CEITEC BUT new building

CEITEC | Central European Institute of Technology
BRNO | CZECH REPUBLIC

NEWSLETTER SPRING 2016

Dear CEITEC friends,

We have successfully completed the initial phase of the CEITEC project by fulfilling all of the Monitoring Indicators presented by the Ministry of Education, Youth and Sports (MEYS), and we have notably utilized the generous financing from the European Commission towards the purchase of state-of-the-art equipment and the construction of superb research facilities. This has been no small achievement. We additionally were awarded a continuation or sustainability grant from MEYS, which will allow us to have a level of continued funding, mainly for personnel, through to 2020. As we enter into the second phase of the evolution of CEITEC, the focus will shift from buildings and equipment, to the development of practices to enhance the scientific culture. This culture will emphasis the openness of scientific ideas, collaboration, and international connectivity.

CEITEC has once again, in 2015, continued on an impressive trajectory of improvement in the qualitative output of scientific discovery, which is a true testament to the positive effect that CEITEC can have. Within this newsletter, you should find some of our many recent achievements, including new discoveries, grants awarded, and upcoming conferences and workshops.

We thank you for your continued interest and support in making CEITEC a choice organization for high-end science in the Czech Republic.

Markus Dettenhofer
Executive director of CEITEC

CONTENT

CEITEC NEWS

CEITEC has a new Scientific Director

Jaroslav Koča has become a new scientific director of CEITEC. A long-term director of the university institute of Masaryk University CEITEC MU, a part of the consortium CEITEC – Central European Institute of Technology, has been selected as the winner of an international tender. In this position, he intends to focus primarily on the interdisciplinary nature of CEITEC and the infrastructure. Since January 2016, Jaroslav Koča has been replaced in the position of the director of CEITEC MU by Jiří Nantl who has extensive experience both in the field of university education and in the field of project management.

A holder of the most prestigious European scientific grant has become the research programme coordinator at CEITEC

One of eleven Czech holders of the most prestigious European scientific grant, Richard Štefl, has joined CEITEC at the position of the head of Structural Biology research programme. He has won an open tender and thus gained the opportunity to influence the future direction of our research in the field of structural biology that already belongs to the world top. His arrival also represents a generation change among heads of research programmes within CEITEC.

On the pricture, from the left, Jiří Nantl (CEITEC MU Director) congratulating to Richard Štefl

Pavel Plevka has received Neuron Award for young scientists

On Wednesday, 18 May, six outstanding Czech scientists under 40 years of age received Neuron Award. One of them was Pavel Plevka, Ph.D. of CEITEC. In his work, Plevka reveals the weaknesses of picornaviruses, the cause of not only common colds, but also of dangerous brain inflammations.

More information is available HERE.

Mystery hidden in the ends of onion chromozomes

Scientists of the Mendel Centre for Plant Genomics and Proteomics, a part of CEITEC MU, have recently revealed one of the secrets of onion, garlic and other plants of Allium genus. Unlike most plants, the Allium genus contains unusual sequences of the so-called telomeres, i.e. the chromosome ends. Chromosomes ensure stability of the entire genome, but until this year nobody has described what their telomeres look like.

The publication published in „the plant journal" is available HERE.

CEITEC MU and microscope manufacturer FEI will join forces

Scientists from CEITEC MU labs have expert knowledge, FEI Company, on the other hand, is one of the top manufacturers of electron microscopes. In February they signed a general contract which should help to advance the electron microscopy technology another step fur-ther. In future the current contractual research could change into a long-term partnership.

More information HERE.

CEITEC is testing foil that is being used by major global manufacturers

Scientists from CEITEC BUT starts a commercial cooperation in the field of plastic products with the Czech company Rolofol, which supplies international markets with stretch foil. the research group Advanced Polymers and Composites CEITEC will participate in further research and in the testing of this foil.

More information HERE.

COOPERATION

CEITEC will learn from the best

Three Twinning projects will help

Learning from the best and reaching as fast as possible the top level of European science thanks strategic partnership. This is the aim of the European Commission which will help European research centres with a strong potential of growth towards excellence. Success within the first call for Twinning with even three projects out of five selected for funding in the Czech Republic proved that the strategy of international growth is on the right way at CEITEC. A close interconnection with several outstanding and successful scientific institutions gives CEITEC the opportunity to move forward in specific scientific fields.

More info HERE.

New theoretical methods of modelling Collaboration with Norwegian University of Science and Technology

Dr. Petr Šesták and Dr. Petr Řehák of the research group of Advanced Metallic Materials and Metal Based Composites at CEITEC BUT have joined the Norwegian group led by Prof. Zhiliang Zhang, in order to integrate new theoretical methods of modelling into the ongoing research of the hydrogen embrittlement.

The hydrogen embrittlement represents a degradation of material that is usually not detectable prior to the final leakage or component fracture which can lead not only to huge economic losses, but also ecologic harms.

More info HERE.

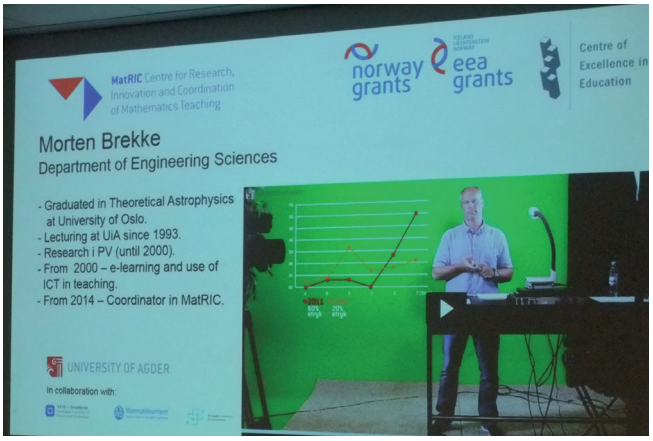
Collaboration with University of Tromsø – The Arctic University of Norway

Jan Novotny, a researcher of the Structural Biology Programme of CEITEC MU, has received financial support to reinforce and further develop collaboration in the field of Paramagnetic NMR Spectroscopy of Metallodrugs between CEITEC MU and University of Tromsø – The Arctic University of Norway. Jan Novotny and the research group leader Radek Marek launched a bilateral scholarship project within the Programme EEA and Norway Grants during their first visit to Tromsø in August 2015. The planned mobilities will extend expertise and skills in paramagnetic NMR spectroscopy of transition-metal complexes with potential anticancer activity. The Czech team will learn about the calculation of NMR/EPR parameters using software developed in the group of prof. Ruud from University of Tromsø and provide experimental approach.

This project generates a synergy between the experimental (MU) and theoretical (UiT) chemists in developing novel antitumor agents.

More information available HERE.

Mathematics and mathematics eduation



CEITEC BUT has received support from Norway Grants for 3 projects related to education and mathematics. METMAS wants to establish a network of experts from the Czech Republic and Norway in the fields of mathematics and mathematics education. The project BUT-MAS provides an opportunity for young academics to spend between 1 and 2 months in Norway, and the project PLATSUM aims to investigate possible relations between the personality type of the student and their study results.

More information HERE.

Nucleic acid and immunity – unique conference

CEITEC's ERA Chair, Mary O'Connell, and Liam Keegan plans to organize a series of conferences focused on the role of the epitranscriptome and innate immunity. Recent publications have highlighted the overlap between the fields of immunology and nucleic acid modifications, however until now, researchers from these disciplines have had few opportunities or platforms to engage in this field.

The first conference will take place in Brno on 7–9 September 2016, with two key note speakers – Jean-Laurent Casanova (from Rockefeller University, USA) and Caetano Reis e Sousa (Francis Crick Institute, UK).

Conference website available HERE.

Milan Brázdil on DVTV, explaining déjà vu mystery among other neurology topics

On Tuesday, 10 May, the research group leader prof. Milan Brázdil appeared on DVTV, talking about the use of stem cells in treatment of neurologic diseases, such as Alzheimer's disease. More information, including a link to the video, available HERE.

Prof. Milan Brázdil is Behavioural and Social Neuroscience Research Group Leader at CEITEC.

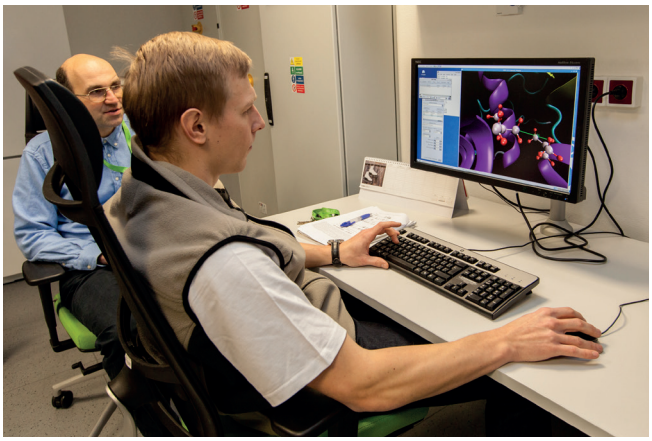
Czech science and research appeal to the global market. The winning project means a revolution in materials analysis

The winners of the fifth annual Cooperation of the Year awards are the Central European Institute of Technology (CEITEC) at Brno University of Technology, the start-up AtomTrace and Tescan Brno with the Sci-Trace project. These entities' cooperation on the development of a globally unique solution for analysing materials was recently recognised by the Association for Foreign Investment (AFI) and the American Chamber of Commerce in the Czech Republic (AmCham) together with partners. The awards ceremony was attended by Minister of Industry and Trade Jan Mládek, who presented the Special Prize of the Ministry of Industry and Trade.

More info HERE.

INFRASTRUCTURE

CEITEC core facilities – 3 years of service to the scientific community



It has been already more than three years, when back at the end of January 2013 the new Josef Dadok National NMR Centre was opened. Building on the existing expertise and technology it was the first CEITEC core facility that was launched to full operations. Funding from Operational Programme Research and Development for Innovations made possible a considerable upgrade of the facility, which now houses NMR 6 spectrometers ranging from 500 MHz to 950 MHz. It is named after Josef Dadok, a Czech national and co-founder of the nuclear magnetic resonance technology.

Currently all ten CEITEC core facilities cater to the needs of the scientific community and not only to users from CEITEC, Masaryk University or Brno University of Technology and other members of the CEITEC consortium. Thanks to external funding from Czech ministries or European Commission also to users from other academic institutions. We have already helped to a number of external users, incl. ERC Grant holders. There are also active projects with industry. As Jaroslav Koča, CEITEC Scientific Director said: "CEITEC core facilities are constantly evolving and developing to cope with the future challenges of science." More info HERE.

Imagining facilities from the Czech Republic are a part of the pilot phase of Euro-BioImaging

In December 2015 the EuroBioImaging (EuBI) interim board ratified the first generation of Nodes (imaging facilities) for the pilot phase of the operating of the European research infrastructure for biological and medical imaging. Among the 28 selected nodes from all over the European Union there is also Brno EuBI node, which is coordinated by CEITEC. Advanced Light Microscopy and Medical Imaging Node as it is officially called comprises also of Faculty of Informatics of Masaryk University, Institute of Scientific Instruments of Czech Academy of Sciences and Brno University of Technology. Being selected as EuroBioImaging node is a clear proof of quality and international competitiveness of research infrastructure and available expertise in imaging methods in the Czech Republic. International experts from Harvard and Stanford universities and other prestigious facilities outside of Europe participated in the selection and evaluation of the nodes.

One more Czech node, coordinated by Institute of Molecular Genetics in Prague, is among the first wave of nodes as well. Both the Brno and Prague nodes form a backbone of CzechBioImaging, the Czech national imaging infrastructure.

From 2016 the imaging facilities of these institutes will offer open access to state-of-the-art imaging technologies (e.g. super-resolution microscopy, scanning electron microscopy combined with focused ion beam, magnetic resonance) to scientists from all over Europe. By getting involved in EuroBioImaging, the Czech imaging facilities expect to gain new international users with interesting scientific projects and new possibilities for cooperation in methodological research with top international facilities.

EURO-BIOIMAGING

UPCOMMING EVENTS

11th DACH FIB Workshop

WHEN: June 27–28, 2016

WHERE: Hotel International Best Western and CEITEC BUT, Brno, Czech Republic

The XTOP 2016 – 13th Biennial Conference on High-Resolution X-Ray Diffraction and Imaging

WHEN: September 4–8, 2016
WHERE: Brno, Czech Republic

Second Integrated Plant and Algal Phenomics Meeting (IPAP)

WHEN: September 4–7, 2016
WHERE: Park Holiday Congress & Wellness Hotel, Květnového povstání 194, Prague, Czech Republic

Conference Nucleic Acids and Immunity

WHEN: September 7–9, 2016
WHERE: Hotel International Best Western, Brno, Czech Republic

RNA Club 2016

WHEN: September 16, 2016
WHERE: CEITEC, University Campus Bohunice, Brno, Czech Republic

SELECTED RESENT PUBLICATIONS

ADVANCED NANOTECHNOLOGIES AND MICROTECHNOLOGIES

KOLIBAL, M; NOVAK, L; SHANLEY, T; TOTH, M; **SIKOLA, T**, 2016: Silicon oxide nanowire growth mechanisms revealed by real-time electron microscopy. *NANOSCALE* **8** (1), p. 266–275.

ROCNAKOVA, I; **MONTUFAR, EB**; **HORYNOVA, M**; **ZIKMUND, T**; **NOVOTNY, K**; **KLAKURKOVA, L**; **CELKO, L**; SONG, GL; **KAISER, J**, 2016: Assessment of localized corrosion under simulated physiological conditions of magnesium samples with heterogeneous microstructure: Value of X-ray computed micro-tomography platform. *CORROSION SCIENCE* 104, p. 187–196.

ADVANCED MATERIALS

HADRABA, H; **CHLUP, Z**; **DRDLIK, D**; **CIHLAR, J**, 2015: Micro-fibres containing composites prepared by EPD. *JOURNAL OF THE EUROPEAN CERAMIC SOCIETY* **36** (2), p. 365–371.

MICHLOVSKA, L; **VOJTOVA, L**; **HUMPA, O**; KUCERIK, J; **ZIDEK, J**; **JANCAR, J**, 2016: Hydrolytic stability of end-linked hydrogels from PLGA-PEG-PLGA macromonomers terminated by alpha,omega-itaconyl groups. *RSC ADVANCES* **6**(20), p. 16808–16816.

STRUCTURAL BIOLOGY

CIVIS, S; SZABLA, R; SZYJA, BM; SMYKOWSKI, D; IVANEK, O; KNIZEK, A; KUBELIK, P; **SPONER, J**; FERUS, M; **SPONER, JE**, 2016: TiO2-catalyzed synthesis of sugars from formaldehyde in extraterrestrial impacts on the early Earth. *SCIENTIFIC REPORTS* **6**

KALYNYCH, S; **PALKOVA, L**; **PLEVKA, P**, 2016: The Structure of Human Parechovirus 1 Reveals an Association of the RNA Genome with the Capsid. *JOURNAL OF VIROLOGY* 90 (3), p. 1377–1386.

GENOMICS AND PROTEOMICS OF PLANT SYSTEMS

PEKAROVA, B; **SZMITKOWSKA, A**; **DOPITOVA, R**; DEGTJARIK, O; **ZIDEK, L**; **HEJATKO, J**, 2016: Structural Aspects of Multistep Phosphorelay-Mediated Signaling in Plants. *MOLECULAR PLANT* **9** (1), p. 71–85.

GREGUS, M; **FORET, F**; **KUBAN, P**, 2016: Portable capillary electrophoresis instrument with contactless conductivity detection for on-site analysis of small volumes of biological fluids. *JOURNAL OF CHROMATOGRAPHY A* **1427**, p. 177–185.

MOLECULAR MEDICINE

FENG, YQ; VAN DER VEEKEN, J; SHUGAY, M; PUTINTSEVA, EV; OSMANBEYOGLU, HU; DIKIY, S; HOYOS, BE; MOLTEDO, B; HEMMERS, S; TREUTING, P; LESLIE, CS; **CHUDAKOV, DM**; RUDENSKY, AY, 2015: A mechanism for expansion of regulatory T-cell repertoire and its role in self-tolerance. *NATURE* **528** (7580), p. 132–136.

BALIAKAS, P; HADZIDIMITRIOU, A; AGATHANGELIDIS, A; ROSSI, D; SUTTON, LA; **KMINKOVA, J**; SCARFO, L; **POSPISILOVA, S**; GAIDANO, G; STAMATOPOULOS, K; GHIA, P; ROSENQUIST, R, 2015: Prognostic relevance of MYD88 mutations in CLL: the jury is still out. *BLOOD* **126** (8), p. 1043–1044.

BRAIN AND MIND RESEARCH

SVATKOVA, A; MANDL, RCW; SCHEEWE, TW; CAHN, W; KAHN, RS; POL, HEH, 2015: Physical Exercise Keeps the Brain Connected: Biking Increases White Matter Integrity in Patients With Schizophrenia and Healthy Controls. *SCHIZOPHRENIA BULLETIN* **41** (4), p. 869–878.

LABBE, C; OGAKI, K; LORENZO-BETANCOR, O; SOTO-ORTOLAZA, AI; WALTON, RL; RAYAPROLU, S; FUJIOKA, S; MURRAY, ME; HECKMAN, MG; PUSCHMANN, A; MCCARTHY, A; LYNCH, T; SIUDA, J; OPALA, G; RUDZINSKA, M; KRYGOWSKA-WAJS, A; BARCIKOWSKA, M; CZYZEWSKI, K; SANOTSKY, Y; **REKTOROVA, I**; MCLEAN, PJ; RADEMAKERS, R; ERTEKIN-TANER, N; HASSAN, A; AHLSKOG, JE; BOEVE, BF; PETERSEN, RC; MARAGANORE, DM; ADLER, CH; FERMAN, TJ; PARISI, JE; GRAFF-RADFORD, NR; UITTI, RJ; WSZOLEK, ZK; DICKSON, DW; ROSS, OA, 2015:Role for the microtubule-associated protein tau variant p.A152T in risk of alpha-synucleinopathies. *NEUROLOGY* **85** (19), p. 1680–1686.

MOLECULAR VETERINARY MEDICINE

NOVAKOVA, L; **KOVACOVICOVA, K**; **DANG-NGUYEN, TQ**; **SODEK, M**; **SKULTETY, M**; **ANGER, M**, 2016: A Balance between Nuclear and Cytoplasmic Volumes Controls Spindle Length. *PLOS ONE* **11** (2) e0149535.

GOMEZ, A; PETRZELKOVA, KJ; BURNS, MB; YEOMAN, CJ; AMATO, KR; VLCKOVA, K; **MODRY, D**; TODD, A; ROBINSON, CAJ; REMIS, MJ; TORRALBA, MG; MORTON, E; UMANA, JD; CARBONERO, F; GASKINS, HR; NELSON, KE; WILSON, BA; STUMPF, RM; WHITE, BA; LEIGH, SR; BLEKHMAN, R, 2016: Gut Microbiome of Coexisting BaAka Pygmies and Bantu Reflects Gradients of Traditional Subsistence Patterns. *CELL REPORTS* **14** (9), p. 2142–2153.

Any comments or ideas?
Send it to **info@ceitec.cz**