**Registration form for Polish scientific institution**

1. **Research institution data** (name and address):
Faculty of Mathematics, Informatics and Mechanics
University of Warsaw
Krakowskie Przedmiescie 26/28
00-927 Warszawa.

2. **Type of research institution:**
1. Basic organisational unit of higher education institution

3. **Head of the institution:**
dr hab. Maciej Duszczyk - Vice-Rector for Research and International Relations

4. **Contact information of designated person(s) for applicants and NCN**
(first and last name, position, e-mail address, phone number, correspondence address):
Prof. dr hab. Anna Gambin,
Deputy dean of research and international cooperation,
Faculty of Mathematics, Informatics and Mechanics,
Banacha 2 02-097 Warsaw, +48 22 55 44 212,
A.Gambin@mimuw.edu.pl

5. **Science discipline in which strong international position of the institution ensures establishing a Dioscuri Centre** (select one out of 25 listed disciplines):
Natural Sciences and Technology disciplines:

   1) Mathematics

6. **Description of important research achievements from the selected discipline from the last 5 years including list of the most important publications, patents, other**
(up to one page in A4 format):

**The institution and its faculty.** UW is the leading Polish department of mathematics and one of the islands of excellence on the map of Polish science. Our strength arises not only from
past achievements, but also from on-going scientific activities that attract new generations of young mathematicians from the whole of Poland. The following is a non-exhaustive list of important results published no earlier than 2016 obtained by mathematicians from MIM UW. Research articles based on these results have appeared or will appear in, among other venues, *Ann. of Math., Invent. Math., J. Eur. Math. Soc., Duke Math. J., Arch. Ration. Mech. Anal., Adv. Math., Comm. Math. Phys., Geom. Topol., J. Mach. Learn. Res.* Employees of MIM UW have also recently published in e.g. *IMRN, J. Math. Pures Appl., J. Algebraic Geom., J. Diff. Equations, J. Funct. Anal., Proc. Lond. Math. Soc., Trans. Amer. Math. Soc., Found. Comput. Math., Geom. Funct. Anal., Comm Pure Appl. Math.*
**Probability.** R. Latała and his collaborators solved an open problem concerning bounds on the expected value of operator norms of random matrices with independent non-identically distributed Gaussian entries. W. Bednorz and a collaborator gave a positive answer to the 25-year old question of S. Kwapien whether so-called superstable domination is inherited by sums of independent symmetric random vectors.
**Dynamical systems, analysis.** R. Pol and a collaborator solved a problem of Talagrand,

stated in 1985, concerning separately continuous bivariate functions with no points of continuity. In joint work with E. Strózyna (TU Warsaw), H. Zoładek classified plane vector field singularities with a nilpotent linear part. This solves a problem stemming from a paper of Takens from 1974. In joint work with P. Hajłasz (Pittsburgh), P. Goldstein constructed a measure and orientation preserving homeomorphism of the n-dimensional cube with approximate Jacobian equal to - 1 almost everywhere.

**Algebraic geometry, topology, algebra.** A. Langer proved *Bogomolov's inequality* for Higgs bundles in positive characteristic, which implies a conjecture stated by Shepherd-Barron in 1989. M. Donten-Bury, J. Wisniewski and their collaborators used a special 4-dimensional Hyperk¨ahler manifold to answer a question on incident planes in 5-dimensional space dating back to 1930. M. Krupski and W. Marciszewski constructed a metrizable space over which the space of real-valued functions is not homeomorphic to its own square, solving a *problem of Arhangelskii* from the 1980's. J. Okninski and his collaborators answered a series
of questions on the solutions of the *Yang-Baxter equation* posed by T. Gateva-Ivanova and P. Cameron. M. Borodzik and a collaborator generalized an algorithm of Rudolph in order to prove that every link is topologically concordant to a strongly quasipositive link.

**PDEs, numerical analysis.** P. Mucha and R. Danchin have proved basic mathematical results for the incompressible Navier-Stokes system in vacuum which solved an open problem posed by Field medal winner P.L. Lions. I. Chlebicka and A. Zatorska-Goldstein in the series of papers gave substantial contribution to rapidly developing theory of solutions to parabolic equations in Musielak-Orlicz spaces. A.G. Werschulz and H. Wozniakowski studied the worst case complexity and the tractability of a second-order Neumann problem for elliptic operators, finding necessary and sufficient conditions to exhibit a given degree of tractability and thus filling a gap in the existing theory.


7. **List of no more than 3 important research projects from the selected discipline awarded in national and international calls to the institution in the last 5 years**
(title, name of PI, source of funding, amount of funding):
_ *Algebraic Geometry: Varieties and Structures*,
PI: prof. Jarosław Wisniewski,
National Science Centre Project MAESTRO,
budget: 2.237.920 PLN
_ *Estimates of random vectors and processes*,
PI: prof. Rafał Latała,
National Science Centre Project MAESTRO,
budget: 1.513.800 PLN
_ *Effectiveness of infection control strategies against intra- and inter- hospital transmission of multidrug-resistant Enterobacteriaceae – insights from a multi-level mathematical Network model*,
PI: dr hab. Monika Piotrowska,
JPI-EC-AMR project,
budget: 1.047.068 PLN


8. **Description of the available laboratory and office space for Dioscuri Centre** (up to one page in A4 format):
The unique location of Faculty of Mathematics, Informatics and Mechanics of the University of Warsaw at the Ochota campus surrounded by the departments of Physics, Chemistry, Biology, and several excellent institutes of Polish Academy of Sciences, fosters fruitful interdisciplinary

cooperation. Computational resources allocated for Dioscuri Centre comprise
air conditioned server rooms as well as computer laboratory with number of PCs. Overall
surface is around 70 square meters. Office space allocated for Dioscuri Centre consists of:
3 single person office rooms (12 square meters each),
2 double office rooms (20 square meters each),
1 office room for Phd students (40 square meters),
1 administrative office
and other necessary facilities.

9. **List of the available scientific equipment for Dioscuri Centre:**
The computing infrastructure of the Faculty of Mathematics, Informatics and Mechanics of
the University of Warsaw includes servers with sufficiently high power to allocate resources
for all research groups created within the framework of Dioscuri Call.
To renew and maintain the infrastructure we use funds from a number of other projects
carried out at the Faculty.

10. **List of the additional benefits that the Institution declares to provide for Dioscuri
Centre** (i.e.: additional funds, personal benefits, other) (up to one in page A4 format):
Additional benefits for researchers of Dioscuri Centre include professional service supporting
the research activity. The employees of Research Support Office, Financial Section and
Office
of Institutes provide advice and assistance with the realization of the project.
The extensive support on management of the project covers all financial and reporting issues,
as well as the organization of small and medium-size scientific meetings.
MIM UW department collaborates with the University's technology transfer office that are
responsible for assisting researchers to protect and commercialise their Intellectual Property
potentially resulted from the research activity of Dioscuri Centre.
Moreover, additional funding will be provided by Dean of MIM UW to support small
scientific
meetings, workshops and individual research visits organized by Dioscuri Centre. MIM UW
department have an excellent pool of undergraduate and graduate students (each year 50-60
laureates of Mathematics and Computer Science Olympiad choose to study here).
Last but not least, the researchers of Dioscuri Centre are eligible to use the University Sports
Centre located on Banacha Street. The extensive facilities include: competition-standard
swimming pool and climbing wall.

11. **Other information about internationalization of the scientific institution, foreign
scientists employed at the institution, availability of the English language
seminars etc.** (up to one page in A4 format): Employees of the department are involved
in top-level mathematical research, which by its very nature takes place in an international
community. Mathematicians from MIM UW have hundreds of collaborators from around
the world, regularly publish their work in internationally recognized journals (including such
leading journals as *the Annals of Mathematics* and *Inventiones Mathematicae*), and are
frequently
invited as speakers to major international conferences.
Some long-term members of the faculty are foreign-born (J. Noble, B. Warhurst). Many more
mathematicians from outside of Poland come to MIM UW as postdoctoral researchers. In
recent years, support for postdoctoral positions has come mostly from the *Warsaw Centre of
Mathematics and Computer Science* (WCMCS, www.wcmcs.edu.pl, a consortium consisting
of MIM UW and the Institute of Mathematics of the Polish Academy of Science), which in

the years 2012-2017 had the status of a National Scientific Leadership Centre along with associated funding. Other sources of support have included ERCIM (the *European Research Consortium for Informatics and Mathematics*, www.ercim.eu) and individual grants, such as J. Wisniewski's Maestro project in algebraic geometry. Overall, in the last 5 years over 20 mathematicians from more than 10 countries (not including Poland) have visited MIM UW as postdocs. On the other hand, young members of the faculty are expected to spend some time on postdoctoral stays in internationally recognized research centres.

Mathematicians from MIM UW also actively involved in the organization of international conferences. In a typical year, employees of the department are among the organizers of a double

digit number of large and medium-sized mathematical conferences, all with a significant international presence, and many more small meetings and workshops. In recent years, the number of such small events and of individual research visits to Warsaw was exceptionally high thanks to the additional funding provided by WCMCS.

Many mathematicians employed at the department are holders of grants intended to support cooperation with research groups from specific institutions outside of the country. This includes for instance numerous *Harmonia* grants funded by the National Science Centre and a *Central* grant (funded by the German Academic Exchange Service DAAD) involving MIM UW along with institutions from Germany, Austria and the Czech Republic. Employees of MIM UW have also taken advantage of the *Polish-French cooperation programme Polonium* and the *Polish-Italian programme Canaletto*. In 2015, Adrian Langer was the winner of the *Szolem Mandelbrojt* prize contest organized by the French Institute in Poland and the French embassy. The prize comes with a scholarship intended to support a one-month research visit to a selected research group in France.

Essentially all graduate-level courses at the department are offered in English. Many research seminars have foreign participants and are held in English on a regular basis, while all the others can be held in English whenever there is a non-Polish speaking participant.