Registration form

This is a registration form for Host Institutions wanting to establish a Dioscuri Centre of Scientific Excellence within Dioscuri 4 call.

Registration form for Polish research institution

1. Research institution data (name and address):

Jagiellonian University in Cracow
ul. Gołębia 24, 31-007 Kraków
Faculty of Mathematics and Computer Science
ul. Prof. S. Łojasiewicza 6, 30-348 Kraków

2. Type of research institution[1] (select one from the 9 listed options):

   1) higher education institution
   2) federation of higher education institutions established on the territory of Poland
   3) research unit of the Polish Academy of Sciences
   4) research institute
   5) international research institute
   6) Lukasiewicz Centre
   7) Institute of Lukasiewicz Centre
   8) The Polish Academy of Arts and Sciences
   9) other units which carry out independently and continuously mainly research activity

3. Head of the institution: Vice-Rector for Research, Prof. dr hab. Piotr Kuśtrowski
4. Contact information of designated person(s) for applicants and the NCN: first and last name, position, e-mail address, phone number, correspondence address:

Prof. dr hab. Włodzimierz Zwonek,
position: Dean of the JU Faculty of Mathematics and Computer Science,
e-mail address: Wlodzimierz.Zwonek@uj.edu.pl, matinf@uj.edu.pl
phone number: 12 664 6630, 12 664 6629

[1] As specified in "Addressees of the call"

correspondence address: ul. Prof. S. Łojasiewicza 6, 30-348 Kraków

5. Research discipline in which the strong international position of the institution ensures establishing a Dioscuri Centre (select one from the 25 listed disciplines):

Natural Sciences and Technology ☐ **Mathematics** ☐ Fundamental constituents of matter ☐ Condensed matter physics ☐ Chemistry ☐ Materials ☐ Computer science and informatics ☐ Systems and communication engineering ☐ Production and processes engineering ☐ Astronomy and space research ☐ Earth sciences
Life Sciences ☐ Molecular biology, structural biology, biotechnology ☐ Genetics, genomics ☐ Cellular and developmental biology ☐ Biology of tissues, organs and organisms ☐ Human and animal non-infectious diseases ☐ Human and animal immunology and infection ☐ Diagnostic tools, therapies and public health ☐ Evolutionary and environmental biology ☐ Applied life sciences and biotechnology
Arts, Humanities and Social Sciences

☐ Fundamental questions of human existence and the nature of reality

☐ Culture

☐ The study of the human past

☐ Individuals, institutions, markets

☐ Norms and governance

☐ Human nature and human society

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

- Marian Aprodu, Gavril Farkas, Stefan Papadima, Claudiu Raicu, Jerzy Weyman, *Koszul modules and Green's conjecture*, Inventiones Math. Vol. 218 (2019), 657-720.
- Jacek Bochnak, János Kollár, Wojciech Kucharz, *Checking real analyticity on surfaces*, J. Math. Pure Appl. vol. 133 (2020), 167-171.
- Przemysław Spurek, Sebastian Winczowski, Jacek Tabor, Maciej Zamorski, Maciej Zięba, Tomasz Trzciński *Hypernetwork approach to generating point clouds Przemysław* International Conference on Machine Learning (ICML) 9099--9108 (2020).
- Sławomir Dinew, Sławomir Kołodziej, *Liouville and Calabi-Yau type theorems for complex Hessian equations*, Am J. Math. Vol. 139 (2017), 403–415.
- Atanas Iliev, Grzegorz Kapustka, Michał Kapustka, Kristian Ranestad, *EPW cubes*, J Reine Angew. Math., vol 748 (2019) 241-268.
- Marian Mrozek, *Conley-Morse-Forman theory for combinatorial multivector fields on Lefschetz complexes*, Found. Comput. Math. Vol. 17 (2017), 1585–1633.
- Śmieja, M., Struski, Ł., Tabor, J., Zieliński, B., Spurek, P., *Processing of missing data by neural networks*, Advances in Neural Information Processing Systems 32, 2018.
- Bilski, M., Parusiński, A., Rond, G., *Local topological algebraicity of analytic function germs,* J. Algebraic Geom. 26 (2017), no. 1, 177–197.

Asymmetric numeral systems (ANS) – entropy coding methods introduced by Jarosław Duda are used, among others, by the Facebook Zstandard compressor, Apple LZFSE compressor, Google Draco 3D compressor, DNA CRAM 3.0 compressor of SAMtools utilities and are being considered for use in the AV1 open video coding format. Recently, they were applied by Google to JPEG XL (it will replace standard JPEG). Adaptation of ANS is actively supported by dr Duda (among others by cooperation between the JU and Huawei). ANS was chosen by ,,Rzeczpospolita'' to be one of the most important achievements in 2020: (https://www.rp.pl/Spoleczenstwo/210119906-Dziesiec-niezwykle-istotnych-osiagniec-naukowych-2020-roku.html)

Most important prizes:

- Six Maestro grants (NCN) held at the Department of Mathematics of Jagiellonian University during last five years (Principal Investigators: J. Weyman, P. Zgliczyński, M. Mrozek, P. Idziak, S. Kołodziej, S. Migórski); total amount of funding: PLN 11 120 306 (approx. EUR 3 200 000).
- W. Kucharz, Mikołaj Kopernik Price (awarded by PAU), 2020.
- F.H. Szafraniec, Béla Szőkefalvi-Nagy Medal, 2020.
- S. Kołodziej, Stefan Bergman Prize, 2016. The most important international prize in complex analysis, awarded by the American Mathematical Society.
- W. Kucharz, an invited speaker at the International Congress in Mathematics in Rio de Janeiro (Brasil) in 2018.
- W. Kucharz, Banach Prize, 2018.
- P. Zgliczyński, Hugo Steinhaus Prize, 2017.
- S. Dinew, Szolem Mandelbrojt Prize, 2017.
- Szymusiak, the International Stefan Banach Prize for a Doctoral Dissertation in the Mathematical Sciences, 2017.

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):

- *Nonsmooth Contact Dynamics,* Stanisław Migórski, Project ID: 823731, funded under: H2020, MSCA-RISE-2018, EU contribution: EUR 644 000.
- *Sztuczne sieci neuronowe inspirowane biologicznie* (*Biologically inspired artificial neural networks*), Jacek Tabor, Foundation for Polish Science, TEAM-NET 1/4.4/2018, amount of funding: PLN 19 701 875 (approx. EUR 5 000 000), 2019-2023
- *Applications of Lie algebras to Commutative Algebra,* Jerzy Weyman, Polish Returns, Polish National Agency for Academic Exchange, PLN 2 000 000 (approx. EUR 450 000), 2019-2023

8. Description of the available laboratory and office space for the Dioscuri Centre (*up to one page in A4 format*):

   The Department of Mathematics and Computer Science is located in a modern building (constructed in 2008) in the new science campus of the Jagiellonian University. The building is fully equipped with all the modern infrastructure and has a sizeable library.

   The total area of the building is 19 551 m^2, which allows for very ample office space to be available for use of the newly established Dioscuri Centre. The building has a number of large lecture rooms (up to 248 people) as well as many smaller seminar rooms equipped with computers and video projectors. The department also has a computational grid that is freely available to the faculty. Faculty members have access to a wide range of scientific journals and databases including, e.g., Mathscinet and Zentralblatt.

   The building is located about 4 km from the historical centre of Kraków and 13 km from a major international airport. The site is easily accessible by public transportation, including a fast tram network.

9. List of the available research equipment for the Dioscuri Centre:

   The department has a computational server with 224 cores and 6TB RAM and GPU-accelerated server Nvidia DGX-1 with 16 Tesla V100 GPU cards that are freely available to the faculty and students.

   Furthermore, the Academic Computing Centre Cyfronet is also located in Kraków. Cyfronet is the largest supercomputing and networking centre in Poland and is an administrator of the Prometheus supercomputer. Prometheus has 2,4 Pflops of theoretical performance and was recently (19th of June, 2020) listed as the 71th fastest supercomputer in the world. According to Cyfronet's regulations, the computing resources of the centre are available principally to scientific institutions located in Kraków.

10. List of the additional benefits (other than listed in call text) that the Institution declares to provide for the Dioscuri Centre (i.e.: additional funds, personal benefits, other) (*up to one page in A4 format*):

    Jagiellonian University owns several residential buildings at prestigious locations in the centre of Kraków. For the first several months of his or her stay in Kraków, one of those apartments will be provided for the Dioscuri Centre leader free of charge.

Jagiellonian University offers its employees a rich social benefits program. Many cultural and sports events are available to the employees free of charge or at reduced prices, including:

- Access to the JU kindergarten and nursery (located at the university campus),
- JU resort hotel rooms (Zakopane, Rabka, Ustroń k. Wisły),
- Language courses at the Jagiellonian Language Centre,
- Paid holidays and extra holiday benefits,
- Access to the Multisport programme (50% cost coverage by the JU),
- Trips organized by the JU.

Jagiellonian University also offers administrative support. This includes:

- Project Centre (CAWP) - provides information concerning current research grant opportunities as well as formal support in preparing grant applications
- Welcome Centre – provides help in all practical and formal matters related to your arrival in Poland,
- Technology Transfer Centre (CITTRU) – offers support in all matters concerning Intellectual Property Rights (IPR).

11. Other information about the internationalisation of the research institution, international researchers employed at the institution, the availability of English language seminars etc. (*up to one page in A4 format*):

The Department of Mathematics and Computer Science cooperates closely with many institutions outside of Poland and offers teaching in both Polish and English. Currently 10 foreigners are employed in the department. 12 faculty members have obtained their PhD at a foreign scientific institution; another 4 faculty members have obtained their habilitation degree at a foreign scientific institution.

Courses at the Institute of Mathematics are offered both in Polish and in English (mostly in Polish for 1st-3rd year students; both in English and in Polish for Master and PhD students). There is over a dozen of research seminars in mathematics --- some of them are very international (e.g. seminars in Algebra, Dynamical Systems, and two seminars in Complex Analysis); all others are run in English unless everyone present happens to be a native Polish speaker.

The department is actively involved in the Strategic Program Excellence Initiative that has been realized since 2020. It participates in three Priority Research Areas (Anthropocene, DigiWorld and SciMat), which focus on research and teaching quality. This framework allowed us to open recently several positions for outstanding experienced researches and postdocs from abroad; furthermore, many researches at various stages of

development (from senior students, through doctoral students, young scientists, to professors) have been supported with mini-grants.

Jagiellonian University is also a co-beneficiary (besides Masaryk University in Brno and the University of Warwick) of the ERC Consolidator Grant *Large discrete structure*, PI: Daniel Kráľ, Project ID: 648509, funded under: H2020, EU contribution total EUR 1 386 859.

The institute also organises the **S. Łojasiewicz Lecture,** an annual event held at the Institute of Mathematics since 2010. The speakers were: S.-T. Yau (a Fields medallist), R. Hamilton, B. Malgrange, N. Trudinger, F. Costa, N. Alon, A. Avila (a Fields medallist), and Luis A. Caffarelli.