
ÚFE
Institute of Photonics and Electronics
The Czech Academy of Sciences

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ABOUT US

The Institute of Photonics and Electronics (ÚFE) is a public research institution, a part of the Czech Academy of Sciences (CAS) – the biggest Czech non-university research organisation. The Institute was established in 1954 and until 2007 it was named the Institute of Radio Engineering and Electronics of the CAS. The ÚFE past saw several important milestones, such as one of the first masers and lasers in Czechoslovakia, first laser eye surgery, transmission of accurate time using television signal or opening the Laboratory of Optical Fiber Technology.

Nowadays, the ÚFE principal projects are focused on fundamental and applied research in photonics, optoelectronics and electronics, extended by metrology, education and popularization. The ÚFE contributes to the learning advancement in many research fields and creates a broad base of knowledge for development of new high technologies.

www.ufe.cz

RESEARCH

The programme of the Institute covers six research fields which is reflected in its structure with the research teams.

In the field of photonics the ÚFE focuses on research and development of new optical biosensors, high-power fiber lasers, coherent light generation in mid-IR spectral region and specialty optical fibers.

In the field of optoelectronics, the ÚFE pursues research on electrical and optical phenomena occuring on the surfaces and interfaces of nanomaterials. These phenomena are induced by photons, ions, electrons, and the adsorption of atoms and molecules and are used for applications in sensing, new sources of light generation and in advanced analytic and imaging processes.

In the field of electronics, the focus lies on the study of electrodynamic properties of biological systems and development of detection systems.

The ÚFE has been entrusted with the responsibility for the National Standard Time and Frequency and runs and develops The Laboratory of the National Time and Frequency Standard.

EDUCATION

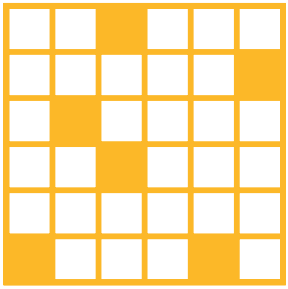
The ÚFE cooperates with the universities and thus contributes to higher quality of education in both traditional and emerging new research fields. The ÚFE researchers give lectures at the universities and university students have an opportunity to work at the ÚFE on their Master´s and doctoral theses.

The high school students can do their traineeships at the ÚFE under the project of the Czech Academy of Sciences „Otevřená věda“ (Open Science).

POPULARIZATION

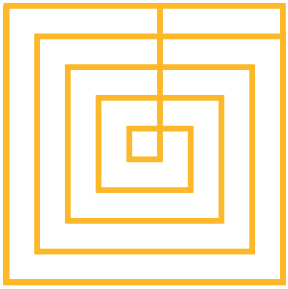
The ÚFE regularly organizes seminars for the researchers and scientists and partakes in the organization of many conferences. The ÚFE researchers are regular participants in the popularization lectures, e.g. during science festivals „Týden Akademie věd“ (The week of the Czech Academy of Sciences) – formerly „Týden vědy a techniky AV ČR“ (the Week of Science and Technology of the CAS) and „Veletrh vědy“ (The Science Fair).

The general public is regularly given an opportunity to have an insight into the scientific work in the ÚFE laboratories during the Open-door Days held traditionally at the beginning of November.



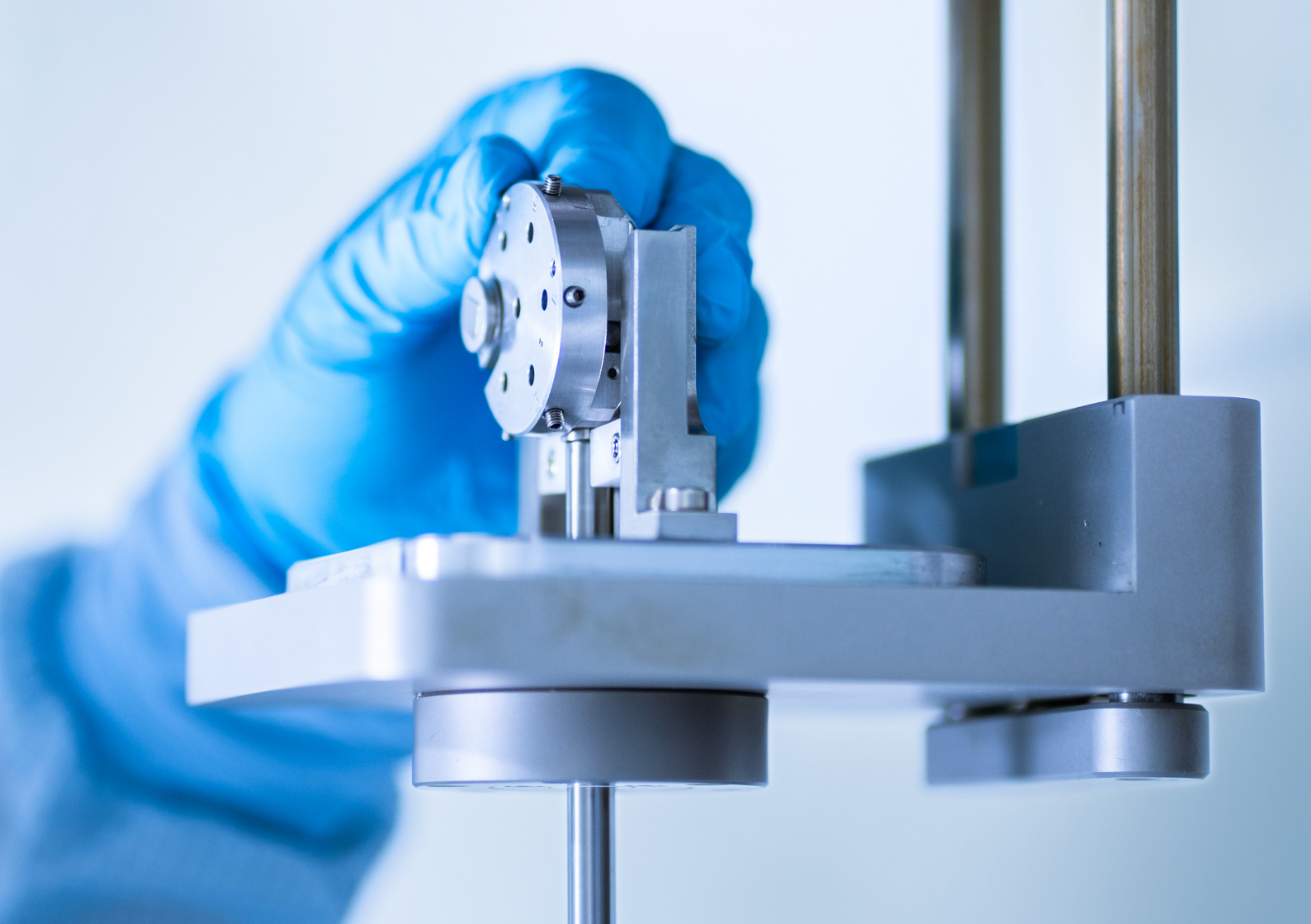
OPTICAL BIOSENSORS

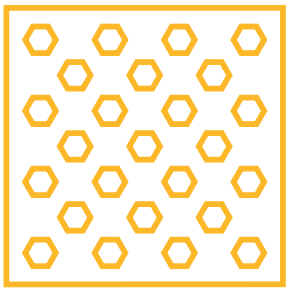
The research team develops unique tools that provide a detailed insight into the biomolecular world – ultrasensitive optical biosensors. The team evolves this technology behind its state-of-the-art by combining advances in modern photonics, chemistry and biology. The optical biosensors enable observation of biomolecular interactions and thus allow a better understanding of biological processes, such as those that play an essential role in the progression of diseases. Such knowledge can be further employed in the development of new therapies and drugs. The instruments developed by the team are used for a variety of other applications, among other fields, environmental monitoring, food safety, and the prevention of bioterrorism.



FIBER LASERS AND NON-LINEAR OPTICS

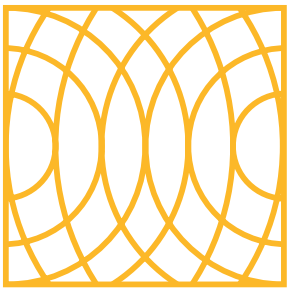
The team focuses on the research of fiber lasers and optical fibers technologies. The fiber lasers offer a broad variety of utilisation in industry (material processing), in medicine (minimally invasive surgery, laser spectroscopy) or in defense industry (quick and precise neutralization of agile targets). They are based on the optical fibers. The special fibers enable to generate laser radiation with high average output power; to transfer optical pulses of giant energies or to provide efficient interaction of the laser radiation with gases. Thus, they complement conventional fibers which nowadays connect the computers and telephone switchboards all over the world.





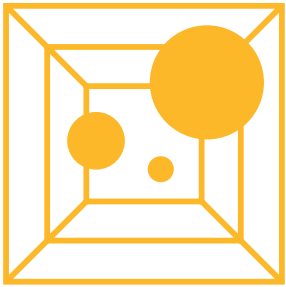
SYNTHESIS AND CHARACTERIZATION OF NANOMATERIALS

The semiconductor nanostructures are the cornerstones of electronic and photonic elements of future. The research team develops the techniques which use the focused electron and ion beams for the position-controlled deposition of semiconductor nanostructures, with the aim to better understand the growth mechanisms and to describe the charge transport. The results of the research will be applied in the green energy sources, the sensors of chemicals and the light sources and detectors.



BIOELECTRO-DYNAMICS

The team studies how to analyze and influence organisms at the (bio)molecular level by using an electromagnetic field. The knowledge will be further applied in diagnostic and therapeutic methods in medicine and bio-nanotechnology. In comparison with current (often invasive) methods, the team strives to attain more efficient and non-aggressive technique.



NANO-OPTICS

Nano optics takes over where conventional optical microscopy reaches its fundamental limits. It enables to capture processes at the level of a single molecule and to study mechanisms hidden deeply inside single cells. The team aims to push forward the imaging methods using visible light and to study the dynamics of biological systems at the level of single molecules. The emerging microscopy techniques advance our knowledge in life sciences and medicine.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ÚFE AV ČR
INPUT CHANNELS
MANUAL CONTROL
START
STOP
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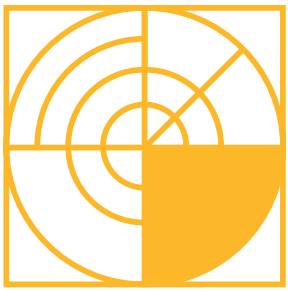
DAB

RESEARCH TEAMS



LABORATORY OF THE NATIONAL TIME AND FREQUENCY STANDARD

The laboratory operates the National standard time in the Czech Republic and partakes in calculation of Coordinated Universal Time - UTC. The laboratory provides distribution of accurate time within Internet, time transfer by optical fibers, calibration of secondary time and frequency standards, and expert and consultancy services.

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