

# Annual Report **2021**



National Science Centre in Poland  
ul. Twardowskiego 16, 30-312 Kraków  
tel. +48 12 341 90 03  
fax: +48 12 341 90 99  
e-mail: [biuro@ncn.gov.pl](mailto:biuro@ncn.gov.pl)  
[www.ncn.gov.pl](http://www.ncn.gov.pl)

Facebook: [@NarodoweCentrumNauki](https://www.facebook.com/NarodoweCentrumNauki)  
Instagram: [@ncn\\_gov\\_pl](https://www.instagram.com/ncn_gov_pl)  
Linkedin: [NCN National Science Centre](https://www.linkedin.com/company/ncn-national-science-centre)  
Twitter: [@NCN\\_PL](https://twitter.com/NCN_PL)  
YouTube: [@ncngovpl](https://www.youtube.com/channel/UCncgovpl)

Editors: Communications Team

Layout Design and typesetting: PAPER CUT

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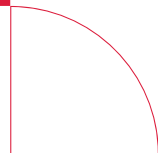
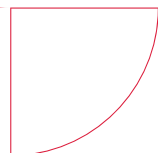
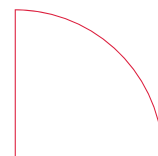
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ABOUT  
THE NATIONAL  
SCIENCE CENTRE

# General information

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

We have a rich offer of calls for proposals to fund projects and single research activities. Every researcher, regardless of their age, level of achievement, academic degree or title, or field of interest, will find a funding scheme matching their needs.

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. Together with the German Max Planck Society (MPG) we have been operating the DIOSCURI programme to establish Centres of Scientific Excellence in Poland. We are a co-ordinator of the QuantERA programme – a network of 39 agencies funding scientific research in the field of quantum technologies, and CHANSE, a call organised by 27 institutions that fund research in Humanities and Social Sciences. Both programmes are funded from the resources of the EU Horizon 2020 Programme. We are also the operator of the Research area in the scope of basic research funded by the EEA and Norway Grants. In 2020, we won a Marie Skłodowska-Curie COFUND grant to launch POLONEZ BIS, a programme targeted at foreign researchers coming to Poland. POLONEZ BIS 1 was launched in September 2021.

# Mission and goals

## 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.

# Highlights 2021

launch of the Weave-UNISONO call for international research projects carried out in cooperation with foreign research-funding agencies based on the Lead Agency Procedure (LAP)



online conference promoting the Basic Research programme, funded from the EEA and Norway Grants

in tandem with the NCBR, the NCN launched ARTIQ, a call to fund projects aimed at establishing three new Centres of Excellence in the field of AI

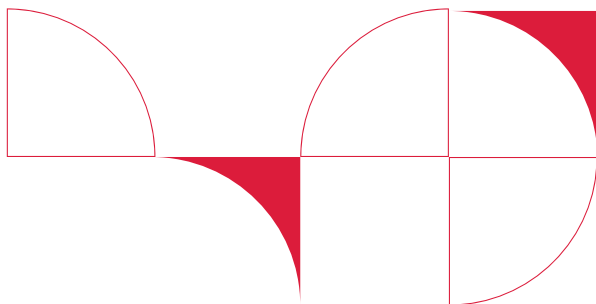
**4 January**

**17 June**

launch of the CHANSE call

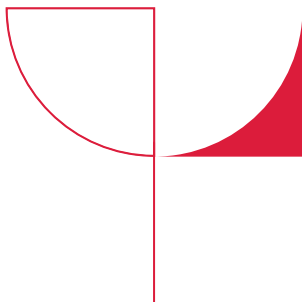
**9 March**

**30 July**



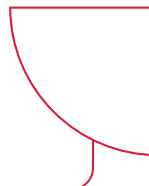
celebrations of the  
10<sup>th</sup> anniversary of  
the National Science  
Centre

**9-10 September**



launch of the first  
edition of POLONEZ  
BIS and the first  
OPUS call with an  
international track  
(OPUS+LAP/Weave)

**15 September**



the ceremony of NCN  
Award 2020 and 2021.  
2020 winners:  
Prof. Jakub Growiec (HS),  
Prof Wojciech Fendler (NZ),  
Dr hab. Michał Tomza (ST).  
2021 winners:  
Dr Paweł L. Polkowski (HS),  
Prof. Jonatan Gutman (HS),  
Dr hab. Sebastian Glatt (NZ).

**6 October**



# NCN Structure



The National Science Centre's executive officer is its director, selected in a competition by the Council of the NCN, and appointed by the Minister of Science and Higher Education. Since March 2015, the role has been performed by Prof. Zbigniew Błocki. The director is the NCN's representative, and is in charge of the NCN's statutory tasks and financial policy.

The NCN Council is a policy body consisting of twenty-four distinguished researchers representing different academic fields. The Council sets priority areas in basic research, decides on the type of programmes and specifies the call regulations. Its range of competencies also includes electing members of the expert teams responsible for evaluation of proposals.

The NCN Office is composed of departments and teams in three major divisions in charge of organisation, finances and grant management. On a day-to-day basis, the Office is responsible for processing calls for proposals and organising meetings for experts at the peer review evaluation stage. Furthermore, the Office provides day-to-day support to the grantees who carry out projects; it manages the process of signing funding agreements, oversees their implementation, initiates international co-operation in the scope of research funding, organises calls under the EEA funds and Norway Grants in co-operation with the Council and coordinators, as well as the Research Programme Committee, and disseminates information on the national calls throughout the scientific community.





## NCN Coordinators

The NCN Coordinators are scientific officers responsible for organising and conducting calls for proposals for research projects. Their responsibilities also include evaluation of the impartiality of the peer review process, the eligibility check of proposals submitted within the calls, as well as the promotion of NCN funding programmes in the research community. Coordinators support the NCN Council in developing the research policy. Coordinators work within the NCN in three units: Arts, Humanities and Social Sciences; Life Sciences; and Physical Sciences and Engineering. They are selected by the NCN Council on the basis of competition. Candidates for this position must have at least a PhD.

# NCN Council

in 2020-2022

## Prof. Dr hab. Jacek Kuźnicki

President of the Council



### Arts, Humanities and Social Sciences (HS)

Prof. Dr hab. Krystyna Bartol

Prof. Dr hab. Wojciech Dajczak

Dr hab. Joanna Golińska-Pilarek

Prof. Dr hab. Dariusz Markowski

Prof. Dr hab. Justyna Olko

Prof. Dr hab. Tomasz Szapiro

Dr hab. Joanna Wolszczak-Derlacz

Prof. Dr hab. Tomasz Zaleśkiewicz



### Physical Sciences and Engineering (ST)

Prof. Dr hab. Stefan Dziembowski

Dr hab. inż. Krzysztof Fic

Prof. Dr hab. Grzegorz Karch

Prof. Dr hab. Jerzy Łuczka

Prof. Dr hab. Piotr Migoń

Prof. Dr hab. Bronisław Rudak

Prof. Dr hab. inż. Marek Samoć

Prof. Dr hab. inż. Teresa Zielińska



### Life Sciences (NZ)

Prof. Dr hab. n. med. Jakub Fichna

Prof. Dr hab. Robert Hasterok

Prof. Dr hab. inż. Monika Kaczmarek

Prof. Dr hab. Barbara Klajnert-Maculewicz

Prof. Dr hab. Andrzej Sobczak

Prof. Dr hab. n. med. Anetta Undas

Prof. Dr hab. inż. Aneta Wojdyto

# NCN Structure

## NCN Council

## NCN Director NCN Deputy Director

### Organizational Division

Administration  
Department

Communications Team

IT Team

ICT Systems Analyst

### Financial Division

supervised by  
Chief Accounting Officer

Finance and Accounting  
Department

Finance Team

Accounting Team

Project Monitoring Department

Audit and Compliance Team

### Project Division

Research Projects  
Administration Department

Arts, Humanities  
and Social Sciences

Physical Sciences  
and Engineering

Life Sciences

Proposal Processing  
Department

International Cooperation  
Department

Evaluation Team

Expert Support Team

Electronic Submission  
System Team

EEA and Norway Grants Team

Open Science Officer

Commissioner for State Aid

Coordinators

The Arts, Humanities  
and Social Sciences  
Coordinator Unit

The Physical Sciences  
and Engineering  
Coordinator Unit

The Life Sciences  
Coordinator Unit

Legal Team

Chief Accounting Officer

Office of the NCN Council

HR Department

Protection of Classified  
Information Officer

Data Protection Officer

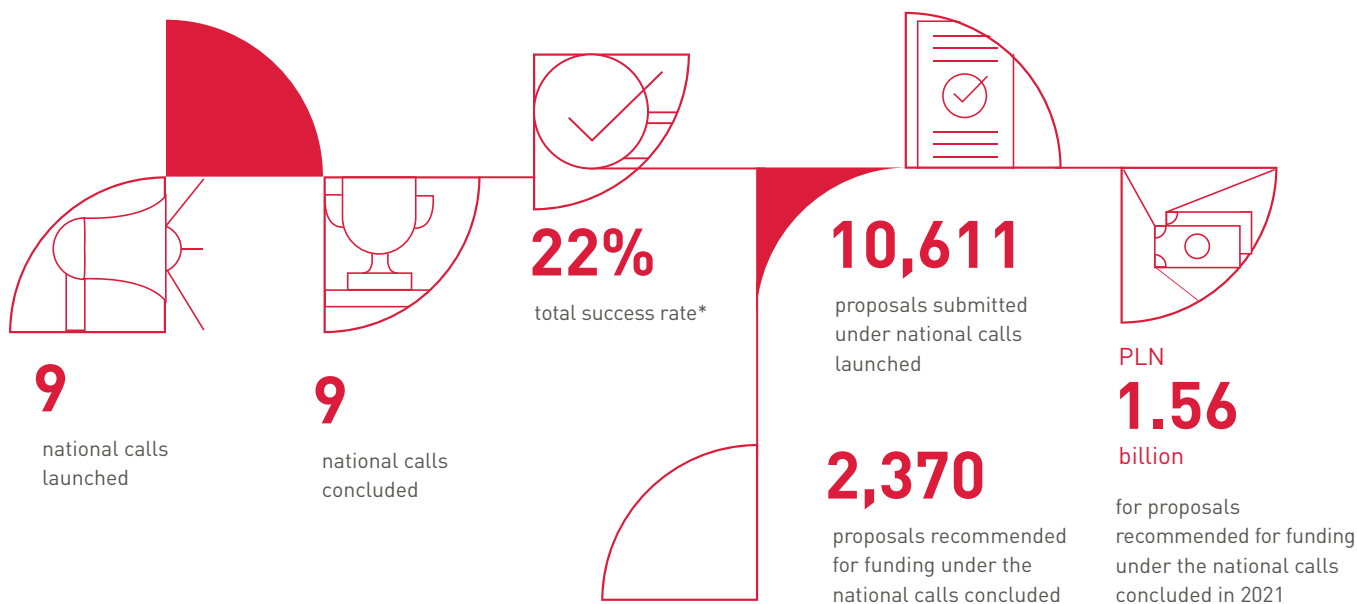
Health and Safety Officer

Media and Promotion Specialist

NCN  
PERFORMANCE  
IN 2021

# NCN in figures

## National calls



\* Success rate is the ratio of the number of the proposals recommended for funding against the number of proposals submitted, expressed as a percentage.

## International calls



\*\* The number of proposals does not include the calls launched in collaboration with the Polish National Agency for Academic Exchange (NAWA). The Weave-UNISONO ongoing call presents the state of affairs as at 31.12.2021

# NCN national schemes 2021

We finance basic research conducted as projects, single research activities, scholarships and post-doc fellowships. The funding schemes on offer match the diverse needs of the research community, from scholars embarking on their career in research to the most accomplished researchers. The funding is granted to the best research teams, whose principal investigators and members have the required experience and facilities prerequisite to the implementation of their projects. The NCN accepts proposals from all research disciplines on the NCN panels' list.



## **PRELUDIUM**

Call for research projects



**Applicants:** early stage researchers, without doctorate



**Duration:** 12, 24 or 36 months



**Funding:** PLN 70,000, PLN 140,000 or PLN 210,000 depending on the project's duration



**Requirements:** carried out under mentor's supervision



**Open:** once a year

## **PRELUDIUM BIS**

Call for research projects carried out by PhD students at doctoral schools



**Applicants:** PhD supervisors at doctoral schools



**Duration:** 36 or 48 months



**Funding:** up to PLN 300,000 for a research project, whereas the principal investigator may be a beneficiary of up to PLN 40,000; the project's budget also covers doctoral scholarships and indirect costs (up to 20% of total direct costs).



**Requirements:**


- under the call, a PhD student is selected and enrolled in a doctoral school;
- research projects are carried out by PhD students as part of their doctoral dissertations;
- foreign fellowships for PhD students for a period of 3 to 6 months in a foreign research institution, the funding of which shall be requested by PhD students under programmes operated by the NAWA;
- a PhD must be awarded within 12 months of project completion.




**Open:** once a year

## ☪ SONATINA

Call for research projects: employment at research institutions, funding for research projects and fellowships abroad

 **Applicants:** researchers with a doctorate received within 3 years of submitting the proposal or those who will receive the degree by 30 June of the year of the call

 **Duration:** 24 or 36 months, fellowship at a research centre abroad of 3 to 6 months

 **Funding:** no cap on funding research projects, PLN 12,000 a month during the fellowship abroad + travel allowance.

 **Open:** once a year


## ☒ SONATA

Call for research projects: innovative research using state-of-the-art equipment or original methodology

 **Applicants:** researchers with a doctorate received within 2 to 7 years of submitting the proposal

 **Duration:** 12, 24 or 36 months

 **Funding:** no cap on funding research projects


 **Requirements:** the post-doc position is open to candidates who earned their PhD degree at an institution other than their scheduled host institution or completed a continuous fellowship of at least 10 months at another centre in a country other than the one in which they earned their PhD. In order to be entitled to an NCN scholarship or hired as a post-doc under the project (with a salary paid from the NCN grant) candidates must be selected via an open competition process.

 **Open:** once a year



## SONATA BIS

Call for research projects: establishing a new research team


 **Applicants:** researchers who have received their doctorate 5 to 12 years before submitting the proposal

 **Duration:** 36, 48 or 60 months

 **Funding:** no cap on funding research projects


 **Requirements:**

- apart from the principal investigator, the project team must not include any other members with a scientific degree, the title of professor, the scientific degree of habilitated doctor or any equivalent qualification, or members who have already collaborated with one another under a research project funded through the call system;
- PhD holders/candidates must be hired for a period of minimum 36 months

 **Open:** once a year

## MINIATURA

Call for single research activities instrumental in basic research


 **Applicants:** researchers who earned their PhD up to 12 years before submission of the proposal, have never coordinated a research project and have not previously won any NCN-funded PhD scholarships or fellowships and whose research record includes at least one published paper or (in the case of art and other creative fields), at least one achievement in art or art and research.

 **Duration:** up to 12 months

 **Funding:** PLN 5,000 to PLN 50,000

 **Requirements:**

- funding for the following activities: preliminary research, pilot studies, library and archive searches, fellowships, exploratory visits, consultancy visits;
- applicants may not seek funding for employment costs or scholarships, with the exception of personnel costs of collective investigators who are not employees of the MINIATURA host institution
- applicants must be employed by the host institution under an employment contract

 **Open:** continuous call, fast track evaluation process





## MAESTRO

Call for ground-breaking research projects, including interdisciplinary research, offering a substantial contribution to the advancement of science, seeking to go beyond that which is known, which may result in new discoveries



**Applicants:** advanced researchers with a PhD degree or higher, who have published a minimum of 5 papers in renowned academic journals and coordinated at least two research projects selected through a call for proposals procedure within the 10 years prior to the submission of the proposal



**Duration:** 36, 48 or 60 months



**Funding:** no cap on funding research projects



**Requirements:** the project team must include at least one investigator with a doctorate and at least one doctoral candidate



**Open:** once a year



## OPUS

Call for research projects



**Applicants:** all researchers, regardless of academic degree



**Duration:** 12, 24, 36 or 48 months



**Funding:** no cap on funding research projects

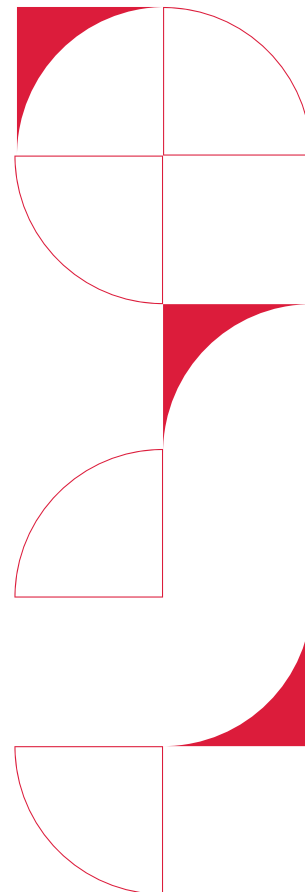


**Requirements:** and whose research record includes at least one published paper or (in the case of art and other creative fields), at least one achievement in art or art and research.



**Open:** twice a year


OPUS call launched in September 2021, was also open for research projects carried out by teams from Poland in cooperation with their partners from Austria, the Czech Republic, Slovenia, Switzerland and Germany whose tasks were funded by the partner agencies of the National Science Centre based on the recommendations of the latter acting as the lead agency in charge of the merit-based evaluation of proposals. In 2022 OPUS + LAP call is open in addition for teams from Luxembourg and Belgium – Flanders.



## TANGO

Call for projects assuming the implementation of findings with an innovative potential, obtained as a result of basic research (basic projects funded by the National Science Centre, NCN), announced by the National Centre for Research and Development (NCBR).

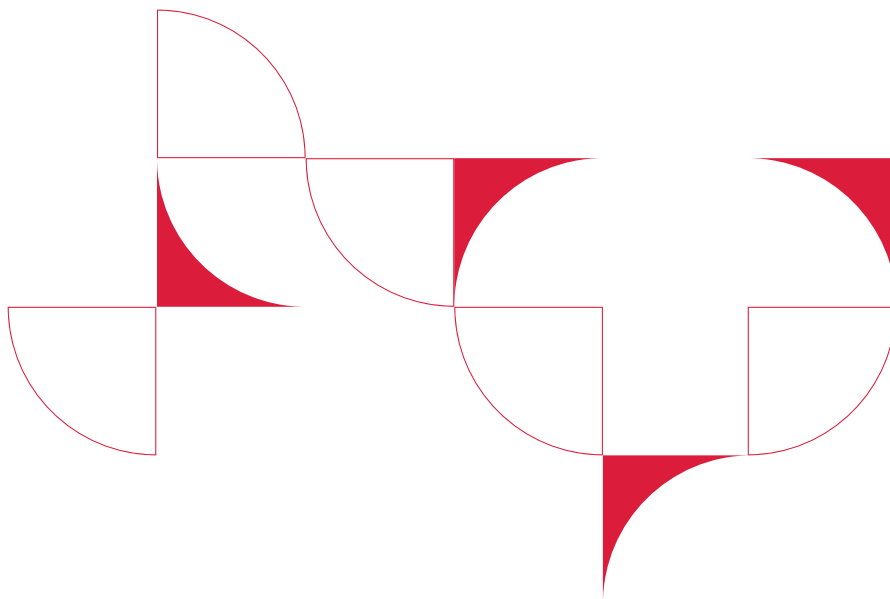
The call is divided into three tracks: A (proof-of-concept with an R&D component), B (industrial research, development) and C (industrial research, development, proof-of-concept).

 **Applicants:** researchers who have acted as Principal Investigator in a basic research project for at least one year or who have secured permission from the basic research project's Principal Investigator to develop it under the TANGO scheme

 **Duration:** up to 15 months in Track A, up to 36 months in Tracks B and C

 **Funding:** up to PLN 250,000 in Track A, up to PLN 3,000,000 in Tracks B or C

 **Open:** once a year



# NCN Panels



## **HS** **Arts, Humanities** **and Social Sciences**

- HS1** Fundamental questions of human existence and the nature of reality
- HS2** Culture and cultural production
- HS3** The study of the human past
- HS4** Individuals, institutions, markets
- HS5** Norms and governance
- HS6** Human nature and human society



## **ST** **Physical Sciences** **and Engineering**

- ST1** Mathematics
- ST2** Fundamental constituents of matter
- ST3** Condensed matter physics
- ST4** Chemistry
- ST5** Materials
- ST6** Computer science and informatics
- ST7** Systems and communication engineering
- ST8** Production and processes engineering
- ST9** Astronomy and space science
- ST10** Earth sciences



## **NZ** **Life** **Sciences**

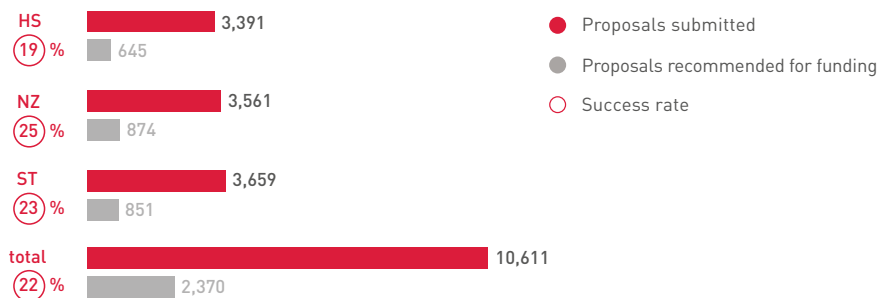
- NZ1** Molecular biology, structural biology, biotechnology
- NZ2** Genetics, genomics
- NZ3** Cellular and developmental biology
- NZ4** Biology of tissues, organs and organisms
- NZ5** Human and animal noninfectious diseases
- NZ6** Human and animal immunology and infection
- NZ7** Diagnostic tools, therapies and public health
- NZ8** Evolutionary and environmental biology
- NZ9** Fundamentals of applied life sciences and biotechnology

# Funding of basic research

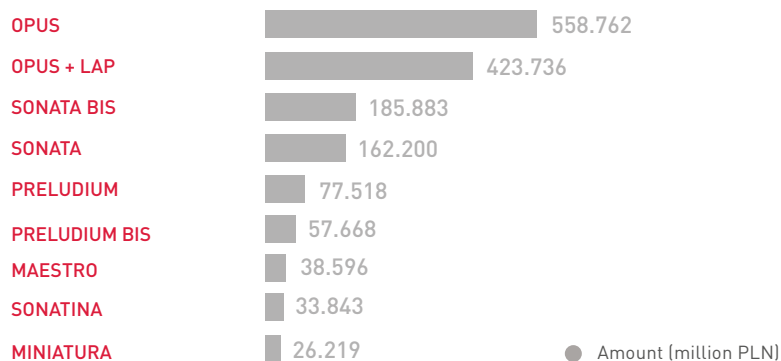
In national calls published in 2021, we received 10,278 proposals worth in total PLN 7.8 bln.

In calls concluded in 2021, funding was granted to 2,370 projects worth PLN 1.56 bln.

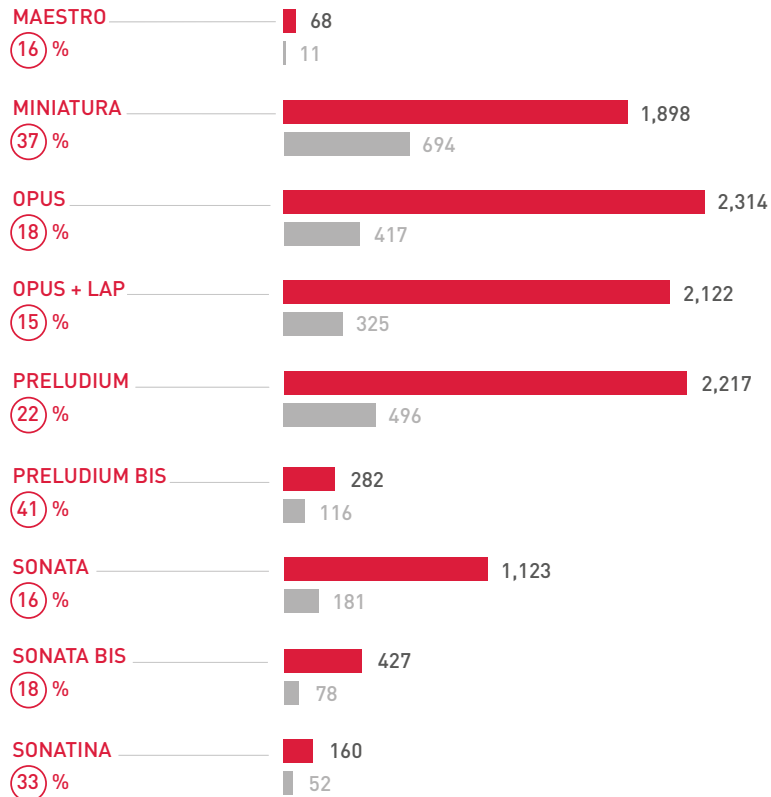
## Number of proposals submitted and recommended for funding under the calls concluded in 2021, broken down by discipline group, alongside their respective success rates



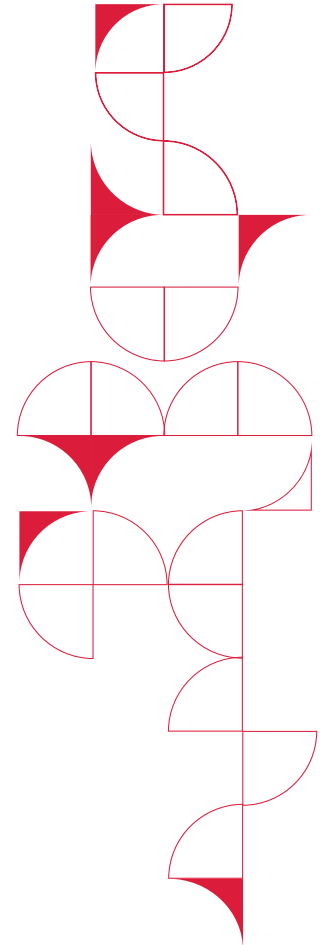
## Funding awarded in calls concluded in 2021, broken down by call types



**Number of proposals submitted and recommended for funding under the calls concluded in 2021, broken down by call type, alongside their respective success rate**



- Proposals submitted
- Proposals recommended for funding
- Success rate



# Leaders of the national call rankings in 2021

The chief beneficiaries of the national calls concluded in 2021 were:

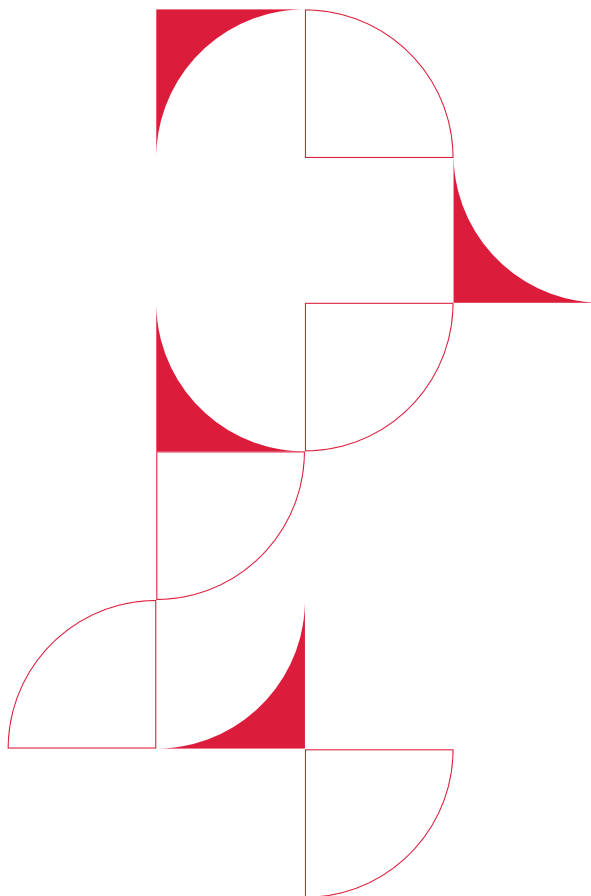
- public and non-public higher education institutions (78% of all beneficiaries),
- research institutes of the Polish Academy of Sciences (18%),
- research institutes (4%).



Host Institution	Funding granted (million PLN)	Proposals qualified for funding	Success rate
Jagiellonian University in Kraków	164.987	216	29%
University of Warsaw	151.638	216	30%
Adam Mickiewicz University in Poznań	95.905	144	28%
University of Wrocław	58.177	82	27%
University of Gdańsk	50.976	68	28%
Wrocław University of Science and Technology	44.524	62	24%
Nicolaus Copernicus University in Toruń	42.077	60	20%
Nencki Institute of Experimental Biology, Polish Academy of Sciences	39.254	18	31%
Warsaw University of Technology	33.648	49	25%
Institute of Bioorganic Chemistry, Polish Academy of Sciences	33.634	30	43%
University of Silesia in Katowice	31.683	60	16%
AGH University of Science and Technology	30.072	55	19%

Host Institution	Funding granted (million PLN)	Proposals qualified for funding	Success rate
Institute of Physical Chemistry, Polish Academy of Sciences	26 097	21	44%
Medical University of Warsaw	22.868	32	29%
University of Łódź	21.887	52	22%
Silesian University of Technology	21.640	26	16%
Gdańsk University of Technology	21.348	38	23%
Mossakowski Medical Research Institute, Polish Academy of Sciences	19.728	14	27%
Institute of Animal Reproduction and Food Research of Polish Academy of Sciences	19.117	13	33%
International Institute of Molecular and Cell Biology in Warsaw	17.367	10	50%
Institute of Organic Chemistry of the Polish Academy of Sciences	16.228	10	37%
Wrocław University of Environmental and Life Sciences	15.540	32	27%
Institute of Plant Genetics, Polish Academy of Sciences	14.988	7	37%
Institute of Biochemistry and Biophysics, Polish Academy of Sciences	14.862	14	24%
University of Warmia and Mazury in Olsztyn	14.851	38	16%
Warsaw University of Life Sciences	13.997	37	17%
Medical University of Lublin	13.935	24	27%
Medical University of Gdańsk	13.633	22	19%
Łódź University of Technology	12.542	23	21%
Institute of Fundamental Technological Research, Polish Academy of Sciences	12.321	18	38%
Poznań University of Medical Sciences	12.304	35	28%
Institute of Physics, Polish Academy of Sciences	12.022	10	20%
Jerzy Haber Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences	11.694	9	26%
Poznań University of Life Sciences	11.238	31	21%
Łukasiewicz Research Network - PORT Polish Center for Technology Development	10.589	5	38%
University of Agriculture in Krakow	10.443	22	24%

The table presents a ranking list of institutions that received more than 10 million PLN in funding from the NCN in 2021. Once again, the leaders, both in terms of funding and the number of projects and other research activities, were the Jagiellonian University and University of Warsaw – each of them with 216 funded projects. The success rate given in the table corresponds to the ratio of successful projects that were recommended for funding to the total number of proposals. The highest success rate among those who won grants of more than 12 million PLN in 2021 was 50%, achieved by the International Institute of Molecular and Cell Biology, followed by the Institute of Physical Chemistry of Polish Academy of Sciences with 44% and the Institute of Bioorganic Chemistry of Polish Academy of Sciences with 43% success rate. Among universities, the highest rates were recorded by the University of Warsaw (30%), the Jagiellonian University (29%) and Medical University of Warsaw (29%).

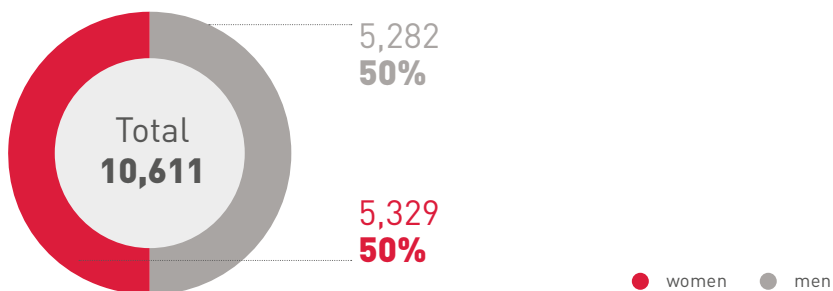




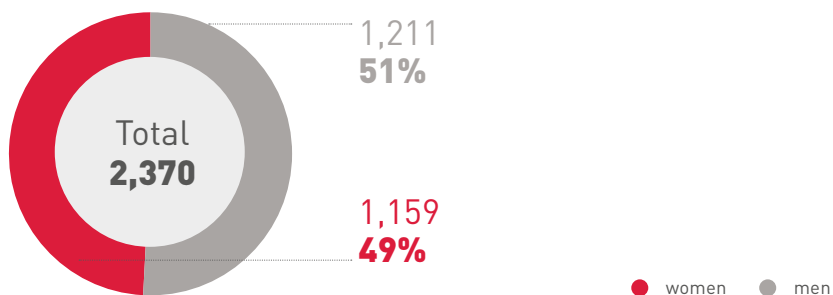
# Principal investigators

In 2021, proposals submitted by women made up 50% of all applications. They were slightly less successful in applying for funding than their male colleagues; the success rates for the two groups were 22% and 23% respectively. Of the projects awarded funding in 2021, 51% had a male Principal Investigator, whereas women acted as Principal Investigators to 49% of the awarded projects.

The number of proposals submitted for funding in 2021, broken down by gender\* of the Principal Investigator



The number of proposals recommended for funding in 2021, broken down by gender\* of the Principal Investigator



\* Gender data based on the applicants' PESEL numbers. The data do not include the Principal Investigators without a PESEL numbers (foreigners).

# Early stage researchers

We are very serious about supporting early stage researchers who have not yet earned their PhD or have done so within the last 7 years. The PRELUDIUM, PRELUDIUM BIS, SONATINA, SONATA, ETIUDA, where they do not need to compete against more experienced researchers, are specifically designed for this group. In 2011-2021, a total of 59 editions of the calls addressed to early stage researchers were announced.



37%

## In the national calls concluded in w 2021:

of the overall amount disbursed on funding research projects constituted the amount allocated for the funding of projects, fellowships and scholarships by researchers at the outset of their career



55%\*

of all proposals were submitted in calls targeted at early-stage researchers and other NCN calls, in which the principal investigator met the definition of an early-stage researcher



62%\*

of the proposals recommended for funding, the Principal Investigator was an early stage researcher

\*No data were available for the TANGO call.

# Evaluation process

The National Science Centre grants funding to top research projects selected through a two-stage peer review process. As a general rule, the NCN Council takes into account, in carefully considered proportion, both the quality of the project as such, and the achievements of the researchers involved.

The review procedure begins with a formal eligibility check performed by NCN Coordinators, which involves checking the completeness and correctness of the submission. The proposals then undergo a two-stage peer review by dedicated expert teams (groups of experts selected by the NCN Council among distinguished academics appointed by the NCN Director for the purpose of proposal evaluation).

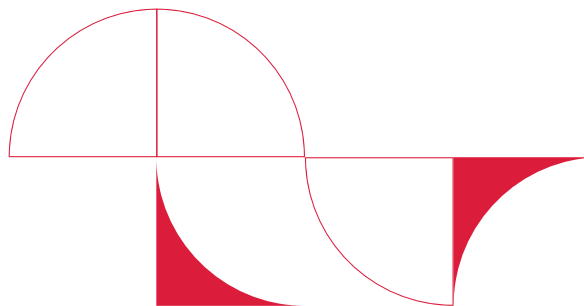
## STAGE 1

The proposals are first assessed individually by the members of expert team working independently. Individual evaluations serve as a point of departure for debate during the first team meeting. The decision to reject or approve the proposal is taken collectively by the team as a whole. Subsequently, the members prepare a shortlist of projects admitted to stage two of the peer review process or projects qualified for funding in PRELUDIUM BIS and MINIATURA (there is one-stage merit-based evaluation in these calls).

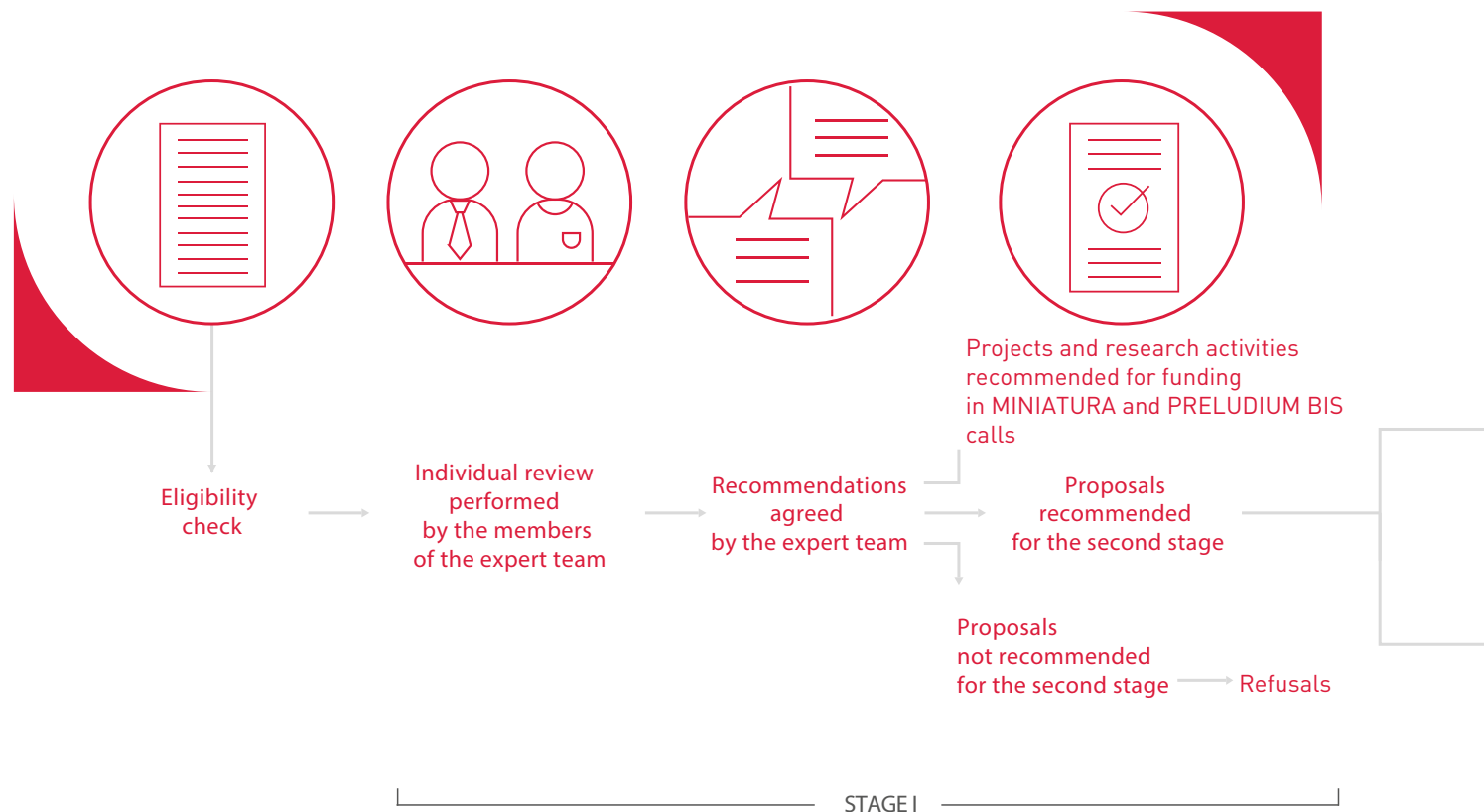
## STAGE 2

Stage two may be conducted in one of two ways, depending on the type of call. Proposals submitted in the OPUS, PRELUDIUM and SONATA calls are evaluated by at least two external experts (often foreign) working independently, whose reviews are later discussed by the expert team during the second team meeting. Reviewers are nominated by NCN coordinators, based on the recommendations of team members. The second stage of the review process in the SONATINA, SONATA BIS, MAESTRO and POLONEZ BIS calls includes an interview with the principal investigator.

The procedure (see on p. 26-27) applies to most national calls from the current NCN portfolio. Proposals submitted in the TANGO call are evaluated by NCBR. Proposals in international calls are assessed based on separate principles described in dedicated call documents.



# Proposal review scheme



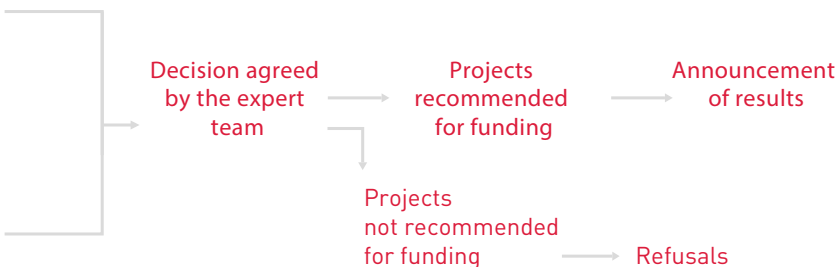


SONATINA, SONATA BIS,  
MAESTRO, POLONEZ BIS

Evaluation by reviewers  
and interview with the principal  
investigator



OPUS, PRELUDIUM, SONATA  
Evaluation by reviewers



STAGE II

# Experts

In 2021 as many as 2,110 reviewers were appointed, who assessed a total of 11,014 research proposals in the first stage of evaluation. Among the members of the expert teams appointed in 2021, 1,193 (56,5%) were affiliated abroad. Expert teams are appointed from among experts representing three research domains (ST, HS and NZ). Proposals may be evaluated by inter-domain teams (all domains represented in one team), by inter-panel teams (each domain has its own team) or by panel teams dedicated to specific thematic panels (ST 1-10, HS 1-6, NZ 1-9). Each team may review proposals in one or more calls of a given edition (the term edition refers collectively to all calls for proposals with the same deadline of submission). This means that for a specific thematic panel, one or more expert teams may be appointed. See the table below for more details.

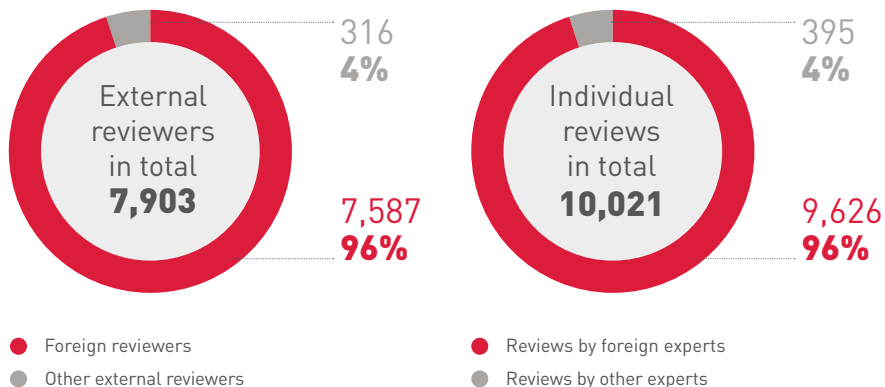
In the second stage of peer review, 7,903 external reviewers performed 10,021 individual evaluations. 96% of the external reviewers were experts from abroad, who performed 9,626 reviews.

## Number of expert teams and number of proposals reviewed under the calls concluded in 2021

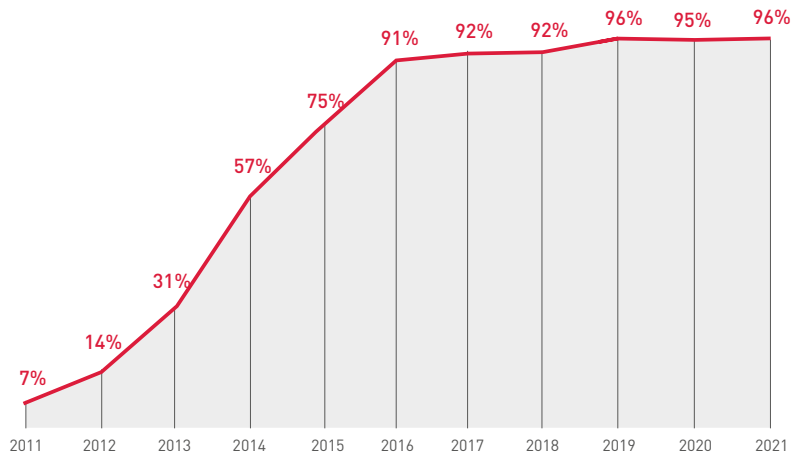
Call announcement	Number of expert teams	Reviewers in expert teams (including foreigners)	Proposals reviewed
<b>15 June 2020</b>	3 inter-panel teams for MAESTRO 3 inter-panel teams for SONATA BIS 3 inter-panel teams for DAINA 2	134 (122)	628
<b>15 September 2020</b>	38 panel teams for OPUS+LAP, PRELUDIUM BIS, SONATA, BEETHOVEN CLASSIC 4 2 teams in each panel: HS2, HS3, HS4, HS5, HS6, NZ5, NZ7, NZ9, ST4, ST5, ST8, ST10 1 team in all the other panels	575 (496)	3,594
<b>15 December 2020</b>	3 inter-panel teams for SHENG 2, 3 inter-panel teams for SONATINA	80 (28)	363
<b>15 March 2021</b>	38 panel teams for OPUS, PRELUDIUM. 2 teams in each panel: HS2, HS3, HS4, HS5, HS6, NZ5, NZ7, NZ8, NZ9, ST4, ST5, ST8, ST10. 1 team in all the other panels	681 (547)	4,531
<b>4 May 2021</b>	1 team for MINIATURA 5	640 (0)	1,898
<b>TOTAL</b>		<b>2,110 (1,193)</b>	<b>11,014</b>

Source: NCN Coordinators, based on own data.

## Number of external reviewers and number of reviews they provided in 2021\*



## Percentage of foreign reviews in the years 2011-2021

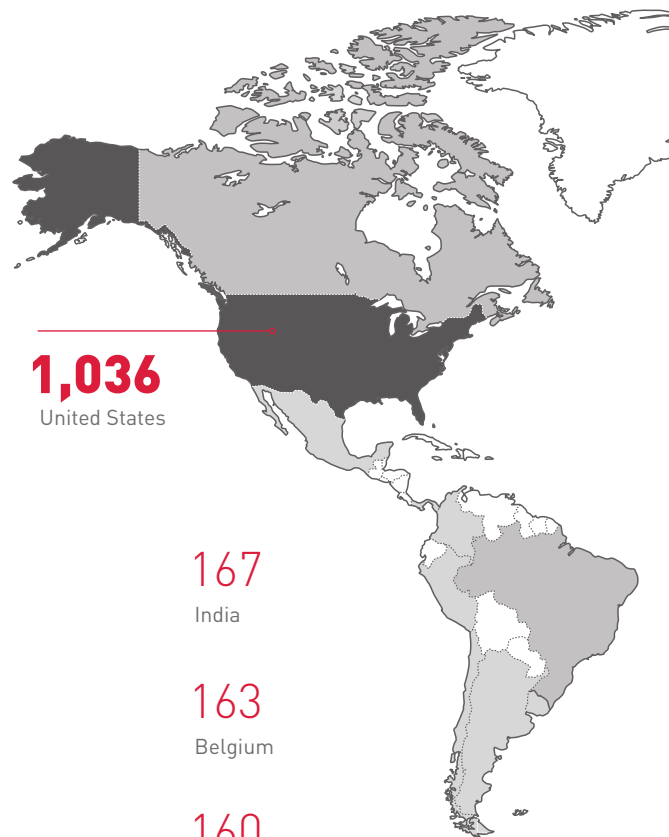


Source: NCN Coordinators, based on the data in the ZSUN/OSF system.

\* Data does not include MINIATURA due to different evaluation procedure.

## NCN foreign reviewers in 2021 by country of affiliation

36	Singapore	2	Bangladesh
33	New Zealand	2	Belarus
29	Mexico	2	Iceland
29	South Africa	2	Columbia
27	Chile	2	Morocco
27	South Korea	2	Mauritius
22	Malaysia	2	Peru
22	Taiwan	2	Uruguay
13	Ukraine	1	Afghanistan
12	Bulgaria	1	Albania
12	Pakistan	1	Azerbaijan
11	Cyprus	1	Bahrain
11	Latvia	1	Equador
9	Luxembourg	1	Ghana
8	Egypt	1	Georgia
8	United Arab Emirates	1	Guatemala
7	Indonesia	1	Jordan
7	Qatar	1	Kenya
6	Saudi Arabia	1	Moldova
5	Kazakhstan	1	Oman
5	Nigeria	1	Paraguay
4	Iran	1	Sri Lanka
4	Lebanon	1	Trynidad i Tobago
3	Bosnia and Herzegovina	1	Uganda
3	Northern Macedonia	1	Vietnam
3	Thailand	1	Faroe Islands
3	Tunisia	1	Zambia



**1,036**  
United States

**302**  
China

**167**  
India

**249**  
Netherlands

**163**  
Belgium

**221**  
Canada

**160**  
Czech Republic

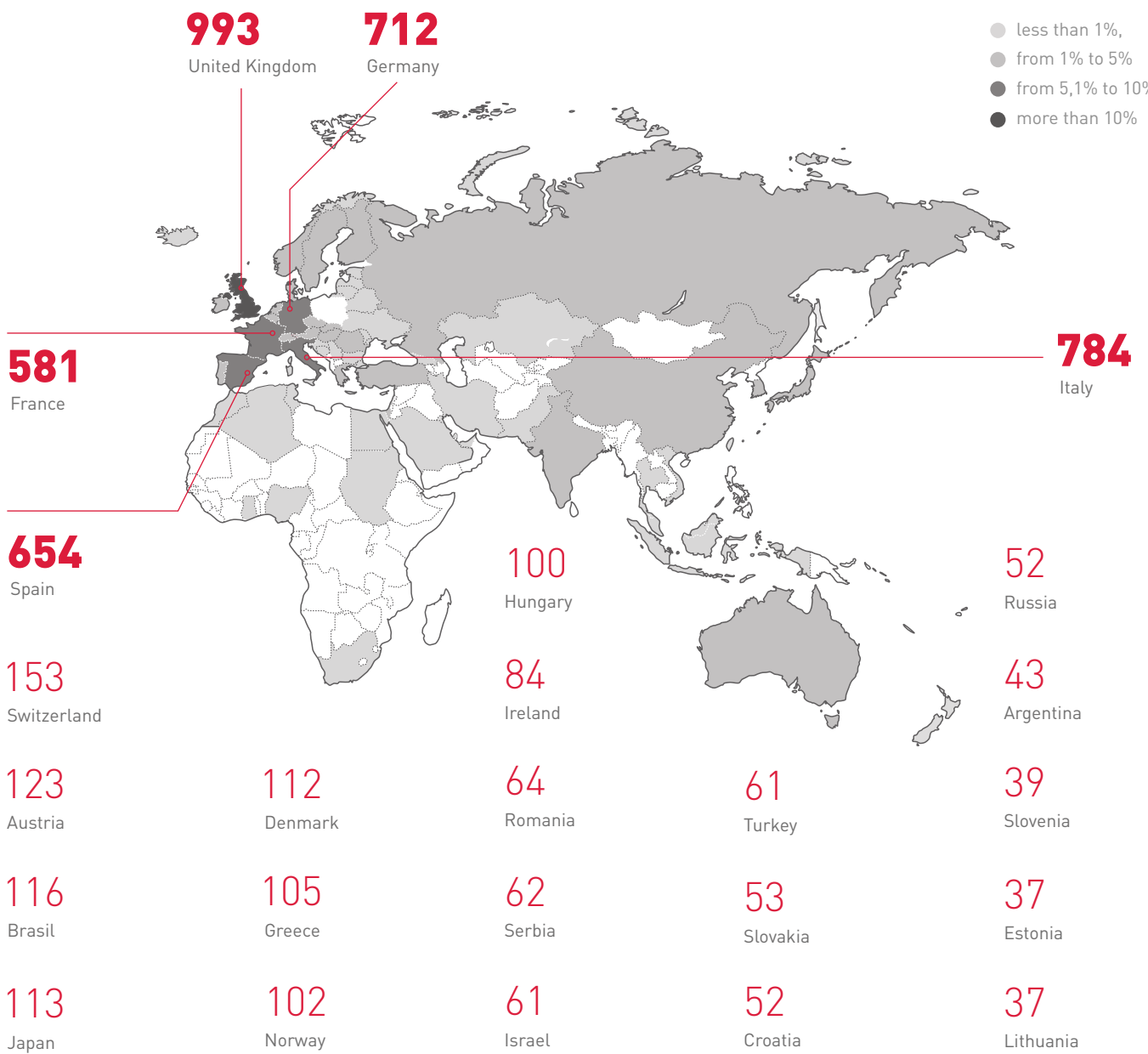
**201**  
Portugal

**158**  
Finland

**169**  
Australia

**158**  
Sweden





# NCN Appeal Committee

Applicants (institutions or natural persons) may appeal against decisions of the NCN Director which refuse funding within 14 days of the date of receiving the decision. The appeals are considered by the Appeal Committee, appointed by the Council of the NCN.

## In 2021 the Committee:

179

appeals considered

16

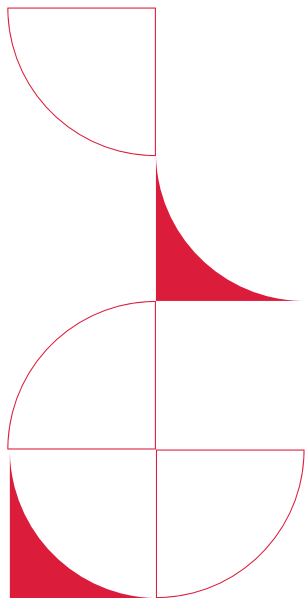
granted funding of more than **PLN 12,3 million** to 16 projects

21

cases required additional inquiries

19

cases the director's decision was annulled and the proposals were submitted for re-evaluation.



# Supervising the research

Our tasks include supervising the implementation of research projects, fellowships, scholarships and research activities and the disbursement of the awarded funding. This consists in evaluating interim, annual and final reports on the completion of research projects, on-site audits at grantees' host institutions, and in the director's power to suspend or discontinue funding of an improperly implemented project. The procedure of evaluating and verifying the reports consists in examining the implementation of the project for formal and financial correctness, as well as the scientific evaluation of the project's results.

## Reports on the projects' completion

In 2021 the NCN's expert reviewers evaluated:

- final reports on the implementation of NCN and international research projects without co-financing from foreign funds taken over by the NCN from the Ministry of Science and Higher Education (MNiSW),
- annual and final reports on the implementation of research projects granted funding under calls launched by the NCN.



### Reports evaluated in 2021:

Type of report	Number of evaluated reports
Final report submitted before 2021 – NCN calls	3,007
Final report submitted before 2021 – MNiSW projects	17
Annual report submitted in 2021	4,798
Final report submitted in 2021	4
<b>TOTAL</b>	<b>7,826</b>

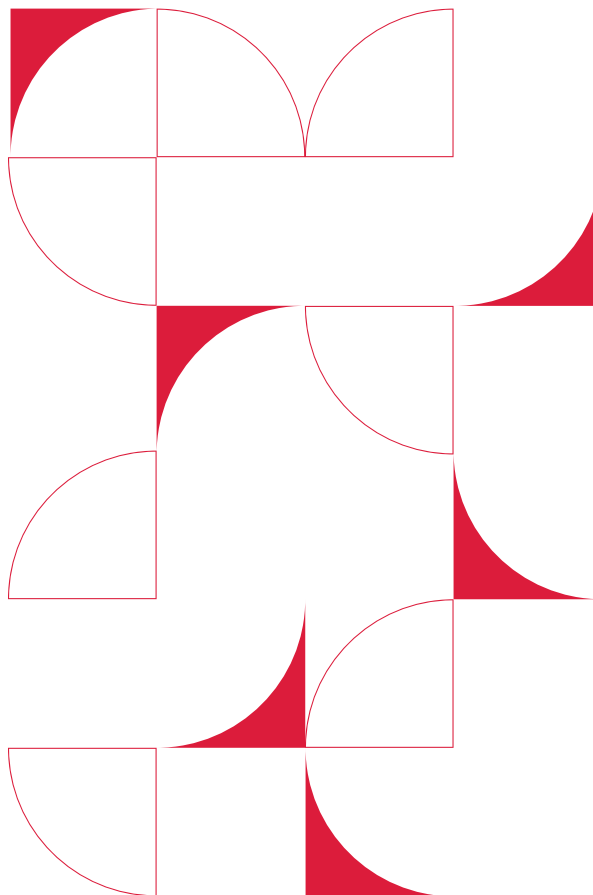
Source: Research Projects Administration Department, International Cooperation Department and Project Monitoring Department.

## On-site audits

As another tool serving a supervisory function, the NCN may conduct on-site audits to verify the compliance of the project with the funding agreement. The audits are carried out by the Audit and Compliance Team in accordance with an annual audit plan. Our selection of the grants to be examined follows an analysis of risk factors involved in their implementation. Information on possible risks and alarming signals regarding the projects funded is collected and shared by the personnel of the Research Projects Administration Department, Finance and Accounting Department and NCN Coordinators.

The audit plan may, however, be extended to projects selected at random. Audits of such projects may be conducted in an ad hoc manner. Normally we take this measure when a project is reported to be carried out inappropriately, and such audit is usually limited in scope. The auditing team always comprises an officer of the Audit and Compliance Team and, depending on the programme and scope of the audit, may also include an NCN financial officer and an NC Coordinator.

25 audits were completed in 2021. Following the detection of various irregularities, the NCN demanded the reimbursement of more than PLN 385 thousand in total from the institutions in question.



# International cooperation

In 2021, we launched twelve new calls carried out in multilateral cooperation and published the results of three bilateral calls. We also expanded our call portfolio to include a multilateral programme, Weave, organised in tandem with Austria, the Czech Republic, Germany, Slovenia, and Switzerland, which allowed us to further grow our LAP-based (Lead Agency Procedure) cooperation network. The proposals were accepted by the NCN under two different calls, depending on which agency acted as the lead agency: under Weave UNISON0 or under OPUS 22 + LAP/ Weave.

On 15 September 2021, we announced the first round of POLONEZ BIS. Two more editions are scheduled to follow on 15 March and 15 September 2022. In total, POLONEZ BIS will allow us to invite as many as 120 talented foreign researchers to Poland.

## Bilateral cooperation

We regularly launch bilateral calls organised in cooperation with foreign research-funding organisations. The best among the research proposals prepared and submitted jointly by Polish and foreign teams are selected according to the terms agreed on by all partner agencies.

### POLISH-CHINESE COOPERATION



On 18 November 2021, we announced the results of SHENG 2, a call for Polish-Chinese research projects in selected disciplines of science. The call was organised in cooperation with the National Natural Science Foundation of China (NSFC) and involved a parallel review procedure. The two agencies carried out independent eligibility checks and merit-based evaluations, and funding was granted only to projects that were recommended for funding by both institutions. Grants were awarded to 18 out of 203 submissions: 1 in

Psychology, 6 in the Life Sciences and 11 in selected disciplines of Physical Sciences and Engineering.

### POLISH-GERMAN COOPERATION

#### BEETHOVEN CLASSIC 4

On 18 October 2021, we announced the results of BEETHOVEN CLASSIC 4, a call for Polish-German research proposals in Arts, Humanities and Social Sciences. Partner agencies had cooperated in the merit-based evaluation and selection of the best projects. The call attracted 67 proposals, 15 of which will be funded.

#### DIOSCURI

DIOSCURI is an initiative of the Max Planck Society (Max-Planck-Gesellschaft, MPG), which aims to create new Centres of Scientific Excellence in Poland, managed by outstanding foreign researchers-leaders in cooperation with, and with the support of, MPG. Each of the newly founded Dioscuri Centres will be awarded a total of EUR 1.5 million in funds over a period of five years.

On 17 September 2019, the MPG, in cooperation with the NCN, opened the doors of the first two Dioscuri Centres at the M. Nencki Institute of Experimental Biology, PAS, headed by Dr Aleksandra Pekowska and Dr Grzegorz Sumara. Finalised in December 2019, the DIOSCURI 2 call selected three more leaders: Dr Gracjan Michlewski (International Institute of Molecular and Cell Biology), Dr Bartłomiej Wactaw (Institute of Physical Chemistry, PAS), and Dr Paweł Dłotko (Institute of Mathematics, PAS). No candidates won DIOSCURI 3.

In 2021, the fourth edition of the call ended with three new laureates: Dr Mikołaj Frączyk, Dr Przemysław Nogły, and Dr Mateusz Sikora, who will create new Dioscuri Centres at the Jagiellonian University in Kraków.

## POLISH-LITHUANIAN COOPERATION

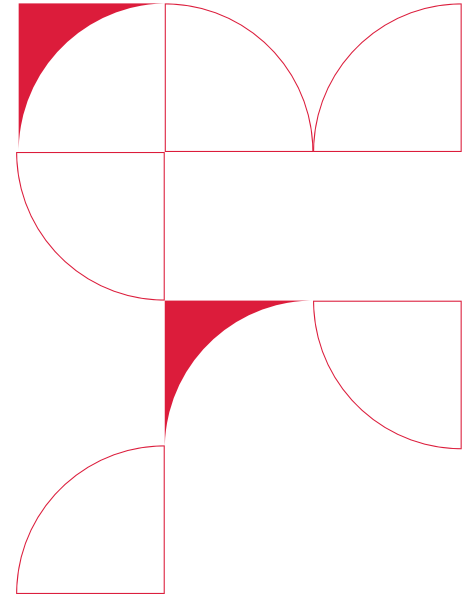


On 4 May 2021, we announced the results of the second round of DAINA, a call organised in cooperation with the Research Council of Lithuania (LMT) in all disciplines of science. The eligibility checks and merit-based evaluations were performed in parallel at both agencies and funding was awarded only to proposals recommended by both the NCN and the LMT. The call attracted 133 submissions, 11 of which were recommended for funding: 3 in Arts, Humanities and Social Sciences; 4 in Life Sciences; and 4 in Physical Sciences and Engineering.



## Multilateral cooperation

Every year, we also announce multilateral calls organised in partnership with foreign research-funding agencies within the framework of international networks that support specific disciplines. In ERA-NET Cofund programmes, for instance, the budget consists of national funds and sources provided under the EU Horizon 2020 Framework Programme. Other initiatives are funded exclusively from the national sources of individual agencies.



Projects funded under the “Horizon 2020” EU Framework Programme for Research and Innovation: CHANSE – grant agreement no 101004509 ; CHIST-ERA IV – grant agreement no 857925; JPCofuND2 – grant agreement no 825664; JPI-EC-AMR – grant agreement no 681055; JPIAMR-ACTION – grant agreement no 963864; M-ERA.NET 2 – grant agreement no 685451; NORFACE Governance – grant agreement no 822166; QuantERA – grant agreement no 731473, 101017733; InCoQFlag – grant agreement no 952223; BiodivERsA3 – grant agreement no 649307; BiodivClim – grant agreement no 869237; BiodivRestore – grant agreement no 101003777; EN-UAC – grant agreement no 875022; EN-UTC – grant agreement no 101003758; POLONEZ – Marie Skłodowska-Curie Actions grant agreement no 665778; POLONEZ BIS – Marie Skłodowska-Curie Actions grant agreement no 945339

Biodiversa+ was co-funded within the framework of the EU Research and Innovation Funding Programme “Horizon Europe” (grant agreement no 101052342).

## International networks in which the NCN participates

Name	Number of organisations	Number of countries	Network supports:
<b>BiodivERsA</b>	39	25	research into environmental protection and sustainable management of biodiversity
<b>BIODIVERSA +</b>	74	37	support for the development and implementation of a new biodiversity protection policy in Europe, biodiversity monitoring
<b>CHANSE</b>	29	24	humanities and social sciences
<b>CHIST-ERA</b>	29	25	research in the scope of information and communication technologies
<b>EqUIP</b>	8	7*	European-Indian collaboration in the scope of humanities and social sciences
<b>ERA-CAPS</b>	20	18	research into healthy, safe and sufficient food, plant-based products and sustainable agriculture, forestry and landscape
<b>ForestValue</b>	31	19	research in the scope of forest management; promoting increased innovation and competitiveness of the forest-based sector in Europe
<b>HERA</b>	26	25	research in the area of humanities responding to the social, cultural and political challenges of modern Europe
<b>InCoQFlag</b>	4	4	quantum technologies – by developing an international cooperation strategy in the field
<b>JPIAMR</b>	30	28	research into antimicrobial resistance
<b>JPI Urban Europe</b>	25	18	interdisciplinary research projects that respond to the challenges of modern cities and urban areas
<b>JPND</b>	29	24	research aimed at identifying causes of neurodegenerative diseases, early detection of their symptoms and appropriate forms of therapy
<b>M-ERA.NET</b>	50	36	research in the area of material science and material engineering
<b>NORFACE</b>	25	19	research in the area of social sciences (until now devoted, among others, to migration, future of the welfare state and social inequalities)
<b>QuantERA</b>	39	31	research in quantum technologies
<b>Solar-Driven Chemistry</b>	6	6	research in the scope of photochemical processes in solar light
<b>Trans-Atlantic Platform (T-AP) for Social Sciences and Humanities</b>	18	13	humanities and social sciences ( <i>Recovery, Renewal and Resilience in a Post-Pandemic World (RRR Call 2021)</i> concerned the impact of the COVID-19 pandemic on social life)

\* Europe + India



## QuantERA

QuantERA (ERA-NET Co-fund in Quantum Technologies) is an international network coordinated by the National Science Centre; it connects 39 different research-funding agencies from 31 countries that aim to support quantum technology research and innovation in Europe by organising calls for international research proposals in the field. The programme has already allowed 77 international projects to be funded worth nearly 89 million euro in total.

In 2021, the NCN embarked on QuantERA II, which is designed to follow up on its previous activities in the field of quantum technology. The total budget for the new grant agreement signed with the European Commission amounts to more than EUR 45 million, EUR 15 million of which are provided by the EU.

Last year, QuantERA II organised a call for research proposals (Call 2021) and campaigned to promote scientific excellence [a process known as “widening”]. The call attracted 128 proposals, 39 of which will receive funding. Its winners include as many as 15 Polish research teams. Ten basic research proposals will be funded by the National Science Centre, while five applied research projects will receive funding from the National Centre for Research and Development. The NCN alone will contribute more than PLN 7.7 million.

In September 2022, Kraków will host an international strategic conference (QuantERA Strategic Conference) to evaluate the QuantERA programme thus far, attended by call winners, as well as representatives of the European Commission and European research-funding agencies.

**www.quantera.eu**

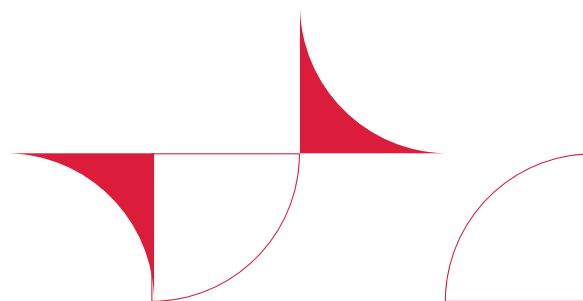
**Twitter:** @QuantERA\_EU

**Facebook:** @QuanteraCoFund



## InCoQFlag – Coordination and Support Action

The purpose of InCoQFlag (International Cooperation in Quantum Technologies) is to develop a strategy of cooperation with non-European countries in the field of quantum technology research. The project is coordinated by the French Alternative Energies and Atomic Energy Commission (CEA), and the National Science Centre acts as a partner responsible for the analysis of quantum technology funding schemes and public policies in Europe, Canada, United States, and Japan.



## CHANSE

Collaboration of Humanities and Social Sciences in Europe (CHANSE) is an ERA-Net Cofund programme coordinated by the NCN, launched on 1 January 2021. CHANSE is a network of 27 research-funding institutions from 24 European countries established with the goal of launching international calls for research proposals. The budget of the consortium is 36 million euro, 10 million of which comes from the EU Horizon 2020 Framework Programme.

The mission of CHANSE is to fund high-quality international research projects, inspire collaboration between scientists and various stakeholder groups, promote gender equality in science and strengthen the European Research Area, especially in countries with a less successful track record within EU Framework Programmes (known as the “widening countries”).

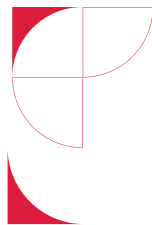
In 2021, the CHANSE consortium launched a new call, entitled “Transformations: Social and Cultural Dynamics in the Digital Age”. The NCN works in partnership with the Spanish State Research Agency (AEI) and the Estonian Research Council (ETAg) to organise the proposal submission and review process. There has been a lot of interest in the European research community and as many as 366 proposals were submitted to the call, including 168 by Polish research centres. As many as 12 research teams from

Poland made it to the list of 26 winners; the list also features one DigiPatch project headed by a Polish principal investigator, Prof. Dr hab. Małgorzata Kossowska. In addition, the programme initiated campaigns to support the exchange of knowledge between project team members and non-academic stakeholders.

**www.chanse.org**

**Twitter:** @euchanse

**Facebook:** @euchanse



## Calls announced under multilateral co-operation

Polish scientists in multilateral calls are awarded grants to carry out research projects in collaboration with foreign research teams. Institutions announcing a call jointly evaluate proposals and then provide funding to teams from their countries. Such projects are distinguished not only by their high scientific level, but also by collaboration in international consortia which often paves the way for yet further joint projects.

Apart from projects carried on from the previous year, 2021 also witnessed the launch of another five-year ERA-Net Cofund project, JPIAMR-ACTION, devoted to drug resistance, as well as BiodivRestore, a new programme from the BiodivERsA network in the field of biodiversity protection.

At the turn of 2020 and 2021, the National Science Centre started a cooperation with the Trans-Atlantic Platform (T-AP) for Social Sciences and Humanities and helped organise a call for international research proposals entitled “Recovery, Renewal and Resilience in a Post-Pandemic World” (RRR Call 2021), devoted to the impact of the COVID-19 pandemic on social life. The call was announced in April 2021 and attracted 315 international proposals. 19 of these, including 5 Polish projects, were awarded funding.

## Calls for proposals concluded in 2021

Area	Network	Subject	Projects cofinanced by the NCN	Partner countries in projects with the participation of Polish researchers
INTERDISCIPLINARY	<b>BiodivRestore</b>	<i>BiodivRestore Conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems</i>	4	Austria, Belgium, Finland, France, Spain, Netherlands, Latvia, Morocco, Germany, Portugal, Romania
	<b>EN-UTC JPI Urban Europe (Call 2021)</b>	<i>Urban Transformation Capacities</i>	5	Belgium, France, Spain, Netherlands, Norway, Romania, Sweden
NZ – Life Sciences	<b>JPcofuND 2 (Call 2021)</b>	<i>Linking pre-diagnosis disturbances of physiological systems to Neurodegenerative Diseases.</i>	2	France, Netherlands, Israel, Germany, Romania, Slovakia, Switzerland, Sweden, Hungary, Turkey
	<b>ForestValue (Call 2021)</b>	<i>Sustainable and multifunctional use and management of forests, to maximize their contribution to all SDGs Building with wood from various perspectives Analysis of benefits, synergies and trade-offs in the use of forest biomass</i>	2	Finland, Latvia, Germany, Norway, Slovenia, Sweden
	<b>JPIAMR-ACTION (Call 2021)</b>	<i>One Health interventions to prevent or reduce the development and transmission of antimicrobial resistance (AMR)</i>	4	Belgium, France, Spain, Netherlands, Lithuania, Moldova, Germany, Norway, Tunisia, United Kingdom, Italy
ST – Physical Sciences and Engineering	<b>CHIST-ERA IV (Call 2020)</b>	<i>Advanced Brain-Computer Interfaces for Novel Interactions Towards Sustainable ICT</i>	3	Finland, France, Spain, Ireland, Canada, Luxembourg, Switzerland, United Kingdom
	<b>M-ERA.NET 2 (Call 2020)</b>	<i>Modeling for materials engineering and processing; Innovative surfaces, coatings and interfaces; High performance composites; Functional materials; New strategies for advanced material-based technologies in health applications; Materials for additive manufacturing.</i>	5	Czech Republic, Japan, Lithuania, German, Norway
	<b>QuantERA (Call 2021)</b>	<i>Quantum Phenomena and Resources (QPR) Applied Quantum Science (AQS)</i>	10	Austria, Belgium, Denmark, Finland, France, Spain, Ireland, Israel, Luxembourg, Germany, Norway, Portugal, Slovenia, Switzerland, Italy

## Calls for proposals launched in 2021

Area	Programme	Topic	Call for proposals	Application deadline (preproposals)	Application deadline (full proposals)
INTERDISCIPLINARY	Europejskie Partnerstwo na rzecz Biodóżnorodności Biodiversa+ (Call 2021)	<i>Supporting the protection of biodiversity and ecosystems across land and sea</i>	1 October 2021	30 November 2021	14 April 2022
	EN-UTC JPI Urban Europe (Call 2021)	<i>Urban Transformation Capacities</i>	29 January 2021	15 April 2021	23 September 2021
HS	CHANSE	<i>Transformations: Social and cultural dynamics in the digital age.</i>	9 March 2021	7 May 2021	7 December 2021
	Trans-Atlantic Platform (T-AP) for Social Sciences and Humanities	<i>Recovery, Renewal and Resilience in a Post-Pandemic World (RRR Call 2021)</i> 1. Reducing inequalities and vulnerabilities 2. Building a more resilient, inclusive and sustainable society 3. Fostering democratic governance and political participation 4. Advancing responsible and inclusive digital innovation; and 5. Ensuring effective and accurate communication and media	12 April 2021	Letter of intent required by 14 June 2021	12 July 2021
NZ	JPco-fuND2 (Call 2021)	<i>Linking pre-diagnosis disturbances of physiological systems to Neurodegenerative Diseases.</i>	4 January 2021	2 March 2021	29 June 2021
	ForestValue (Call 2021)	<i>Sustainable and multifunctional use and management of forests, to maximize their contribution to all SDGs</i> <i>Building with wood from various perspectives</i> <i>Analysis of benefits, synergies and trade-offs in the use of forest biomass</i>	19 January 2021	no data (one-stage call)	13 April 2021
	JPIAMR-ACTION (Call 2021)	<i>One Health interventions to prevent or reduce the development and transmission of antimicrobial resistance (AMR)</i>	14 January 2021	16 March 2021	12 July 2021

Area	Programme	Topic	Call for proposals	Application deadline (preproposals)	Application deadline (full proposals)
ST	<b>M-ERA.NET 3 (Call 2021)</b>	1. Modeling for materials engineering, processing, properties and durability; 2. Innovative surfaces, coatings and interfaces 3. High performance composites 4. Functional materials 5. New strategies for advanced material-based technologies for health applications 6. Materials for additive manufacturing	15 March 2021	15 June 2021	17 November 2021
	<b>CHIST-ERA IV (Call 2020)</b>	<i>Advanced Brain-Computer Interfaces for Novel Interactions            Towards Sustainable ICT</i>	7 January 2021	No data (one-stage call)	1 March 2021
	<b>CHIST-ERA IV (Call 2021)</b>	<i>Nano-Opto-Electro-Mechanical Systems for ICT (NOEMS)            Foundations for Misbehaviour Detection and Mitigation Strategies in Online Social Networks and Media (OSNEM)</i>	8 November 2021	No data (one-stage call)	17 January 2022
	<b>QuantERA (Call 2021)</b>	<i>Quantum Phenomena and Resources (QPR)            Applied Quantum Science (AQS)</i>	12 March 2021	13 May 2021	15 September 2021
	<b>Solar-driven Chemistry</b>	<i>Solar-driven Chemistry Call 2021 (photochemical transformation of small molecules, such as water, carbon dioxide or nitrogen into more valuable, storable chemicals by means of solar radiation)</i>	30 July 2021	29 October 2021	2 May 2022

## Multilateral co-operation based on the Lead Agency Procedure

In tandem with other European research-funding agencies, the NCN announces multilateral calls based on the lead agency procedure, which takes advantage of domestic calls organised by each partner institution in order to assess international projects. Bilateral and trilateral

research proposals undergo merit-based evaluation at only one institution, the lead agency, appropriate for one of the project teams, and compete against other proposals submitted to the same call. Not unlike in other cases of cooperation between the NCN and its foreign partners, each agency funds the part of the project that will be carried out by the national team from its country.

In 2021, the LAP procedure allowed the selection of:

- under CEUS (Central European Science Partnership) and in partnership with research-funding institutions from Austria (FWF), Czech Republic (GAČR), and Slovenia (ARRS):
  - 15 (out of 78) proposals in the CEUS-UNISONO call, with FWF, GAČR or ARRS as the lead agency;
- 61 (out of 227) proposals in the OPUS 20+LAP call, with the NCN as the lead agency, including:
  - 26 proposals in cooperation with teams from Austria, Slovenia and the Czech Republic under the CEUS scheme;
  - 5 Polish-Swiss proposals;
  - 30 Polish-German proposals.

## WEAVE

In 2021, the Weave programme, with its unique openness to international cooperation, replaced all the different bilateral initiatives previously organised with Germany, Switzerland and, within the framework of CEUS, with Austria, the Czech Republic and Slovenia. Under Weave, the National Science Centre continues to work with its long-standing partner institutions, i.e. FWF, SNSF, DFG, GAČR and ARRS.

Bilateral and trilateral projects in all disciplines of science are taken in by the NCN under two calls for proposals, depending on whether the role of the lead agency is played by the NCN or the foreign partner institution:

- Weave-UNISONO – for proposals submitted and evaluated at foreign partner institutions in their capacity as the lead agency (in 2021 these included: FWF, GAČR, ARRS, SNSF and DFG);
- the September round of OPUS – for proposals evaluated at the NCN in its capacity as the lead agency.

The results are announced on a rolling basis as the proposals are evaluated at lead agencies and depend on how long it takes for the evaluation to be approved by partner agencies.

Submissions to Weave-UNISONO will also be accepted in 2022 as the FNR (Luxembourg) and the FWO (Belgium) will join the programme as partner institutions. In following years, the group of foreign partners will be further expanded.

The OPUS 22+LAP/Weave call accepted proposals between 15 September and 15 December 2021. Projects were evaluated alongside other domestic proposals submitted to OPUS 22. The results are announced on a rolling basis, as the results of merit-based review performed at partner institutions appropriate for foreign research teams are approved by the NCN.

## POLONEZ AND POLONEZ BIS

In the first half of 2021, we continued the Marie Skłodowska Curie Actions Cofund POLONEZ, a programme aimed at supporting the professional growth and mobility of experienced researchers by making it possible for them to complete their research projects at Polish research centres and non-academic institutions. Over the period in question, we monitored the last four research projects still in progress and took in the final reports for those that finished in previous years. In March 2021, as part of its public outreach programme, the NCN published a catalogue entitled "The POLONEZ Experience – Why It Matters", which presented 24 selected projects. Their principal investigators were asked about their research and shared some of their personal experiences in our country. The booklet also featured interviews with their research partners and presented various project statistics.

The POLONEZ programme finished on 31 May 2021; in August of the same year, the European Commission unreservedly approved its final and billing reports. The NCN had received a total of EUR 5.8 million in funding from the European Commission (the total cost of the programme approached EUR 21 million).

From early on in 2021, the NCN engaged in an intense campaign to promote its new POLONEZ BIS programme, within the frame-

work of which 120 experienced researchers will be recruited to complete a two-year research fellowship at Polish institutions of their choice. The promotional campaign was targeted at potential applicants, as well as at public and private institutions in Poland that may be interested in taking them on board. In 2021, the NCN also launched a new programme website, [www.polonezbis.eu](http://www.polonezbis.eu), started publishing a dedicated newsletter, created a promotional video animation and sent out teasers and application information to more than 350 research institutions across the globe and over 1500 Polish research and academic institutions in Poland. A special engine, Partner Search Tool, was developed to assist the programme, and a guidebook for applicants was also published.

The first round of POLONEZ BIS was announced on 15 September and finished on 15 December 2021. During the recruitment period, the NCN organised two webinars for applicants and one for host institutions.

The first round attracted 151 proposals from all around the world. Round two and three start on 15 March and 15 September 2022, respectively.

[www.polonezbis.eu](http://www.polonezbis.eu)

**LinkedIn:**

[www.linkedin.com/company/polonez-bis/](https://www.linkedin.com/company/polonez-bis/)



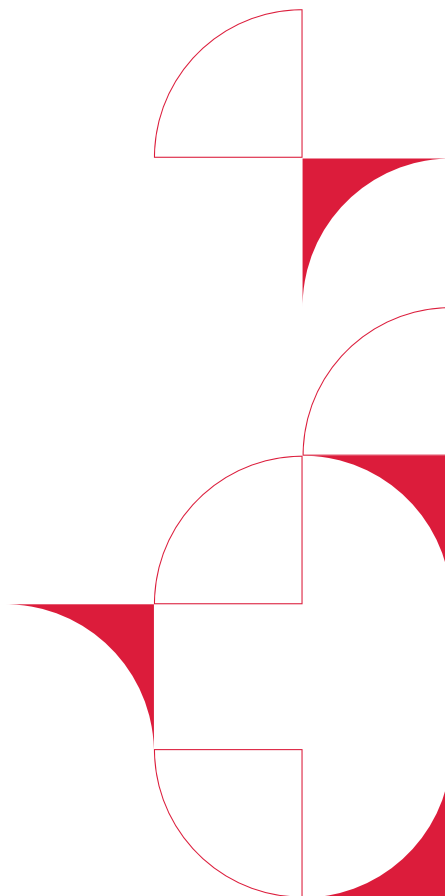
## Calls for proposals funded under The EEA and Norway Grants

In 2021, we continued work on the implementation of the Mechanism of the European Economic Area and the Norwegian Financial Mechanism 2014-2021 under the agreement signed in December 2017 between Poland and Iceland, Liechtenstein and Norway. Under the 3<sup>rd</sup> edition of the Basic Research Programme within the framework of the EEA and Norway Grants, three calls for proposals have been conducted:

-  GRIEG – call for research projects carried out by Polish-Norwegian teams, with a budget of EUR 37.34 million,
-  IdeaLab – call for innovative, interdisciplinary research projects that are a response to important social challenges and which are carried out by teams from Poland, Norway, Iceland and Liechtenstein, with a budget of EUR 4.43 million,
-  POLS – call for proposals supporting researcher mobility with small grants, targeting foreign researchers wishing to carry out research in Poland, with a budget of EUR 7 million.

35 Polish-Norwegian research projects with a total budget of over PLN 198 million are currently underway under the GRIEG call. Two more projects, worth more than PLN 11 million, are in progress under the interdisciplinary IdeaLab call, focusing on social resilience against misinformation in cyberspace and a new methodology of climate change research. The POLS mobility call funds 34 projects with a budget of more than PLN 27 million.

  
**Iceland**  
**Liechtenstein**  
**Norway grants**      **Norway grants**





# Promoting our work

An important section of our efforts is oriented towards disseminating information on our funding opportunities in the research community. In 2021 we worked on that objective through a number of actions at home and abroad. We spread the news of the announced and concluded calls and NCN's initiatives both online and by means of traditional media; we organised and actively participated in a variety of initiatives for improving the publicity reach of science.

## NCN's 10<sup>th</sup> anniversary

On 9 and 10 September 2021, the NCN celebrated its 10th anniversary.

Celebrations kicked off with a festive gala at the Juliusz Słowacki Theatre in Kraków, with accolades from: Przemysław Czarnek, the Minister of Science and Higher Education; Wojciech Murdzek, Secretary of State at the Ministry of Science and Education; Marc Schiltz, President of Science Europe; and Katja Becker, Chair of the Global Research Council (GRC). The guests also listened to a lecture delivered by philosopher and member of the Royal Swedish Academy of Sciences, Åsa Wikforss, entitled "Science Denial in the Post-Truth Era". The gala closed with a concert by the Sinfonietta Cracovia Orchestra of the Royal Capital City of Kraków, conducted by Edmon Levon.

On the second day of celebrations, representatives from Polish and European research-funding institutions and scientists from various disciplines of science came together at the International Cultural Centre to hold a debate on open access and science during the pandemic. Panellists discussed the impact of the pandemic on research, the various challenges faced by researchers and the way in which science can support countries and societies to

help them find their way around the new pandemic reality. Another panel debate focused on open access to research publications, particularly in the context of an initiative spearheaded by cOAlition S, which invited European research-funding agencies to adopt Plan S and called for full and immediate (without any time embargo) access to any and all publications containing the results of publicly-funded (or co-funded) research projects. The conference also featured presentations by three NCN call winners, who were able to use their NCN grants to build international research teams, conduct ground-breaking research and achieve world-class results.

All anniversary events were live streamed on NCN channels and later posted online.



## The NCN Open Days

The NCN Open Days are organised once per year to showcase the NCN call portfolio. The guiding idea behind the event is mobility; every year, the event is held in a different corner of Poland, which means that a very wide range of established scientists and entry-level researchers can all learn about the call portfolio. The NCN Open Days' agenda also features themed meetings and debates, as well as workshops on the financial and administrative aspects of carrying out NCN-funded projects. The event is also an excellent opportunity to present those that have already won NCN grants and are currently in progress.

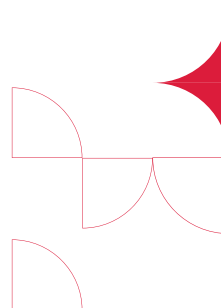
In 2021, the NCN Open Days had to be cancelled on account of the pandemic.

## NCN Award 2021

On 6 October 2021, the NCN named the laureates of the eighth edition of its award, conferred for young researchers up to the age of 40 in three categories: Arts, Humanities and Social Sciences (HS), Life Sciences (NZ) and Physical Sciences and Engineering (ST). The awards ceremony could not take place in 2020 on account of the pandemic. However, the NCN did select winners, whose names were announced on 14 October 2020. During the 2021 gala, statuettes were handed out both to 2020 and 2021 winners. Each winner also received a prize of PLN 50 thousand for outstanding achievements in basic research.

In the field of Arts, Humanities and Social Sciences, the 2021 Award was granted to Dr Paweł L. Polkowski from Polish Centre of Mediterranean Archaeology, University of Warsaw and Archaeological Museum in Poznań for studies on the rock art in the Dakhleh Oasis, Egypt. In the domain of Life Sciences, the Award was conferred on Dr hab. Sebastian Glatt from Matopolska Centre of Biotechnology, Jagiellonian University. His nomination for the Award came in characterization of the structure and function of the Elongator protein complex and the links between mutations and the onset of neurodevelopmental and neurodegenerative disorder. The third laureate, awarded in the field of Physical Sciences and Engineering, was Prof. Yonatan Gutman

from Institute of Mathematics of the Polish Academy of Sciences. He received the 2021 Award for groundbreaking results in the field of dynamical systems and ergodic theory, in particular regarding the optimal dimension estimation for embedding of dynamical systems into Hilbert cubes and the theory of nilspace structures.





Dr Paweł L. Polkowski



Dr hab. Sebastian Glatt



Prof. Jonatan Gutman

## Informing the public about the NCN

The mainstay of our public communication is our website ([www.ncn.gov.pl](http://www.ncn.gov.pl)), featuring comprehensive information on programmes and all key data concerning the NCN and our activities. The service has versions in Polish and English.

Apart from updated information on domestic and international calls available in the NCN portfolio, the website also features data on all NCN-funded projects (NCN Project Database), as well as a listing of open positions in research projects funded by the NCN (Job Offer Database). In 2021, the NCN launched an English version of its Project Database.

The NCN website attracts a lot of traffic. In order to better address our users' needs, on 9 September 2021, we launched a revamped version of [www.ncn.gov.pl](http://www.ncn.gov.pl), which divides information into sections targeted at different users: applicants, grant holders and experts. The new website also has a grant search engine, more clearly showcases the achievements of the NCN and describes its international activities. It also comes in a mobile version that can be comfortably browsed on your smartphone. To celebrate the 10th anniversary of the NCN, a special jubilee subpage was also launched (in Polish and English): [www.ncn.gov.pl/10lat](http://www.ncn.gov.pl/10lat) and [www.ncn.gov.pl/10years](http://www.ncn.gov.pl/10years).

Information on new calls and top events was also disseminated via social media channels, including Facebook, Instagram and Youtube, as well as our newsletter, KODA NCN. In 2021, the NCN also opened a Twitter account and became active on LinkedIn.

Apart from actively promoting our work online, we printed official publications: brochures with information on the NCN call portfolio and its activities in two language versions, Polish and English; the "Annual Report 2020", which described NCN's activities in 2020 (in Polish); a publication about the 10 years of the NCN in Polish and English; a POLONEZ BIS brochure in Polish and English; a "Quantum Technologies: Public Policies in Europe" report (in English) for the QuantERA programme; a catalogue of projects carried out within the framework of POLONEZ, entitled "The POLONEZ Experience"; and a set of NCN call leaflets in Polish. The NCN also published a 2022 wall calendar with photographs of NCN call winners at their workplaces or sites related to their research projects. The calendar is yet another way to promote the NCN call portfolio and the research projects it has allowed to fund.

Last year, we also recorded five films about the activities of the National Science Centre, subtitled in Polish and English:

- a promotional video about the QuantERA programme,

- a jubilee video to celebrate the 10th anniversary of the National Science Centre,
- a video report on the celebrations of the 10th anniversary of the National Science Centre,
- a film about the winners of the NCN Award for 2021,
- a video report on the 2020 and 2021 NCN Awards ceremony.

## NCN in the media

In 2021, national and local press titles, as well as academic and scientific media outlets (e.g. the Polish Press Agency, "Gazeta Wyborcza", "PAUza Akademicka", "Forum Akademickie", "Dziennik Polski", "Gazeta Krakowska" and many others) published many articles about the NCN, penned either by journalists or NCN staff. Because the NCN changed its media monitoring methodology in 2021 (the task was outsourced to an external company), data on press coverage was divided into two periods.

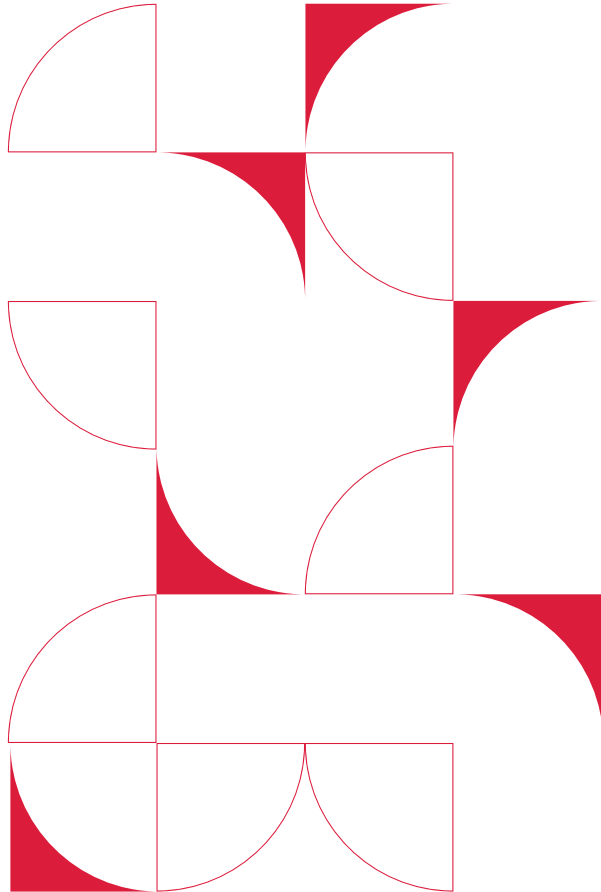
In the first half of the year:

- 499 press, radio, TV and online publications;
- 250 social media posts.

After 30 June 2021:

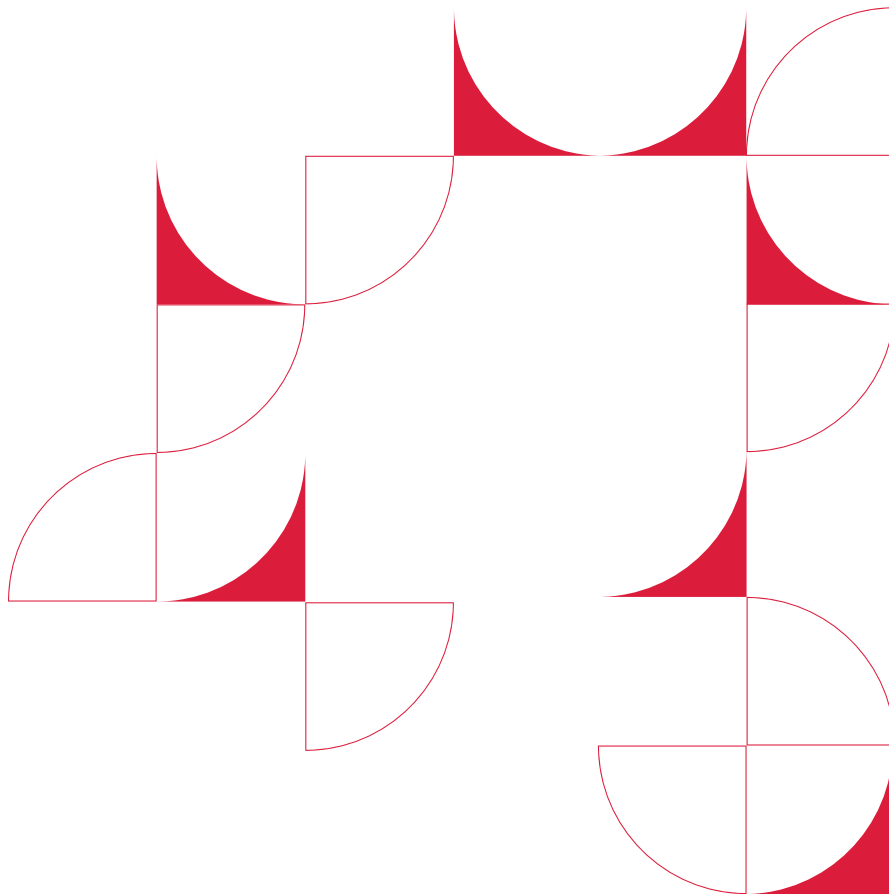
- 338 press, radio, and TV publications;
- 4512 online publications;
- 4439 social media posts.

In 2021, the NCN Director gave 2 interviews: one devoted to the activity of the NCN during the pandemic and the other focused on the 10th anniversary of the NCN. The President of the NCN Council gave one interview about the activity of the agency.



# Budget

Our budget in 2021 amounted to PLN 1.32 billion including PLN 1.27 billion of specific grant for funding research projects. A specific grant for management and operations amounted to PLN 32.4 million.



RESEARCH  
STORIES



**Principal investigator:**

Dr hab. Agnieszka Golec de Zavala, Prof. of SWPS  
SWPS University of Social Sciences and  
Humanities

**Project title:**

Reducing the pain of intergroup rejection:  
Mindful gratitude as a way of reducing collec-  
tive narcissists' retaliatory aggression

**Funding scheme:**

MAESTRO 9, announced on 14 June 2017

**Panel:**

HS6

# Role of mindfulness practice in reducing intergroup aggression in collective narcissists





This research project in social psychology aims to determine whether the practice of mindfulness may help reduce negative reactions to social exclusion in intergroup relations. It asks whether mindfulness based interventions are effective to reduce prejudice among prejudiced group members and whether they help group members whose groups are rejected to cope with distress of rejection. Collective narcissism – the belief that one’s own group is exceptional but not sufficiently recognized by others – predicts prejudice and distress of intergroup rejection. We ask whether mindfulness interventions reduce prejudice and distress especially on high level of collective narcissism.

In the contemporary world, contacts between different cultural, national or ideological groups abound in situations where members of one group may feel excluded by those of another (regardless of their actual intention or ability). Some people will interpret such situations as a threat to the group’s good name and react with aggression. Such individuals often create or join the ranks of radical organizations known for their aggressive tactics, and research shows that they score high on a measure of collective narcissism. Studies conducted at the PrejudiceLab (at [collectivenarcissism.com](http://collectivenarcissism.com)) aim at developing strategies to prevent their radicalization. This research project thus has a double purpose: (1) to determine whether group exclusion is particularly painful for those who hold collective narcissistic views and whether such individuals are more likely to resort to retaliatory aggression; and (2) to test whether the practice of mindful gratitude, which helps regulate negative emotions and reactivity to negative stimuli, can reduce these tendencies.

The practice of mindfulness and a mindful approach to the emotions that connect us to others shape our ability to find constructive ways of coping with negative feelings and a sense of threat, also in situations of social rejection; they also reduce prejudice. It is not clear whether the practice of mindful gratitude can reduce aggression in intergroup relations in people who are particularly prone to aggressive behaviour and prejudice, such as collective narcissists. There are, however, reasons to believe that it may be particularly effective among such people. Collective narcissists react to any threat to their group’s good name in an extremely strong way, probably because, as shown by ample research, they are unable to constructively deal with negative emotions.

Our results confirm that it is painful to witness the exclusion of one’s group, even if the person in question only observes the situation and is not being excluded as such. People who hold collective narcissistic beliefs report particularly negative emotions in such contexts; they also show elevated physiological stress levels and aggressive behaviour against members of the excluding group. Our research also demonstrates that a short course of mindfulness training may help reduce prejudice in participants with narcissistic views and lower their negative emotional reactions to group exclusion.

We are currently studying the effectiveness of our own original long-term mindful gratitude programme in reducing prejudice and retaliatory aggression in collective narcissists. We are also planning to conduct brain activity measurements to understand the psycholog-

ical processes responsible for their reactions in situations of exclusion and during mindfulness practice.



### **Dr hab. Agnieszka Golec de Zavalá, Prof. of SWPS**

Dr hab. Golec de Zavalá works at the SWPS University of Social Sciences and Humanities in Poznań, where she runs an international research group called the PrejudiceLab ([collectivenarcissism.com](http://collectivenarcissism.com)). She has won fellowships from the Fulbright Commission, the Batory Foundation, the Kościuszko Foundation, and the European Research Commission under the Marie Curie-Skłodowska programme. She is also a member of Concilium Civitas. Golec de Zavalá is the author of the theory of collective narcissism and has extensively published on the subject, as well as the issues of prejudice, intergroup conflict, political radicalization and social exclusion. She is the principal investigator under a MAESTRO project, funded by the National Science Centre, which studies the role of collective narcissism and group identity in the experience of social exclusion by group members; the purpose of the research is to develop an original mindful gratitude programme to facilitate the regulation of negative emotions in the process of experiencing and overcoming social exclusion.



**Principal investigator:**

Dr hab. Paweł Gancarczyk, Prof. of IS PAN  
Institute of Art of the Polish Academy  
of Sciences (IS PAN)

**Project title:**

Sound Memories: The Musical Past in  
Late-Medieval and Early-Modern Europe

**Funding scheme:**

HERA *Public spaces: Culture and Integration  
in Europe*, announced on 28 August 2017

**Panel:**

HS2

# Sound memories: The Musical Past in Late-Medieval and Early-Modern Europe



Our current repertoire is dominated by the music of the past; it reigns supreme both in concert halls and on radio stations, which love to broadcast the golden oldies. We frequently go back to the music created decades or centuries ago and accord it great importance in our culture, European and national identity, as well as a regional and generational sense of belonging. Underway since the early 19th century, this trend has been further reinforced by contemporary media. But how was the music of the past perceived several centuries ago, in the late medieval and the early modern period? Was it also somehow important then? Is it true that 15th- and 16th-century audiences preferred a largely contemporary repertoire? These questions were addressed by a research project conducted by musicologists from universities in Cambridge, Heidelberg/Zurich, Prague and Utrecht, as well as the Institute of Art of the Polish Academy of Sciences in Warsaw.

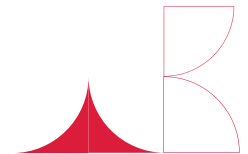
Scholars from these five research centres examined a wide variety of 13th-16th-century sources, both those that were already well known and those that were first discovered and analysed within the framework of the project, and searched them for data and music pieces that document the presence of music from the past in the medieval and the early-modern period. It turned out that such music played an important role in the identity of certain social and religious groups, e.g. the Czech Utraquists or Lutherans in Northern Germany. As early as the 13th-century, polyphonic music was being archived at the University of Paris. In the 15th and 16th centuries, alongside new works, there existed a large body of earlier pieces going back to the preceding decades but also to earlier

generations and historical periods. The Warsaw team (Paweł Gancarczyk, Antonio Chemotti, Bartłomiej Gembicki) presented this phenomenon using the example of various music genres practiced in Central Europe, such as the hymns collected by the Lutheran pastor Valentin Triller (Wrocław, 1555). They also asked how this old music functions in the 21st century, both in academic discourse and among performers and listeners.

The project's products include: four PhD dissertations, two monographs, a critical edition of music and a number of articles published, for instance, in a volume entitled *Sounding the Past: Music as History and Memory* (Turnhout, 2020). In accordance with the requirements of the HERA programme, the researchers put great emphasis on outreach activities, organizing seminars, workshops, concerts and exhibitions, as well as publishing popular articles and teaching young people. In this endeavour, they worked in tandem with associate partners: musical ensembles, such as *Bastarda* (Warsaw), *La Morra* (Basel), *Schola Gregoriana Pragensis* (Prague), *Trigon* (Leiden), and a new group formed as a result of the project, *Anonymous III* (Cambridge). Young composers from the Academy of Performing Arts in Prague composed modern pieces inspired by early music and a CD with late medieval compositions was released. The team produced several documentary films which, along with videos recorded during the concerts, are now available on their YouTube channel, "SoundMe HERA Research Project". More information: [www.soundme.eu](http://www.soundme.eu) (archived website).

## Dr hab. Paweł Gancarczyk, Prof. of IS PAN

Head of the Department of Musicology of the Institute of Art at the Polish Academy of Sciences and editor-in-chief of the *Muzyka* quarterly. In 2020, he was elected as a member of *Academia Europaea* and the *Warsaw Scientific Society*. He specialises in the history of medieval and early modern music. The French version of his monograph *Muzyka wobec rewolucji druku* [Music and the Printing Revolution] won the *Prix des Muses* (2016). In 2021, he published a book entitled *Petrus Wilhelmi de Grudecz i muzyka Europy Środkowej XV wieku* [Petrus Wilhelmi de Grudecz and the Music of 15th-century Central Europe].





**Principal investigator:**

Dr hab. inż. Grzegorz Soboń, Prof. of PWR  
Wrocław University of Science and  
Technology (PWR)

**Project title:**

Passive mode-locking in dispersion-managed  
ultrafast Thulium-doped fiber lasers

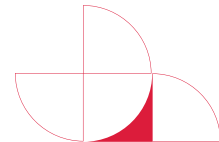
**Funding scheme:**

SONATA 6, announced on 16 September 2013

**Panel:**

ST7

# Generating ultrashort optical pulses with thulium-doped fiber lasers



Because of their multiple applications in various areas of life, lasers are crucially important for science and industry. They are capable of emitting light pulses of incredibly short duration, of the order of femtoseconds (where 1 femtosecond equals 10<sup>-15</sup> of a second). Not everyone knows this, but even the touch-screens of our smartphones, which are made of very hard glass, are cut with femtosecond lasers. In scientific parlance, devices of this type are known as passive-mode locked lasers.

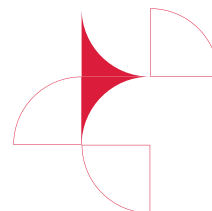
Naturally, scientists have invested a lot of effort to try and develop lasers that would generate pulses with an even shorter duration and higher power, as well as minimal complexity and low final device manufacturing costs. A basic factor that constrains the duration of a laser pulse is known as chromatic dispersion. Chromatic dispersion is a phenomenon in which an initially sharp pulse is blurred out as it travels through a medium, such as an optical fiber. To generate shorter pulses, we need to apply special compensation mechanisms.

Fiber optic lasers are a special group of lasers, in which the light is "trapped" in optical fibers. The wavelength of the emitted light beam (or, more commonly, its colour) depends on the kind of doping used in the manufacturing of the fiber. For instance, lasers that use thulium-doped fibers (thulium being a lanthanide element) emit optical beams in the middle infrared spectral range, invisible to the human eye, i.e. c. 1800-2100 nanometres. This range is known as the eye-safe wavelength range, because it is absorbed by the cornea and the vitreous body before it can reach and damage the retina. Lasers of this type could thus have

a variety of new applications, e.g. in rangefinders, sensors, and optical communications, but, above all, in medicine (esp. in dermatology) and spectroscopy. Laser light in the 1800-2100 nm range is very strongly absorbed by water, which facilitates the incision or selective elimination of various tissues. Importantly, the 1800-2100 nm range also corresponds to the absorption lines of two basic greenhouse gases, i.e. carbon dioxide (CO<sub>2</sub>) and nitrous oxide (N<sub>2</sub>O). As a result, our research may contribute to developing highly sensitive systems for detecting trace quantities of these molecules in the atmosphere. Such applications are very important in the context of the growing greenhouse effect, which requires us to monitor our emissions and recapture carbon dioxide.

Our project looked into the possibility of generating ultrafast pulses with thulium-doped fiber lasers, using various dispersion compensation techniques. The structure of these lasers opens up brand new applications in real-world settings outside the lab, which often require high reliability and insensitivity to external interference. We were able to demonstrate the world's first thulium-doped all-in-fiber laser with zero dispersion, using graphene as a pulse-forming material, and generated pulses of c. 200 fs. Before the project, it was believed that graphene could not generate pulses in such conditions because of its low optical damage threshold. We also developed a thulium-doped fiber laser with the broadest recorded emission spectrum of up to 100 nm, which may be incredibly important for spectroscopy applications, since it will allow, e.g. systems capable of monitoring the atmospheric levels of many chemical compounds at the

same time to be designed. Apart from creating devices for important practical applications, the project also contributed to increasing our knowledge of the phenomena that occur in thulium-doped lasers.



### **Dr hab. inż. Grzegorz Soboń, Prof. of PW**

Affiliated with the Wrocław University of Science and Technology, where he works as a professor. His research interests focus on laser technology and, in particular, on generating ultrashort laser pulses. Since 2018, he has headed a research team working, e.g. on developing optical frequency combs for the purposes of laser spectroscopy and biomedical imaging lasers. He has won many awards and distinctions, including the Polish Prime Minister's Award.





**Principal investigator:**

Prof. Dr hab. Jan Marcin Węstawski  
The Institute of Oceanology of the Polish  
Academy of Sciences

**Project title:**

Arctic benthic ecosystems under change:  
the impact of deglaciation and boreal species  
transportation by macroplastic (ADAMANT)

**Funding scheme:**

DAINA 1, announced on 15 September 2017

**Panel:**

NZ8

Arctic benthic  
ecosystems under  
change: the impact of  
deglaciation and boreal  
species transportation  
by macroplastic

The Arctic is the region hardest hit by global climate change; its effects can be observed not only as an increase in air and sea water temperatures, but also as the rapid meltdown of Arctic ice (glaciers and sea ice), which has, until recently, defined the most characteristic features of the Arctic ecosystem. These “natural” changes are now being exacerbated by a new phenomenon related to anthropogenic activity, i.e. plastic garbage floating on the surface of the ocean.

In the past, only wood would drift all the way from the estuaries of Siberian rivers to the coasts of the European Arctic. Accumulating on polar shores over centuries, these wood piles did not modify the local ecosystem in any novel way (all they did, after all, was drift over from another part of the Arctic). For centuries, Atlantic waters flowing up north along European coastlines carried larvae and adult animals, but only a small proportion of these made it all the way to the farthest north. In the 1970s, however, fisheries began to use plastic nets and boxes, and the industry started to inundate Europe with plastic packaging and containers. These almost indestructible, floating pieces of waste now serve as rafts on which adult animals of various southern species embark on a voyage across the ocean.

The ADAMANT project sets out to show how the plastic waste that lands on its shores affects the ice cover of Spitsbergen and to determine which species most commonly use this form of transport (bivalves, crustaceans, polychaetes). Genetic studies suggest that incoming species arrive on Spitsbergen from different corners of Europe, including Iceland, Denmark

and Scotland, and not only nearby Norway. The importation of southern species increases species diversity and the genetic diversity of local fauna. By comparing the earliest available satellite photos of the region (from the 1990s) with contemporary images, we also distinguished the sites where sea ice disappears from the coast completely from those where its retention period has just shortened. Thanks to the fact that our voyage on IOPAN OCEANIA in 1990 had allowed us to collect data on the benthic fauna of two bays located near glaciers, we were able to compare data from 30 years ago with new samples from the same sites. It turns out that the bay from which the glacier is slowly retreating has undergone significant changes over these past 30 years; both the quantity and diversity of its fauna has increased, while the other bay, which has experienced no such changes in ice cover (there was no ice there 30 years ago either), has remained almost completely unchanged.

Our research is still in progress; the project was prolonged because of the pandemic, but we have already broadcast a movie to show our field work in the Arctic, and the results of our last publication have made the cut for a prestigious scientific press review.

## Prof. Dr hab. Jan Marcin Węstawski

Graduate of the first intake of the oceanography programme at the University of Gdańsk in 1975. He spent seven years working at the Hel Marine Station of the University of Gdańsk, and after his PhD defence, completed another year at the Institute of Geophysics of the Polish Academy of Sciences as the head of the Polish Polar Station in Hornsund. Since 1985, he has worked at the Institute of Oceanology of the Polish Academy of Sciences in Sopot – since 2018, as its director. He was awarded the title of professor in 2000. He has participated in polar and sea expeditions in the Arctic, including to Canada, Greenland, Spitsbergen and Franz Josef Land. Since the 1990s, he has been part of European teams tasked with marine biodiversity assessment. He has also participated in a 10-year Census of Marine Life programme. His research interests centre on the impact of climate change on marine ecosystems and the relationship between man and nature.





**Principal investigator:**

Dr hab. inż. Magdalena Rowińska-Żyrek  
University of Wrocław

**Project title:**

Antimicrobial peptide – metal interactions –  
understanding the correlation between coordi-  
nation chemistry, structure, thermodynamics  
and mode of action

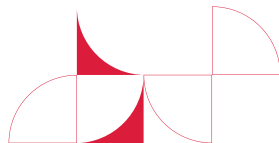
**Funding scheme:**

SONATA BIS 7, announced on 17 March 2014

**Panel:**

ST5

# Antimicrobial peptides – an antidote to drug resistance





Funded under the SONATA BIS call, this project was inspired by the marked rise in drug resistance that we have now seen for more than 30 years. Drugs we have relied on until now are gradually becoming ineffective as pathogenic bacteria and fungi develop specific defence mechanisms that make them drug-resistant.

Antimicrobial peptides (AMP) now offer a glimmer of hope in our struggle against such drug-resistant pathogens. AMPs are small molecules that form part of the innate immune response of all living organisms. Different AMPs can combat fungi, bacteria, viruses, protozoans and even cancer cells. Bacteria are likely to have been exposed to AMPs for millions of years and yet, except in a handful of species, no widespread resistance to these molecules has been observed. This makes them a potential "treasure trove" for designing antimicrobial drugs.

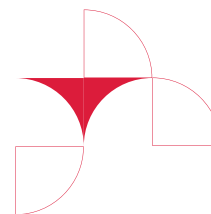
Biologically essential metal ions, such as zinc – Zn(II) and copper – Cu(II), have a dual effect on the activity of antimicrobial peptides: (1) AMPs bind these ions, which means that microbes do not get enough essential metals they need to survive and cause disease (metal-ion capturing) or (2) AMPs require specific metal ions to reinforce their antimicrobial action. The project studied the thermodynamics, structure and coordination chemistry of a number of AMPs with zinc and copper ions and compared these data with their antimicrobial action to determine the correlation between the structure of metal-peptide complexes and their stability, mode of action and efficacy. In cooperation with a group headed by Dr Agnieszka Matera-Witkiewicz from the

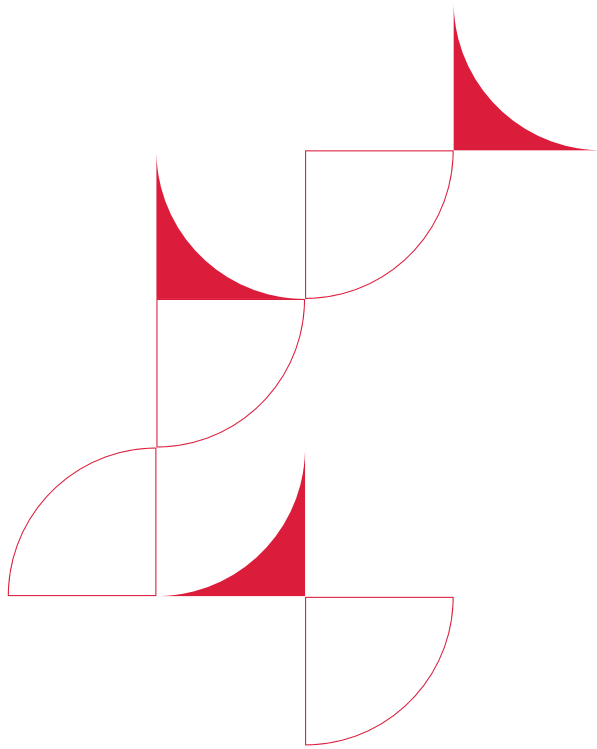
Medical University of Wrocław, we selected the most effective AMP-metal complexes, i.e. calcitermin (isolated from human airways) and piscidins (isolated from fish), to design new antimicrobial peptides and metal-peptide complexes with a higher antimicrobial effect.

These newly designed AMP complexes will be combined with a fragment of the Pra1 zincophore, a protein secreted by *Candida albicans*, which binds the Zn(II) ions essential for the fungus and delivers them to their specific receptor, the transmembrane zinc transporter (Zrt1). This interaction was described within the framework of an earlier SONATA project ["Zrozumienie oddziaływań cynku z cynkoforami i transporterami Zn(II) w grzybowych patogenach" ["Understanding zinc interactions with zincophores and Zn(II) transporters in fungal pathogens"]] in cooperation with Professor Duncan Wilson from the University of Exeter. We demonstrated that even the short C-terminal region of the zincophore, which consists of just 29 amino acids, effectively binds zinc ions and is selectively recognized by the fungus. Such a highly selective targeting molecule can be successfully combined with antifungal drugs, selected from among those commonly used in clinical practice or, in the case of drug-resistant infections, antifungal agents based on one of the antimicrobial peptides we are currently working on.

## Dr hab. inż. Magdalena Rowińska-Żyrek

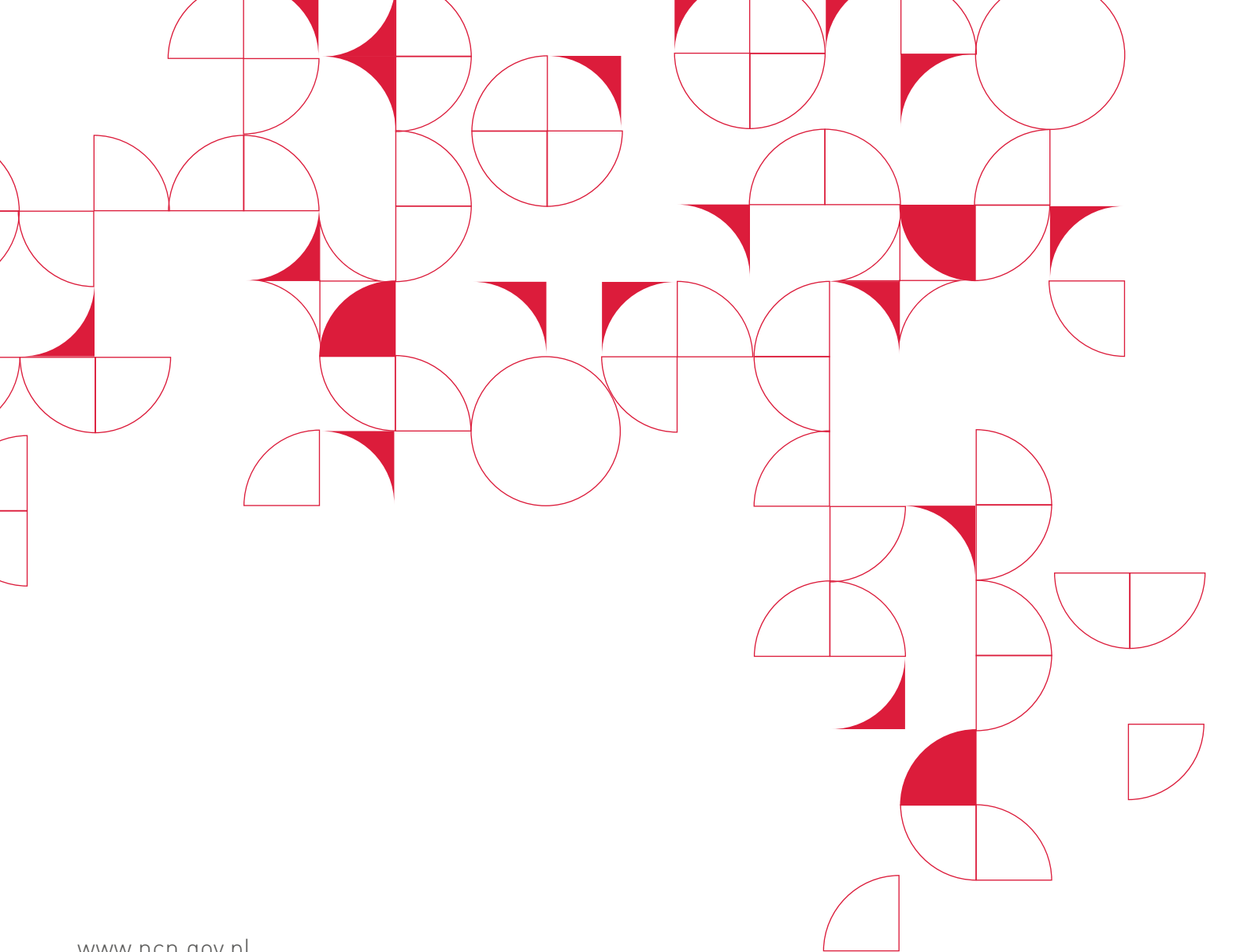
Earned an MSc in biotechnology and physics (2008) and a PhD (2011) and habilitation degree (2018) in chemical sciences. Author of more than 70 publications. Graduate of the Wrocław University of Science and Technology and École Normale Supérieure de Cachan. Between 2012 and 2015, she worked at the University of Zurich. Currently, she heads a team at the University of Wrocław that tries to decipher the secrets of antimicrobial peptides (a promising alternative to traditional antibiotic therapies) and zincophores (molecules that guide these therapeutics to selected bacteria and fungi).







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