Institute of Scientific Instruments

The Czech Academy of Sciences

ISI CAS Institute of Scientific Instruments The Czech Academy of Sciences

MISSION

Development of new diagnostic methods, novel instrumentation principles and advanced technologies operating in the range from the macroscopic to the quantum regimes, enabling significant progress in the understanding of inanimate and living nature and the practical applications thereof.

PRINCIPAL ACTIVITIES

- Multidisciplinary research and advanced engineering combining the fields of magnetic resonance spectroscopy and tomography, electron microscopy and microanalysis, laser based spectroscopy, imaging, manipulation, and nanometrology, acquisition and processing of biosignals and large data, cryogenics, electron and laser beam technologies
- Dissemination of scientific results in respected journals, proceedings etc.
- Training of young researchers in multidisciplinary world-class research
- Involvement of university students in ISI scientific activities and provision of doctoral study programmes in cooperation with universities
- Raising the level of knowledge and education via popularization activities focused on the public and students of all levels, promoting science and technology through direct research projects with high and basic schools
- Technology transfer of applicable results to industry, education and health
- Promoting international cooperation within the scope of ISI activities
- Organization of scientific meetings, conferences and seminars at national and international level
- Providing critical infrastructure for research

Main entrance of ISI CAS.

Institute of Scientific Instruments
of the CAS, v.v.i.
Královopolská 147, 612 64 Brno
Czech Republic

Phone: +420 541 514 111
E-mail: institute@isibrno.cz
www.isibrno.cz

VAT number: CZ68081731
Data Box ID: 8c4npnh

MAIN CONTACT PERSONS

Director: prof. Josef Lazar
Phone: +420 541 514 204
E-mail: director@isibrno.cz

Deputy Director for Research:
prof. Pavel Zemánek
Phone: +420 541 514 202
E-mail: Pavel.Zemanek@isibrno.cz

Deputy Director for Executive Affairs:
Dr. Bohdan Růžička, MBA
Phone: +420 734 313 043
E-mail: Bohdan.Ruzicka@isibrno.cz

STATISTICS 2021

Financial resources (in thousands of CZK)

- **Resources for expensive equipment and construction: 28 628**
  - from The Czech Academy of Sciences: 21 794
  - from Czech projects: 6 834
- **Operating resources: 247 555**
  - from The Czech Academy of Sciences: 108 609
  - from Czech projects: 130 401
  - from international projects: 8 545
- **Revenue from contractual research: 11 984**

Number of employees (full-time equivalent FTE)

- **Total: 206**
  - Number of researchers and research assistants: 85 FTE
  - Number of PhD students: 36 FTE
  - Administrative and technical support: 85

Number of outputs

- **Number of papers in scientific journals with impact factor: 72**
- **Number of filed patents or utility models: 2**

RECENT AWARDS

2021 Šárka Mikmeková won the prestigious prize of "The Lumina quaeruntur premium"

2021 Scientific group AIMT (F. Plešinger) won 3× the first prize in the international competition PhysioNet/CinC Challenge for AI algorithm analyzing cardiac rhythm (P. Nejedly et al.)

2021 Vojtěch Svak received prestigious award of "Talent Foundation of Josef, Marie and Zdenka Hlávkas" for the talented young researcher

2020 Ilona Müllerová won the Milada Paulová Award for electrical engineering

2020 Pavel Zemánek won the Academic Award – Praemium Academiae, the most important and prestigious scientific award in the Czech Republic.

2020 Tomáš Králík, Jiří Frolec, Pavel Hanzelka, Věra Musilová, Aleš Srnka and Josef Jelínek won The Best Paper of 2019 Award. The award was given by 3 main editors of Cryogenics journal and Elsevier publishing house.

2019 Ilona Müllerová was awarded The František Křižík Honorary Medal for Merit in the Technical Sciences and for the Implementation of Results of Scientific Research

2019 Radovan Smíšek was awarded The Josef Hlávka Award

2018 Radovan Smíšek won in the competition "Left Bundle Branch Block Initiative" organized by International Soc. for Computerized Electrocardiology

2017 Josef Halámek was awarded The František Křižík Honorary Medal for Merit in the Technical Sciences and for the Implementation of Results of Scientific Research

2017 ISI, FNUSA-ICRC and University of Rochester team led by Filip Plešinger was awarded the Clinical Needs Translational Award

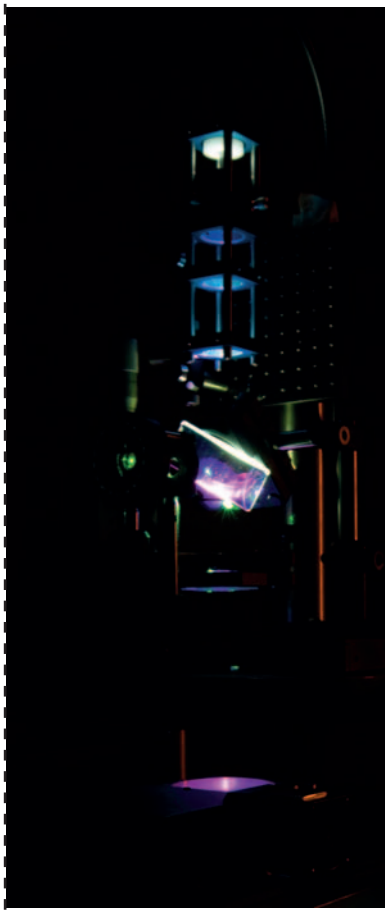
2017 Tomáš Pikálek and his supervisor Zdeněk Buchta were awarded the Werner von Siemens Award 2016 for "The best diploma thesis"

2017 Radim Skoupý was awarded the Thermo Fisher – Czechoslovak Microscopy Society Felowship for young researchers

2016 The team of Vilém Neděla was awarded the Wabunshisyo Award by the Japanese Society of Microscopy

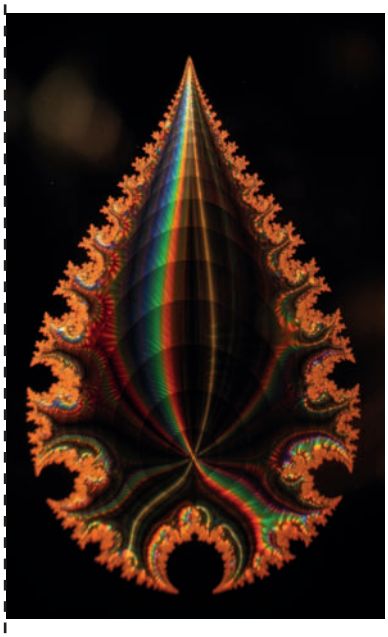
2015 The team of Pavel Jurák was awarded the first and the second prize in the "Computing in Cardiology/Physionet Challenge 2015"

2015 Kamila Hrubanová was awarded the Thermo Fisher – Czechoslovak Microscopy Society Felowship for young researchers



Experimental realization of an optical tractor beam.

E-beam writer: data preparation testing pattern.



CURRENTLY RUNNING LARGE PROJECTS

2021–2025 *Technology of production and scanning of a machine-readable element of the highest level of security.* M. Horáček, supported by the Ministry of Industry and Trade of the Czech Republic (MIC), European Regional Development Fund (ERDF)

2021–2025 *DEep brain photonic tools for cEll-type sPEcific taRgeting of neural diseases.* H. Uhlířová, supported by H2020

2021–2024 *TSCAC Two-species composite atomic clocks.* O. Číp, supported by EURAMET

2020–2022 *Non-Oberbeck-Boussinesq effects in turbulent convection in cryogenic helium at high Rayleigh numbers.* M. Macek, international project supported by the Czech Science Foundation

2020–2022 *Clock Network Services – Design Study.* O. Číp, supported by H2020

2020–2022 *Technology for advanced optics and its industrial application.* M. Šerý, supported by MIC

2020–2022 *National Infrastructure for Biological and Medical Imaging.* Z. Starčuk, supported by the Ministry of Education Youth and Sports of the Czech Republic (MEYS)

2019–2022 *IINSPIRE-MED INtegrating Magnetic Resonance SPectroscopy and Multimodal Imaging for Research and Education in MEDicine.* Z. Starčuk, supported by H2020-ITN

2019-2022 *Artificial Intelligence in Autonomous ECG Classification for On-line Telemedicine Platform.* F. Plešinger, supported by the National Centres of Competence program of the Technology Agency of the Czech Republic (TACR)

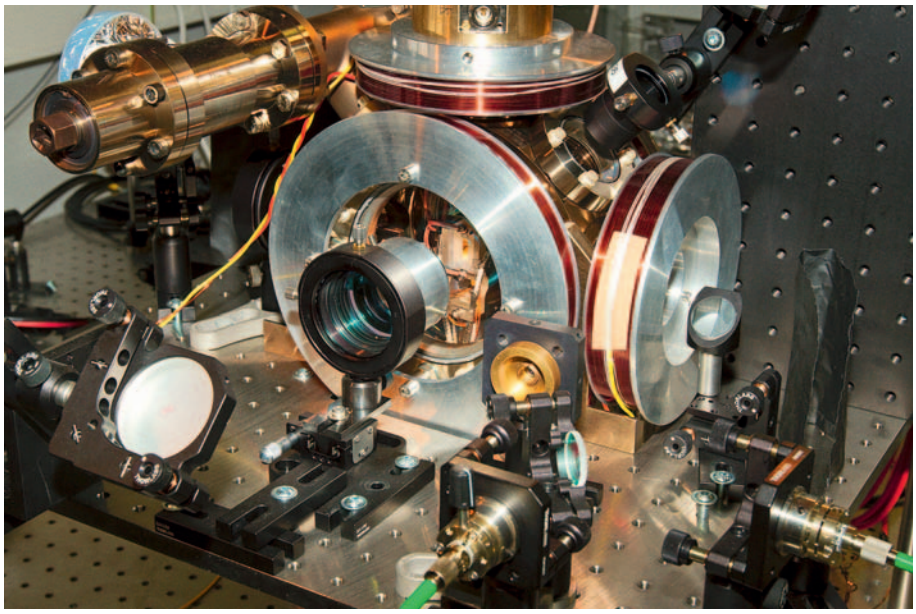
2019–2022 *Super-Pixels: Redefining the way we sense the world.* S. Simpson, supported by H2020-FET Open

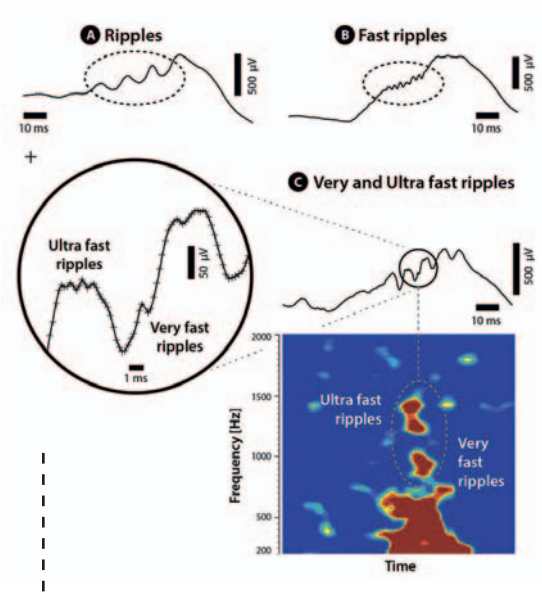
2019–2022 *18SIB06 TiFOON - Advanced time/frequency comparison and dissemination through optical telecommunication networks.* O. Číp, supported by EURAMET

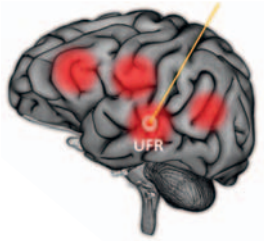
2019–2022 *High-tech cooling sample holder with integrated detection of electrons and control software for optimization of the thermodynamic conditions in the ESEM specimen chamber.* V. Neděla, supported by MIC

2019–2022 *Interdisciplinary Collaboration in Metrology with Cold Quantum Objects and Fibre Networks.* O. Číp, supported by MEYS, ERDF

Experimental arrangement of an ion trap for calcium ions oriented to the development of ultrastable laser optical frequency standard.

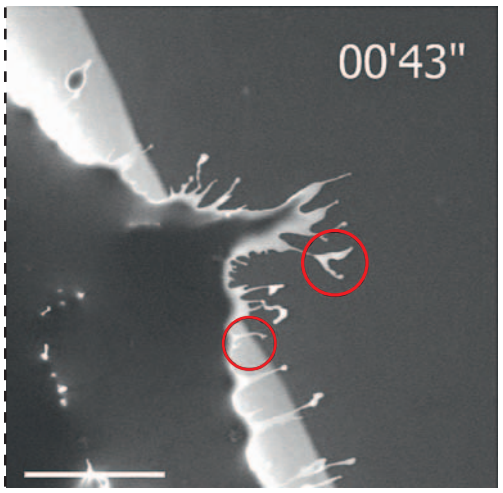


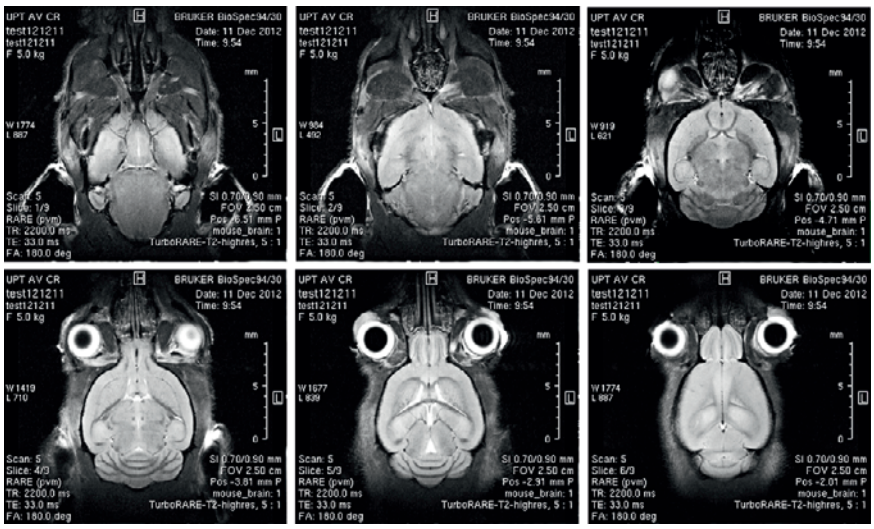




Ultra-fast ripples (UFR) in the epileptic brain show oscillation above 1000 Hz. UFRs occur only in the pathological region that is the origin of an epileptic seizure

Formation of brine "fingers" during slow evaporation of water from a frost flower. The individual fingers bending and flapping around are highlighted in circles. Imaged with the Environmental Scanning Electron Microscope (ESEM) AQUASEM II.





Anatomical image of a mouse brain obtained by magnetic resonance imaging.

2018–2022 *Centre of Electron and Photonic Optics.* I. Müllerová, supported by the National Centres of Competence program of the Technology Agency of the Czech Republic (TACR)

2017–2022 *Holographic Endoscopy for in vivo Applications.* T. Čižmár, supported by MEYS, ERDF

RECENT IMPORTANT ACHIEVEMENTS

2021 Novel three-dimensional imaging of macroscopic objects using holographic endoscope based on multimode optical fiber (T. Čižmár)

2021 Demonstration of a novel microscopic method combining environmental scanning electron microscopy with total internal reflection fluorescence microscopy (V. Neděla)

2020 Discovering novel titania and carbon-based nanostructured materials that can catalyze electrochemical reduction reactions – US patent application (E. Materna Mikmeková)

2020 VDI (Ventricular Dyssynchrony Imaging) technology for cardiac pacing optimization, The Czech Business Project of 2020, Ministry of Industry and Trade (P. Jurák)

2020 Demonstration of the ability of Raman optical tweezers to detect bacteriophages attacking a host bacterial cell virtually in real time (O. Samek)

2019 Demonstration of strong effect of superconducting transition in radiating thin layers of niobium nitride on heat transport by electromagnetic near field (V. Musilová)

2019 Publication of an unique database of thermal emissivities and absorptivities covering various materials and wide range of cryogenic temperatures

2019 Handheld detector of atrial fibrillation (F. Plešinger).

2019 Localization of epileptic areas in deep brain structures (P. Jurák)

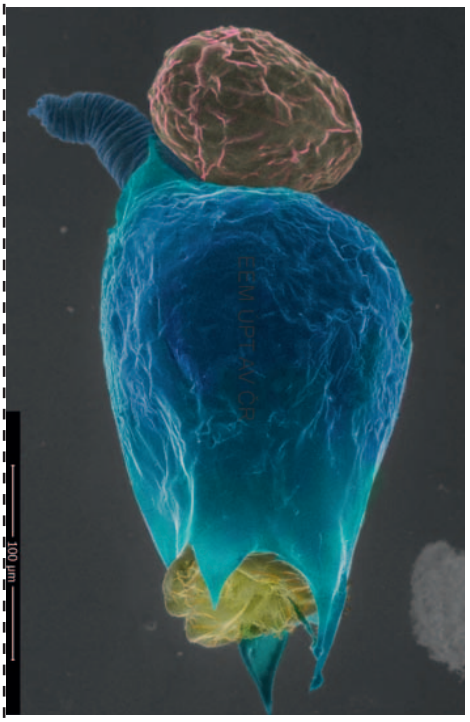
2019 Demonstration of coherent anti-Stokes Raman spectroscopy through multimode optical fibers for fiber-based chemical imaging (T. Čižmár)

2019 Localization of nanodiamonds inside cells (V. Krzyžánek)

2018 Demonstration of non-classicity of light emitted from a large number of atoms that were laser-cooled to the absolute zero as a key step towards scalable secure quantum communications (O. Číp)

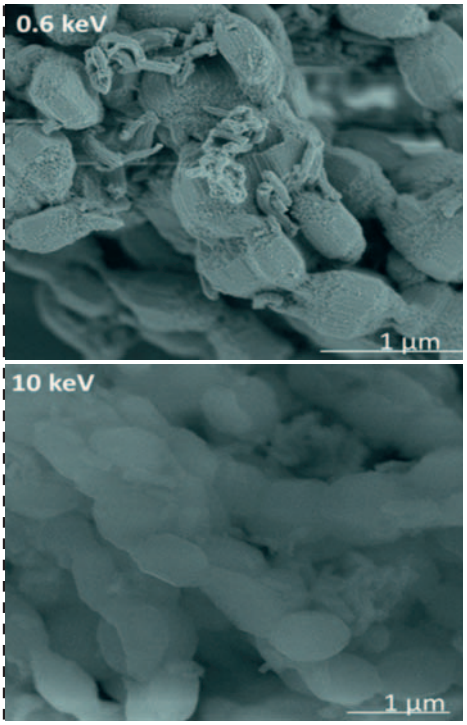
2018 Three-dimensional holographic optical manipulation through a high-numerical-aperture soft-glass multimode fiber (T. Čižmár)

2018 A comprehensive methodology covering automatic patient identification for cardiac resynchronization therapy (P. Jurák)



The world´s first image of planktonic microorganism Brachionus calyciflorus recorded using low-temperature method for ESEM and a new ionisation detector of secondary electrons. The image was colorized additionally.

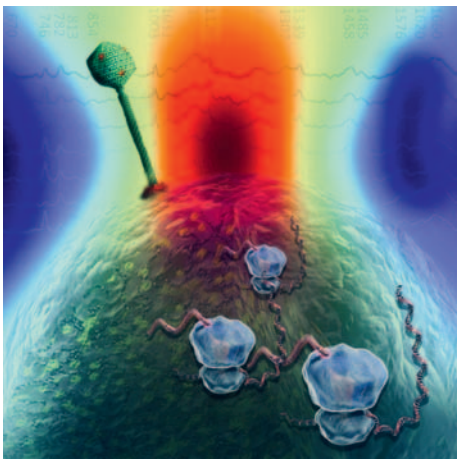
Structure of a mesoporous silica-based nanocomposite carrying catalytic gold nanoparticles, imaged by means of our method using low-energy electrons (top) and with a standard scanning electron microscope (bottom).



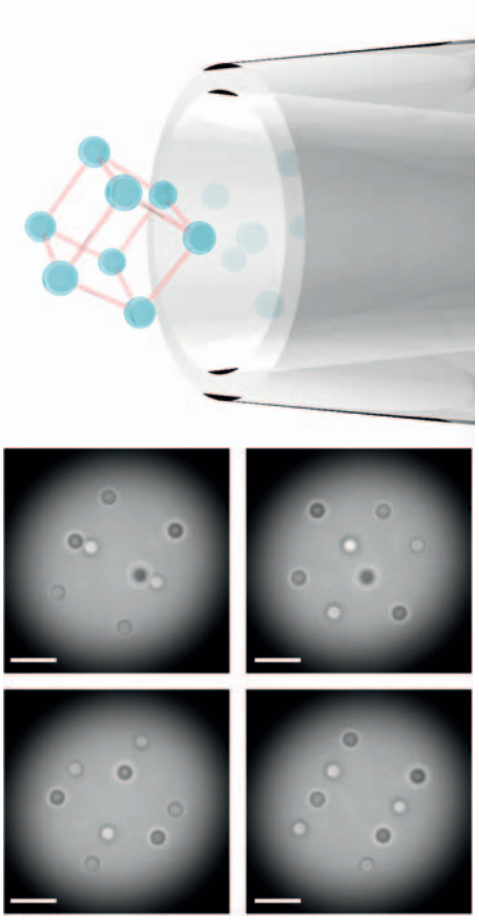
2018 Demonstration of mechanical effect of optical spin force on a vacuum levitating microobject (O. Brzobohatý)
2017 Demonstration of ultra-high frequency oscillations in the brain helping precise localization of the epileptic foci (P. Jurák)
2017 Demonstration of a novel method of transport of many microobjects by two-dimensional optical „ratchet" (P. Zemánek)
2017 Proof that the „frost flowers" do not contribute to the damage to Earth's ozone layer by the formation of aerosols (V. Neděla)
2017 Demonstration of a fast and precise methodology that employs machine learning algorithms to identify 277 bacterial *Staphylococus* strains by means of Raman microspectroscopy (O. Samek)
2017 Developed technology for manufacturing diffractive optical variable imaging device (DOVID) based on phyllotactic spiral arrangements (V. Kolařík)
2017 Experimental verification of the theoretical model for heat transfer by the near field affected by the superconducting transition (A. Srnka)
2016 Successful test of national photonic network for the transmission of signals of ultra-precise atomic optical clocks (O. Číp)
2016 SignalPlant – an open software platform providing methodological solutions for medical signal analysis (F. Plešinger)
2016 NMRScopeB for jMRUI v. 6.0 – a substantially expanded version of the simulator of quantum-mechanical behavior of coupled and relaxing systems of nuclear spins (Z. Starčuk)
2016 Prototype and clinical tests of a device for whole-body impedance monitoring of blood distribution and pressure wave spreading (P. Jurák)
2015 Demonstration of high-contrast images of single-layer and overlapped flakes of graphene using ultralow-energy electron microscopy (L. Frank)
2015 Experimental trapping and laser cooling of calcium ions (O. Číp)
2015 Development and testing of a new optical fiber-based sensor for detection of shape-deformations of nuclear power plant containment (B. Mikel)

RECENT HIGH-IMPACT PUBLICATIONS

- D. Stellinga, D. B. Phillips, S. P. Mekhail, A. Selyem, S. Turtaev, T. Čižmár, M. J. Padgett: *Time-of-flight 3D imaging through multimode optical fibers*. Science **374**, 1395–1399, 2021
- S. Li, S.A.R. Horsley, T. Tyc, T. Čižmár, D.B. Phillips: *Memory effect assisted imaging through multimode optical fibres*. Nature Communications **12**, 3751, 2021
- V. Svak, J. Flajšmanová, L. Chvátal, M. Šiler, A. Jonáš, J. Ježek, S.H. Simpson, P. Zemánek, O. Brzobohatý: *Stochastic dynamics of optically bound matter levitated in vacuum*. Optica **8**, 220–229, 2021
- A. Cifuentes, T. Pikálek, P. Ondráčková, R. Amezcua-Correa, J.E. Antonio-Lopez, T. Čižmár, J. Trägårdh: *Polarization-resolved second-harmonic generation imaging through a multimode fiber*. Optica **8**, 1065–1074, 2021
- A. Jonáš, Z. Pilát, J. Ježek, S. Bernatová, P. Jedlička, M. Aas, A. Kiraz, P. Zemánek: *Optically transportable optofluidic microlasers with liquid crystal cavities tuned by the electric field*. ACS Applied Materials & Interfaces **13**, 50657–50667, 2021
- K. Curila, P. Jurák, M. Jastrzebski, F. Prinzen, P. Waldauf, J. Halámek, K. Vernooy, R. Smíšek, J. Karch, F. Plesinger, P. Moskal, M. Susánková, L. Znojilová, L. Heckman, I. Viscor, V. Vondra, P. Leinveber, P. Osmančik: *Left bundle branch pacing compared to left ventricular septal myocardial pacing increases interventricular dyssynchrony but accelerates left ventricular lateral wall depolarization*. Heart Rhythm **18**(8), 1281–1289, 2021
- Y. Arita, S.H. Simpson, P. Zemánek, K. Dholakia: *Coherent oscillations of a levitated birefringent microsphere in vacuum driven by nonconservative rotation-translation coupling*. Science Advances **6**, eaaz9858, 2020

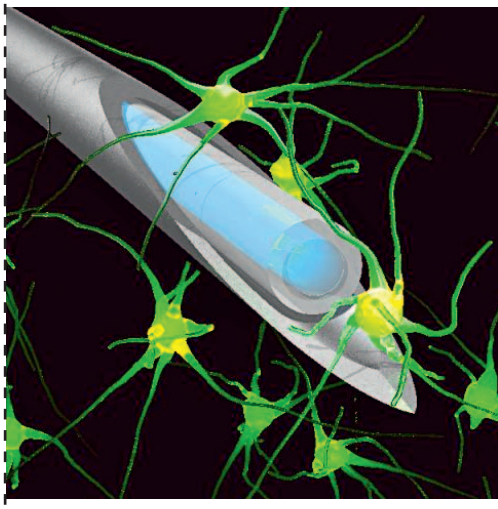


Schematic illustration of a bacteriophage attacking a bacterial cell and the real-time monitoring of the process of infection by Raman tweezers.



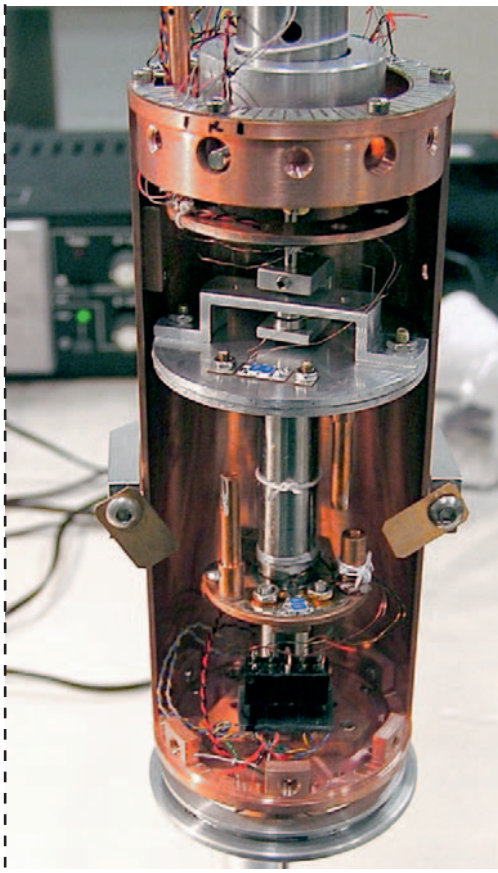
Schematic view of eight microparticles optically trapped near the tip of an optical fiber (top). Eight particles as shown above forming a rotating 3D cube (bottom). Scale bar 10 micrometers.

- L. Peter-Derex, P. Klimeš, V. Latreille, S. Bouhadoun, F. Dubeau, B. Frauscher: *Sleep disruption in epilepsy: Ictal and interictal epileptic activity matter.* Annals of Neurology **88**, 907–920, 2020
- T. Zhang, J. Low, J. Yu, A. M. Tyryshkin, E. Mikmeková, T. A. Asefa: *Blinking mesoporous TiO(2-x)composed of nanosized anatase with unusually long-lived trapped charge carriers*. Angewandte Chemie **59**, 15000–15007, 2020
- P. Zemánek, G. Volpe, A. Jonáš, O. Brzobohatý: *Perspective on light-induced transport of particles: from optical forces to phoretic motion*. Advances in Optics and Photonics **11**, 577–678, 2019
- K. J. Abrams, F. Mika, S. Krátký, Z. Pokorná, I. Konvalina *et al.: Making sense of complex carbon and metal/carbon systems by secondary electron hyperspectral imaging.* Advanced Science **6**, 1900719, 2019
- M. G. Donato, O. Brzobohatý, S. H. Simpson, A. Irrera, A. A. Leonardi, M. J. Lo Faro, V. Svak, O. M. Maragò, P. Zemánek: *Optical trapping, optical binding, and rotational dynamics of silicon nanowires in counter-propagating beams.* Nano Letters **19**, 342-352, 2019
- P. Nejedlý, J. Cimbálník, P. Klimeš. F. Plešinger, J. Halámek, V. Křemen, I. Viščor *et al.*: *Intracerebral EEG artifact identification using convolutional neural networks*. Neuroinformatics **17**, 225-234, 2019
- T. Obšil, A. Lešundák, M. T. Pham, G. Araneda, M. Čížek. O. Číp, R. Filip, L. Slodička: *Multipath interference from large trapped ion chains*. New Journal of Physics **21**, 093039, 2019
- E. Dražanová, J. Rudá-Kučerová, L. Krátká, T. Štark, M. Kuchař, M. Maryška, F. Drago, S. Starčuk jr., V. Micale: *Different effects of prenatal MAM vs. perinatal THC exposure on regional cerebral blood perfusion detected by Arterial Spin Labelling MRI in rats*. Scientific Reports **9**, 6062, 2019
- L. Vetráková, V. Neděla, J. Runštuk, D. Heger: *The morphology of ice and liquid brine in an environmental scanning electron microscope: a study of the freezing methods*. Cryosphere **13**, 2385-2405, 2019
- A. Knápek, D. Sobola, D. Burda, A. Daňhel, M. Mousa, V. Kolařík: *Polymer graphite pencil lead as a cheap alternative for classic conductive SPM probes*. Nanomaterials **9**, 1756, 2019
- I. Leite, S. Turtaev, X. Jiang, M. Šiler, A. Cuschieri, P. Russell, T. Čižmár: *Three-dimensional holographic optical manipulation through a high-numerical-aperture soft-glass multimode fibre.* Nature Photonics **12**, 33-39, 2018
- V. Svak, O. Brzobohatý, M. Šiler, P. Jákl, J. Kaňka, P. Zemánek, S. H. Simpson: *Transverse spin forces and non-equilibrium particle dynamics in a circularly polarized vacuum optical trap*. Nature Communications **9**, 5453, 2018
- S. Turtaev, I. Leite, T. Altwegg-Boussac, J. Pakan, N. Rochefort, T. Čižmár: *High-fidelity multimode fibre-based endoscopy for deep brain in vivo imaging.* Light: Science & Applications **7**, 92, 2018
- J. Damková, L. Chvátal, J. Ježek, J. Oulehla, O. Brzobohatý, P. Zemánek: *Enhancement of the 'tractor-beam' pulling force on an optically bound structure.* Light: Science & Applications **7**, 17135, 2018
- D. Boonzajer Flaes, J. Stopka, S. Turtaev, J. De Boer, T. Tyc, T Čižmár: *Robustness of light-transport processes to bending deformations in graded-index multimode waveguides*. Physical Review Letters **120**, 233901, 2018
- M. Šiler, L. Ornigotti, O. Brzobohatý, P. Jákl, A. Ryabov, V. Holubec, P. Zemánek, R. Filip: *Diffusing up the hill: Dynamics and equipartition in highly unstable systems.* Physical Review Letters **121**, 230601, 2018
- P. Obšil, L. Lachman, M.-T. Pham, A. Lešundák, V. Hucl, M. Čížek, J. Hrabina, O. Číp, L. Slodička, R. Filip: *Nonclassical light from large ensembles of trapped ions.* Physical Review Letters **120**, 253602, 2018
- T. Králík, V. Musilová, T. Fořt, A. Srnka: *Effect of superconductivity on near-field radiative heat transfer*, Physical Review B **95**, 060503, 2017
- S. H. Simpson, P. Zemánek, O. M. Marago, P. H. Jones, S. Hanna: *Optical binding of nanowires.* Nano Letters **17**, 3485-3492, 2017



An artist's impression of endoscopic imaging of neurons in the brain using an optical fiber inserted in a hypodermic needle.

ISI-built apparatus for measurement of thermal conductivity of insulating materials for cryogenics under different mechanical loads



RECENT PATENTS AND UTILITY MODELS

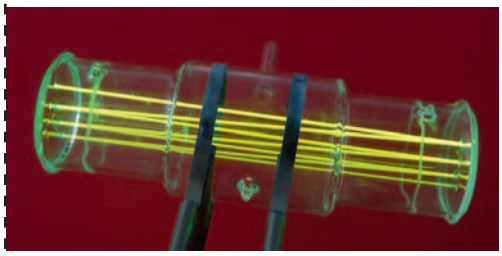
- J. Hrabina, M. Jelínek, B. Mikel, M. Holá, O. Číp, J. Lazar: *Optical frequency reference unit for linear absorption spectroscopy containing a hollow-core microstructured optical fibre.* ISI CAS, v.v.i., 2019. Utility model number: 33481
- P. Jurák, P. Andrla, *et al.*: *Device for surface mapping of electrical potential caused by cardiac activity with a set of electrodes for placement in orthogonal coordinates*. ISI CAS, v.v.i. & partners, 2019. Utility model number: 33326
- E. Mikmeková, L. Frank, I. Müllerová, J. Sýkora, P. Klein, *et al.*: *Electron microscope sample holder.* ISI CAS, v.v.i., 2019. Utility model number: 33509
- L. Mrňa, P. Jedlička, H. Šebestová, P. Horník: *Devices for monitoring continuous laser beam welding and devices for continuous laser beam welding*. ISI CAS, v.v.i., 2019. Utility model number: 33227
- P. Jurák, *et. al.*: *Method of EKG signal processing and apparatus for performing the method*. ISI CAS, v.v.i. & partners, 2018. Patent number: US9949655
- M. Horáček, V. Kolařík. *Optically variable imaging device and method of its preparation.* ISI CAS, v.v.i., 2017. Patent number: CZ 306956 B6
- V. Vondra, P. Jurák, *et al.*: *Device for blood flow property measurement and method of its connection.* ISI CAS, v.v.i., 2015. Patent number: US9167984

MASTERED TECHNOLOGIES

- Ventricular Dyssynchrony Imaging (P. Jurák)
- Deposition of optical thin films by electron beam evaporation (P. Pokorný)
- Deposition of systems of thin films for extreme ultraviolet and RTG optical components by magnetron sputtering (T. Fořt)
- Manufacturing of nanostructures by electron beam writing and reactive ion etching (V. Kolařík, M. Šerý)
- Soft-lithography for microfluidic chips (J. Ježek)
- Two-photon polymerization (P. Jákl)
- Liquefaction of helium (A. Srnka)
- Electron-beam welding of parts from different metals (M. Zobač)
- Laser-beam cutting and welding (L. Mrňa)
- Electron microscopy and microanalysis (F. Mika)
- Production of cuvettes filled with ultrapure gases for precise spectroscopy and metrology (J. Lazar)
- Magnetic resonance tomographic imaging (Z. Starčuk)
- High-voltage electronics (M. Zobač)
- Measurement of thermal radiative properties of materials in the range from 10 K to 300 K for cryogenic and space applications (A. Srnka)
- Optical micromanipulation with various types of microobjects and microorganisms (O. Brzobohatý, O. Samek)
- Contactless characterization of living microorganisms by Raman microspectroscopy (O. Samek)
- Optical imaging and spectroscopy through multimode optical fibers (T. Čižmár)
- On-demand design and construction of scientific instruments or their parts

HISTORY OF ISI

2009 Establishment of the Applied Laboratories of ISI (ALISI)
2007 ISI transformed to the Public Research Body (v.v.i.)



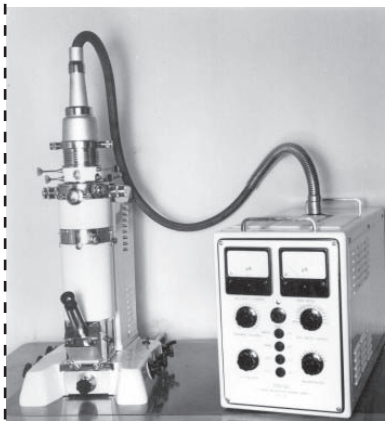
An absorption cell filled with iodine gas, equipped with internal mirrors, designed for applications in ultraprecise nanometrology. Yellow fluorescent paths visualize multiple passages of a laser beam.

Entrance to the Applied Laboratories of ISI (ALISI).

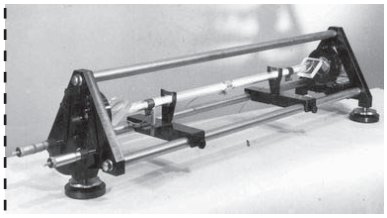
1993 Academy of Sciences of the Czech Republic established as the Czech successor of the former Czechoslovak Academy of Sciences
1961–1990 Armin Delong served as the director of ISI
1960 Laboratory of Electron Optics and Laboratory of Industrial Electronics joined ISI in its new building
1957 Development Workshop of the Czechoslovak Academy of Sciences (DWCAS) renamed the Institute of Scientific Instruments (ISI)
1953 Establishment of DWCAS

REMARKABLE ACHIEVEMENTS IN THE PAST

2013 Experimental demonstration of an optical tractor beam and its applications in optical sorting and binding
2012 Identification of the local crystallographic orientation from the reflectance of very slow electrons
2012 Novel methodology and instrumentation for contactless calibration of gauge blocks
2011 Experimental determination of heat transfer efficiency in natural turbulent convection at high Rayleigh numbers in cold helium gas
2009 Novel sample nanopositioning system for nanometrologic AFM using interferometric measurement in all six degrees of freedom (axial motions and angle deviations)
2009 Original approach for the calculation of aberration coefficients using the results of accurate electron ray tracing
2008 Novel laser nanocomparator for the calibration of length sensors, in cooperation with the Mesing company and the Czech Metrology Institute
2007 Prototype of an original electron-beam welding machine for Focus GmbH
2005 The world's first concept of an optical conveyor belt was presented and demonstrated, in cooperation with University of St. Andrews (UK)
2004 Development of a new experimental apparatus for the measurement of low-temperature radiative properties of materials used in cryogenics
2004 Development of various nanocomposite coatings used as hard solid lubricants, in cooperation with Masaryk University, Aarhus University Denmark, University of West Bohemia in Pilsen, Czech Technical University in Prague, Brno University of Technology, Euroconsult and the Institute of Electrical Engineering of the Slovak Academy of Sciences
2004 New ESEM AQUASEM II
2004 New method of length measurement with sub-nanometer resolution using an optical cavity
2000 New type of scanning electron microscope using very slow electrons
1990 The first Czechoslovak ESEM, AQUASEM I
1987 The first Czechoslovak ultra-low loss cryostat for nuclear magnetic resonance (NMR) magnets
1987 Original setup of iodine-stabilized HeNe laser for metrological purposes
1985 The first electron beam lithograph in the Eastern Block developed at ISI and commercialized by the TESLA company
1978 The first Czechoslovak Fourier NMR spectrometer
1976 Scanning electron microscope with a cold-field emission gun
1972 The first Czechoslovak superconducting magnet for NMR
1971 Gold medal at the International Brno Fair for laser interferometric system LA3000 developed at ISI and produced by the Metra Blansko company
1966 NMR spectrometers commercially produced by the TESLA company
1965 The first Czechoslovak ruby laser
1963 The first Czechoslovak HeNe laser
1960 The first Czechoslovak NMR spectrometer (30 MHz)
1959 Transmission electron microscope (TEM) with resolution below 1 nm
1958 Gold medal at the Brussels World's Fair EXPO58 for the table-top TEM
1954 The world's first table-top TEM developed at the Laboratory of Electron Optics (LEO)
1951 Tesla BS 241 – the first Czechoslovak commercial TEM developed at LEO and TESLA company
1950 The first Czechoslovak TEM developed at LEO



The first table-top transmission electron microscope developed at the predecessor of ISI in 1954 and produced by TESLA Brno.



The first HeNe laser built in Czechoslovakia, operating at the wavelength of 633 nm.

ISI in 60 years and 4 seasons
Diffractive optically variable image device based on a patented approach taking advantage of spiral cross grating arrangements (quasiperiodic phyllotaxy model). The single device is captured at four different lighting conditions demonstrating its outstanding potential of image variability.