NCP Digital and Industrial Technologies
German National Contact Point for Horizon Europe

Partner Offer

Date of Submission: 28.01.2026

We are… ☒ **offering ourselves as partners** ☐ **looking for a partner to join our consortium**

Horizon Europe Call Topic

(Title or topic ID)

HORIZON-CL4-2026-DIGITAL-EMERGING-18: Large-Scale Photonic Quantum Computing Platform Technologies (RIA) or others by agreement

Description of your expertise / the expertise you are looking for

(up to 1000 characters)

SDU University is a leading Kazakhstani university with strong and internationally recognised expertise in mathematical modelling, computer science, and applied physics. The university has well-established schools in mathematics and IT, providing advanced competencies in numerical methods, machine learning, data analytics, high-performance computing, and algorithm development. These strengths form the foundation for SDU's contributions to complex interdisciplinary projects, particularly in photonics, quantum technologies, and intelligent sensing systems.

The university maintains an active and diversified research environment supported by competitive grants from the Ministry of Science and Higher Education of the Republic of Kazakhstan. Ongoing projects demonstrate a strong combination of fundamental research and applied innovation across mathematics, computer science, and digital technologies. These include studies in modern algebra and topology, as well as AI-driven initiatives focused on plagiarism detection, authorship attribution, and intelligent digital publishing platforms that strengthen research infrastructure and academic integrity.

A key element of the university's research ecosystem is the AI Research Center of SDU, which advances artificial intelligence through fundamental research, applied development, and education. Its activities address real-world challenges in logistics, education, administration, and intelligent systems. Current research includes reinforcement learning for vehicle routing optimisation, AI-powered student support systems, OCR-based automation for admissions, robotics training programmes, and federated learning approaches for privacy-preserving improvement of large language models.

Together, these grant-funded projects and AI-focused initiatives reflect the university's sustained commitment to research excellence, innovation, ethical digitalisation, and the development of advanced technologies.

Building on this computational and theoretical excellence, SDU develops applied research in semiconductor materials, sensor technologies, photoelectrochemistry, and heterostructure-based devices. The integration of strong modelling capabilities with experimental validation enables SDU to contribute across the full innovation chain—from theory and simulation to prototype development and data processing.

Keywords describing your expertise / the expertise you are looking for

(up to 10 key words)

Machine Learning; Quantum Technologies; Intelligent Sensing Systems; Digital Technologies; Semiconductor Materials; Sensor Technologies; Photoelectrochemistry; Hybrid and Heterostructure-Based Devices; Digital Twins; Prototype Development.

Organisation information

Your organisation:
SDU University

Type of organisation:

- ☐ **Industry (Large)**
- ☐ **Industry (SME)**
- ☒ **University or College**
- ☐ **Research Institute**
- ☐ **Public Body**
- ☐ **Other, please specify:** Klicken oder tippen Sie hier, um Text einzugeben.

Previous participation in an EU project?

- ☒ **No**
- ☐ **Yes, please specify:** Klicken oder tippen Sie hier, um Text einzugeben.

Web page: https://sdu.edu.kz/en/

Description of your organisation or the consortium for which you need a partner:

Description of the Research Team or Group: SDU University is a multidisciplinary academic institution with a strong focus on mathematical modelling, computer science, and applied physical sciences, combining fundamental research with technological innovation and education. SDU brings together a diverse team of researchers specialising in applied mathematics, data science, photonics, semiconductor physics, quantum technologies, and intelligent sensing systems. The university hosts research groups that conduct rigorous theoretical, computational, and experimental studies, including numerical modelling of complex physical processes, machine learning for scientific applications, photonic and quantum system simulation, and development of semiconductor and photoelectrochemical devices. SDU researchers publish in peer-reviewed journals, participate in international conferences, and contribute to national and international research initiatives. A distinctive feature of SDU is the strong integration between mathematics, IT, and physics, enabling interdisciplinary approaches to emerging technologies. The team has experience in: development of mathematical models and algorithms for photonics and quantum systems; data analytics and AI-based optimisation; experimental validation of semiconductor heterostructures; electrochemical and photoelectrochemical sensor design; software development and HPC-supported research. SDU maintains active cooperation with universities and research centres in Europe and Asia and is engaged in national research programmes in energy, digitalisation, and advanced materials. The university is going to provide modern laboratory infrastructure for materials synthesis and characterisation, optical and electrochemical measurements, and computational facilities for modelling and simulation. The research staff work collaboratively across departments of Mathematics, Computer Science, and Physics, integrating academic excellence with practical implementation. The team is experienced in supervising graduate research, organising training programmes, and engaging with industrial and

societal stakeholders. SDU's research group offers a combination of computational strength, experimental capacity, and educational outreach, making it a reliable partner for Horizon Europe projects in digital, quantum, and energy domains. **Expertise of the Team Leader:** Dr. Dina Bakranova is a Senior Research Fellow and Associate Professor at SDU University, Kazakhstan, and recipient of the national award *"Best University Teacher – 2024."* She holds extensive research experience in semiconductor physics, sensor technologies, photoelectrochemistry, and heterostructure-based functional devices. Her research focuses on: development of intelligent photoelectrochemical biosensors based on hybrid heterostructures; semiconductor materials for hydrogen generation and catalysis; integration of quantum-enhanced sensing concepts with classical detection platforms; characterisation of SiC-based heterostructures and thin films. Dr. Bakranova has led national research projects and interdisciplinary teams involving physicists, mathematicians, and IT specialists. She applies a multidisciplinary approach combining experimental methods, materials engineering, data analysis, and modelling. Her work includes optical and electrochemical measurement techniques, prototype development, and validation of sensor systems. She has published in peer-reviewed journals, presented at international conferences, and is actively involved in training undergraduate and graduate students in English-language programmes. Dr. Bakranova has experience in project coordination, preparation of grant proposals, and collaboration with international partners. Current and planned research directions under her leadership include: multichannel photoelectrochemical sensing platforms; hybrid quantum–classical detection architectures; NV-diamond and quantum-defect sensors; semiconductor–photonics interfaces compatible with QCL and photonic devices. Dr. Bakranova is committed to translating scientific results into practical technologies for environmental monitoring, biosensing, and sustainable energy. She promotes interdisciplinary cooperation between modelling, IT, and experimental physics, contributing to the strategic development of SDU as a regional hub in digital and quantum technologies.

Contact details

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Declaration

☒ I herewith declare that I am responsible for the content provided and that I expressly consent for this information to be published on the NCP DIT website https://www.nks-dit.de/service/kooperationsprofile.

*(Please note that a publication of your data will **not** be possible if this box is not ticked.)*

☒ I agree that the filled-in template should be sent via e-mail to NCP offices in other countries so that they may circulate my offer among their national stakeholders.

Instructions

1. *Fill in the form if you are*
    a. *looking to join a consortium for a call in Horizon Europe Cluster 4 or one of the associated Joint Undertakings and would like to offer your organisation's expertise*
    OR
    b. *looking for a partner with specific expertise to join your consortium for a call in Horizon Europe Cluster 4 or one of the associated Joint Undertakings.*

2. *Check any or all of the boxes under "Declaration" so that we know how you would like us to distribute your offer.*

3. *E-mail the filled-in template to nks-dit@dlr.de and/or nks-dit@fz-juelich.de to have it published on our website and/or distributed to our NCP colleagues in other countries.*