



## **FIRI 2023 - applications funded in January 2024 decision meeting**

Listed in alphabetical order by research infrastructure name.

### **Accelerator Laboratory of the University of Jyväskylä (JYFL-ACCLAB)**

*University of Jyväskylä*

The project aims to complete the construction of the novel MARA Low-Energy Branch (MARA-LEB) radioactive ion beam facility at JYFL-ACCLAB. MARA-LEB will, for the first time, enable the study of nuclear properties of proton-rich and heavy nuclei using a combined spectroscopic approach. State-of-the-art experimental techniques including high-resolution laser spectroscopy, mass spectrometry and nuclear decay spectroscopy will be applied, providing a detailed understanding of exotic nuclear-structure phenomena. The unique capabilities of the MARA-LEB facility will mean that nuclei from a large section of the chart of nuclides will be accessible, allowing a broad range of nuclear properties to be investigated. The new research opportunities provided by MARA-LEB will attract new users to JYFL-ACCLAB while expanding the portfolio of tools, techniques, and science opportunities for existing users.

### **Bioeconomy Research Infrastructure (Bioeconomy RI)**

*Aalto University, VTT Technical Research Centre of Finland Ltd.*

BIOECONOMY research infrastructure (RI) is a unique openly accessible research, education and innovation research environment hosted by Aalto University and VTT. It supports activities tackling such global challenges as climate change and resource sufficiency. Our RI is internationally exceptional as it covers the research value chain from lab to pilot scale and combines research and innovation facilities for material and chemical technologies as well as for biotechnical processes. This RI allows methods for upgrading the forest raw materials and biobased waste and side streams to high-value products. It enables academic research discoveries to be scaled up to novel technology concepts to high TRL level close to the markets. Our vision is to realize the potential of Finland to become a world leader in biomass-based research and innovations in circular economy and to further improve competitiveness of the Finnish industry. The BIOECONOMY RI aims at growing to a European ESFRI.



## **Cosmology Data Center Finland (CDC-FI)**

*University of Helsinki, Aalto University, University of Oulu, University of Turku, CSC - It Center for Science Ltd.*

So that Finland can participate in large international observational cosmology projects, such as the European Space Agency Euclid and LISA space observatories, we establish a Cosmology Data Center in Finland. This data Center is the Finnish in-kind contribution that ensures the Finnish membership in them. Euclid is a wide-field space telescope to be launched in July 2023. Euclid will observe over 1/3 of the sky and will help solve the mystery of the accelerating expansion of the universe: Is it caused by a new form of energy, "dark energy", filling the universe, or must the law of gravity be modified? LISA will be the first gravitational wave observatory in space. Gravitational waves have opened a new window into the universe: LISA will look deeper into the early universe than has been possible with optical or radio telescopes. The data from these missions will have a huge impact on cosmology and astrophysics, and will form a basis for future research in these fields.

## **EU-OPENSSCREEN Finland (EU-OS FI)**

*University of Turku, University of Helsinki, Åbo Akademi University*

Chemical biology, the development of new small molecules with specific biological activities, is of tremendous value as the starting point for understanding biological processes and for discovering new drugs, agrochemicals and other commercially valuable bioactive agents. EU-OPENSSCREEN ERIC (EU-OS, [www.eu-openscreen.eu](http://www.eu-openscreen.eu)) provides open access to world class chemical biology infrastructures, technologies and expertise, with a compound collection of > 100 000 compounds and open database. As founding member, Finland has a key role in EU-OS and Finnish membership in EU-OS brings domestic scientists outstanding opportunities and access to technologies, services and resources not currently available in Finland. In this RI development project, we focus on enhancing our RI's capabilities in providing services in technology areas which are foreseen to provide novel research possibilities and potential for scientific breakthroughs for the users of our RI at national and international level.

## **Finnish Astronomy in the era of the Extremely Large Telescope (FASE)**

*University of Turku, University of Helsinki*

The European Southern Observatory (ESO), which Finland is a member of, is one of the largest international infrastructures in astronomy. ESO is constructing the Extremely Large Telescope (ELT) making use of new technologies that have never been pursued before. It is expected to revolutionise our perception of the Universe by addressing many prominent unsolved questions in astrophysics. Instruments for the ELT are built by consortia from the ESO member states. Participation in the ELT instrumentation projects



is necessary for the Finnish community to strengthen its position in front-line astronomical research and in the development of new technologies. This project is a collaboration between the Finnish universities and the requested funding will provide a significant total investment for the entire Finnish astronomy community to take full advantage of the unique ELT infrastructure and be part of the scientific and technological revolution it will entail.

## **FinnLight Integrated Optics Infrastructure (FinnLight-IO)**

*Tampere University, University of Eastern Finland, VTT Technical Research Centre of Finland Ltd.*

The project will develop the sub-area of the FinnLight national infrastructure dedicated to integrated optics. Compared to the traditional assembly of discrete optical components, integrated optics enable much more compact and efficient processing functionalities with tremendous potential in many application areas including communications, biosensors, quantum computing, and many others. Integrated optics is one of the major trends in photonics, providing a significant gain in terms of reduced size, weight, power consumption, and reliability contributing to a healthy, green & digital future. Complemented by FinnLight existing tools, the integrated optics capabilities will yield significant scientific impact and technological developments in the coming decade, strengthening the position of Finland as one of the high-tech leaders and providing new business opportunities.

## **Infrastructure for single photon correlation studies (i-SPOT)**

*Aalto University*

Recently, quantum photonics in Finland and across the world has grown tremendously in the past decade for fundamental science and applications, such as computing, communications, imaging, health care, security and safety. However, there is no infrastructure in Finland facilitating studies and utilization of entanglement of single optical quanta under the required special conditions. This kind of technology will become more central with the proliferation of quantum photonics, quantum computers and other quantum devices which need to exchange quantum information between separate processing units. We believe the planned, first-of-its-kind infrastructure in Nordic countries will play an important role in studying fundamental science and various technical innovations. The infrastructure is closely associated with the Finnish Photonic Flagship, the Finnish Center of Excellence on quantum technology, the European Graphene and Quantum Flagships, and the AKA university profiling project.



## **Improving OtaNano capabilities for Nanofabrication, nanocharacterization, and Magnetic field measurements of Quantum systems (NAMAQU)**

*Aalto University, VTT Technical Research Centre of Finland Ltd.*

NAMAQU -project aims to strengthen OtaNano's capabilities to offer infrastructure services for academic- and industrial research in following key areas:

- Advanced cleanroom nanofabrication technologies for quantum -, RF-, and nanophotonic devices
- High magnetic-field measurement capability in low temperature facilities for multi-user research environment
- Extended capabilities of high-resolution TEM characterization of nanostructured materials

The practical implementation of the project focuses on following strategically chosen investment tasks to strengthen each of these areas.

## **Printed Intelligence Infrastructure (PII)**

*Tampere University, University of Oulu, Åbo Akademi University, VTT Technical Research Centre of Finland Ltd.*

Printed intelligence is rapidly emerging key enable technology for next generation products such as flexible, thin, light-weight and costand resource-efficient electronics. Printed intelligence infrastructure (PII) is established to provide world-class research and development environment to researchers and technology developers. It offers an efficient use and easy access to a modern research and pilotmanufacturing infrastructure covering the whole research/development path from (i) materials via (ii) functional printing, (iii) components and devices to (iv) circuits and systems. Available processes include synthesis on novel materials, formulation of inks, highdensity digital fabrication and large-area roll-to-roll (R2R) processes for low-voltage thin-film devices and circuitry including finishing and integration. Application areas are e.g. distributed sensors (IoE), diagnostics, on-skin electronics, and personalized drug dosing, with sustainability as a comprehensive approach.

## **Survey of Health, Ageing and Retirement in Europe - Finland (SHARE-FI)**

*University of Eastern Finland, The Family Federation of Finland, University of Turku, Tampere University*

The population in Finland is one of Europe's oldest populations. Population ageing creates health, economic and social effects that emerge over time. To understand and



monitor these effects, a longitudinal data and applicable methods are required. We apply funding to collect the Survey of Health, Ageing and Retirement (SHARE) data in Finland. SHARE is a European Research Infrastructure Consortium (ERIC) and it has provided multidisciplinary and cross-national longitudinal data on changing health, the economic and social living conditions of European citizens aged 50 and over since 2004. Users now have access to 530 000 interviews of individuals from 28 countries in Europe, including Israel. Finland joined SHARE in 2016. Waves 7,8 and 9 (Corona Surveys) of SHARE data have been collected in Finland, and the planning of wave 10 data collection is under way. This application concerns the funding to cover the operational expenditures of wave 11 SHARE data collection in Finland.

### **TAU-WBS Research infrastructure (RI)**

*Tampere University*

Climate change, population growth and antimicrobial resistance have led to the emergence of new microbes and the transformation of previously controlled diseases. Municipal wastewater is a source of various markers that reflect comprehensive unbiased health information of the entire community. Wastewater-Based Surveillance (WBS) is a new scientific tool with the potential to act as a complementary approach to monitoring a number of variables such as local pathogens and clinically important indicators. The same contaminants that are monitored in wastewater from a human health perspective make it difficult to recycle the vital nutrients in the wastewater sludge. The infrastructure implemented is expected to promote the necessary measures for high-quality research, digital and green transition and growth. In addition, the solutions are globally scalable. Tampere University (TAU) will construct and implement the research infrastructure in 2024-2026 with collaborators and stakeholders.

