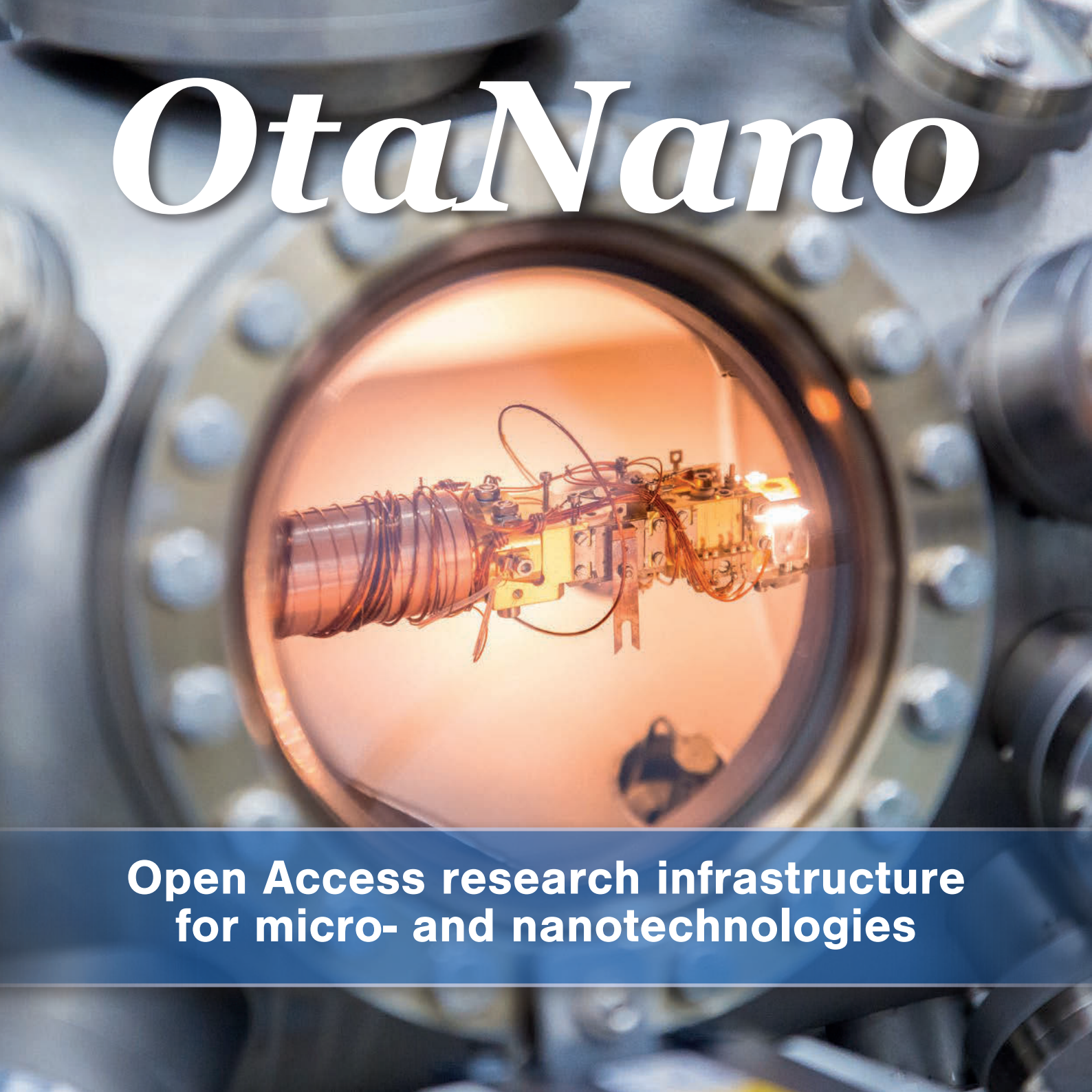
OtaNano



Open Access research infrastructure for micro- and nanotechnologies

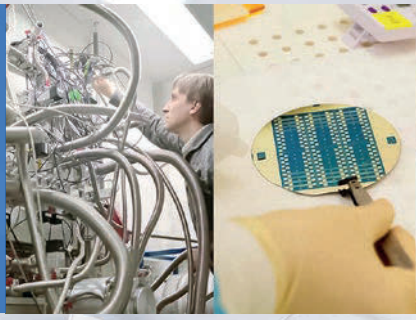
World-class infrastructure

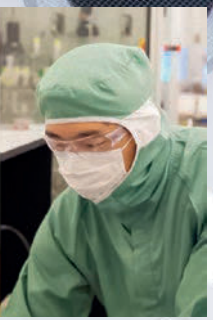
OtaNano is a Finnish open access research infrastructure for micro- and nanotechnologies. It is located in Otaniemi, Espoo, at the heart of the leading Nordic innovation hub.

OtaNano accommodates internationally cutting-edge research facilities for competitive research in nanoscience and -technology, and in quantum technologies. It offers a wide variety of fabrication processes and equipment for micro- and nanostructures. The facilities cover a comprehensive range of imaging and characterization equipment, including electron microscopy, nanomicroscopy and x-ray scattering devices. An eminent component of the research infrastructure is the broad assortment of refrigerators for ultra-low-temperature conductivity and high-frequency measurement.

OtaNano is a top-level learning environment for young researchers and an international centre for scientific research. The facilities are important for scientists as well as for high-tech companies working with micro-, nano- and quantum technology applications. The RI is a national platform to develop innovative enabling technologies and apply them to practical micro- and nano-systems.

Over
20%
of Finnish Nanotechnology research is linked to OtaNano.



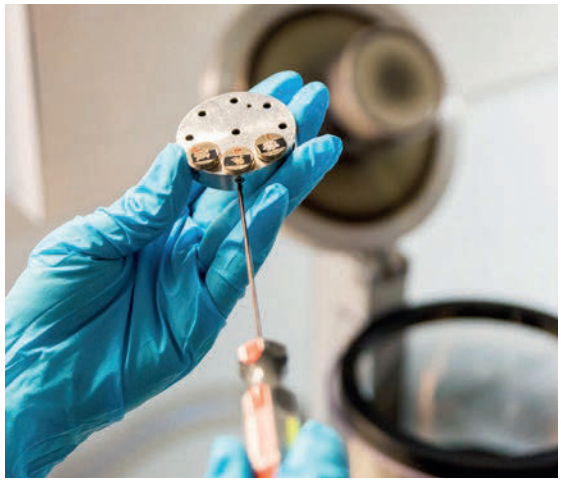


During 2013–2017 OtaNano's equipment has been used for more than 400,000 hours.

Over **100** doctoral dissertations

1,000 scientific journal articles

Almost **100** patents or applications



Wide range of possibilities

OtaNano offers a unique environment to work with pioneering technologies and apply them to practical micro- and nano-systems. The users are leading scientists, talented young researchers, high-tech companies and students.

OtaNano was established in 2013 by a joint effort of two national research infrastructures (RI), to strengthen nano-science and -technology research in Finland. It builds on long-standing experience and collaboration in RI development and demonstrates the national vision on creating impact through scientific and technological excellence. OtaNano is owned by Aalto University and VTT Technical Research Centre of Finland.

OtaNano enjoys a rare position among Finnish research infrastructures for having over twenty years of operation as part of the European large-scale infrastructure collaboration. OtaNano is an open access research infrastructure, available for academic and commercial users internationally.

ACCESS POLICY

OtaNano's access policy follows the guidelines set in "European Charter for Access to Research Infrastructures".

1. The access to OtaNano is **open for academic researchers and industry professionals**. The access is equally open for national and international parties.

2. The users have a **right to reserve and use the tools**. Certain tools are accessible only through service.

3. An **internal scientific advisory panel** supports the facility managers with scientific peer-review of the candidates when necessary. The panel is appointed by the OtaNano Steering Board.

4. The current **rates and** for certain tools the **pricing principles** of the instruments are shown on the webpage of the infrastructure www.otanano.fi/en/prices/.

5. The prerequisite for the access is the **facility introduction training**. The operation of the tools require **operators' licenses**, which are granted on a similar basis. The training may be chargeable.

6. The access to the infrastructure requires a separate written agreement.

7. The access to the infrastructure is facilitated by the **user support** provided in a form of permanent staff of the RI. The user support is subject to charges.

Visit **www.otanano.fi** for practicalities how to obtain an access.

Cutting-edge technologies

OtaNano is at the forefront of developing new micro- and nanofabrication techniques and enables scientific excellence in carefully selected areas, the success of which is strongly dependent on the cutting-edge infrastructure and immediate feedback to research:

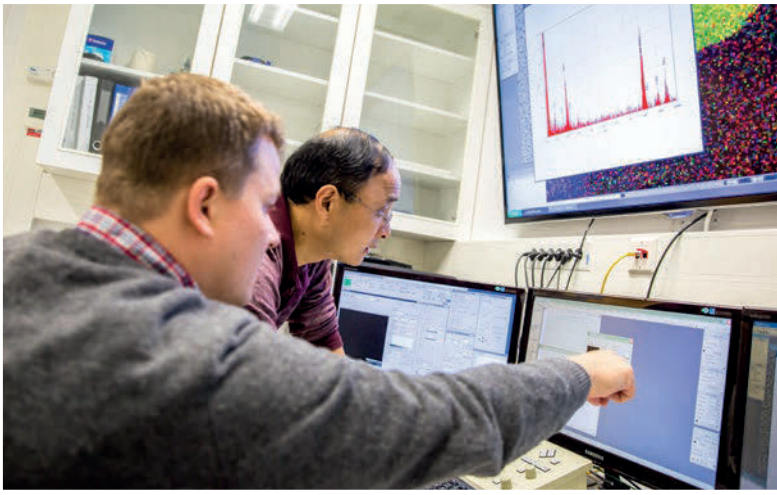
- **Quantum technology and nanoelectronics**
- **Micro- and nanophotonics**
- **Nanostructured materials**
- **MEMS and microsystems**

New users are given:

- Training for the safe and productive use of the facilities
- Training to work with chemicals and hazardous substances if necessary
- Training to use the equipment

OtaNano offers:

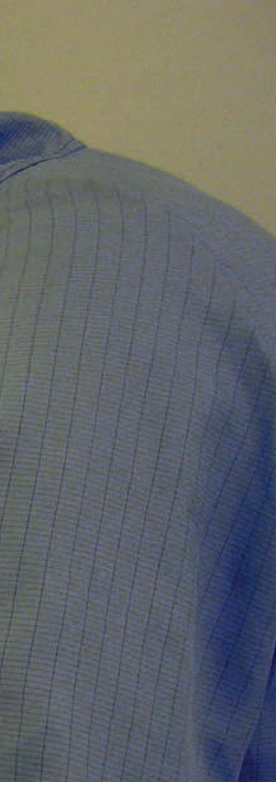
- Support for using the tools yourself
- Equipment operation via OtaNano's experts (subject to availability)
- Contract research projects



Cleanroom

OtaNano's micro and nanofabrication centre, the M2 cleanroom in Micronova, offers facilities to develop innovative, enabling technologies and apply them to practical micro- and nano-systems.

A few examples of components fabricated in Micronova include nanostructured materials for fuel cells, micro- and nano-photonic devices like novel lasers and micro-electromechanical systems to realize the internet-of-things.



Cleanroom facilities

The open-access facilities include 1,500m² of cleanrooms and processing lines for silicon CMOS, MEMS, III-V optoelectronics and thin film devices. This is complemented with 1,100m² pilot plant for contract research and manufacturing services.

The baystructure of the cleanroom allows for dedicated areas for processes such as lithography, plasma etching, wet processing, oxidation and CVD furnace processes, sputtering, wafer bonding, electrochemical deposition, ion implantation, measurements and analysis. The classification ranges from ISO4 in lithography and CMOS-sections, ISO5 in most processing areas to ISO6 in areas dedicated to measurements.

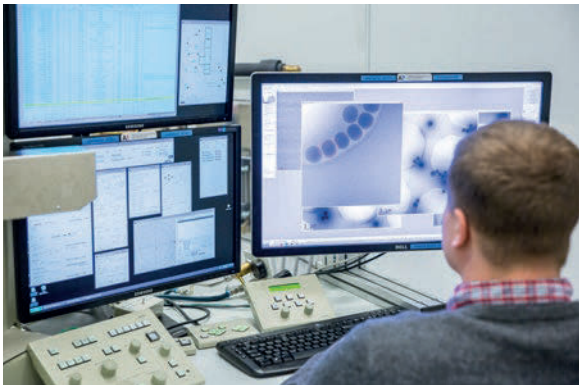
In addition to the main cleanroom there are laboratories with built-in cleanrooms for micropackaging and back-end processes as well as well-equipped and controlled labs for MOVPE, MBE and other thin film processes.

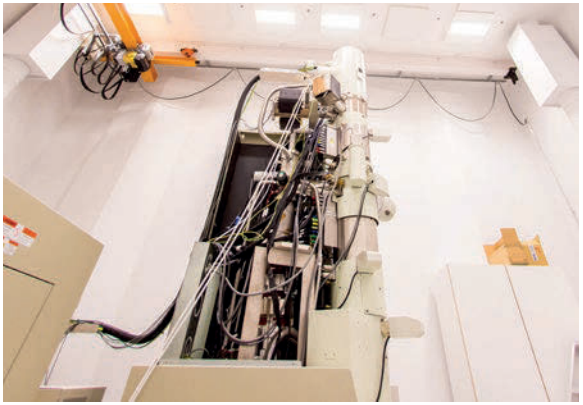
A selection of facilities for the characterization and fabrication of micro and nano size samples, are available in a separate semi-clean-room environment of 100m². These facilities are sufficient for basic manufacturing and testing of mesoscopic or nano carbon devices and are recommended to users who need facilities for non-standard operations or with lower cleanliness requirements.

Nanomicroscopy Center

OtaNano features excellent high-resolution nanostructure imaging and characterization facilities. The instruments include the only sub-Ångström transmission electron microscope (TEM) in Finland, a liquid helium cooled cryo-TEM, cryo scanning tunneling microscopes (STM), and a selection of scanning electron microscopes (SEM), atomic force microcopes (AFM), and X-ray scattering equipment (SAXS/WAXS).

Soft, hard and biomaterial samples can be studied down to atomic-level resolution. These techniques reveal the finest details of an ever-increasing number of nanomaterials.





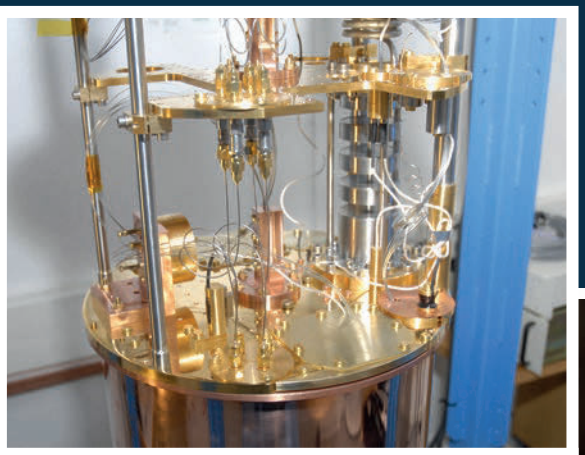
Low-temperature measurements

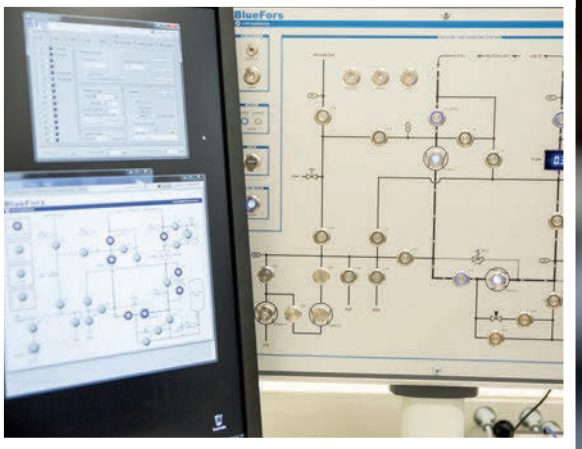
OtaNano is a world-class facility for low-temperature and nanoelectronics research. The cryogenic expertise and equipment further studies even below microkelvin temperatures.

The facilities include a selection of 16 ultra-low temperature refrigerators with versatile capabilities for electronic transport and high-frequency measurement. Three of the refrigerators are equipped with nuclear demagnetization stages, providing sub-mK base temperatures, while the rest of the devices allow studies down to below 0.1 K. Much of the apparatus is home built and can be modified accord-ing to the specific research needs.

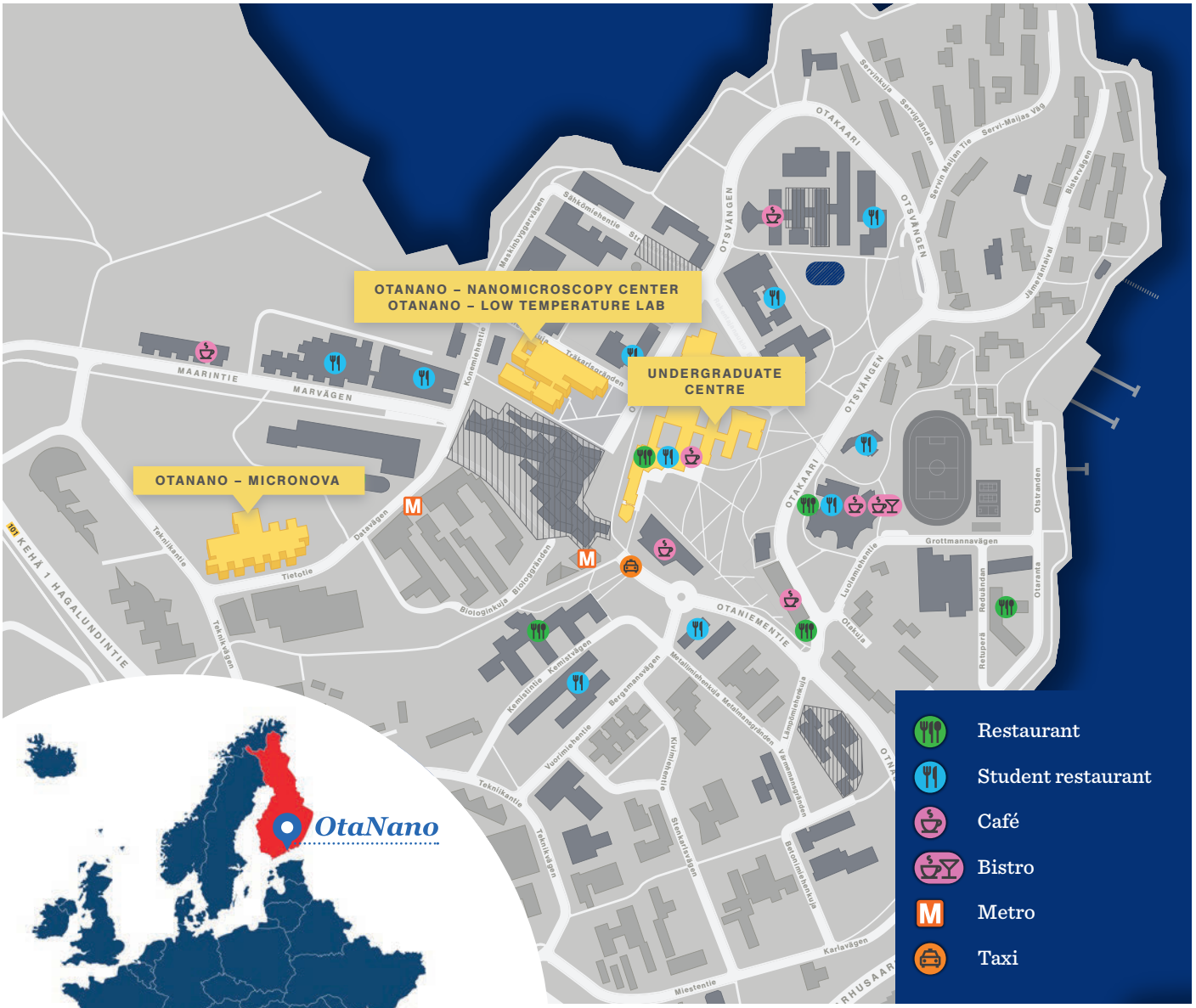
The facilities are a valuable asset for physicists, as well as for small high-tech companies working with cryogenic applications.

Revolutionary fields like quantum technologies find answers and applications in the unique environment of OtaNano. At the European level, the facility is developed as a part of the European Microkelvin Platform.





CAMPUS MAP



www.otanano.fi