UNIVERSITY OF
LATVIA

FACULTY OF
SCIENCE AND
TECHNOLOGY

Dean's Foreword

It is a pleasure to welcome you to the Faculty of Science and Technology (FST). We bring together the strengths of several faculties and research institutes to form one open and forward-looking community. Our shared goal is simple: to turn knowledge into solutions that make a difference.

At FST, research and learning go hand in hand. We encourage curiosity, collaboration, and creativity - within an inclusive culture that values diversity, respect, and balance. Our international outlook and interdisciplinary approach connect science, technology, and society in meaningful ways.

We invite you to explore, study, and collaborate with us - to be part of a faculty where ideas grow into impact and where people shape the future together.

Dr. phys. Aigars Ekers

Dean, Faculty of Science and Technology

Who We Are and Our Vision

The Faculty of Science and Technology at the University of Latvia (UL) was established in 2024 through the merger of three faculties and nine research institutes and centres. FST's research spans physics, mathematics, computer science, materials science and engineering, geography, geology, environmental science, optometry, vision science, and STEM education.

FST's vision is to become an internationally recognized hub of scientific excellence, innovation, and societal impact. To achieve this, the faculty focuses on five strategic priorities:

- Advancing research excellence
- Diversifying funding sources
- Supporting innovation and knowledge exchange
- Empowering talent development
- Strengthening global research networks

2054 *Number of students, 2024*

320 *Academic research personnel, FTE, 2024*

17,8M *Research funding, 2024*

221 *Publications in the top 10% most cited worldwide, 2019–2024*

1488 *Q1/Q2 publications in SCOPUS-indexed journals, 2021–2024*

55% *Proportion of publications available in Open Access, 2019–2024*

55% *Proportion of co-publications with foreign partners, SCOPUS, 2021–2024*

Innovations

FST

drives innovation across physical, material, information, and environmental sciences, contributing to advances in various disciplines such as healthcare, transport, communications, cybersecurity, and others. Collaborations with industry have fostered progress in IT, biotechnology, nanotechnology, and data-driven decision-making. Through its research, education, and outreach, FST addresses global challenges- from AI and quantum computing to space exploration and climate change - while shaping national policy, including Latvia's Sustainable Development Strategy 2030.

Construction and certification of the first Energy Plus private building in the Baltic countries

Collaboration with Lightspace Technologies, Ltd. (Latvia), resulted in the development of a novel volumetric 3D display

Fabrication, testing and modelling of microsphere resonators

Device for dosing, transporting and mixing liquid metals and alloys in metallurgical plants

N-type thermoelectric composite material and its production

Silica microstrip resonator based multi-wavelength light source for data transmission in fibre optic telecommunication systems

Linear motion system for a Crystal growing machine

Partnership with ornithologists and peat scientists resulted in the development of instruments for heavy metals and nanoplastics contamination

Apparatus for contactless flow excitation in electrically conductive liquids

Nanowire Extraction technique

Device for obtaining speckle-free images under scattered laser illumination

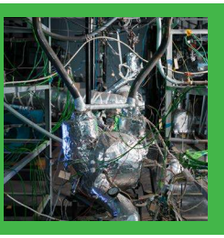
Members of Biophotonics group of IAPS, founded and now run startups Bdetect, Ltd and Vetamplify Ltd which work on developing new skin cancer diagnostic tools and photonics veterinary applications

VETAMPLIFY

Bdetect

Use of a Digital Zenith Camera VESTA for mineral exploration, opening new avenues for geophysical surveying

Prototype of a Magnetohydrodynamic Generator Driven by a Thermoacoustic Engine with potential applications in deep-space missions, offering a novel energy generation solution under extreme conditions



Department of Physics

199 STUDENTS
21 INTERNATIONAL

EDUCATION

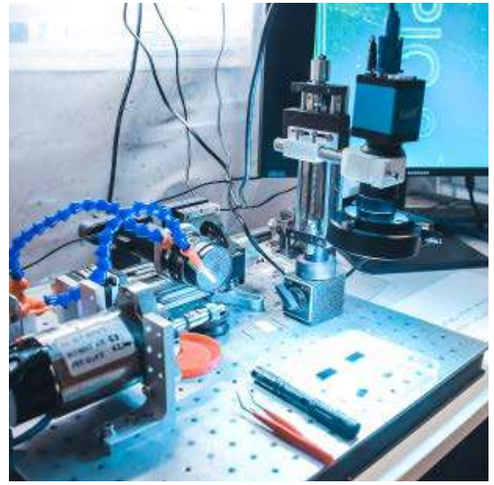
- **5** *PROGRAMMES*
- **113** *BACHELOR'S*
- **29** *MASTER'S*
- **57** *DOCTORAL*

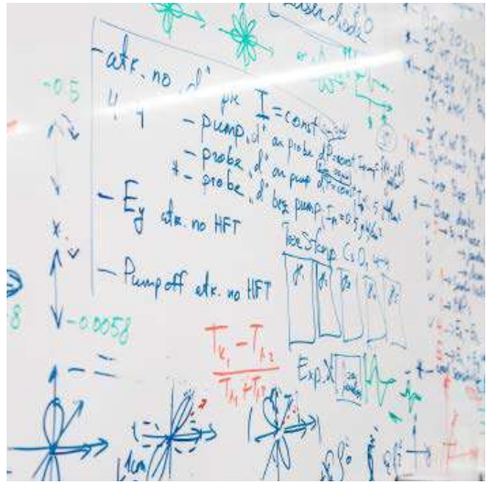
Find out more

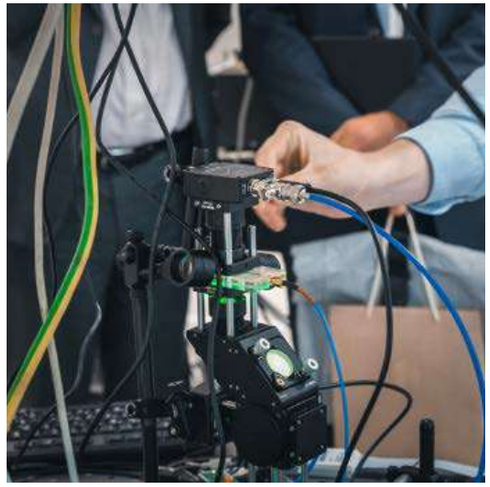
The Department of Physics (DP) combines academic work with experimental research in magnetism, soft materials, and quantum electronics. Research spans from developing mathematical models for complex microscopic systems to advancing quantum-scale technologies.

RESEARCH AREAS

Research in DP combines theoretical modeling with experimental validation in the fields of magnetism and quantum electronics. The Soft Magnetic Materials Laboratory focuses on the development and experimental verification of mathematical models for active media and microscopic systems such as elastic strings, gels, magnetic bacteria, and colloids. The Nanoelectronics Theory Group advances fundamental models for single-electron quantum technologies and plays a key role in coordinating the Latvian Quantum Initiative through collaboration with national and international partners.







MAIN RESULTS

Main achievements include the development and experimental validation of high-value mathematical models for active media and microscopic objects in the Soft Magnetic Materials Laboratory (SMML). These results have advanced understanding of complex material behavior at micro- and nanoscale levels. Additional breakthroughs include the creation of a microscopic model for controlled two-electron collisions, and a statistical benchmarking methodology for single-electron circuits. Together, these innovations contribute to fundamental electrical metrology and the advancement of quantum-scale modeling techniques.

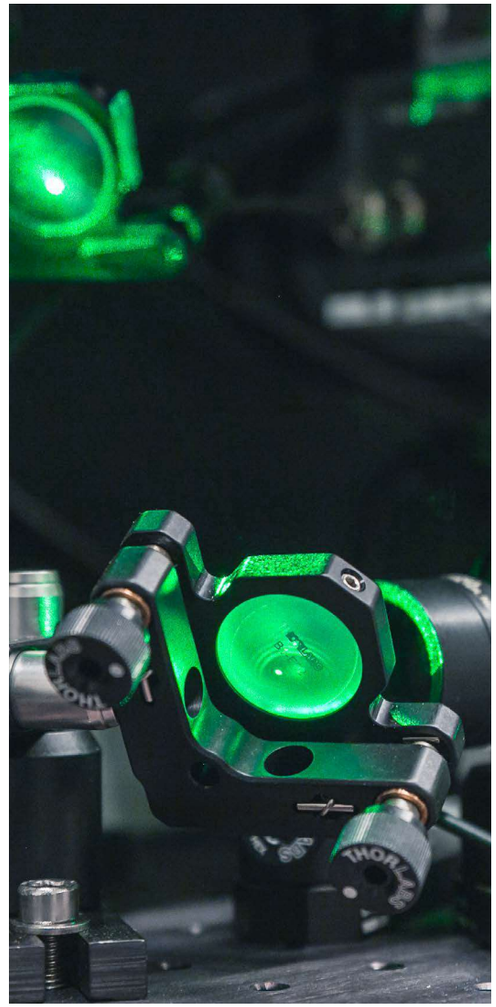
INNOVATIONS AND IMPACT

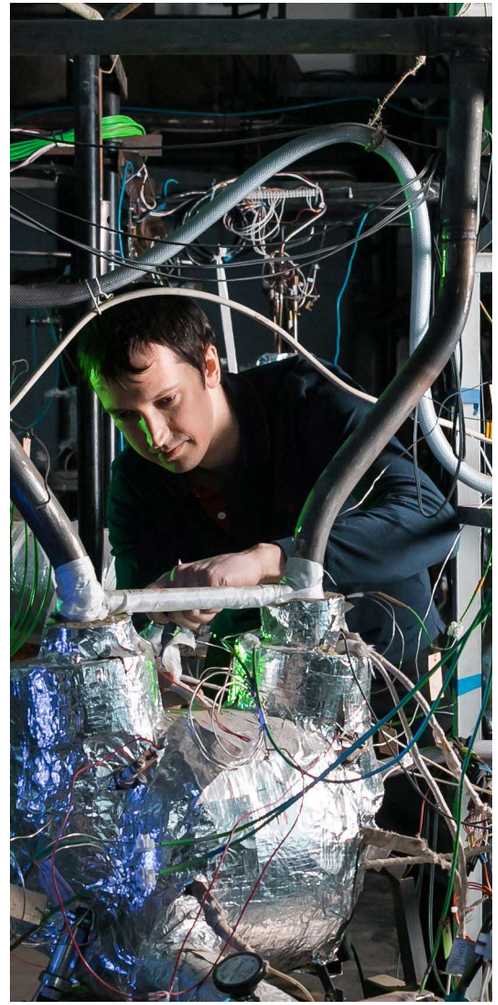
Professor Andrejs Cēbers has received the L'Ordre des Palmes Académiques award from the Republic of France in recognition of his achievements in theoretical physics and his contributions to developing and strengthening scientific collaboration between France and Latvia.

The Nanoelectronics Theory Group has achieved outstanding results, including the development of the world's first single-electron field-effect transistor and the creation of important theoretical models for two-electron collisions.

Collaborations

TAL TECH · NPL · LFSA · NATIONAL EDUCATION CENTER · DANTEC DYNAMICS · Leibniz Universität Hannover · PTB · Humboldt-Universität zu Berlin · Université de Strasbourg · Sorbonne Université





Institute of Atomic Physics and Spectroscopy

The Institute of Atomic Physics and Spectroscopy (IAPS) conducts internationally recognized research in atomic and quantum physics, spectroscopy, photonics, and biophotonics. It conducts interdisciplinary research between physics and medicine to develop optical diagnostic tools, while also advancing quantum optics, laser technologies, and environmental monitoring methods. The Institute has been supported by the European Commission as the Centre for Excellence in Fundamental and Applied Studies.

RESEARCH AREAS

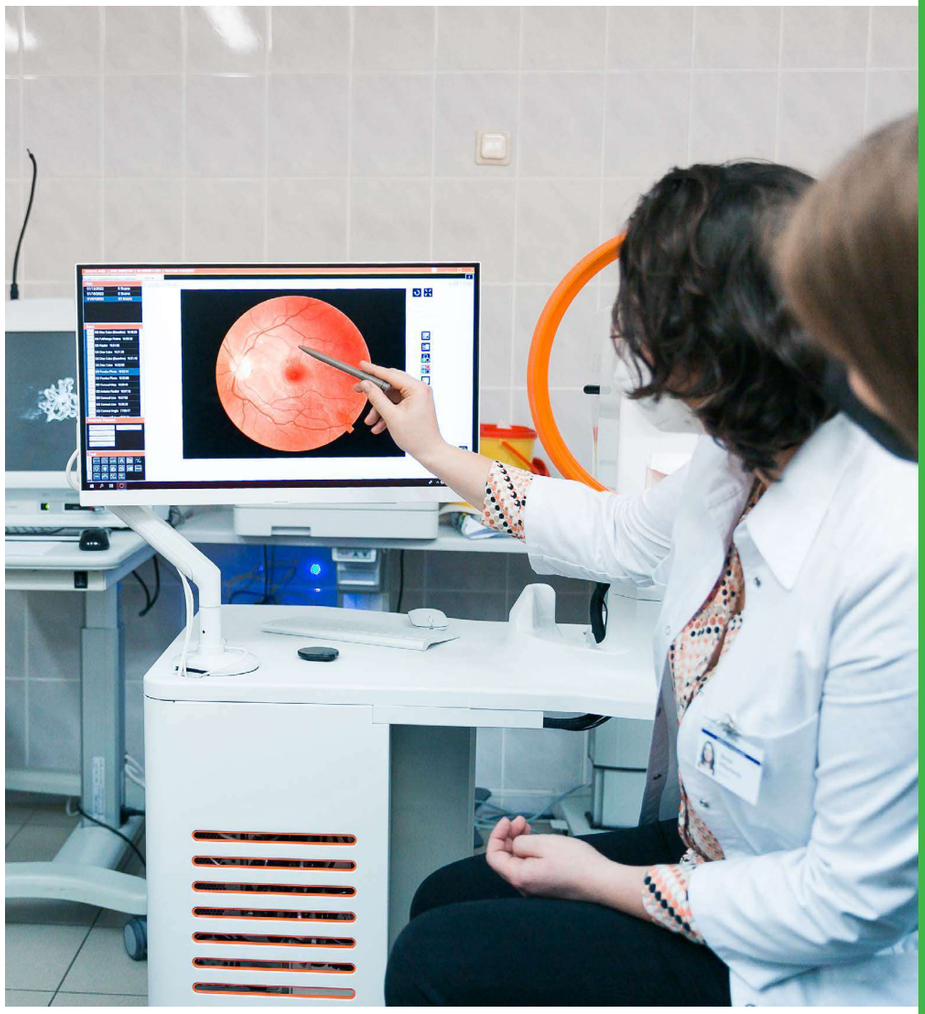
- Optical physics, materials science, and biomedical applications.
- Non-contact optical diagnostics and imaging technologies for clinical use.
- Plasma diagnostics and high-frequency light source technologies.
- Atomic absorption spectroscopy, UV disinfection, and mercury concentration measurements.

Find out more

- Tapered fiber–WGM coupling for comb generation, optical chip testing, and microtoroid resonator fabrication.
- Modeling atomic interactions with electromagnetic fields, photon dynamics, and Rydberg blockade effects.
- Experimental studies on hydrodynamic stability and magnetohydrodynamic (MHD) pseudo-levitation in crystal growth.
- Biological responses of MXenes and other 2D materials for tissue engineering, antibacterial therapy, and targeted anticancer treatment.

MAIN RESULTS

Key achievements include the EU REGIOSTARS 2024–winning melanoma detection device, a prototype for full-body skin spectral imaging, and an anesthesia contactless control system now in clinical use. The institute has advanced veterinary biophotonics, plasma diagnostics, and photonic detection methods for heavy metals and VOCs, while pioneering MXene-based biomedical applications and achieving breakthroughs in quantum technologies, including a record 53 mm Rydberg blockade radius. Other accomplishments include the development of optical gas sensors, nanofibers for drug delivery, and photocatalytic nanomaterials.



INNOVATIONS AND IMPACT

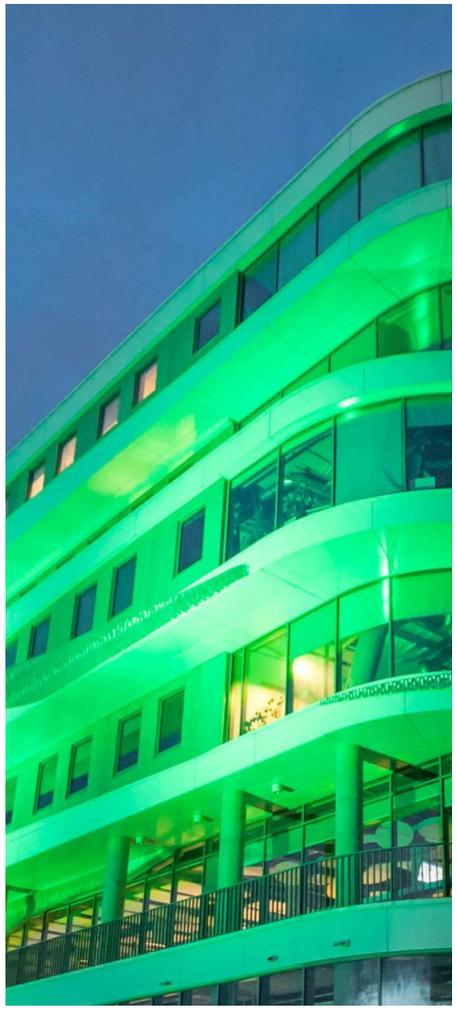
Key achievements include the creation of startups Bdetect and SEPSISCAN, alongside three national patents for innovations in optical imaging and laser illumination technologies. The institute has conducted joint research on plasma-based disinfection systems with Biosan Ltd., developed instruments for detecting heavy metals and nanoplastics in collaboration with ornithologists and peat scientists, and advanced clinical nanomaterial applications through partnerships with Linari Engineering and CSD Health. Further industrial collaborations with OBF Technology, UkraVit, PhaseBreake, NaCo Technology, Eden Tech, and Riga Paint Factory demonstrate strong links between fundamental research and applied innovation.

INFRASTRUCTURE

- Jobin-Yvon 1000M High-Resolution Spectrometer with CCD detection
- Optical Frequency Comb (Menlo Systems)
- CHM Microtoroid Resonator Fusion System for micro- and nano-photonic resonator fabrication
- Raman Spectroscopy and Imaging Facility for high-sensitivity material and biological characterization
- GRIBA Ion Beam Facility
- LIBS Facility
- Plasma chamber with oil-free turbomolecular system

Collaborations

CERN
CARBON UKRAINE
Jožef Stefan Institute
Università degli Studi di Messina
1862 RĪGAS TEHNISKĀ UNIVERSITĀTE
MXenes
ISOLDE
STEMS
Drexel UNIVERSITY
RĪGAS STRADIŅA UNIVERSITĀTE
Latvia University of Life Sciences and Technologies
Fraunhofer IKTS



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