CEITEC
MASARYK UNIVERSITY

CEITEC
Masaryk University

Centre of excellence and the flagship of Czech life science research

ABOUT CEITEC

We are improving quality of life and human health through scientific research and innovations

CEITEC (Central European Institute of Technology) is a young and dynamic interdisciplinary research centre that is focused on life sciences, advanced materials, and nanotechnologies. Its success can be attributed not only to its modern, efficiently managed state-of-the-art laboratories, but also to its people. The centre employs excellent researchers from all over the world who are committed to fulfilling CEITEC's mission of improving quality of life and human health. CEITEC strives to provide a supportive and stimulating environment, with many opportunities to discuss and develop ideas, as well as a culture of open communication and equal opportunities.

Since its foundation in 2011, the centre has quickly grown to a considerable size and has made an immediate impact. The research centre attracts top EU grants and has managed to develop its reputation as a centre of excellence. CEITEC performs among the best science institutes in the Czech Republic, and is above average on the European level. The institute employs excellent scientists from all over the world and is raising a new generation of researchers in its international PhD School. To maintain the high international standards of quality in research, CEITEC is regularly evaluated by the International Scientific Advisory Board (ISAB).

With an annual budget of nearly 30 million euros and investments that exceed 200 million euros, the institution has been successful in its aim of being an integral part of the top scientific networks in its related fields. CEITEC is located in the city of Brno, in the heart of Europe, where Gregor Mendel once laid down the foundation of modern genetics, and is surrounded by top educational institutions, including Masaryk University, Brno University of Technology, and Mendel University, with access to over 60,000 students. CEITEC actively collaborates with leading international universities, research institutes, private companies, and public organisations.

From an ambitious dream to a successful research centre with an international reputation

The CEITEC consortium was born as a project. On 6 June 2011, the Central European Institute of Technology (CEITEC) project was officially approved. Some years before, a group of science enthusiasts from Brno had the ambitious dream to establish a scientific multidisciplinary centre of excellence, which would connect the best scientific teams from **six major Brno-based universities and research institutions** and which would be able to attract foreign scientific talents to Brno. The CEITEC consortium consists of CEITEC Masaryk University led by Jiri Nantl, CEITEC Brno University of Technology led by Radimir Vrba, CEITEC Mendel University led by Jan Zouhar, CEITEC Veterinary University Brno led by Jiri Smola, CEITEC Institute of Physics of Materials of the Academy of Sciences of the Czech Republic led by Lubos Nahlik, and CEITEC Veterinary Research Institute led by Martin Anger.

When the project application was submitted 11 years ago, CEITEC was just a large pile of papers containing a well-elaborated plan of the local scientific community. The main initial financial resources came from the European Commission, with additional support from the Czech Ministry of Education, Youth and Sports, where CEITEC received 208 million EURO to fund a Centre of Research Excellence.

Today, CEITEC, with its modern buildings and state-of-the-art laboratories, is an important research centre in the South Moravian region and is gradually becoming a respected player on an international level. The first director of the CEITEC consortium was Tomas Hruda, followed by Markus Dettenhofer. Pavel Tomancak, a renowned evolutionary and developmental biologist, who has been leading his own research group at the prestigious Max Planck Institute in Dresden for fifteen years, became the new director on 1 February 2021,

The progressive research institute has managed to build a strong brand, which is resonating throughout Europe. In only 10 years, CEITEC has become known for its high-quality, socially relevant basic research, but also thanks to its professional institutional management, emphasis on the quality of the working environment and its determination to constantly learn and improve. Once only a dream, CEITEC gradually developed itself into a successful science centre with a steadily growing international reputation.

The multidisciplinary nature of the CEITEC institute and the extent to which the fields of life sciences, advanced materials, and nanotechnologies are integrated make it the first research centre of its kind in the Czech Republic. Researchers at CEITEC work in eight areas of research: **molecular medicine**, **structural biology, genomics and proteomics of plant systems, brain and human mind research, molecular veterinary medicine, advanced nano and microtechnology, advanced materials, technical cybernetics, instrumentation and systems integration.** The role of the consortium executive director Pavel Tomancak is to bring the partners of this highly interdisciplinary scientific centre together and to help build bridges between the diverse research programmes ranging from nanotechnology and materials science to molecular biology to biomedicine.

Today, the CEITEC consortium employs more than **1,400 people** from more than **45 countries**, who are working on about **300 currently running scientific projects**. Every year, CEITEC scientists publish around **500 scientific publications**, more than half of which were in Q1 journals.

The success of the centre directly depends on the highly skilled people with foreign experience who work here, and on its state-of-the-art scientific equipment, which is hard to find within a single organization. CEITEC provides open access to 13 core facilities equipped with the latest technologies. Top instruments are accessible not only to researchers from CEITEC, but also to external users from the academic and private sectors, with the opportunity to take advantage of the unique expertise that the heads of shared laboratories possess. The state-of-the-art equipment would be useless without the highly skilled and motivated people. **CEITEC Masaryk University is the largest of all consortium partners and focuses on the area of life sciences.**

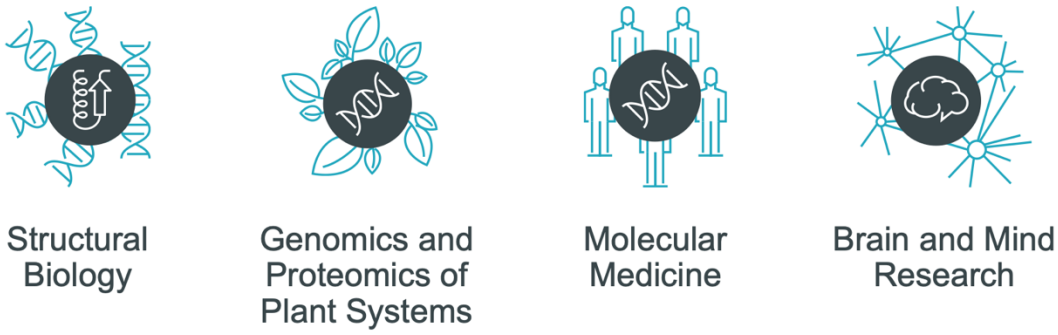
ABOUT CEITEC MASARYK UNIVERSITY

CEITEC Masaryk University (MU) is the largest partner of the CEITEC consortium and at the same time the flagship of Masaryk University. Masaryk University is the second-largest university in the Czech Republic. At present, it comprises ten faculties with over 200 departments, including several institutes and clinics. Masaryk University is recognized as one of the most important teaching and research institutions in the Czech Republic and it has been infused with a strong democratic spirit ever since its establishment in 1919. The CEITEC MU building was built in 2014 and is located at the Brno Bohunice campus.

In 2021, scientists from CEITEC MU worked on 170 life science projects and their research results made a significant contribution to improving the quality of human life and health. CEITEC Masaryk University employs about 500 people from 35 countries, who are contributing to the success of the institute. In 2021, CEITEC MU researchers published over 300 articles in prestigious peer-reviewed scientific journals, 63% of which were in Q1 journals and 39 publications were in T5. 41% of all publications had a corresponding author affiliated with CEITEC MU.

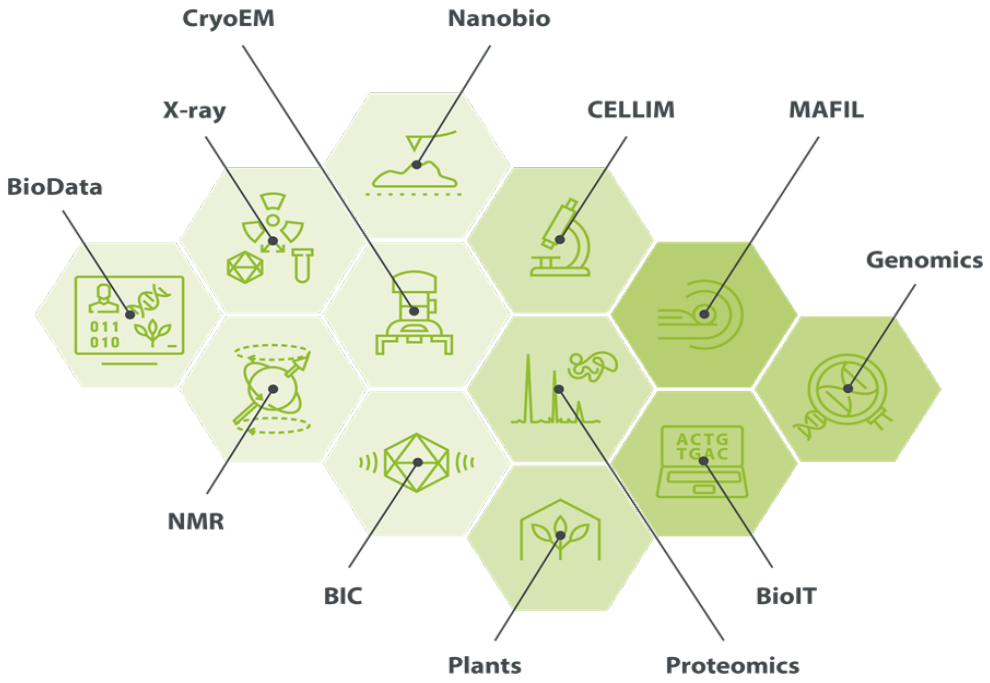
Organisational structure

273 (FTE) researchers work across 29 research groups that are thematically grouped into four research programmes: structural biology led by Richard Stefl, molecular medicine led by Sarka Pospisilova, genomics and proteomics of plant systems led by Jiri Fajkus, and brain and mind research led by Irena Rektorova. The research group leaders and postdoctoral fellows supervise 241 PhD students, of whom more than half come from abroad.



CEITEC MU provides open access to 12 shared laboratories that are equipped with cutting-edge technology. High-end instrumentation is accessible not only to CEITEC researchers, but also to external users from the academic and private sectors. The core facilities include:

- Cryo-Electron Microscopy and Tomography Core Facility
- Josef Dadok National NMR Centre
- Proteomics Core Facility
- X-ray Diffraction and Bio-SAXS Core Facility
- Biomolecular Interactions and Crystallization Core Facility
- Nanobiotechnology Core Facility
- Multimodal and Functional Imaging Laboratory
- Genomics Core Facility
- Cellular Imaging Core Facility
- Plant Sciences Core Facility
- Bioinformatics Core Facility
- Biological Data Management and Analysis Core Facility



Institutional management and HR policy

Since its establishment, CEITEC MU has considered people to be the most important factor for building a successful research centre and carrying out high-quality research. Having top-end infrastructure, modern premises and budget allocation means nothing without quality people and their inputs. CEITEC MU has been proud holder of the HR Excellence in Research Award since January 2019.

Constantly looking for improvements in HR management and development, CEITEC MU drafted the HR Strategy and Action Plan, implementing the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. The HR Strategy aims to bring significant progress in HR management in research by implementing modern HR principles suitable for the academic environment and complying with the European Charter and Code.

The Action Plan specifies priorities and actions for the upcoming five years (2018–2023) with self-evaluation (2021) and external review (2024) as components of their implementation. The HR Strategy and Action Plan are concentrating on the areas of recruitment and onboarding, career system, supervision and training, working conditions, cultivation of internal culture and governance, diversity management, internationalization and gender equality.

In April 2019, CEITEC MU adopted a new Career System. The Career System formalises and specifies the principles that are internationally applied at life science institutes. It prevents the inheritance of research groups, and incorporates measures against inbreeding. The norm regulates the principles and prerequisites of career advancements, career development, and career changes for employees working at CEITEC MU.

In January 2021, CEITEC MU adopted a new Recruitment Policy that serves as a tool for scientific excellence. The research output of every research group is mostly influenced by the skill set and motivation of its lab members. The aim of the new Recruitment Policy is to attract, motivate and retain the best possible candidates for any given research position, based solely on merit and best-fit with the values and strategic goals of the institute.

In April 2022, CEITEC MU adopted a new Leadership Policy. Most experts agree that exceptional leaders make time to develop their own craft. Good leaders emerge by developing their natural talents, and CEITEC´s new Leadership Policy provides several practical tools that help CEITEC´s leaders to evaluate and to develop their leadership skills and also to inspire, develop and empower their team members.

CEITEC MU coordinates the international consortium Alliance4Life. This international partnership of leading life science research universities and institutes based in Central and Eastern Europe is committed to improving the institutional management of its members and increasing the innovation potential in the widening countries. CEITEC MU is also a partner of the international consortium EU-LIFE, which connects 15 leading European biomedical research institutions that advocate excellent research in Europe. The active involvement in both those alliances greatly contributed to the institute's success in the area of modern institutional leadership and management.

MUNI | CEITEC

OUR VISION

What we aspire to be

Leading European research institute in life sciences, known for its discoveries.

OUR MISSION

Who we are

CEITEC MU is a research institute of Masaryk University and a member of the CEITEC consortium that aims to improve quality of life and human health through scientific innovations.

OUR VALUES

What defines us

- Curiosity
- Scientific independence
- Collaboration
- Knowledge sharing
- Integrity
- Inclusiveness

OUR STRATEGIC PRIORITIES

What matters to us

- Excellent research
- Societal relevance and recognition
- Governance and human resources
- Research infrastructure
- Supporting future leaders in research

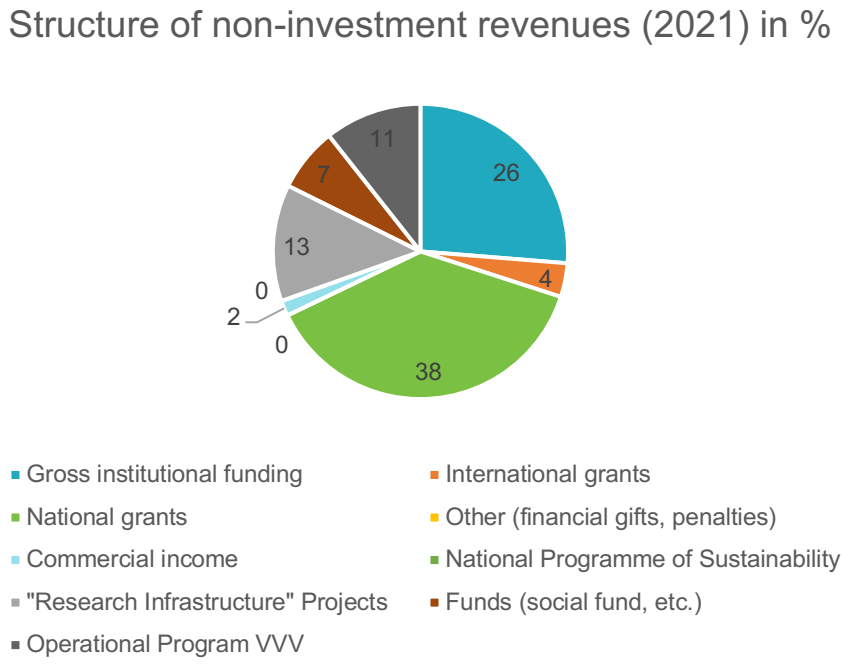
OUR PROFILE TOPICS

What we work on

- Harnessing knowledge of plant biology for crop improvement
- Infectious diseases
- RNA/nucleic acids in health and disease
- Correlative approaches to connect dynamics and structure of living systems
- Cancer biology
- Brain disorders

Funding strategy

National grant schemes are at present, and most probably will be in future, the single most important type of research funding available. CEITEC MU must keep the current rate of acquiring national grants. However, CEITEC MU fully supports, and will strongly encourage, group leaders aspiring for **prestigious individual grants**, which bring holders incomparably greater international visibility and reputation. Major individual research grants (such as ERC, ERC-CZ, GAČR EXPRO, etc.) represent optimal convergence between scientific excellence and financial sustainability.



A decision by an external funding provider to place a bet with a significant amount of money (approximately 10 mil CZK a year) on a scientific plan strongly demonstrates the credibility, viability and competitiveness of a research group´s plan, and represents an additional form of independent external evaluation. CEITEC MU should aspire to achieve the level where cumulatively about one-half of its research groups would hold such major individual grants by 2028, perhaps by stating a formal expectation that a senior group leader should regularly submit a proposal for a major individual grant every five years.

Institutional grants are essential in supporting research infrastructure and strategic development initiatives. CEITEC MU will have the ambition to undertake large-scale projects in the fields of virology and bacteriology, as well as within Masaryk University's aim of establishing The BioPharma Hub at the university campus.

Research highlights

In September 2021, CEITEC (MU) adopted a new Strategic Plan that set the direction of its research for the next seven years. The new strategic plan is driven by the ambition to climb to the top and become one of Europe´s leading research institutes, which will be famous for its own discoveries, high-quality scientific publications and for the education of the science stars of the future.

The new strategic plan clearly sets out profile topics that are cleverly combining the institute's strengths with global challenges as well as with regional opportunities. The profile topics combine the efforts of several research groups and are defined on the basis of the existence of the so-called critical mass, including frontier technologies that will lead to a tangible socio-economic impact and innovative applications. The formulation of profile topics is important for shaping the institute's profile, for guiding further development of research infrastructure and strategic partnerships, as well as for providing a framework for future large-scale institutional projects.

In the next seven years, CEITEC MU will focus mainly on **RNA / nucleic acid research, cancer biology, brain disorders, infectious diseases, harnessing knowledge of plant biology for crop improvement, as well as correlative approaches to connect the dynamics and structure of living systems.** The well-thought-out plan of CEITEC MU also contains a corresponding strategy for the development and management of research infrastructures and a grant strategy to secure necessary financing for the intended activities.

CEITEC MU acknowledges every year the involvement and scientific contribution of its researchers to the excellent research and good reputation of our institute with the CEITEC AWARD. In 2021, the award for exceptional scientific contribution was awarded to the following research groups: Jiri Fajkus Research Group, Karel Riha Research Group, Marek Mraz Research Group, Pavel Plevka Research Group, and Sarka Pospisilova Research Group.

Petr Fajkus and Jiri Fajkus were awarded for their publication in Nucleic Acid Research

Telomere biology is a hot research topic due to its relevance to cellular aging and immortality, but also due to its role in genome stability and the development of serious human diseases, including cancer. The team of authors led by Petr and Jiri Fajkus, significantly expanded the range of organisms with known RNA subunit telomerase and herewith clarified the common origin of telomerase RNAs in plants, algae and even in more evolutionarily distant single-celled organisms, such as ciliates or diatoms. Their study went further into the past and also deeper into the roots of the phylogenetic tree of eukaryotes. Their ground-breaking research results have provided entirely new insights into the evolution of key eukaryotic non-coding RNAs spanning more than a billion years back in time, and were published in the prestigious scientific journal Nucleic Acids Research.

Vivek Raxwal and Karel Riha were awarded for their publication in The Plant Cell

A team of scientists, led by Karel Riha from CEITEC Masaryk University, recently discovered that proteins involved in RNA quality control play a much more complex role in the regulation of gene expression than previously thought. The researchers unravelled the sophisticated connection between

nonsense mediated RNA decay (in short, “NMD”), and pathogen defence that takes place in the model plant, Arabidopsis thaliana. The team revealed that the NMD protein, UPF1, plays a central role in several gene regulatory mechanisms, including splicing and translation, and fine tunes the production of plant immune receptors. Their findings pave a way for new strategies that generate crops with improved pest resistance. Their study was published in July 2020 in the scientific journal, The Plant Cell.

Sonali Sharma and Marek Mraz were awarded for their publication in Blood

Sonali Sharma and her colleagues from Marek Mraz laboratory have shown that a short RNA molecule called miR-29 coordinates the activation of a pathway essential for cell proliferation and aggressiveness in B-cell leukaemia. CD40 signalling or T-cell interaction is one of the critical factors for the proliferation of malignant B-cells. This study provides a better understanding of the regulation of this pathway and could help in improving the current therapeutic approaches in chronic lymphocytic leukaemia or other B-cell malignancies. The research findings open up the possibility to use microRNAs as therapeutic targets and explain why drugs that block BCR signalling also block the B – T cell interactions. This study was published in the scientific journal Blood.

Karel Skubnik and Pavel Plevka were awarded for their publication in Science Advances

Karel Skubnik and his colleagues, led by structural virologist Pavel Plevka, described the mechanism of genome release of honeybee viruses. The research team disproved the previous hypothesis regarding the infection process that takes place during the invasion of the host cells. These remarkable results were achieved thanks to the combination of cryo-electron microscopy and protein simulations performed by the research group of Robert Vacha. The study was published in January 2021 in the scientific journal Science Advances.

Jitka Malcikova, Sarka Pavlova and Sarka Pospisilova were awarded for their publication in Blood

A research team from CEITEC Masaryk University (MU) and from the University Hospital Brno (UHB), led by professor Sarka Pospisilova, clarified the clinical significance of mutations in a key tumour suppressor called TP53, which serves as a central defender of cells against cancer. This breakthrough scientific work was mainly possible thanks to the long-term collaboration between researchers Jitka Malcikova and Sarka Pavlova with a team of doctors from the Department of Internal Haematology (UHB) and Oncology led by professor Michael Doubek. The research results were published in the scientific journal Blood.

ERC grant holders and EMBO members

Our researchers are working on about 300 research projects financed by Horizon 2020, Horizon Europe, Czech Science Foundation and other funding agencies. Among the most prestigious are the ERC grants awarded to the most innovative researchers by the European Research Council. CEITEC Masaryk University have hosted 5 ERC grantees during its short existence, and an additional 3 ERC grantees have been hosted at CEITEC Brno University of Technology. The following ERC grants were and are being implemented at CEITEC MU:

- Pico Structure ERC Starting Grant coordinated by Pavel Plevka from 2014 – 2019
- DECOR ERC Starting Grant coordinated by Richard Stefl from 2015 – 2020
- LeukemiaEnviron ERC Starting Grant coordinated by Marek Mraz from 2019 – 2024
- PeptideKillers ERC Excellent Science coordinated by Robert Vacha from 2022 – 2026
- BioPhage ERC Consolidator coordinated by Pavel Plevka from 2023 – 2027

CEITEC Masaryk University is proud to have six EMBO members within its scientific community. Besides Sarka Pospisilova, who has been elected in 2022, the director of CEITEC consortium Pavel Tomancak has been an EMBO member since 2016, followed by the election of Mary O´Connell in 2017, Stepanka Vanacova in 2018, Karel Riha in 2020, and Jiri Fajkus in 2021. There are currently 12 EMBO members employed in the Czech Republic, and half of them are affiliated with CEITEC and Masaryk University.

Raising the new generation of scientists

PhD students studying at the international CEITEC PhD School have access to state-of-the-art research infrastructure and **education in the interdisciplinary scientific community in English**. The PhD school is based on the so-called **"Principles for Innovative Doctoral Training" issued by the European Commission** in order to unify the quality of European doctoral studies. Students in this doctoral programme, which is rather unique from a national perspective, receive support from mentors and are systematically guided to the successful and timely completion of doctoral studies.

The CEITEC PhD School introduced innovative international standards into doctoral education in the Czech Republic and this model subsequently shaped doctoral studies at CEITEC MU but also inspired and influenced other parts of Masaryk University and even other universities in the Czech Republic and abroad. In 2014, when the CEITEC PhD school was founded, it represented a completely unique concept of doctoral education in the Czech Republic.

Teaching at the CEITEC PhD school takes place entirely in English**, the curriculum includes subjects aimed at the development of soft and transferable skills,** students are guaranteed a significantly higher income than the state subsidy, **supervisors are obliged to support the career development of students, and a transparent system of regular independent monitoring of the study is set up.**

Another important pillar of the CEITEC PhD School is also the **international recruitment of doctoral students**, which has resulted in attracting talented students from all over the world and today has a rate of **52% of international students**. The doctoral programme was successfully re-accredited in 2020 and it also received positive feedback from the international advisory board ISAB.

During the last two years, the CEITEC PhD School implemented the **Thesis Advisory Committee**. This relatively new tool allows for **efficient monitoring of the progress of doctoral studies of individual students and reacts flexibly to potential obstacles and failures through obtaining a second independent opinion from recognized science experts**. At the same time, it empowers doctoral students and offers them the opportunity to take responsibility for their performance and further career,

as the doctoral students themselves are primarily responsible for the composition of their Thesis Advisory Committee.

This approach is bearing fruit and CEITEC´s doctoral students are publishing their first author papers in impact journals, winning competitions, prestigious scholarships and receiving postdoctoral fellowships at renowned institutions such as Yale or the Max Planck Institute.

Postdoctoral researchers at CEITEC MU are highly valued employees who contribute to the overall success of the institution. Postdocs participate in research carried out by the research group and are responsible for specifically assigned projects. Postdocs are appointed for the purpose of training to develop the ability to reason in a scientific manner, formulate hypotheses independently, and to perform independent research. **They are expected to develop the skills acquired throughout PhD studies and get plenty of opportunities to also develop soft skills and transferable skills.**

The postdoctoral fellowship at CEITEC is designed to help researchers become familiar with practical aspects of science and provides opportunities to collaborate with CEITEC´s regional and international partners from academia, as well as industry. Postdoctoral trainees are expected to publish the results of their research, to mentor PhD students, and if they wish, participate in teaching activities. Postdocs at CEITEC are appointed for a period of three years, with a possibility of extension, typically, for an additional three years.

Dissemination and communication of research results

Also in 2021, CEITEC MU scientists managed to keep up very good media visibility and **CEITEC (MU) appeared in the media 693 times during the last year**. CEITEC MU continued to present itself as a flagship of Masaryk University, representing professionally both strong brands and strategically balancing a communication portfolio covering our best research results, major projects and awards, but also promoting CEITEC as a strong institutional brand. In 2021, **CEITEC MU issued 36 press releases and 167 science related articles** on our website, with the vast majority of our content bilingually (Czech and English). The most active scientists in the Czech media were Pavel Plevka, Ivan Rektor and Sarka Pospisilova.

The neuroscience research of Ivan Rektor attracted the attention of the international media all over the world. CEITEC´s active involvement in Allince4Life secured CEITEC MU visibility in the popular Science Business magazine and attracted the attention of the European Commission. **Monthly, CEITEC published on average 27 Facebook posts, 34 tweets, and 14 Instagram posts, targeting various audiences**. CEITEC MU successfully managed the transition to online and hybrid (in-person and online at the same time) formats. In 2021, CEITEC MU was involved in the organisation of 159 events with space for dissemination and communication of science and research results. Approximately half of the events took place online or in the hybrid format and half of the events took place in person.

CEITEC

MUNI

CEITEC MU 2021
in Numbers

31 mil. EUR
Overall Budget

241
PhD Students

International PhD Students
52 %

273
Scientific Employees (FTE)

Women (FTE)
46 %
International Researchers (FTE)
44 %

29
Research Groups
11
Core Facilities

763
Core Facility Users from
15 Countries

170
Ongoing Projects

37
New Projects
29
International Projects

315
Publications*

Q1*
63 %
T5*
39

Publications with Corresponding Author*
41 %

Arabidopsis thaliana, pistil and anthers imaged by fluorescence microscopy. Pavlína Mikulková a Soňa Valuchová, CEITEC MU

HR EXCELLENCE IN RESEARCH

www.ceitec.eu

*Approximate data, the final data will be updated by June 2022.