger who experiences fear. No substantial differences in brain activation were observed in this case, which suggests that what observation does, above all, is provide information: what matters is the knowledge of danger and not where the knowledge comes from. A similar brain activation pattern and its independence from the degree of familiarity were also observed in rodents, which suggests the evolutionary continuity of the phenomenon.

Experiments on rats demonstrated that they can gauge the intensity of fear in other animals and use that information to adapt to the environment. If the observed rat is very afraid, other animals will show a freeze or flight response to evade direct danger. On the other hand, if the rat is less afraid, they will begin to survey the surroundings for possible threats. These reactions are mediated by the amygdala, and in particular the central amygdala nucleus. Its links to the anterior cingulate cortex and the insular cortex, as well as the basolateral amygdala, and plays a key role in socially transmitted fear. Research on animals allowed us to stimulate and inhibit specific neuronal circuits and thus understand their function. Initially, this line of research, which later split into several projects, was funded under the OPUS 6 call. Entitled "Neuronal circuits of the central amygdala nucleus involved



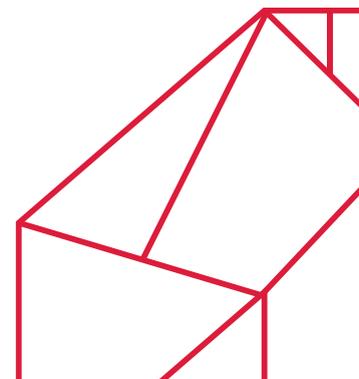
in social fear transmission”, the project allowed us to collect preliminary data and apply for an ERC grant. The ERC Starting Grant then covered my research on rodents, the findings of which have recently been published in “Current Biology” (Andraka, Kondrakiewicz et al., 2021, 31, 2347–2358; <https://doi.org/10.1016/j.cub.2021.03.047>), attracting the interest of the scientific community, as evidenced by a guest commentary in the same journal (Keyzers & Gazzola, Current Biology, 31, R728-R730; <https://doi.org/10.1016/j.cub.2021.03.100>). The results of the OPUS 10 project described above, which compared rodents and people, are currently pending publication.

The research team includes: Dr hab. Ewelina Knapska, professor of the Nencki Institute, Mgr Anna Kaźmierowska, Mgr Michał Szczepaniak, Dr Marek Wypych, Dr hab. Jarosław Michałowski, professor of the SWPS University, Dr hab. Artur Marchewka, professor of the Nencki Institute, and Professor Andreas Olsson, Karolinska Institutet.

**Dr hab. Ewelina Knapska, Professor of the Nencki Institute**

She graduated in biology and psychology from the University of Warsaw and went on to earn a PhD degree in neurobiology at the Nencki Institute of Experimental Biology of the Polish Academy of Sciences (PAS). Following her PhD defence, she completed a two-year research fellowship at the University of Michigan, USA, and in 2013, she earned her habilitation. She has served as the head of the Laboratory of Emotions Neurobiology at the Nencki Institute, and won scholarships awarded by the Foundation for Polish Science, the Minister of Education and Higher Education, and Academia Europaea. In 2016, she also won a prestigious grant from the European Research Council. Since 2018, she has co-managed BrainCity – Centre of Excellence for Neural Plasticity and Brain Disorders (International Research Agenda funded by the Foundation for Polish Science).

**Photo: One HD for FNP**



# POLYMER FIBRES FOR TISSUE ENGINEERING APPLICATIONS



**Principal investigator:**  
Dr hab. inż. Urszula  
Stachewicz, AGH University of  
Science and Technology

**Project title:**  
*3D analysis of cell responses  
to piezoelectric and charge  
induced polymer nanofibres  
scaffolds*

**Funding scheme:**  
SONATA 8, announced  
on 15 September 2014

**Panel:** ST5

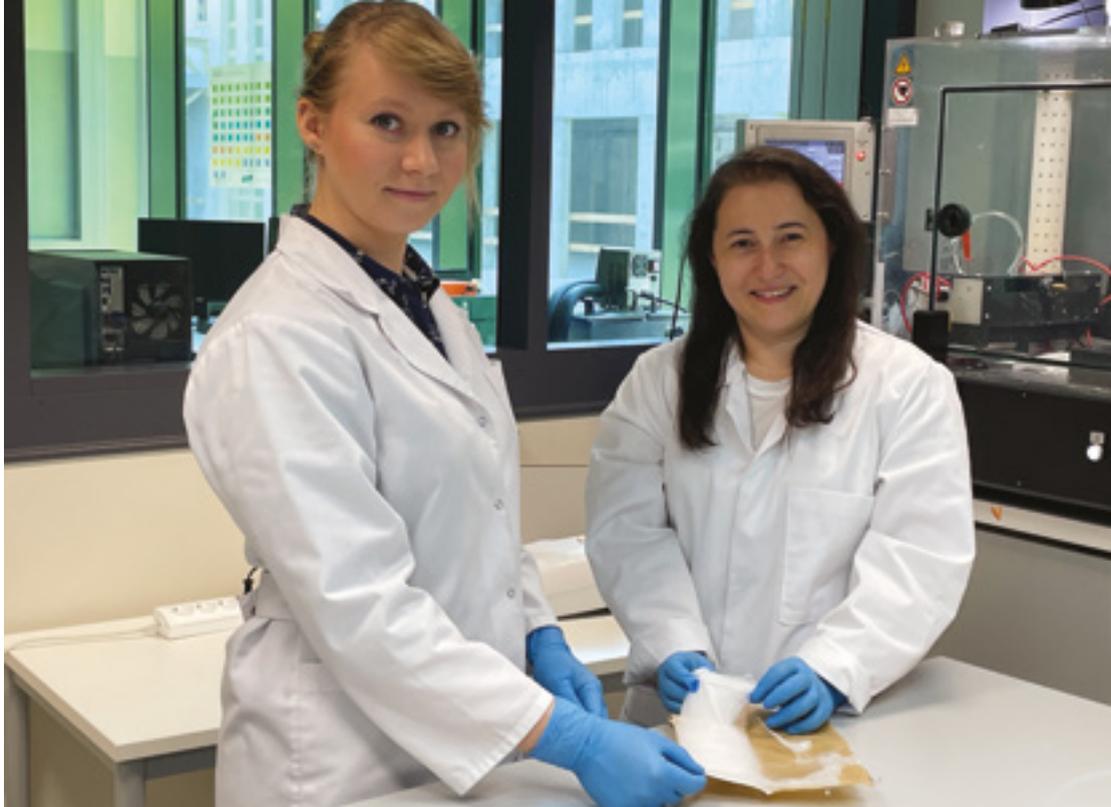
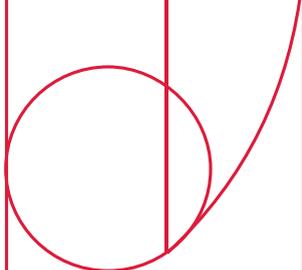
Electrospinning is one of the most popular and widely used methods for producing polymer fibres, through which they can be obtained from a wide range of polymers. In the process, a high-voltage power supply is connected to a nozzle with a polymer solution; the resulting high electrostatic field causes the polymer jet to stretch, while the solvent evaporates. The electrospun fibres are deposited collector usually situated below the nozzle. With the optimal settings, electrospinning allows the production of a variety of fibres, membranes and scaffolds with very specific surface properties for use in tissue engineering. Thanks to their high porosity (up to 95%), electrospun scaffolds closely mimic the natural extracellular matrix; this allows cells to migrate and proliferate inside the scaffold and help to regenerate tissue. In addition, changing voltage polarity during electrospinning will also change the orientation of polymer chain molecules near the surface of the fibres, modifying the chemical composition of the surface and, in consequence, its electric potential.

Our project studied the impact of fibre surface properties, such as surface charge, roughness and porosity, on cell behaviour and bone regeneration. Specifically, we looked at the surface properties of electrospun polycaprolactone (PCL) and polyvinylidene fluoride (PVDF) fibres intended for biomedical applications. The objective was to enhance the surface properties of electrospun fibres without having to modify them. This can be achieved by changing the voltage polarity applied to the nozzle during the electrospinning

of polymer fibres, to control their surface chemical composition.

The surface potentials of polymer fibres were measured by Kelvin probe force microscopy (KPFM) and X-ray photoelectron spectroscopy (XPS) was employed to analyse their chemical composition.

Our findings suggest that the voltage polarity applied in electrospinning changes the surface chemical composition of the resulting fibres. This is caused by a change in the orientation of the functional groups of the polymer chain, as well as an increase in the concentration of oxygen groups on the surface of PCL fibres and fluorine groups on PVDF fibres. When the surface potential of PCL and PVDF fibres was increased, this fuelled the proliferation of cells, increased cell adhesion to the fibres, boosted the production of collagen, and accelerated the mineralization process necessary for bone tissue regeneration. Importantly, the project also used advanced microscopy to describe the fibres and create 3D models of cells integration with fibre scaffolds. The findings of our research into PVDF scaffolds were published in "ACS Biomaterials Science and Engineering" (DOI: 10.1021/acsbomaterials.8b01108). Our microscopy micrograph of a cell on a fibre scaffolding was chosen to appear on the front cover of the journal. Another microscopy micrograph showing a cell attached to PCL fibres, was selected for the inside cover of "Advanced Materials Interfaces" (DOI:10.1002/admi.201801211), where our research results were also published.



SONATA 8 was the first project grant from NCN, I have written and won soon after I returned to Poland in 2014 to work as an Assistant Professor at the AGH University of Science and Technology. This project was incredibly important for me as it allowed me to purchase the first electrospinning set-up with a climate control chamber at the AGH University and initiate a new line of research at the Faculty of Metals Engineering and Industrial Computer Science. Sonata 8 gave me the opportunity for developing a range of new research ideas and helped to create a research group devoted to polymer fibres, intended not only for tissue engineering applications, but also for water and energy harvesting applications. This experience and the contacts I forged during this project enabled me to apply for further funds from the NCN and the FNP, as well as to develop my ERC grant proposal, which evolved during my work at the AGH. I have been awarded with the ERC BioCom4SavEn grant in 2020.

**Dr hab. inż. Urszula Stachewicz**

She is currently an Associate Professor at the AGH University of Science and Technology in Kraków, working at the Faculty of Metals Engineering and Industrial Computer Science. She graduated from the Delft University of Technology with a PhD in electrohydrodynamics of liquids, while conducting research at Philips Research Laboratories in Eindhoven in the Netherlands. She completed her postdoctoral research at the Queen Mary University of London, UK and worked in the spin-out company, Nanoforce Technology Ltd., in the area of electrospun polymer fibres. In 2018, she was a Visiting Fellow at the University of Cambridge, at the Department of Materials Science and Metallurgy, and in 2020, was awarded with a prestigious ERC Starting Grant. Her research focuses on polymer materials for biomedical and water and energy harvesting applications.

Urszula Stachewicz and Ewa Sroczyk demonstrate a sample mat made of electrospun fibres.

**Photo by Daniel Ura**

**Photo on p. 104 by Katarzyna Kurek**

# LIFE IN A LATE JURASSIC SEA AND ITS COASTLINE



**Principal investigator:**  
Dr hab. Błażej Błażejowski,  
Institute of Paleobiology  
Polish Academy of Sciences

**Project title:**  
*Life in a Late Jurassic Boreal  
Sea and on its coast: a  
newly discovered Solhofen-  
like taphonomic window at  
Stawno in central Poland*

**Funding scheme:**  
OPUS 4, announced  
on 15 September 2012

**Panel:** ST10

Systematic research and excavation has been underway in the Owadów-Brzezinki quarry, on the north-western margin of the Świętokrzyskie Mountains, since 2012, when Adrian Kin and Błażej Błażejowski (PHACOPS Geoscience Friends Association and the Institute of Paleobiology of the Polish Academy of Sciences in Warsaw) announced the discovery of a new, unique Fossil-Lagerstätte (fossil deposit) in the commune of Stawno. The palaeontological site contains a documented complex of well-preserved Late Jurassic fossils of marine organisms (e.g. rare ammonites, decapod crustaceans, horseshoe crabs, predatory bony fish, hidden-necked turtles, and ichthyosaurs) and terrestrial biota. The bulk of the fossils represent hitherto unknown species and their scientific description constitutes an important contribution to our knowledge of the history of these animal groups. The findings have thus far been outlined in several dozen scientific publications.

Beginning in 2013, the excavations were carried out under the auspices of the Institute of Paleobiology of the Polish Academy of Sciences within the framework of a three-year research project (2013-2016) funded under the OPUS 4 scheme and which recruited students, PhD candidates, and researchers from all over the world. The core of the group that oversaw the research and documentation of one of the most important palaeontological discoveries of recent years in Poland was formed by: Błażej Błażejowski (principal investigator, Institute of Paleobiology, Polish Academy of Sciences), Bronistaw A. Matyja

(University of Warsaw), Andrzej Wierzbowski (University of Warsaw), and Hubert Wierzbowski (Polish Geological Institute – National Research Institute).

The site at Owadów-Brzezinki sheds a completely new light on the geological past (the so-called *taphonomic window*) of the organic world in the Late Jurassic (between the Early and the Late Tithonian), re-drawing the picture not only of the evolution of living organisms, but also the paleogeography of Europe in that period. The palaeontological findings in the Owadów-Brzezinki quarry indicate that in the Late Jurassic, the Stawno region was a paleobiogeographical node that connected the terrestrial and marine fauna of the north and the south of the continent. The rock layers uncovered in the quarry also preserve the record of an environmental shift from a more open shelf sea to a shallow lagoon that occurred in the Late Jurassic.

The project is of essential importance not only for palaeontology as a science and its popularization in Poland, but also for the development of the region and its inhabitants. For the past several years, the commune of Stawno has hosted regular workshops and lectures that aim to popularize natural science among the residents of the region by fostering an atmosphere of understanding and respect for the natural environment. These actions are mainly targeted at children and students, as well as anyone interested in research and the protection of Polish natural and cultural heritage. The commune also



The museum presents life-size reconstructions of animals which inhabited the local seas and islands during the Late Jurassic.

Photo by Błażej Błażejowski

organizes national and international conferences devoted to geology and palaeontology. All these measures and research projects have led to the opening of the Owadów-Brzezinki Geopark in Sławno, where a newly established palaeontology museum showcases the fossils of local Jurassic animals and their reconstructions. The scientists who studied the fossils from the site also provided scientific guidance for the exhibition as well as the information boards along the geoeducational trail which runs across the observation deck along the edge of the quarry.

The Owadów-Brzezinki Geopark has all it takes to not only successfully activate the region through natural heritage tourism, but also to integrate the local community into various activities and geoeducational projects.

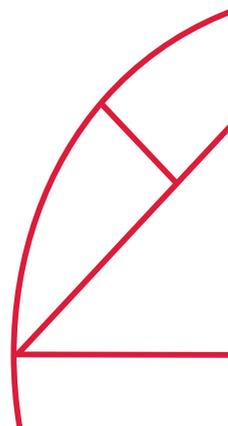
#### **Dr hab. Błażej Błażejowski**

Born in 1978 in Sanok, Błażej Błażejowski is a palaeontologist, polar researcher. He serves as the President of the PHACOPS Geoscience Friends Association.

He graduated from the Faculty of Geology of the University of Warsaw (1998) and the International Doctoral School for Biological Science at the Museum & Institute of Zoology, PAS (2008). He earned a PhD degree (2008) and completed his habilitation (2018) in geoscience at the Institute of Paleobiology of the Polish Academy of Sciences in Warsaw. He has participated in many polar research expeditions, e.g. to Spitsbergen (2002, 2005, 2010), the Canadian Arctic (2004), the Antarctic (2006-2007), and Greenland (2014).

He has won the Artur Rojszczak Award from the Club of the Foundation for Polish Science Scholars (2009) and the National Geographic TRAVELERY award for the "Scientific Discovery of the Year" (2015). He is also a delegate of the Institute of Paleobiology of the Polish Academy of Sciences to the Council of the Polish Polar Consortium (since 2018), member and consultant of the International Union for Conservation of Nature (since 2015), Deputy Head of the Scientific Board of the Museum of the Earth, PAS (since 2019) and a member of the Scientific Board of the Institute of Paleobiology, PAS (since 2020).

Photo on p. 106 by MAGA  
Aga Błażejowska



# ROCK ART OF THE KONDOA REGION IN TANZANIA AND TRADITIONAL RELIGIONS OF LOCAL SOCIETIES



**Principal investigator:**  
Maciej Grzelczyk,  
Jagiellonian University

**Project title:**  
*Rock Art of the Kondoa  
region in Tanzania and  
traditional religions of local  
societies*

**Funding scheme:**  
ETIUDA 8, announced  
on 16 December 2019

**Panel:** HS3

My research is focused in the Kondoa region of central Tanzania. The rock art from the area is mainly known through the work of Mary Leakey, who, together with her husband Louis, introduced the Irangian hill paintings, which have been a UNESCO World Heritage Site since 2006, into the scientific discourse.

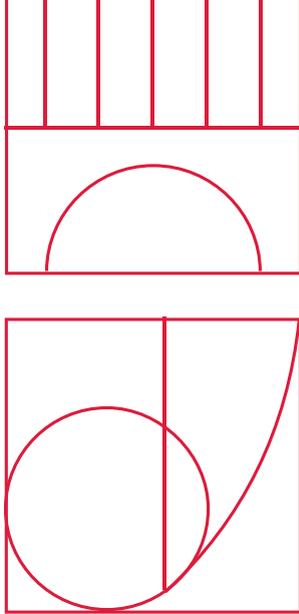
I consider my most important achievement to be the documentation of 52 previously unknown to researchers sites with paintings in the Swaga Swaga reserve area, where only a few sites were previously suspected. For the scientific world, these were the most numerous discoveries of sites with rock art in Tanzania since Mary Leakey's research in the 1950s. It should also be noted that I have so far surveyed about 30% of the entire reserve area, which leads me to believe that the number of shelters with paintings there is much higher. The work has proved that the particularly high density of sites is not an exclusive characteristic of the UNESCO protected area. Thus, in order to have a complete picture of rock art from the central Tanzania area, sites from a much larger area than previously assumed must be included. Only such an activity will lead to the best possible understanding of the rock art from central Tanzania.

Research at Swaga Swaga has also led to the documentation of a site that appears to be of particular importance. Ama'hee 4 contains more than 100 images taken during several phases of the shelter's use. Significant for this site is the occurrence of the so-called

trio – the image of three figures whose arrangement of hands corresponds to the representation of the trio from Kolo – a site located about 50 km from Amak'hee 4 in the UNESCO zone. What is particularly intriguing is that the figures in Amak'hee 4 have heads stylized to look like buffalo heads, the first example of this type documented in Tanzanian rock art.

My research shows that a significant role in the selection of a particular rock shelter as a site for the making of rock art was played by the view that stretched out from it. That is why, at each documented site, in addition to professional photographic documentation, I also make spherical panoramas (360°). Thus, by means of digitisation, the rock shelter is preserved as a whole, consisting of the paintings, the rock surface, the type of shelter and the landscape.

In order to best understand rock paintings and the purpose of making them, I try to look at them from a broader perspective. Therefore, in my research, I learn, among other things, the significance of the motif of the shelter itself and the colours in contemporary Sandawe religion. Understanding these aspects allows one to better understand the reason why specific sites were chosen for the making of rock art and why specific dyes were used. An important aspect is the documentation of the simbó ritual, still practised today by the Sandawe, the descendants of the creators of most of the paintings from central Tanzania. It involves entering altered



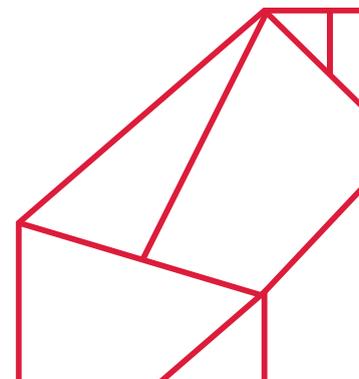
Paintings in Amak Hee.  
Photo by Maciej Grzelczyk.

states of consciousness and contact with ancestors. A better understanding of this issue allows us to explore the hypothesis of a trance-like basis for some rock artworks.

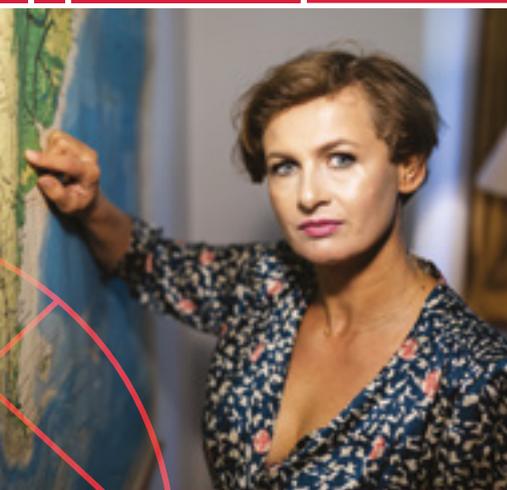
The scientific activities related to Sandawe's rock art and cultural heritage will be progressively continued and the scope of research questions will be expanded as the project develops. Working with local researchers and the Rock Art Conservation Centre, steps will also be taken to include the Swaga Swaga area in the UNESCO zone, as well as to establish the Sandawe Cultural Centre.

#### **Maciej Grzelczyk**

PhD student at the Institute of Religious Studies of the Jagiellonian University in Krakow. Principal Investigator for the ETIUDA 8 call on rock art and its relation to the traditional religion of the Sandawe community in central Tanzania. His main research interests are archaeology/anthropology of religion. Author of publications on the above issues and speaker at numerous scientific conferences at home and abroad. He is a laureate of, among others, the "Diamond Grant" programme of the Ministry of Science and Higher Education, a scholarship of the Minister of Science and Higher Education for outstanding early stage researchers, a grant of the Explorers Club and a special distinction awarded by the Jury of Benedict the Pole Award



# LOCAL KNOWLEDGE OF THE USE OF MEDICINAL AND EDIBLE PLANTS IN SOUTH AMERICA



**Principal investigator:**  
Dr Monika Kujawska, The  
Centre of Molecular and  
Macromolecular Studies,  
University of Łódź

**Project title:**  
*Local knowledge on the  
use of medicinal and edible  
plants in South America -  
intercultural comparative  
studies*

**Funding scheme:**  
OPUS 16, announced  
on 14 September 2018

**Panel:** HS3

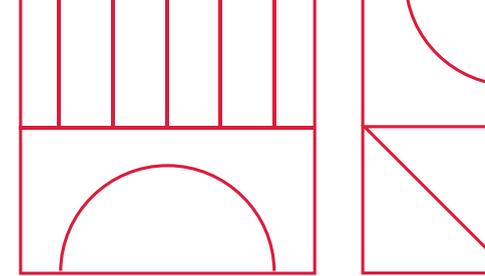
Various sociopolitical and environmental processes today threaten the continuity of traditional ecological knowledge possessed by local communities in the neotropics, i.e. the tropical and subtropical regions of South America. In the context of violent climatic and environmental upheavals, the processes of human mobility and migration, and the intense exchange of plants and knowledge, research into the use of medicinal and edible plants by neotropical rural communities takes on a special urgency and importance.

Ethnobotany is an interdisciplinary field that explores relationships between people and plants, with a special consideration for useful, from human perspective, plants. The local group's ability to use various plant species is the product of its long dwelling in a specific environment and active experimentation with locally grown plants. The relations that shape people's attitude to plants are always set in a specific ontological frame of reference. Ethnobotanical studies frequently focus on documenting the specific species that are used by local communities, and oftentimes describe new species or previously undocumented uses of already known plants for the sake of scientific knowledge. Medical ethnobotany is a special area of ethnobotanical research that concentrates on local knowledge and practices related to medicinal plants. The methods and concepts of medical ethnobotany lie at the point of intersection between cultural anthropology, botany, and pharmacology.

The chief objective of the project is to carry out a comparative analysis of the role of medicinal and edible

plants in three different groups living the neotropics. One is the Polish diaspora community in Argentina; another consists of Paraguayan migrants, both of them live in the Argentinian province of Misiones; and the third includes the Ashaninka indigenous group of the Peruvian Amazonia. Even though the three groups inhabit similar biomes, their histories of settlement are different, as are their relationships with plants and their use of plant resources; these differences are due to the distinct cosmological frames of reference they employ. In particular, the research project aims to study the roots of the continuity of herbal medicine practices in these communities, the range of health problems they are used to treat, the form administration of plant-based medicines, and the forms of plant procurement. It concentrates on the continuum between food and medicine, and especially on the idea of medicinal food, which is variously articulated in the communities under study. Last but not least, the project proposes to compare edible plants, including wild edible plants, as well as the groups' dietary habits and preferences.

The project combines previously collected, though still unpublished, ethnographic data with new, complementary fieldwork material for the purposes of a comparative analysis of medicinal and dietary practices of the three selected local groups. The fieldwork in Argentina has already been completed, while the research trip to Peru has been temporarily put on hold due to the Covid-19 pandemic. In the framework of the project, we are planning to produce a number of scientific publications,



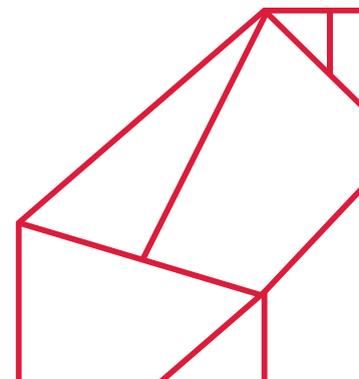
Photos by Michał Łepecki

as well as a monograph written in cooperation with an Ashaninka group that lives on the banks of the River Tambo in Peru. The monograph will be devoted to the medicinal and edible plants of the Ashaninka people. Its essential purpose is to strengthen the sense of agency among the Ashaninka Indians and help secure their intellectual property rights. From the point of view of my discipline, endeavors of this kind make anthropology and ethnobotany even more open to new approaches and intellectual perspectives.

#### **Dr Monika Kujawska**

Monika Kujawska is an Assistant Professor at the Department of Ethnology and Cultural Anthropology at the University of Łódź. Since 2007, she has conducted studies in the field of ethnobotany and medical anthropology among the Polish community of Argentina, the

mestizos of Paraguay, and the indigenous Ashaninka people of the Peruvian Amazonia. In addition, she has explored historical ethnobotany in Poland, which led to the publication of a volume entitled *Rośliny w wierzeniach i zwyczajach ludowych. Słownik Adama Fischera [Plants in Folk Beliefs and Customs. Adam Fischer's Lexicon]*. She has authored 40 articles, published mainly in international journals and devoted to the relationships between people and plants, as seen from an interdisciplinary perspective, combining insights from anthropology, ecology, botany and linguistics. Dr Kujawska has acted as the principal investigator in projects funded under NCN's PRELUDIUM and SONATA schemes, and won a scholarships in the framework of the Bekker Program of the National Agency for Academic Exchange, which allowed her to carry out a project at the School of Anthropology and Conservation, University of Kent.



# BEYOND STEREOTYPES.

## CULTURAL EXCHANGES AND THE ROMANI CONTRIBUTION TO EUROPEAN PUBLIC SPACES



**Principal investigator:**  
dr hab. Anna G. Piotrowska,  
Jagiellonian University

**Project title:**  
*Beyond stereotypes: cultural  
exchanges and the Romani  
contribution to European  
public spaces (BESTROM)*

**Funding scheme:**  
HERA Public spaces: Culture  
and Integration in Europe

The international project *Beyond stereotypes: cultural exchanges and the Romani contribution to European public spaces* (BESTROM) examines the contribution of the Romani to the development of European culture. The basic aim of this project is to highlight the positive relationship between the Romani and non-Romani and to draw attention to the creativity of the Romani who, in an active and passive way, for example, by being a source of inspiration, have contributed to the European heritage for centuries. It was taken as a starting point that contacts between the Romani and non-Romani took place in a public space, the definition of which – over the centuries – has changed considerably. For this project, therefore, the economic relations between the Romani and non-Romani are important (the case of fairs where horses were traded was taken as an example), or the participation of the Romani in shaping public cultural life (based on the example of the Romani's contribution to the development of circus art in Europe). Another important aspect of research is to bring closer the significant role played by the Romani in the history of European musical life.

The Polish team, which is part of the BESTROM research consortium – led by musicologist Dr Hab. Anna G. Piotrowska, professor at the Jagiellonian University – is responsible for extensive research on the musical contribution of the Romani to European culture, with particular emphasis on their role

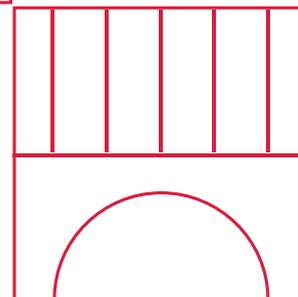
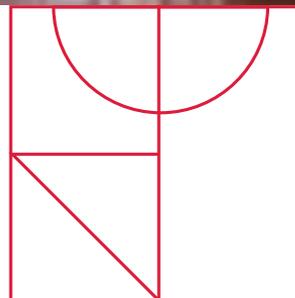
and function in urban space using the example of large European metropolises both in the past and at present. Although the research focuses on Central and Eastern Europe, other parts of Europe have also been considered, including the flamenco phenomenon in Spain. As part of the project, researchers refer to both typical musicological methods (e.g. formal analysis, instrument science), as well as sociological methods (e.g. conducting numerous interviews with Romani musicians), and ethnographic methods. The project aims to try to overcome the stereotypes about the Romani by drawing attention to the genesis of certain wordings and judgments and their historical and cultural entanglements. The Polish team is particularly concerned with showing the extraordinary value of the Romani contribution to the development of European musical life, both professional and amateur. The effects of the project include a documentary film *The Romani and cymbals*, a record album with works inspired by Romani culture, an online exhibition (available at <https://bestrom.org/>), as well as scientific papers, including numerous articles in English and Polish, and a volume of collective works and an author's monograph.

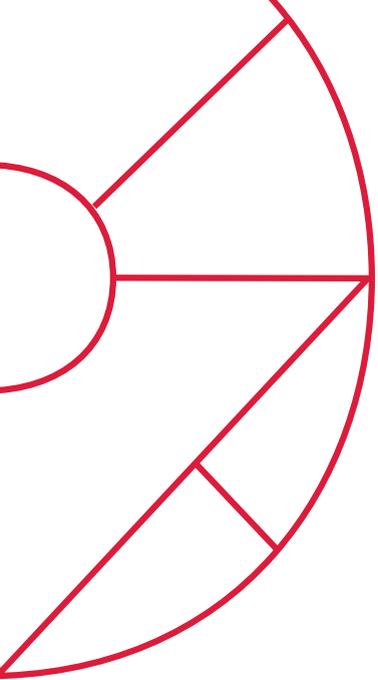


**Dr hab. Anna G. Piotrowska, professor at the Jagiellonian University**

A graduate of the Jagiellonian University and Durham University, the author of many books and studies on European and American musical culture (including *Gypsy Music in European Culture*, Boston 2013). She has participated in the work of international research groups (e.g. within the Balzan project). She has received scholarships from many prestigious foundations (including the Volkswagen Stiftung), and her work has been honoured by the Austrian Academy of Sciences (2009) and the Polish Historical Society (2011).

Photos by Michał Łepecki





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