Registration Form - declaration of willingness for establishing interdisciplinary Dioscuri Centres of Scientific Excellence

This is a registration form for Host Institutions wanting to establish an interdisciplinary Dioscuri Centre of Scientific Excellence within Dioscuri 5 call.

Registration form for Polish research institution

1. Research institution data (name and address):

   Jagiellonian University, ul. Gołębia 24, 31-007 Kraków

   Jagiellonian Center for Artificial Intelligence

2. Type of research institution[1]:

   higher education institutions

3. Head of the Institution: prof. dr hab. Wojciech Macyk, Vice-Rector for Research

4. Contact information of designated person(s) for applicants and the NCN:

   dr hab. Bartosz Zieliński, Director of Jagiellonian Center for Artificial Intelligence, head.ai@uj.edu.pl, 500733057, ul. Łojasiewicza 6, 30-348 Kraków, Poland

5. Research disciplines in which the institution ensures establishing of an interdisciplinary Dioscuri Centre (select two (and if necessary three) of the domains that should be combined; select two (or if necessary three) from the 25 listed auxiliary panels of disciplines). Provide two (and if necessary three) specific NCN subpanels according to the list[2].

NZ7_01: Medical imaging for prevention, diagnosis and monitoring of diseases

NZ7_14: Digital medicine, e-medicine, medical applications of artificial intelligence

[2] Lists of the disciplines for each auxiliary panel of disciplines to be found here: https://www.ncn.gov.pl/en/finansowanie-nauki/panele-ncn

ST6_07: Artificial intelligence, intelligent systems, multi-agent system

☐ **DOMAIN: Humanities, Social Sciences and Art Sciences** [3]

☐ Fundamental questions about human existence and the nature of reality

☐ Culture and cultural production

☐ The study of the human past

☐ Institutions, markets, space

☐ Law and political science

☐ Human nature and human society

☒ **DOMAIN: Life Sciences**[4]

☐ Molecules of Life: Biological Mechanisms, Structures and Functions

☐ Integrative Biology: from Genes and Genomes to Systems

☐ Cellular, Developmental and Regenerative Biology

☐ Physiology in Health, Disease and Ageing

☐ Neuroscience and Disorders of the Nervous System

☐ Immunity, Infection and Immunotherapy

☒ Prevention, Diagnosis and Treatment of Human Diseases

☐ Environmental Biology, Ecology and Evolution

☐ Biotechnology and Biosystems Engineering

[3] Lists of the disciplines for each auxiliary panel of disciplines to be found here: https://www.ncn.gov.pl/en/finansowanie-nauki/panele-ncn

[4] Lists of the disciplines for each auxiliary panel of disciplines to be found here: https://www.ncn.gov.pl/en/finansowanie-nauki/panele-ncn

☒ **DOMAIN: Physical Sciences and Engineering**[5]

☐ Mathematics

☐ Fundamental constituents of matter

☐ Condensed matter physics

☐ Chemistry

☐ Synthetic Chemistry and Materials Science

☒ Computer science and informatics

☐ Systems Engineering

☐ Production and processes engineering

☐ Earth sciences

☐ Materials Engineering

6. Description of important research achievements from the selected disciplines from the last 5 years including a list of the most important publications, data bases, series of workshops, patents, policy briefs, field work/ field site, exhibitions, other:

Research at the Jagiellonian Center for Artificial Intelligence (JCAI) focuses on developing and applying advanced AI methods in life sciences and medicine, with particular emphasis on multimodal learning, interpretability, and generative models. Over the past five years, this work has been supported by competitive projects funded by NCN, FNP, NCBR, and EU programmes, addressing key challenges in biomedical AI.

Key research directions include AI-driven medical image analysis for segmentation, diagnostic support, and method benchmarking on complex clinical data such as MRI, CT, X-ray, and ultrasound, with applications in oncology, cardiology, and other medical domains. Another important direction is interpretable and trustworthy machine learning, including prototype-based reasoning, counterfactual explanations, uncertainty quantification, and methods that improve the transparency and reliability of deep neural networks in high-stakes applications. A further strand focuses on computational approaches to drug discovery and molecular modelling, including generative models for chemical

[5] Lists of the disciplines for each auxiliary panel of disciplines to be found here: https://www.ncn.gov.pl/en/finansowanie-nauki/panele-ncn

space exploration, graph-based molecular representations, and learning methods that support protein function and structure analysis. Additional work addresses efficient and adaptive learning systems, such as continual learning, meta-learning, hypernetwork-based models, and sparsity-driven architectures, as well as methods for 3D representation and reconstruction of visual and biomedical data.

These activities are reflected in an extensive publication record in top-tier venues, including A* conferences such as NeurIPS, ICML, ICLR, CVPR, ICCV, ECCV, AAAI, MICCAI, and IJCAI, as well as leading Web of Science-indexed journals, including *Nature Communications*, *PLOS Computational Biology*, *Information Sciences*, *Knowledge-Based Systems*, *Neurocomputing*, *Medical Image Analysis*, and *IEEE Transactions on Medical Imaging*. This body of work demonstrates both methodological depth and sustained international impact.

Current projects and achievements of the group are presented at: https://gmum.net/

7. List of no more than 4 important research projects from the selected disciplines awarded in national and international calls to the institution in the last 5 years (title, name of PI, source of funding, amount of funding):

I. Biologically Inspired Artificial Neural Networks (BioNN)
Name of PI: Jacek Tabor
Funding source: Foundation for Polish Science (FNP), Team-Net
Amount: PLN 19,701,875

The project develops novel neural network architectures inspired by biological systems. It combines insights from neuroscience with modern deep learning to improve AI model robustness, efficiency, and interpretability, with applications in computer vision, generative modelling, and biomedical data analysis.

II. Effective rendering of 3D objects using Gaussian Splatting in an Augmented Reality environment
Name of PI: Przemysław Spurek
Funding source: Foundation for Polish Science (FNP), First Team
Amount: PLN 3,129,800

This project develops scalable, efficient methods for photorealistic 3D content generation using Gaussian Splatting. The research targets applications in virtual, augmented, and mixed reality (VR, AR, and MR), with an emphasis on adaptive, controllable representations for real-time rendering and interaction.

III. Interpretable and Interactive Multimodal Retrieval in Drug Discovery
Name of PI: Bartosz Zieliński
Funding source: Foundation for Polish Science (FNP), First Team
Amount: PLN 3,900,600

The project aims to develop explainable AI methods to support drug discovery. It combines multimodal data (e.g., cellular imaging and chemical information) with interactive machine learning systems, enabling researchers to explore, interpret, and optimize experimental outcomes transparently and efficiently.

IV. COeXISTENCE: Playing urban mobility games with intelligent machines. Framework to discover and mitigate human-machine conflicts
Name of PI: Rafał Kucharski
Funding source: European Research Council (ERC), Starting Grant
Amount: EUR 1,494,405

This project explores how humans and autonomous systems can coexist in urban mobility, with a focus on interactions between human drivers and autonomous vehicles. It develops multi-agent reinforcement learning frameworks and large-scale simulation environments to model and mitigate conflicts in real-world transportation systems.

8. Description of the available office space, working space, laboratory for the Dioscuri Centre:

The Jagiellonian University (UJ) in Kraków offers extensive, modern research infrastructure across several campuses, including the Third Campus (Campus of the 600th Anniversary of the Renewal of the Jagiellonian University), which hosts numerous faculties and interdisciplinary research centres, and the Medical College (Collegium Medicum) in the Prokocim district. Together, these sites create a comprehensive academic environment that supports both fundamental and applied research in science, engineering, and life sciences.

The Third Campus is a major hub for scientific research, bringing together institutes in physics, chemistry, biology, and computer science. It offers modern office space, lecture and seminar rooms, shared research infrastructure, and access to a large scientific library and centralised university services. The campus is designed to foster interdisciplinary collaboration among computational, experimental, and applied research groups.

The Collegium Medicum campus provides access to advanced clinical and medical research infrastructure, including collaborations with university hospitals and medical units, enabling translational research in areas such as medical imaging and computational medicine.

Campuses are well located within Kraków, approximately 4 km from the historic city centre and around 13 km from the international airport. They are well connected by public transportation, including a fast tram network, ensuring convenient access for staff and international collaborators.

The Jagiellonian Center for Artificial Intelligence (JCAI) will provide dedicated office and working space for the Dioscuri Centre, along with administrative and technical support, high-performance computing resources, and assistance in accessing existing laboratory infrastructure across UJ units. JCAI will also facilitate collaboration with other faculties and research groups, enabling access to specialised equipment and experimental facilities.

Overall, the combination of UJ's research campuses, strong biomedical and computational infrastructure, central location, and institutional support from JCAI ensures an excellent environment for the development of the Dioscuri Centre.

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

The research equipment available to the Dioscuri Centre will be provided primarily through the Jagiellonian Center for Artificial Intelligence (JCAI), complemented by national and European high-performance computing infrastructures and access to selected laboratory facilities across the Jagiellonian University.

JCAI will provide access to a comprehensive high-performance computing (HPC) environment designed for advanced artificial intelligence and data-intensive research. This includes enterprise-grade GPU computing systems based on modern NVIDIA architectures (H100 and A100), as well as additional multi-GPU servers equipped with high-performance NVIDIA RTX-class GPUs. The infrastructure is supported by high-speed interconnects (e.g., NVLink/NVSwitch), scalable storage systems for large datasets (including medical imaging and molecular data), and containerized computing environments ensuring reproducibility and efficient resource utilization.

In addition, JCAI will provide access to national and international HPC infrastructures trough PLGrid consortium, enabling access to distributed supercomputing clusters across Poland for large-scale scientific computations. Furthermore, the University is a consortium partner in the European Gaia AI Factory initiative, which will provide access to cutting-edge AI infrastructure and cloud-scale computational resources dedicated to advanced AI research and innovation.

Beyond computational resources, JCAI will assist in accessing existing laboratory infrastructure across the Jagiellonian University. This includes facilitating collaboration and access to biomedical and clinical research equipment operated within university hospitals and associated research units. Examples include advanced medical imaging systems such as MRI, CT, PET, and high-resolution ultrasound scanners used in research on diagnosis, prevention, and treatment of human diseases, particularly in oncology, cardiology, and neurology. Additional available infrastructure includes laboratory facilities for histopathology, molecular

and cellular biology, and biomedical data acquisition used in translational and clinical research.

Overall, the combination of JCAI-provided HPC systems, PLGrid national computing resources, access to the Gaia AI Factory ecosystem, and facilitated access to biomedical laboratory infrastructure across the Jagiellonian University provides a comprehensive and competitive research environment for the Dioscuri Centre.

10. List of the additional benefits (other than listed in invitation call) that the Institution declares to provide for the Dioscuri Centre (i.e.: additional funds, personal benefits, other):

Jagiellonian Center for Artificial Intelligence (JCAI) will provide a comprehensive package of institutional support designed to facilitate the establishment, integration, and long-term success of the Dioscuri Centre and its leader.

In terms of relocation and housing support, the University owns several residential buildings located in prestigious areas in the centre of Kraków. To reduce relocation barriers and enable immediate engagement in research activities, the University will consider providing the Dioscuri Centre leader with access to a fully equipped apartment during the initial period of their stay.

The Jagiellonian University also offers an extensive social benefits programme aimed at enhancing work–life balance and overall well-being. Employees have access to a wide range of cultural, recreational, and family-oriented services. These may include access to university-operated kindergarten and nursery facilities located on the campus. Additionally, the University provides preferential access to university-owned resort facilities in Zakopane, Rabka, and Ustroń, allowing for rest in prominent Polish leisure destinations.

Integration into the local environment is further supported through language courses at the Jagiellonian Language Centre. The University also encourages participation in the Multisport programme with partial cost coverage by the institution, alongside access to various cultural and sports events, organized trips, and social activities. These measures are designed to foster a sense of community and support the personal well-being of the international research team.

On an administrative and organizational level, the University provides structured assistance through dedicated units. The Research Support Centre (CWN) offers comprehensive guidance on national and international funding opportunities and hands-on support in grant management. The Welcome Centre assists international researchers and their families with relocation-related formalities, including legal and practical aspects of living in Poland. Furthermore, the Technology Transfer Centre (CITTRU) provides expertise in intellectual property management and collaboration with industry partners.

In conclusion, the Dioscuri Centre will benefit from the University's well-established institutional framework for international collaboration and research dissemination. This integrated support ecosystem ensures that the Centre leader and their team can focus on high-impact scientific work while relying on professional administrative and organizational backing.

11. Other information about the internationalisation of the research institution e.g. international environment (international researchers community at the institution, internationalization of the management and administration), didactic in English, availability of Polish course for Foreigners etc.:

The Jagiellonian University (UJ) in Kraków is Poland's oldest and most prestigious academic institution, comprising 16 faculties where 4,000 academic staff educate approximately 40,000 students across 87 fields of study. With over 3,800 international students and 100 foreign staff members, the global reach of UJ is consistently recognized in major international rankings.

The university actively supports foreign nationals throughout their academic careers. Since 2024, UJ has operated as a EURAXESS Centre, providing international researchers and their families with essential relocation and administrative assistance. Furthermore, the Centre for Polish Language and Culture offers semester-based courses for international scholars, while the International Students Office provides comprehensive support for all incoming students and researchers. With around thirty-degree programs taught entirely in English, the university ensures that the global community can fully engage in academic life without language barriers. UJ is also a long-standing member of the Utrecht Network, promoting international mobility and joint degree programs across 26 countries, as well as, Una Europa, an alliance of leading European research universities committed to building a shared European university of the future.

The Jagiellonian Centre for Artificial Intelligence (JCAI) thrives within this international environment, maintaining an extensive network of collaborations with leading global institutions. Active joint research is conducted with partners such as the University of Oxford, Imperial College London, TU Berlin, and the Mila – Quebec AI Institute. On the industry side, JCAI collaborates with global leaders including Philips Healthcare, Johnson & Johnson, and AstraZeneca.

This extensive breadth of cooperation establishes JCAI as a genuinely global research hub, deeply embedded within one of Central Europe's most internationally oriented universities.