



CEITEC

Central European Institute of Technology
BRNO | CZECH REPUBLIC**NEWSLETTER 1/2015**

Dear CEITEC friends,

As the summer is coming to a close, it means that the busiest time of the year, the Autumn season, is upon us. CEITEC will be organising a number of international events, of which, the EMBO conference, "Signalling in Plant Development", is bringing a great deal of attention from the international scientific community. Moreover, it is worth mentioning, that the Life Sciences Seminar Series brought many excellent speakers to Brno, including some Nobel Laureates, and will continue in the new Fall Semester. Many other exciting scientific conferences and workshops are planned, so check the CEITEC website for updates.

CEITEC is a member of a new consortium, EU-Life, an alliance of 13 top research centres in life sciences to support European research excellence. Earlier in the year, there was a very serious threat from the EC to cut

the "excellence pillar" of Horizon2020 by over 500 M€. The members of EU-Life joined together to successfully speak with "one voice" against these planned cuts, along with other research organisations, which resulted in preventing this motion and restored the ERC budget. Furthermore, in collaboration with partners in the EU-Life consortium, we have been awarded an EC Horizon 2020 grant, LIBRA: Leading Innovative measures to reach gender Balance in Research Activities, to promote gender equality in research and innovation. This story and more are detailed in this issue.

We are grateful to all of you who have put their energy into helping CEITEC grow into a respected centre for research. Congratulations goes to Richard Stefl for his ERC award. Job well done!

Best wishes,

Markus Dettenhofer

Executive director of CEITEC

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RESEARCH

Genomic 'Dark MATTER' attracts another prestigious European grant to CEITEC MU

The European Research Council's most prestigious grant (ERC) is once more going to CEITEC MU. Biologist Richard Štefl's project, aiming to study in detail the mechanism of the creation and functioning of genomic 'dark matter', succeeded in competition with experienced scientists from around the world. His team's research concerned with non-coding RNA, sometimes termed genomic 'dark matter', has thus gained support

to the tune of €2 million for a period of five years. Over the last two years this is the second such extraordinary grant from this source to be won by CEITEC Masaryk University scientists. It is also further confirmation of the quality of the activities of CEITEC, which is steadily enhancing its position as a recognised European scientific research centre.

More information can be found [HERE](#).



Conference Creating Life in 3D

At the beginning of September the second year of a prestigious conference Frontiers in Material and Life Sciences took place in Brno. The aim of the conference is to interconnect research topics in the fields of life and material sciences and this year we have been especially successful in the topic of Creating life in 3D. The speakers who participated were very successful and according to the information gathered from participants, there were more than enough opportunities to start future cooperation. You can see some of the photos from this event [HERE](#).

We would like to thank all participants for coming and those who could not attend will be welcome at a conference which we are organizing next September

under the auspices of ERA Chair Mary O'Connell - [Nucleic Acids and Immunity](#).



CEITEC MU scientists begin brain research using unique magnetic resonance scanners

Scientists from the CEITEC MU research centre have begun to make use of two unique scanners for visualising the functioning and structure of the brain and spinal cord with the help of nuclear magnetic resonance. Thanks to these instruments worth some 100 million Czech crowns scientists will be able to investigate a range of serious diseases such as Parkinson's and Alzheimer's as well as epilepsy and schizophrenia and they will also be used to study the functioning of a healthy brain in research into risky behaviour of drivers or the perception of music.


More information can be found [HERE](#). 

A cheap electric car for which even long distances won't be a problem

This year the European Union is providing millions of Euros for projects which are approaching the moment that there will be mainly environmentally-friendly electric cars driving on the roads. Scientists from the research group Cybernetics in Material Science from CEITEC BUT in Brno, in cooperation with the company Infineon Technologies AG, are involved in two of these projects - OSEM-EV and 3Ccar.


More information can be found [HERE](#). 

Prof. Kaiser's group from CEITEC BUT were the first in the Czech Republic to get the chance to scan a meteorite

It wasn't by chance that CEITEC BUT was chosen for scanning the media famed 41g meteorite, which was found near Vatín in the Žďár area. The reason is that the CT installed in our institute is able to scan the given object without damaging it or disrupting its structure in any way. The nondestructive form of examining this meteorite is, according to RNDr. Pavel Spurný, CSc., the Head of the Department of the Interplanetary Matter of the Astronomical Institute of the Czech Academy of Science, definitely significant in its examination. 



CEITEC BUT scientists find a way of producing ultrafine powders by the means of cavitation

Even the smallest things can achieve great success. This can be applied with only slight exaggeration to the new technology which at the end of last year was given honorary recognition at the annual meeting of the Engineering Academy of the Czech Republic, and which was developed within a BUT pre-seed project – Materials Research in the Activity [“The Use of Hydrocavitation in the Preparation of Ferromagnetic Nanopowders”](#). 



Sex and gender may be a critical factor in research. CEITEC MU focuses on equal opportunities

“Female cancer” can also endanger men. The seemingly paradoxical statement is not only true but also summarizes one of the areas of a significant European project [LIBRA](#) focused on gender balance in science and research, in which CEITEC Brno is involved together with

twelve European institutions. It focuses not only on how to ensure equal opportunities to male and female scientists, but also on how to take into account gender in the experiments themselves. [◊](#)

CEITEC makes it possible for other institutions and businesses to use its expensive and unique instruments

[Core Facilities](#) are helping to solve the steadily widening financing gap for scientific research. CEITEC in Brno is one of the pioneers of this concept, relatively new in the Czech Republic. Its Coordination Board has

already approved the first joint regulations covering the running of the Core Facilities.

More information can be found [HERE](#). [◊](#)



Prestigious European Union Marie Curie Innovative Training Network

Medical Genomics Research Group (CEITEC MU) became part of a prestigious European Union Marie Curie Innovative Training Network in a successful bid for €4 million. The project called ALKATRAS (ALK activation as a target of translational science: break free from cancer) is coordinated by Dr Suzanne Turner from the Department of Pathology, University of Cambridge.

Within the project 13 research groups from 7 European countries will create a competitive training programme for 15 PhD students, which is complemented by an array of companies and other research organisations. With a score of 95.4 the ETN made it into the top 6.3 %

out of more than 1,300 proposals to obtain an invitation for funding. This makes European Training Networks one of the most competitive funding opportunities available within HORIZON2020. The core focus of the consortium which is called ALKATRAS: Break free from cancer, is to investigate mechanisms employed by the ALK oncogene to induce a variety of cancers including lymphoma, neuroblastoma and lung cancer. In doing so, it is hoped that novel therapeutic targets will be discovered and treatments for these developed together with the assistance of a number of companies based within Europe. [◊](#)

Richard Štefl, research group leader from CEITEC MU, received financial support for his research from the endowment fund Neuron for “the best ones”

Every year the [Neuron maecenases](#) provide a financial sum which is divided among the best candidates by the [Scientific board](#) consisting of top Czech scientists based on their expert assessment. The endowment fund Neuron aims at young scientist active in the Czech Republic and successful Czech scientists who decide to return from abroad to carry out their basic research in the Czech Republic. The Scientific Board selects those applicants who have the potential to become top in the

world within their field – each of them receives a [Neuron impulse](#) of one million CZK for their project. Since its establishment, the fund has paid out over 25 million CZK to young scientists. Richard Štefl is one of them. You can find more information [HERE](#). [◊](#)



Scientists from CEITEC are among the top experts in the field of strength of materials


A team from CEITEC, led by prof. Jaroslav Pokluda from CEITEC BUT, was asked by the prestigious Progress in Material Science Journal to write an overview article on the development of computing methods in the field of strength of materials. The article Ab Initio Calculations of Mechanical Properties: Methods and Applications was accepted by this prestigious high impact journal and was published in May.

Professor Jaroslav Pokluda, together with doc. Miroslav Černý and prof. Mojmír Šob have been part of the world's top scientists in the field of mechanical properties of materials for many years. Together with colleagues from the USA and Japan they were one of the first teams to deal with first principles calculations of mechanical properties (strength). This way they manage to bring closer the values of theoretical strength to the values which can be proven by experiments. [◊](#)

Collaboration with University of Iceland

Two CEITEC MU scientists, Drs. Martin A. Lysák and Terezie Mandáková from Genomics and Proteomics of Plant Systems research programme are establishing a new collaboration in the field of plant cytogenomics between CEITEC MU and University of Iceland. They launched a bilateral scholarship project within the Programme EEA and Norway Grants during their first visit to Reykjavík in June.

The Czech team will learn about the distribution, ecology and reproduction biology of the Icelandic crucifers


from experts of the Plant Genetic Research Group at the Faculty of Life and Environmental Sciences under the leadership of Professor Kesara Anamthawat-Jónsson. The Icelandic team will get acquainted with state-of-the-art cytogenomic techniques available at CEITEC. More information can be found [HERE](#). 



INFRASTRUCTURE

Research infrastructure CEITEC Nano

Research infrastructure CEITEC Nano has started the installations to complete a unique complex facility for the experimental research in the field of nanotechnology, nanoscience, and advanced materials. New laboratories at CEITEC BUT will enable to carry out both complete fabrication process of nanostructures and nanodevices, and their characterization down to the sub-nanometre level in a clean environment. Researchers from the Czech Republic and abroad can profit from the 60 technologies and instruments, for ex. High resolution (scanning) Transmission Electron Microscope TITAN FEI, 2x Focused Ion Beam/Scanning Electron Microscope, X-ray Photoelectron Spectroscopy Axis

New Ultra DLD Kratos, Secondary Ion Mass Spectroscopy TOF.SIMS5 ION-TOF, Ultra High Vacuum Preparation and Analytical system SPECS, Atomic Layer Deposition system Ultratech Cambridge Nanotech Fiji 200 etc. The whole list of equipment is available [HERE](#). The new research infrastructure CEITEC Nano, composed by two shared core facilities Nanofabrication and Nanocharacterization and Structural Analysis Laboratory is strictly planned and run on the open access policy enabling the users both from academia (internal and external groups) and industry an access. Almost all instruments can be directly operated by users (after the proper training led by technical staff). 

PAST EVENTS

Nanotechnology and Advanced Materials Workshop and Summer school


In the last week of June up to eighty participants took part in the event called Nanotechnology and Advanced Materials Workshop and Summer School, which was held under the auspices of CEITEC BUT by Dr. Jana Drbohlavová. Within a rich and extensive agenda, Czech experts and international guests from the universities in Germany, Norway and Italy introduced their presentations. In their presentations representatives of top management of several Czech com-

panies gave the participants their practical experience with using nanotechnology. This event was held as part of the project Formation of research surrounding for young researchers in the field of advanced materials for catalysis and bioapplications (project no. NF-CZ07-ICP-1-040-2014). The premises were provided by the South Moravian Innovation Centre JIC and we are thankful for all their sponsorship and support.

More information can be found [HERE](#). 

Eurotraining Course

Two days in March, Core Facility Nanofabrication and Nanocharacterization with Research Group Smart Nanodevices hosted the Eurotraining course "Nanotechnology for Electronics" in cooperation with Budapest University of Technology and Economics. 9 lectures and workshops held by the experts from academic and industry fields aimed at the delivery of micro-/nanosystems awareness to students and scientists interested in nanoelectronics and related disciplines. Almost 100 par-

ticipants were absorbing information about electron beam lithography, MEMS, enhancing biosensors with nanotechnology, magnetic nanodisks, semiconductor quantum dots or organic electronics and finished the course by the visits of CEITEC laboratories. The achieved training and training materials in the most advanced subjects of micro-/nano technologies were managed under the patronage of 6 european universities and CEITEC Brno University of Technology. 

EMBO practical workshop

From 25th to 31st July 2015 the Centre for Molecular Medicine at CEITEC MU hosted a prestigious international workshop with the topic [Analysis of Small Non-coding RNAs – Per Aspera Ad Astra](#)". The team of prof. Šárka Pospíšilová from the Centre for Molecular Medicine CEITEC MU (M. Mráz, B. Tichý, J. Baloun, K. Černá) managed to organize the event and its expert course excellently. The meeting was organized under the auspices of the European Molecular Biology Organization (EMBO). Dr. Vladimír Beneš from EMBL Heidelberg was the coordinator and a number of top experts from many countries gave their lectures, for example Eric Miska from the Sanger Institute in Cambridge, Donal O'Carroll and Ramesh Pillai from EMBL and Igor Ulitski from the Weizmann Institute in Rehovot. Presentations


of several scientist from CEITEC MU could be heard – by M. Mráz, O. Slabý and Š. Vaňáčová, who are engaged in the field of small RNAs. Apart from the lectures, the participants of the workshop had the opportunity to experiment and try the analysis of small non-coding RNAs in practice. Thanks to new, high-quality equipped genomic laboratories in CEITEC MU, it was possible to carry out high-capacity sequencing of a microRNA set of leukemic cells, detect the quantity of small RNAs by means of „Real-time PCR“ (i.e. real-time polymerase chain reactions) or test the detection of small RNAs by means of *in situ* hybridization. All participants gained a lot of understanding and new contacts from this workshop and we hope they will be happy to come back to CEITEC, the Masaryk University and Brno.

Photos from the workshop [HERE](#). 

★ EUROMAR 2015


EUROMAR, a joint conference on magnetic resonance phenomena established in 2004 as a unified forum of its predecessors (EENC, Congress Ampere, and International Meetings of the British NMR Discussion Group), took place on July 5-10, 2015 in the Prague Congress Centre. The meeting was chaired by Prof. Vladimír Sklenář, the coordinator of the CEITEC Structural Biology Programme and one of the pioneers of nuclear magnetic resonance (NMR) spectroscopy of nucleic acids. EUROMAR 2015, gathering leading scientists from all around the world, offered a unique opportunity to report and to witness the latest scientific breakthroughs in magnetic resonance in a broad range of scientific fields, stretching from physics and chemistry to biology and medicine. Altogether, 136 lectures were delivered during the congress. The congress fully accomplished its main goal to serve as a stimulating forum for sharing experience, exchanging ideas, and establishing fruitful collaborations.

CEITEC is greatly acknowledged for the financial support of Prof. Juli Feigon, one of the plenary speakers and chairman of the session focused on disordered proteins. Prof. Feigon joined the University of California, Los Angeles in the Department of Chemistry and Biochemistry in 1985. She pioneered the use of NMR to determine structures and dynamics of DNA and RNA. Her most recent work employs hybrid methods of NMR, X-ray crystallography, and electron microscopy along with biochemistry to study structure, dynamics, and

function of RNA and RNA-protein complexes. She has a long-standing collaboration with Prof. Vladimír Sklenář in developments of NMR methods. 




★ ESLHO: EuroClonality-NGS Bioinformatics Workshop

CEITEC MU and the team of Dr. Nikos Darzentas organised and hosted the inaugural bioinformatics workshop in the context of their long-standing involvement in the EuroClonality-NGS Consortium. Attended by collaborators from across Europe, it took place in Brno's city centre and CEITEC MU, and involved presentations, hands-on, and endless discussions on analysing our immune system's B-cell and T-cell receptor next-gen sequencing data—overall, a unanimous success, both scientifically and socially, which only means that more will follow. 

UPCOMING EVENTS

Grants Week

Grants Week, which takes place at the end of September, is a symposium intended to enhance the ability of the academic community to win grants for their work. This event will last over 4 days, and provide an in-depth look at not only Czech and European grant schemes, but also give helpful tips to make their next application to have a greater chance of success. Check out the [website](#) and sign-up for the session(s) you are interested in. 



GRANTS WEEK
 „All you need to know about the research funding“
29 September – 2 October 2015
 Brno, Czech Republic

The banner features a blue background with a central illustration of a green tree growing out of a glass flask, which is placed on top of an open book. The book is surrounded by several purple Euro banknotes.

WHERE: The Brno House of Arts

15th European Congress on Clinical Neurophysiology

WHEN: September 30 - October 4, 2015

WHERE: Best Western Premier Hotel International, Brno

HR in the academic environment

The goal of the 1st national HR conference is to open and promote issues associated with human resources development within the academic environment. The target group is mainly top management of universities and research institutions. More information can be found [HERE](#).



1ST NATIONAL CONFERENCE
HR IN THE ACADEMIC ENVIRONMENT
 INTENDED AND UNINTENDED CONSEQUENCES OF RESEARCH
 INTERNATIONALISATION IN THE CZECH REPUBLIC
 26 NOVEMBER 2015, BRNO

Human resources (HR) development in the academic environment
 Reintegration of Czech scientists from abroad
 Welcome services

Internationalisation of research teams
 Mobility of researchers

The banner is decorated with various icons related to research, education, and human resources, including a microscope, a graduation cap, a person, a gear, and a network diagram. A logo for the Human Resources Platform is visible in the top right corner.

WHEN: November 26, 2015

WHERE: Museum of Applied Arts in Brno

SELECTED RESENT PUBLICATIONS

ADVANCED NANOTECHNOLOGIES AND MICRITECHNOLOGIES

PRUSA, S; PROCHAZKA, P; BABOR, P; SIKOLA, T; TER VEEN, R; FARTMANN, M; GREHL, T; BRUNER, P; ROTH, D; BAUER, P; BRONGERSMA, HH, 2015: Highly Sensitive Detection of Surface and Intercalated Impurities in Graphene by LEIS. *Langmuir* 31 (35), p. 9628-9635

J. K. PARK, C. D. M CAMPOS, **P. NEUŽIL**, L. ABELMANN, R. M. GUIJT AND A. MANZ, 2015: Direct coupling of a free-flow isotachopheresis (FFITP) device with electrospray ionization mass spektrometry (ESI-MS), *LAB ON A CHIP* 15, p. 3495 - 3502

ADVANCED MATERIALS

POKLUDA, J; CERNY, M; SOB, M; UMENO, Y., 2015: Ab initio calculations of mechanical properties: Methods and applications. *PROGRESS IN MATERIALS SCIENCE* 73, p. 127 - 158.

ONDREAS, F; JANCAR, J, 2015: Temperature, Frequency, and Small Static Stress Dependence of the Molecular Mobility in Deformed Amorphous Polymers near Their Glass Transition. *MACROMOLECULES* 48 (13), p. 4702 - 4716.

STRUCTURAL BIOLOGY

HEGYI, H, 2015: Enhancer-promoter interaction facilitated by transiently forming G-quadruplexes. *SCIENTIFIC REPORTS* 5 (9165)

HOUSER, J; KOMAREK, J; CIOCI, G; VARROT, A; IMBERTY, A; **WIMMEROVA, M,** 2015: Structural insights into *Aspergillus fumigatus* lectin specificity: AFL binding sites are functionally non-equivalent. *ACTA CRYSTALLOGRAPHICA SECTION D-BIOLOGICAL CRYSTALLOGRAPHY* 71, p. 442 - 453.

GENOMICS AND PROTEOMICS OF PLANT SYSTEMS

PESKA, V; FAJKUS, P; FOJTOVA, M; DVORACKOVA, M; HAPALA, J; DVORACEK, V; **POLANSKA, P;** LEITCH, AR; **SYKOROVA, E; FAJKUS, J,** 2015: Characterisation of an unusual telomere motif (TTTTTTAGGG)(n) in the plant *Cestrum elegans* (Solanaceae), a species with a large genome. *PLANT JOURNAL* 82 (4), p. 644 - 654.

MANDAKOVA, T; SCHRANZ, ME; SHARBEL, TF; DE JONG, H; **LYSAK, MA,** 2015: Karyotype evolution in apomictic *Boechera* and the origin of the aberrant chromosomes. *PLANT JOURNAL* 82 (5), p. 785 - 793.

MOLECULAR MEDICINE

MALCIKOVA, J; STANO-KOZUBIK, K; TICHY, B; KANTOROVA, B; PAVLOVA, S; TOM, N; RADOVA, L; SMARDOVA, J; **PARDY, F; DOUBEK, M;** BRYCHTOVA, Y; **MRAZ, M; PLEVOVA, K;** DIVISKOVA, E; OLTOVA, A; **MAYER, J; POSPISILOVA, S; TRBUSEK, M,** 2015: Detailed analysis of therapy-driven clonal evolution of TP53 mutations in chronic lymphocytic leukemia. *LEUKEMIA* 29 (4), p. 877 - 885.

BOLOTIN, DA; POSLAVSKY, S; MITROPHANOV, I; SHUGAY, M; MAMEDOV, IZ; PUTINTSEVA, EV; **CHUDAKOV, DM,** 2015: MiXCR: software for comprehensive adaptive immunity profiling. *NATURE METHODS* 12 (5), p. 380 - 381.

BRAIN AND MIND RESEARCH

ANDERKOVA L, **ELIÁŠOVÁ I**, **MAREČEK R**, JANOUŠOVÁ E, **REKTOROVÁ I**, 2015: Distinct pattern of gray matter atrophy in mild Alzheimer's disease impacts on cognitive outcomes of noninvasive brain stimulation. JOURNAL OF ALZHEIMER'S DISEASE 45 (1), p. 1 - 10

MOLECULAR VETERINARY MEDICINE

KAMENIK, J; SALAKOVA, A; **HULANKOVA, R**; **BORILOVA, G**, 2015: The effect of high pressure on the microbiological quality and other characteristics of cooked sausages packed in a modified atmosphere or vacuum. FOOD CONTROL 57, p. 232 - 237.

H.CERNOHORSKA; S.KUBICKOVA; **O.KOPECNA**; **M.VOZDOVA**; C.A. MATTHEE; T.J.ROBINSON; **J. RUBES**, 2015: Nanger, Eudorcas, Gazella, and Antelope form a well-supported chromosomal clade within Antilopini (Bovidae, Cetartiodactyla). CHROMOSOMA 124 (2), p. 235 - 247.

JAROSOVA, V; **HRAZDILOVA, K**; FILIPEJOVA, Z; SCHANILEC, P; **CELER, V**, 2015: Whole genome sequencing and phylogenetic analysis of feline anelloviruses. INFECTION GENETICS AND EVOLUTION 32, p. 130 - 134.



Please send your comments and ideas
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