

ANNUAL REPORT ON THE ACTIVITY OF THE ACADEMY OF SCIENCES OF THE CZECH REPUBLIC



2012



THE ACADEMY
OF SCIENCES
OF THE CZECH
REPUBLIC

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Introduction

INTRODUCTION



President of the ASCR Jiří Drahoš

Interview with the President of the ASCR

How would you characterise 2012 from the perspective of the Academy of Sciences?

In 2012, we commemorated the 20th anniversary of the creation of the Academy of Sciences of the Czech Republic. In both the life of a human and the life of an institution, anniversaries connected with their birth are usually occasions to remember the continuity, namely in a look back and a look forward. Unfortunately, in the course of the last years it has been shown that some political representatives do not sufficiently understand the importance and role of non-university research, which was manifested in the tense disputes on the financing of the activities of the Academy of Sciences in summer 2009. Luckily, it did not reach the fulfilment of the catastrophic scenarios, which would essentially have meant the liquidation of the Academy of Sciences in its existing form. Nonetheless, the budget of the Academy of Sciences was reduced repeatedly and groundlessly. That understandably inauspiciously affected and continues to influence the functioning of the individual scientific workplaces and complicates their further de-

velopment. I therefore consider it as a clear success that despite these difficulties the Academy of Sciences has remained the most efficient Czech institution in the area of basic research, able to succeed even in strong international competition.

The ASCR encountered a lack of financing also this year. How can we get the optimal amount of financial means into the scientific milieu?

The situation of Czech science is relatively stabilised, because the total budget for science is not going down, but for several years now the share of finance intended for the Academy of Sciences has been considerably reduced. I believe that the most fundamental and long-term problem is the fact that in Czech society and its political representation there is a deeply rooted conception of science as primarily production forces, which curiously enough has not disappeared even with the change of the political regime in the period since the Velvet Revolution. Also the Reform of the System of Research, Development and Innovation from 2008 was based on this entirely mistaken conception that the state and scientists are responsible for how our companies will innovate their products. One of its paradoxical consequences is the fact that currently of the stagnating public means for science of roughly CZK 26 billion the activities of the entrepreneurial sector are subsidised with almost CZK 5.5 billion, thus over 20%. It is a substantial disproportion already because as a percentage it is twice the average of the European Union. These means then naturally are lacking in science. It is also alarming that only 1.8% of entrepreneurial expenditures on research ended up in the support of science at higher education institutions and public research institutions. The mentioned imbalance is a glaring example.

The Council for Sciences of the ASCR rejected the proposal of the Methodology of Evaluation of the Results of Scientific Work for 2013, which the R&D&I Council proposed and which conserves the so-called "coffee grinder" (quality is ignored in favour of quantity). What in your opinion should a professional evaluation of science look like?

I am convinced that an effective counterbalance to the mentioned coffee grinder is a system of the evaluation of science and research based on the method of informed peer review, which has been used already for a number of years precisely by the Academy of Sciences. Unlike the simple

mechanism of the current methodology, which lies exclusively in the simple counting of the results and in a view to the past, the professional system of evaluation must be based on a substantially broader perspective – primarily it must follow whether the evaluated activity leads to the set goals, assess whether and to what extent the goals were achieved and provide an instrument for creating strategies, where the main criterion of the evaluation must be quality measured in comparison with the world. Unfortunately, the newly proposed principles of Methodology 2013 not only fail to resolve the problems of the existing methodology of the evaluation but also generate a number of further problems. It thus continues in the experiments with evaluation in the area of science and research that have no parallel in this form in the known foreign practice.

Despite the poor financial situation, the ASCR achieves very high-quality results. Which of them do you hold in highest esteem?

We have been able to achieve a number of significant scientific results, namely across the individual scientific areas – the current ones are regularly published on our website. I will therefore mention only several selected examples with application potential in the area of medicine: new methods have been developed of the preparation of biomaterials with the possibilities of usage for regenerative medicine and tissue engineering, further new knowledge was discovered in research of the mechanisms of acute and chronic pain, which could contribute to the development of new directions of their treatment, and last but not least so-called anti-angiogenic materials have been prepared, which could be used in the therapy of tumours. For that matter, our public continuously finds out about the results and successes of the scientists of the Academy of Sciences from the media. The examples given but also a number of other results clearly show that the quality of life of our citizens in the next years and decades depends on today and tomorrow's discoveries of basic and applied research.

You were nominated by the Academic Assembly for another four-year terms as president of the ASCR. Where would the ASCR under your leadership head?

In our regular, internal evaluations of the Academy of Sciences by independent experts, it has been shown that it would be desirable to expand and motivate cooperation

of the teams of various institutes on interdisciplinary topics, because we have a great number of scientific groups, which in their focus are closer to colleagues from other institutes than the teams under the same roof. We are therefore preparing a strategy of the advancement of the Academy of Sciences for the next years where the transition to this strategy should lead to gradual changes in the structure of the Academy of Sciences. We anticipate that the new priorities of the Academy of Sciences will be problem-orientated, just like in successful economies, which are built mainly on quality research. We are preparing complex programmes for example in the area of energetics, human health or new materials and technologies. The strategy is still being discussed at the level of the Academy Council and Council for Sciences. The clear goal is then a further increase in the quality of research at the Academy of Sciences.

Academy of Sciences of the CR from the Perspective of Conceptual and Scientific-Organisational Work

In 2012, the Academy of Sciences of the CR (hereinafter only as "ASCR") in accordance with its long-term strategy of advancement continued in intensive research, educational, popularisation and cultural activities. The most important results and activities of these functions are described in the further chapters of this report and documented in its appendices.

There were no changes in the development of the system of research institutes of the ASCR in 2012. Conceptual and structural changes in the activities and organisations took place at the level of the individual workplaces of the ASCR according to the results of their evaluations for 2005–2009. The system of the institutes of the ASCR in 2012 included 53 scientific workplaces, the Centre for Administration and Operations of the ASCR, v. v. i., and the Head Office of the ASCR and retained a total of 4,489 research employees with university-level qualification. The ASCR as the founding entity utilised its legal authorisation and through elected bodies coordinated the whole scientific and economic policy with the aim of maintaining the cohesiveness of the institutes of the ASCR and based on the evaluation implemented instruments for determining the level of the institutional support of the workplaces.

A significant event in the life of the ASCR in 2012 was the installation or alternation of the **steering bodies of the institutes of the ASCR** – the public research institutions (the councils of the workplaces, supervisory councils and directors of the institutes) for the term of office of 2012–2017. The leadership of the ASCR devoted continuous attention mainly to the filling of the key members of the specialised and personnel structures of the ASCR, which are the posts of the directors of the institutes of the ASCR. It took care of the quality composition of the selection commissions and the observation of the rules of the selection process. The President of the ASCR based on a selection process and the proposals of the councils of the relevant institutes of the ASCR and after discussion in the Academy Council appointed to a five-year term of office 43 directors, of which 16 entered the post for the first time, 25 continued in their second term of office. Two persons were entrusted



President of the Czech Republic Václav Klaus honoured President of the Academy of Sciences ČR Prof. Jiří Drahoš with the Medal for Service to the State in the Area of Science on Sunday, 28 October 2012. The high state award was presented to him at Prague Castle.

with leading the institutes until the time a new selection process was completed.

In the interest of the high-quality preparation of the optimal composition of the new academy-wide bodies for the term of office 2013–2017, the preparation of the election of a candidate for president of the ASCR was begun already in July and the preparation of the election of the members of the Academy Council of the ASCR and the Council for Sciences of the ASCR in October 2012. The election of a candidate for president of the ASCR took place at the XLIst Session of the Academy Assembly on 13 December 2012 and Prof. Ing. Jiří Drahoš, DrSc., dr. h. c. was elected as the candidate. He assumed the post of President of the ASCR after being appointed by the President of the CR with effect as of 25 March 2013 along with the members of the Academy Council and Council for Sciences of the ASCR, who were elected at the March XLIInd Session of the Academy Assembly of the ASCR.

Scientific Activity

SCIENTIFIC ACTIVITY

02.1 THE SCIENTIFIC AREAS OF THE ASCR

I. Mathematics, Physics and Earth Sciences

The section of mathematics, physics and information science includes six institutes with a very broad spectrum of applied and theoretical research.

In mathematical disciplines, mathematical and informatics methods are being developed both within the branches themselves and with regard to the needs of physics and technical branches, further chemistry and biology and, last but not least, social sciences and the humanities.

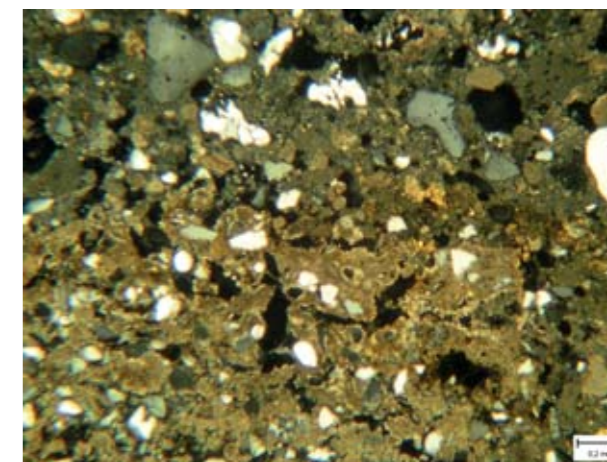
Research in physics provides knowledge not only on the basic natural laws of the micro- and macro-worlds but also on the particular behaviour of various physical systems under extreme conditions and on the opportunities for a practical utilisation of the new discoveries and phenomena. The research of condensed systems with distinguished physical properties including systems structured on the nanoscale, the study of the properties, structure and interactions of matter at the subatomic level, and classical, particulate, quantum and nonlinear optics is significantly supported.

The subject of interest of astrophysics and astronomy is the study of the character and behaviour of matter and radiation in all of space from the upper atmosphere of Earth to the most distant parts of universe seen so far. The research is therefore focused on the astronomy and astrophysics of galaxies, stellar systems, stars, the Sun, Sun-Earth relations, interplanetary bodies and artificial satellites of the Earth.

The section of applied physics includes seven institutes, whose research focuses on the utilisation of applications of physical research in the technical sciences, the research of properties of ionised environments and laser plasma, photonics, the generation and diagnostics of high-temperature and low-temperature plasma, the transfer phenomena in liquid systems and the hydrosphere. This section further focuses on the mechanics of ductile objects and biomechanics, the dynamics of liquids, thermodynamics, research of the properties of heavy-current electromechanical systems, new concepts of energy conversion, sensors, the transmission and processing of signals, material research and research of properties of advanced materials

with respect to their microstructure. The development of new physical methods, special technologies and instrumental principles, the development of interdisciplinary basic as well as applied research focusing on basic knowledge crossing the borders of field research with typical applications in bioengineering, medicine, ecology, including health protection and human safety and the preservation of the natural and cultural heritage of humankind are also supported.

The earth-science section includes five institutes whose subject of research is the Earth and its nearby as well as distant surroundings. The priorities include the study of the inner structure and physical properties of the Earth, research of the development of the lithosphere, biosphere and natural environment from the earliest geological past to the present, including research of the processes in the lithosphere induced by human activity. It also deals with the study of selected processes in the Earth's atmosphere and its cosmic surroundings. The applied sphere conducts focused research of the geodynamic processes in the upper layer of the Earth's crust and of the hydrological processes influencing the environment and ecological use of mineral resources.



Analysis of the historical mortar from Jiřské náměstí (St. George Square, Prague).

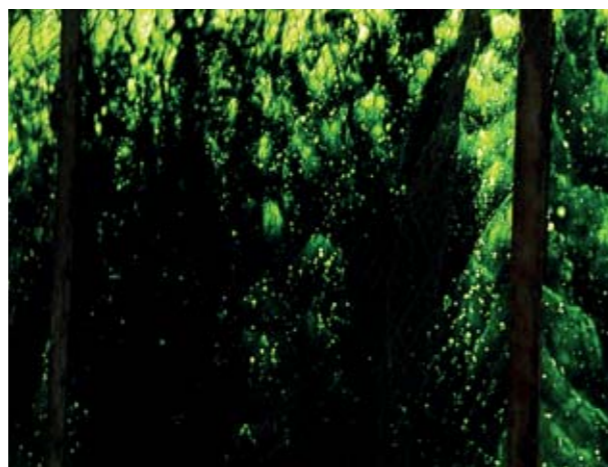
The microphotograph of the cut of the historical mortar shows the structure of lime mortar from the 10th century. In the picture, it is possible to see the secondarily used piece of earlier mortar (bottom left), which has finely sorted filler ca 50 μm in size and air-entrained lime as the cement. On the contrary, the binding matrix of the whole sample (top right) is formed by hydraulic lime cement. The filler is quartz sand.

II. Life Sciences and Chemical Sciences

The chemical-science section associates six workplaces whose research focuses on the targeted synthesis and the structural and functional characterisation of new inorganic and organic compounds with a special focus on crystalline, composite, glass and polymeric materials and supramolecular or nanostructured systems. Another priority is research of the relations between the structure, properties and reactivity of materials associated with the clarification of temporally and spatially distinguished mechanism of their reactions, yielding a theoretical basis for applications. A substantial part of the activities is also the study of the chemical principles of the biological phenomena in biomedicine and ecology and the development of new chemotherapeutics, biologically active substances and polymeric biomaterials for targeted therapeutic applications. Advanced technologies are sought in the research focused on the processes in multiphase reactive systems, molecular engineering, new methods for initiating chemical reactions and processes important for environmental decontamination and protection. An indispensable part of chemical research is also the development of instrumental, analytical and bioanalytical methods.

The section of biological and medical sciences associates eight workplaces whose research is focused on the processes in living systems at various levels of their organisation. Special attention is paid to the development of genomics, proteomics and system biology as bases for future biomedicine and biotechnologies. Biomedical research is particularly focused on the knowledge of the biophysical properties of living systems, the mechanisms of the function and disorders of the nervous, immune, cardiovascular and reproductive systems, their being influenced by external factors, on the study of gene expression and its signal path, the genetic bases of diseases and evolution, the research of tumour and stem cells, on the development of new pharmaceuticals, the influence of lifestyle factors on the health of the population and on the biology of microorganisms and microbe biotechnologies; the emphasis is placed on obtaining knowledge applicable in the prevention, diagnostics and therapy of serious diseases and in modern biotechnologies. Research in the biology of animals includes above all physiology and the pathological processes in animals. Other research is focused on the genetic bases of the development of plants and the interaction of the plant genome with the environment and on the biodegradation of xenobiotics in water and soil.

The section of biological-ecological sciences associates four workplaces whose research is focused on the mutual relations between organisms, between organisms and the environment and on the functional mechanisms in ecosystems with respect to the anthropogenic effects. The objective is to understand the key processes with the possibility of using the results in medicinal, biotechnological, veterinary and agricultural practice as well as the bases for rational exploitation of the landscape. The research is also focused on animal biodiversity, vertebrate evolutionary ecology and adaptations of their behaviour, on the research of the evolution, structure and ecological role of plant biodiversity (from the genetic level through the level of organisms and communities to ecosystems) and on the study of the insect as a biological model as well as pest. Another area of interest includes the interactions of parasitic and symbiotic organisms, organism communities in the soil ecosystems, the functioning of the ecosystems of valley reservoirs and lakes, the study of the global cycle of carbon, energy and material flows through ecosystems, and the ecology of the landscape influenced by man. An important component of the research is the use of advanced methodologies in ecology, in particular the methods of molecular biology, of remote research of the Earth and of mathematic modelling with an emphasis on a systemic approach.



A sector of phototrophic microorganisms living at the Opatovice pond in Třeboň. The research programme focuses on the study of photosynthetic microorganisms, i.e. green algae, blue-green algae and photosynthetic bacteria. One of the laboratories studies the production technology of algae, its optimization and treatment of the products as also various methods of the industrial use of algae biomasses. (Institute of Microbiology)

III. The Humanities and Social Sciences

The section of social-economic sciences includes five workplaces whose research activities focus on the topical research issues. Research in economics reflects the changing conditions of our society. It focuses in particular on the economic aspects of the integration of post-transformation countries in the European Union and European Monetary Union and on the specifics of the Czech Republic's convergence to EU standards. Research in the field of law investigated the process of the institutional provision of the requirements of EC/EU law on the domestic (national) law of member states and the influence of this process on the legal systems of the member states under the conditions of an information society; all of this in terms of legal philosophy, theory and practice. Research in sociology is focused on the analysis of long-term social processes in Czech society and on the investigation of the conditions for the advancement of knowledge society, of human, social and cultural capital. The pivotal topic for the psychological research is the study of the conditions of the optimal development of humankind from a life-long perspective and in the context of the social changes of the unifying Europe.

The section of historical sciences includes six workplaces whose research activities concentrate on research topics in the areas of historical sciences and archaeology which in an important way contribute to forming the cultural, national and state identities. Historical research focuses on the issues of Czech historical area from the Early Middle Ages to the present, including the period of both totalitarian regimes. The research takes into consideration both the European context in terms of diversity, continuity and integration and the challenges and threats of the contemporary global world. The history of the fine arts and music in the Czech lands is thoroughly placed in the European context. Archaeological research emphasises the development of methodology, particularly in cooperation with the methods of the natural-science disciplines. Since the archaeological potential of the Czech lands is ever more intensively being perceived as a part of the national cultural heritage, the quality information science of the branch is being developed along with the legal protection of archaeological monuments. The development and implementation of an information infrastructure for science and research, modern ways of processing and making the re-

source base accessible and a prospective strategy for work with electronic documents have become the priorities of the historical and archaeological workplaces.



The Library of the ASCR organised on 5 November 2012 until 31 January 2013 an exhibition entitled Books at the Time of the Reign of Rudolf II. The picture is a photograph of a book with the front board containing supralibros from the collections of the Museum of North Bohemia in Liberec.

The section of the humanities and philological sciences associates six workplaces whose research activities focus on numerous research themes. The humanities-focused workplaces deal with philosophy, ethnology, language and literature. Within the research in the area of philosophy, also selected problems of related disciplines are resolved, in particular logic, theory of science, classical and mediaeval studies. Components of the resolution of these issues also include research of the resources and traditions of European thought. In the area of political and moral philosophy, the research endeavour concentrates specifically on the philosophical aspects of democracy and the plurality of cultures. In the field of ethnology and social anthropology, the research focuses on the topics of the migrations of minorities and socially-excluded communities in the Czech Republic, on research of Czechs abroad and selectively also on non-European ethnology. Czech Oriental Studies deal with the research of the history, cultures, languages and religions of countries in Asia and Af-

rica. Linguistics and literary science has its focus in Czech and Slavic research and its applications (e.g. research of the Czech lexis, the research of Czech literature and other Slavic literatures including their positions in the European context). In addition, the research of Czech book culture from the 16th century to the present continues. A substantial part of the activities in the fields of the humanities is the publication of scientific journals, critical editions, encyclopaedias, lexicographic and musical works focused on making the national cultural heritage accessible and also creating electronic data and information sources for the needs of the public.

02.2 TO THE BORDERS OF KNOWLEDGE

From the results of 2012, we present:

The Bunburra Rockhole meteorite fall in SW Australia: fireball trajectory, luminosity, dynamics, orbit, and impact position from photographic and photoelectric records (Astronomical Institute)

In 2007–2012, a team of employees from the Astronomical Institute conducted a detailed analysis of the first instrumentally observed fall of a meteorite in Australia which was recorded photographically and photoelectrically by 2 stations of the Desert Fireball Network (DFN) on July 20, 2007. This event was caused by a small meteoroid with an initial mass of 22 kg which entered the atmosphere with a low speed of 13.4 km/s and began a luminous trajectory at an altitude of 63 km. In maximum it reached a magnitude of -9.6 and terminated after a 5.7 s and 65 km long flight at an altitude of 30 km. On the basis of evaluation of photographic records, a possible fall of small meteorites and their impact location was predicted. The first organized search took place in October 2008 and the first meteorite (150 g) was found 97 m southward from the predicted central line at the end of the first searching day. The second stone (174 g) was found 39 m northward from the central line, both exactly in the predicted mass limits. During the second expedition in February 2009, a third fragment of 14.9 g was found again very close (~100 m) to the predicted position. The meteorite was designated Bunburra Rockhole (BR) after a nearby landscape structure.

This result is from many aspects unique. It is the fifth predicted meteorite fall in history, the first instrumentally observed meteorite fall in the southern hemisphere and the first one based only on data from instruments developed at the Astronomical Institute. Without this unique experiment, the fall in a very remote area of SW Australia would have been completely unknown. Besides, BR is the first documented meteorite fall from a relatively small meteoroid and from a great terminal height of an observed bolide. All previous observed meteorite falls were caused by much larger bodies that penetrated much deeper into the atmosphere. Meteorites classified as achondrites are also very exceptional and moreover it is a new type of anomalous basaltic meteorite (Bland, Spurný et al. 2009, published in the journal *Science*).

BR is also the first known meteorite from an unusual Aten type orbit ($a < 1$ AU). BR is the first achondrite with a known orbit and it is one of the most precise orbits ever calculated for a meteorite dropping fireball. A comprehensive article on the detailed analysis of the fall of the meteorite BR was issued in 2012 in the journal *Meteoritics and Planetary Science* (Spurný, P. et al., *Meteoritics and Planetary Science*, Vol. 47 (2012), pp. 163-185).



Bunburra Rockhole meteorites recovered by the first expedition in October 2008. The meteorites are classified as anomalous achondrites and they are the first achondrites with a known heliocentric orbit. The first meteorite (right on the image) with a mass of 150 g was found on 3 October. The second meteorite with a mass of 174 g was found on 11 October 2008. (Astronomical Institute)

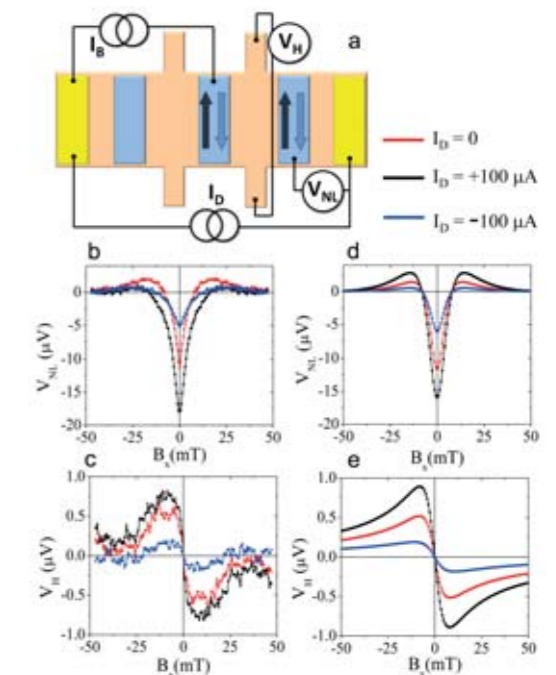
Cooperating entities: Imperial College in London, Great Britain and Western Australian Museum in Perth, Australia

Spin Hall Devices

(Institute of Physics)

The spin Hall effect is a relativistic spin-orbit coupling phenomenon that can be used to electrically generate or detect spin currents in non-magnetic systems. In a Physical Review Letters paper, scientists from the Institute of Physics have introduced an experimental and theoretical work in this field, performed by the international Prague-Nottingham-Cambridge-Texas group. In the work, they succeeded in demonstrating electrical spin-injection into a non-magnetic semiconductor combined with electrical detection by the inverse spin Hall effect in an Fe/GaAs microdevice.

Electrical spin injection and detection is complemented in microdevice with an applied electrical drift current to control the spin distribution and spin current in the channel. The structure represents a realization of a new type of an all-electrical spin transistor/modulator device. In an invited review article published in a special issue of Nature Materials on Spintronics, this new work was mentioned along with the series of studies by the group of employees of the Institute of Physics and other groups from around the world that, since the first experimental observation of the spin Hall effect less than 10 years ago, have established the basic physical understanding of the phenomenon and its functioning in experimental microelectronic components.



Spin Hall devices
(a) A semiconductor component for the detection of the inverse spin Hall effect with electrical modulation of the spin signal. Schematics of the experimental setup. (b),(c) Experimental symmetric non-local spin valve and antisymmetric inverse spin Hall signals in the in-plane hard-axis field measured at constant spin-injection bias current $I_B=300$ μ A and at three different drift currents I_D depicted in (a). (d),(e) Calculations of the non-local spin valve and inverse spin Hall signals. (Institute of Physics)

Cooperating entities: Charles University in Prague, University of Nottingham, Great Britain

Weak-Strong Uniqueness Property for the Full Navier-Stokes-Fourier System*(Institute of Mathematics)*

A mathematical description of the motion of compressible, viscous and heat conducting fluids is necessary for developing effective numerical methods used in a large variety of real world applications. The public encounters the omnipresence of such mathematical models used in weather predictions (meteorology), aircraft and spaceship design, or astrophysics, among many others. Despite the concerted effort of generations of excellent mathematicians, the basic questions concerning solvability of the underlying systems of equations remain largely open, among which the existence of classical solutions. Several concepts of the so-called generalized solutions have been developed since the beginning of the last century. The paper examines the mutual relations between different concepts of generalized solutions. In particular, it is shown that all generalized solutions to the same problem coincide with the classical solution as long as the latter exists. Such a result is fundamental for future development of the mathematical theory as well as effective numerical methods and their implementations.

Cooperating entity: Université du Sud Toulon Var, France

Krylov Subspace Methods, Principles and Analysis*(Institute of Computer Science)*

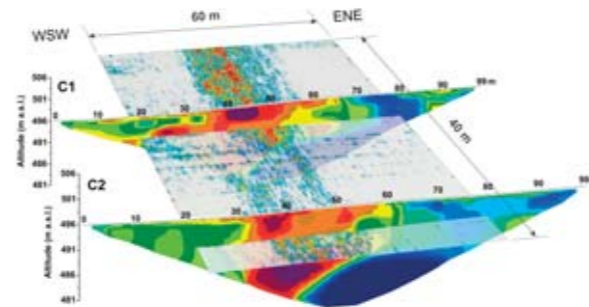
Krylov subspace methods are frequently listed among the ten most important algorithmic achievements of the 20th century. They are described in several first-class books written by excellent authors, which reflect the current state-of-the-art as the outcome of the enormous algorithmic developments over the last several decades. This monograph entitled Krylov Subspace Methods, Principles and Analysis by J. Liesen and Z. Strakoš (from the Institute of Computer Science), which was issued in 2012 has a different focus. Its goal is to describe mathematical fundamentals of Krylov subspace methods. This places them into the context of several mathematical disciplines as well as into the historical context which goes several centuries back but still is linked with the latest developments in computational mathematics and natural sciences. A significant part of the material is presented in the book form for the first time and some results are entirely new. The emphasis on exposition

instead of algorithmic descriptions makes the monograph distinctive from existing literature.



The cover of the book *Krylov Subspace Methods, Principles and Analysis* (Institute of Computer Science)

Cooperating entities: Faculty of Mathematics and Physics of Charles University in Prague, Technische Universität Berlin, Germany

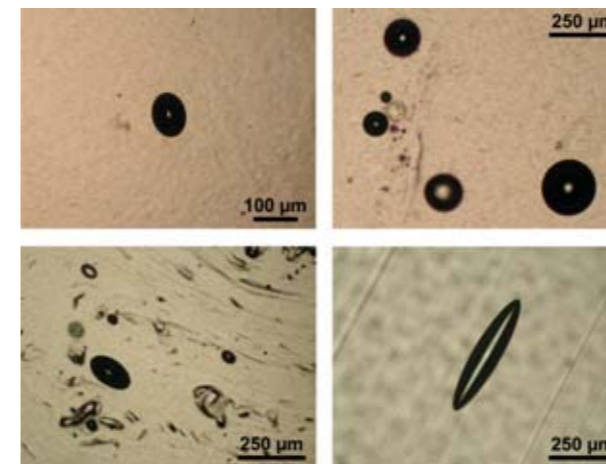
Imaging the Mariánské Lázně Fault by 3-D ground-penetrating radar and electric resistivity tomography*(Institute of Geophysics)*

Electric resistivity profiles across the marginal fault of the Cheb basin

Electric resistivity sections across the marginal fault of the Cheb basin close to Kopanina. The colours from blue to red are proportional to the electric resistivity. The horizontal slice shows the reflectivity for electromagnetic waves obtained by the 3D survey using the method of ground penetrating radar. The high resistivities correlate with the high reflectivity of the gravel body, which is intersected by several faults. (Institute of Geophysics)

The Institute of Geophysics as a part of its research of the paleoseismic activities of the Mariánské Lázně Fault performed a geophysical investigation in the neighbourhood of a near-surface groove, which discovered the outcrop of one part of the fault. By using the combination of geoelectric resistance tomography and ground penetrating radar, the continuation of the fault both laterally and horizontally was successfully found. Another fault was discovered by tectonic analysis of a gravel body exhibiting high reflectivity and low conductivity. This fault is crossed by two younger faults, the activity of which will be subject of further studies.

Cooperating entity: Faculty of Science of Charles University in Prague

A review of volatile compounds in tektites and carbon content and isotopic composition of moldavite glass*(Institute of Geology)*

A review of volatile compounds in tektites and carbon content and isotopic composition of moldavite glass
Characteristic appearance of bubbles in moldavite. Photo by L. Dziková. (Institute of Geology)

Tektites, natural silica-rich glasses produced during impact events, commonly contain bubbles. The pressure and composition of a gas phase contained in the tektite bubbles can be obtained after the release of the gases from tektites by either high-temperature melting or by crushing or milling under vacuum. Gas extraction from tektites using high-temperature melting generally produces a higher gas yield and different gas composition than the low-tem-

perature extraction using crushing or milling under vacuum. The high-temperature extraction obviously releases volatiles not only from the bubbles, but also volatile compounds contained directly in the glass. Moreover, the gas composition can be modified by reactions between the released gases and the glass melt. Published data indicate that besides CO₂ and/or CO in the bubbles, another carbon reservoir is present directly in the tektite glass. To clarify the problem of carbon content and carbon isotopic composition of the tektite glass, three samples from the Central European tektite strewn field – moldavites – were analyzed. The samples contained only 35 to 41 ppm C. Isotopic C composition indicates that terrestrial organic matter was a dominant carbon source during moldavite formation.

Cooperating entity: Nuclear Physics Institute of the ASCR, Řež near Prague

Iterative methods for mathematical modelling*(Institute of Geonics)*

Mathematical modelling of physical processes in mechanics, heat transfer, fluid flow in porous rock media, coupled processes, as well as inverse problems of identification of parameters lead to the solution of large linear and nonlinear algebraic systems. Efficient iterative methods are therefore looked for, especially those that can take advantage of the contemporary powerful and massively parallel computers. Development of iterative methods and mathematical modelling tools is therefore systematically carried out also at the Institute of Geonics ASCR, Ostrava and valuable results were achieved in the last year.

At first, it is the development of techniques for preconditioning, i.e. finding a cheap approximation to the solved problem which is applicable for speeding up the iterations. For the problems solved by the finite element method, numerical methods were developed and analyzed using recursive division of matrices into 2x2 blocks and macroelement based preconditioners for the pivot blocks and their Schur complements. Such approach is effective for modelling processes in heterogeneous media with oscillating coefficients and can be utilized for computing on parallel computers.

Another result concerns the solution of problems in poroelasticity, which play an important role in geoscientific applications.

Poroelasticity is an important physical model and an example of coupled physical processes. The discretization of these tasks provides block-structure systems corresponding to desired physical quantities, in our case, the pressures in liquid, flow velocities and displacement in solid matrix. This block structure has also been used for the construction of a new type of preconditioning.

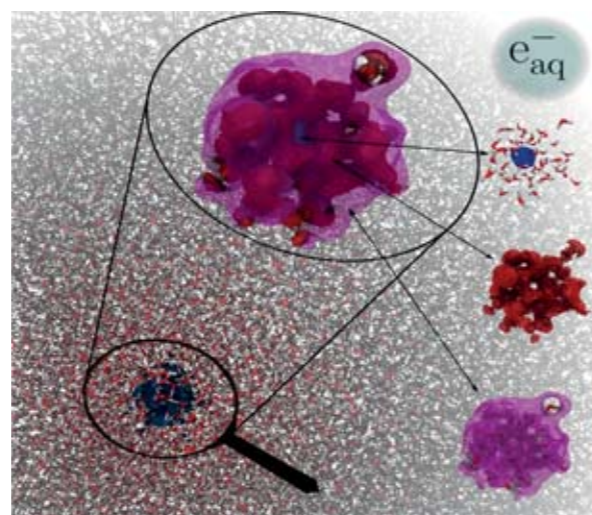
Scientists implemented iterative methods in their own MKP (Finite Element Method) GEM software, developed in the long range in the Institute of Geonics. The implementation has been tested in comparison with the procedures of the universal library of programmes, particularly relatively new but growing library Trilinos from Sandia National laboratory in the U.S. Testing both GEM and Trilinos software on smaller parallel computing machines has shown greater efficiency of GEM tuned for the solved type of tasks. Testing on massively parallel computers will be performed within the project Centre of Excellence IT4Innovations, where the institute is one of the consortium partners.

In the case of processes with nonlinear response, one has to use iterative linearization of a task in combination with the iterative solution of the linearized systems. The results of our research are related to solving tasks described by operators differentiable, except for small exceptions. The achieved results concern the analysis of the semismooth Newton method and can be applied in elastoplasticity.

Unravelling the structure of “wet” electrons helps to understand radiation processes involved in DNA damage during cancer treatment and in nuclear waste storage
(*Institute of Organic Chemistry and Biochemistry*)

The employees of the Institute of Organic Chemistry and Biochemistry conducted a study, which attempts to provide an “authoritative answer” to the question concerning structure of a key intermediate in water radiolysis – the solvated electron (Science 2012, 338, 583) This study concludes a five-year research project performed in Prague in collaboration with the University of Southern California and ETH Zurich. It has been aimed at computational and experimental description of ultrafast processes following photoionization of water leading to formation of OH radicals and solvated electrons. OH radicals play a crucial role in indirect DNA damage during radiation cancer treatment while the

latter represent a dangerous reactant in nuclear waste storage. If the solvated electrons are not efficiently neutralized, they can react in the acidic environment of aqueous nuclear waste with protons forming a potentially explosive hydrogen gas. The present computational study, performed solely at IOCB, provides a detailed view on the structure and dynamics of the solvated electron. Thanks to a state-of-the-art methodology combining quantum chemistry and molecular dynamics techniques we were able to solve a 40-year old riddle about how an electron “dissolves” in water.



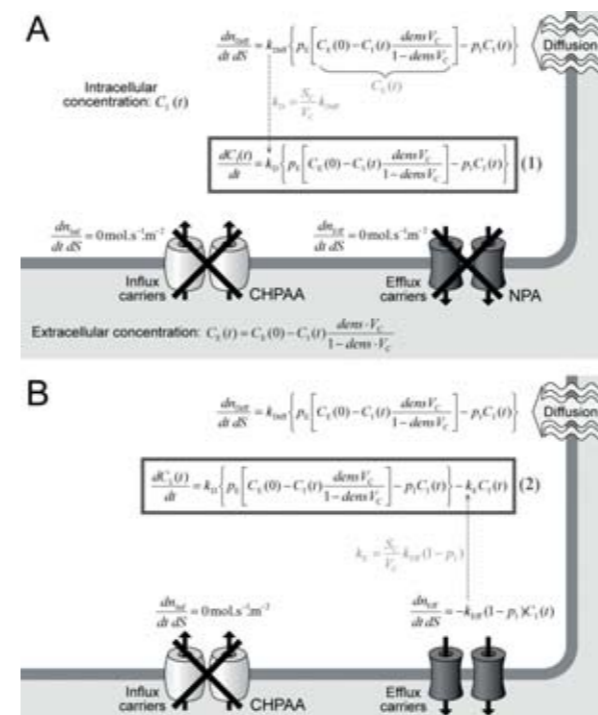
Unravelling the structure of “wet” electrons helps to understand radiation processes involved in DNA damage during cancer treatment and in nuclear waste storage
The figure shows a water-solvated electron with its detailed structure composed of three contributions seen in a “magnifying glass”. The major part of the electron density (in blue, ca 40%) is situated in the cavity while the remaining two electron density contributions formed by an overlap with adjoining water molecules possess a radical anion (in red, ca 25%) and diffuse (in pink, 35%) characters. (*Institute of Organic Chemistry and Biochemistry*)

Cooperating entities: ETH Zurich, Switzerland, University of Southern California, Los Angeles, USA

Mechanisms regulating intracellular homeostasis of plant hormone auxin
(*Institute of Experimental Botany*)

Plant morphogenesis is controlled on the basis of genetically determined developmental programme in relation to

actual environmental conditions. One of the most important tools of morphogenetic regulations is plant growth regulator (phytohormone) auxin. In plant tissues and organs, auxin forms concentration gradients that are modulated based on changes of concentration of auxin in cells and intracellular space.



Mathematical model
Mathematical model of 3H-2,4-D uptake by diffusion or both diffusion and efflux. (*Institute of Experimental Botany*)

At the Institute of Experimental Botany within the study of the mechanisms of auxin homeostasis, the properties of the protein ABCB4 from the superfamily of “ATP-binding-cassette” (ABC) transporters were characterised. It was discovered that this is able to translocate auxin across plasma membrane in both directions, i.e. into cells and out of cells, in relation to actual auxin concentration. At low auxin levels, ABCB4 works as auxin importer, at high auxin levels as exporter. The Institute of Experimental Botany has contributed to identification of so far unknown family of proteins PIN-LIKES (PILS), involved in regulation of auxin levels in cell compartments. PILS proteins are localized in endoplasmic reticulum and control accessibility of auxin for nuclear signalling pathways. The institute has further contribut-

ed to understanding the function of putative auxin carrier PIN8. In *Arabidopsis thaliana*, it is expressed only in male gametophyte and plays a key role in pollen development. PIN8, similar to another auxin carrier PIN5, is localized on membranes of endoplasmic reticulum but in many aspects, both transporters are acting antagonistically.

On the basis of kinetic data obtained from the model tobacco cell line, dynamics of auxin accumulation in cells has been mathematically characterized and these quantitative data used to design the mathematical model of auxin accumulation in cells. This model provides key parameters of auxin transport into and from cells, and it also can predict the way of auxin accumulation in cells under various experimental conditions. These results reveal multiple mechanisms for regulation of homeostasis of a key signalling molecule – auxin, and their indispensability for optimal development of plant and its organs.

Cooperating entities: Purdue University, Indiana, USA, VIB Univ. Ghent, Belgium, BOKU Vienna, Austria, Univ. of Fribourg, Switzerland, FBMI ČVUT (Faculty of Biomedical Engineering of the Czech Technical University)

Whooping cough-causing bacterium: suppression of defence mechanisms
(*Institute of Microbiology*)

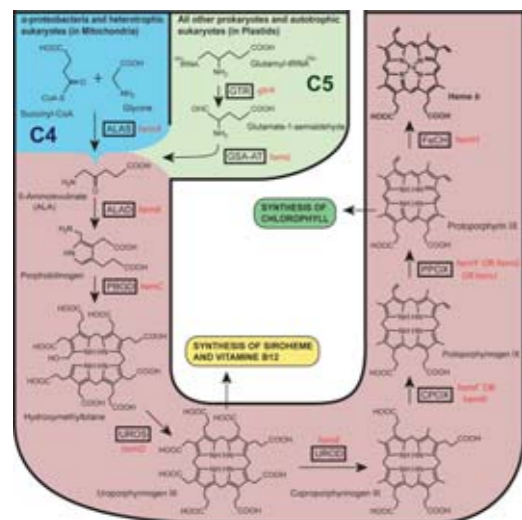
The origin of whooping cough, the bacterium *Bordetella pertussis*, suppresses the defence mechanisms of the attacked organism by producing toxins. One of them has the ability to not only interfere with cellular signalling through the creation of cAMP molecules but also to create pores in the membrane of the phagocytes and block their removal by allowing the entry of calcium ions into the cells. This paralyzes the phagocytes and hinders their liquidation of the infection.

The employees of the Institute of Microbiology within cooperation with the Faculty of Science of CU in Prague and the Institut Pasteur in Paris were able to determine that in the interaction of the toxin of the bacterium *Bordetella pertussis*, the initiator of whooping cough, with the cellular membrane there is an entry of calcium ions into these cells and slowdown in the repair of the pores created by endocytosis. The synergy of cAMP signalling with membrane

permeabilization results in death of the phagocytic cells, paralyzing the immune response to infection and contributing to disease development.

Cooperating entities: Faculty of Science of Charles University in Prague and Institut Pasteur, Paris, France

Life without heme (Biology Centre)



Life without heme
Metabolic pathway of the flagellate *Phytomonas serpens*, which is able to survive without heme. (Biology Centre)

An astonishing discovery that shifts our understanding of how eukaryotic cell works and under what circumstances it is able to function has been made by L. Kořený and his colleagues. It took three years to confirm his audacious idea that a protist of the genus *Phytomonas* is able to live without heme. Heme is an iron-binding molecule, which serves as a co-factor of various proteins and plays a key role in the energy metabolism of the cell as well as in the protection against oxidative stress. Another unique characteristic of heme is that it can bind diatomic gases, a key feature for oxygen transport. Many of these processes are universal for virtually all organisms and up to now it was hardly imaginable that an aerobic cell could survive without heme. By analyzing the genome of a *Phytomonas* flagellate, a close relative of the well-known human parasites trypanosomes and leishmanias, it was found that it does not use heme for oxidative stress defence, fatty acid desaturation and mito-

chondrial respiration. The only process in which heme is still employed is one enzymatic step during the biosynthesis of sterols. Even though the inhibition of this enzyme is normally lethal for eukaryotic cells, *Phytomonas* can survive the lack of its activity without even slowing the rate of cell division. This discovery has helped to elucidate why one species of leishmania is resistant to a drug which targets this particular function of heme. So far, *Phytomonas* is the only known eukaryotic cell that can survive without heme making it an excellent model for investigating various cellular processes in an environment lacking heme. This discovery might help in development of more effective treatment of a serious tropical disease leishmaniasis.



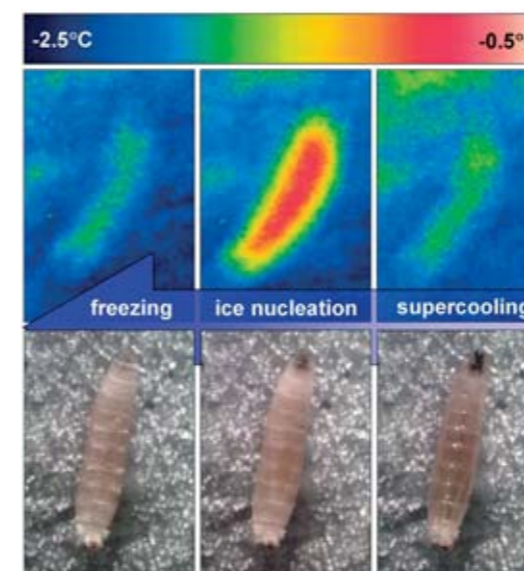
Life without heme
Metabolic pathway of flagellate *Phytomonas serpens*, which does not need the molecule heme for its existence. (Biology Centre)

Cooperating entities: Faculty of Science of the University of South Bohemia in České Budějovice, Institute of Microbiology of the ASCR, Workplace Třeboň; Comenius University, Bratislava, Slovakia; Department of Ecology and Evolutionary Biology, University of California, Irvine, CA, USA

Principles of insect freeze-tolerance (Biology Centre)

Evolutionary adaptations for freeze-tolerance are considered to be highly complex and difficult to apply to unad-

apted species. The employees of the Biology Centre have described basic physiological and biochemical principles of freeze-tolerance in the subarctic drosophilid fly *Chymomyza costata*. Moreover, they managed to apply these mechanisms in the fruit fly, *Drosophila melanogaster* – a species of tropical origin with a weak innate capacity to tolerate even mild chilling. The scientists found that a synergy of two fundamental prerequisites is required in order to change the chill susceptible insect to the freeze-tolerant one: (a) shutdown of larval development, including all the chill sensitive processes linked to it, by exposing larvae to low but above-lethal temperatures (quiescence), and (b) incorporation of the free amino acid L-proline in tissues by feeding larvae an augmented diet (cryopreservation). Larvae of the fruit fly can then survive at subzero temperatures when approximately half of their body water turns to ice crystals.



Freezing the larva of the fruit fly, *Drosophila melanogaster*
Time lapse photographs taken using CCD camera (right column) and thermocamera (left column). The larvae were gradually cooled from -0.5°C to -2.5°C at a rate of $-0.1^{\circ}\text{C}/\text{min}$. The upper two images show the situation at a temperature above the freezing of body fluids (supercooled state); the middle two images capture the moment of ice nucleation and formation of ice (at approximately -2°C , note shift to "warm" colours due to release of heat of ice crystallization); the lower two images show larvae with body fluids partially turned to ice crystals. The time interval between taking individual pictures was 10 sec. (Biology Centre)

02.3 ON THE WAY TO NEW PRODUCTS AND TECHNOLOGIES

From the results of 2012, we present:

Preparation of Graphene by Using an Intense Cavitation Field in a Pressurized Ultrasonic Reactor (Institute of Inorganic Chemistry)

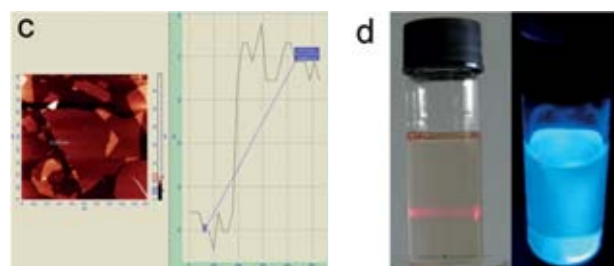
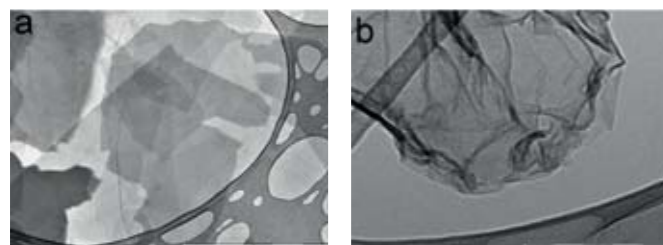
Graphite is a layered hexagonal mineral, whose name comes from *grafein*, a Greek word for *to write*. A pencil writes because single platelets are flaking off and remain on the paper. A single layer of graphite with thickness of one atom is called graphene. In 2004, A. Geim a K. Novoselov obtained a graphene single-layer using an adhesive tape; their discovery was awarded Nobel Prize in 2010. Graphene is conventionally prepared from graphite by a Hummers' method using an oxidative "cocktail" of concentrated sulphur acid and KMnO_4 via graphene oxide (GO), which is subsequently reduced (i.e. by glucose).

Layered natural minerals can be delaminated by means of cavitation field in a liquid medium; layered particles in a liquid become wavy like strings on a guitar and single thin leaflets begin to flake off.

Through the modification of this method with a higher intensity (2000 W) in a pressurized ultrasonic reactor, it was possible at the Institute of Inorganic Chemistry to prepare graphene from graphite, namely directly, without acids, oxidation or GO intermediates. This method allows the preparation of graphene in tens of grams per hour and a safe quantitative conversion of graphene to GO with a possibility of large-scale production of both graphene and GO, because the oxidation of graphene takes place at substantially milder and safer conditions than the oxidation of graphite.

GO prepared by oxidation of graphene is more reactive than that prepared by oxidation of graphite and its single-layers are falling into nanoparticles at lower temperatures; it can be used for syntheses of other advanced materials or materials, which are difficult to be prepared, i.e. for the synthesis of quantum dots, which are so far prepared from GO in high-pressure reactors at elevated temperatures. Our reactive GO allows the synthesis at common laboratory conditions.

A managing of the direct synthesis of graphene and GO opens the path to syntheses of novel, sophisticated materials, such as nanomaterials for photocatalytic applications, barrier transparent paints, luminescence materials, sorbents for persistent organic pollutants and/or materials for stoichiometric degradation of environmental pollutants.



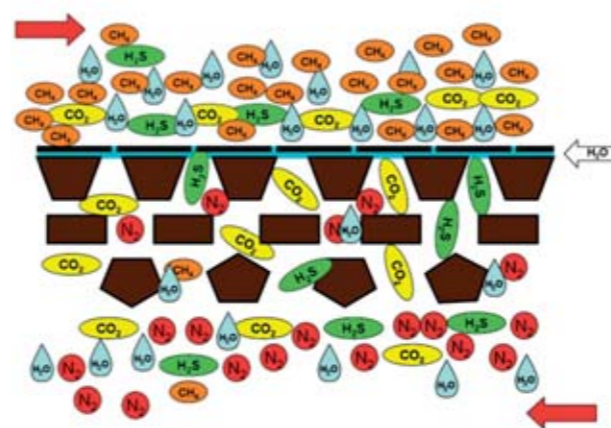
Materials based on graphene (preparation of graphene through an intensive cavitation field in a pressurized ultrasonic reactor).

1a) High Resolution Transmission Microscope (HRTEM) image of graphene. 1b) HRTEM image of reduced graphene oxide. 1c) AFM study of graphene oxide. 1d) graphene quantum dots. (Institute of Inorganic Chemistry)

A Water-Swollen Thin Film Composite Membrane for Effective Upgrading of Raw Biogas by Methane

(Institute of Chemical Process Fundamentals)

The Institute of Chemical Process Fundamentals managed to develop a one-step method for cleaning raw biogas, in which the temperature of the swollen, thin, hydrophilic composite membrane below the dew point of the raw biogas feed is used. This ensures the condensation of the water vapour in the raw biomass on the membrane surface, with the result of a very thin selective layer of water being created. Precisely the significant difference between the solubility coefficients of CH_4 , CO_2 and H_2S in water is responsible for the successful upgrading of the biogas by methane.



Function of condensing water membrane on thin film reverse osmosis membrane (effective separation of enriched raw biogas from methane using water of an enriched polymer gel). (Institute of Chemical Process Fundamentals)

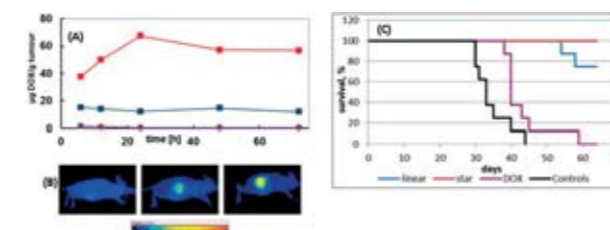
Capillary electrophoresis with capacitively coupled contactless conductivity detection: A universal tool for the determination of supported liquid membrane selectivity in electromembrane extraction of complex samples

(Institute of Analytic Chemistry)

Monitoring the selectivity of supported liquid membranes (SLMs) is of paramount importance since the amount and type of compounds that are transferred across a SLM directly influence the transfer efficiency, reproducibility and accuracy. To apply a correct SLM in particular sample pretreatment, rapid determination of the transfer of analytes and matrix compounds across the SLM is necessary, which requires the use of an analytical method with universal detection technique. At the Institute of Analytic Chemistry, it was possible to prove that capillary electrophoresis with capacitively coupled contactless conductivity detection (CE-C4D) is a useful tool for the determination of SLM selectivity. The CE-C4D method has evidenced for the first time that large proteins, such as human serum albumin, are efficiently retained on all examined SLMs and that transfer of other matrix components and the analytes is strongly SLM dependent.

Impact of the structure of polymer cancerostatics on their biodistribution and anti-tumour activity *in vivo*

(Institute of Macromolecular Chemistry)



Accumulation in tumour and anti-tumour activity of free drug (DOX) and linear and star polymer drug conjugates in mice after i.v. injection.

(A) The accumulation of the high-molecular-weight star conjugate (red) in the tumour is much higher than accumulation of the linear conjugate (blue). The accumulation of the free drug (DOX, violet) is significantly lower. The data are related to the DOX concentration in all cases. (B) The accumulation of the fluorescently labelled polymer carriers in HT-29 colon carcinoma is significant with superior accumulation found for star conjugate (left - control, middle - linear carrier, right - star conjugate). (C) The treatment of mice bearing mice EL4 lymphoma was most effective by using star conjugate (red), treatment with the linear conjugate (blue) was less effective but superior to the treatment with free DOX (violet). Treatment with 15 mg DOXeq/kg administered on day 8 after tumour inoculation. (Institute of Macromolecular Chemistry)

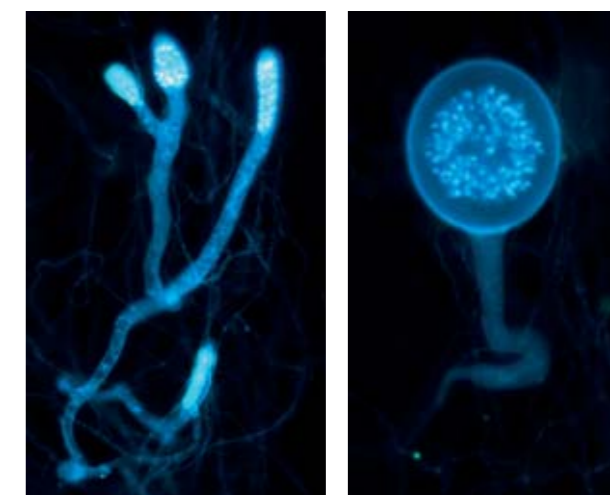
Conjugates of *N*-(2-hydroxypropyl) methacrylamide (HPMA) copolymers with cancer statics exhibit significant anti-cancer activity *in vivo* and their application for treatment of model tumours in mice often results in complete curing of the mice. In the study of biodistribution of such polymer medications, scientific employees of the Institute of Macromolecular Chemistry discovered that the selection of a proper size and structure of the polymer results in significant accumulation of the drug delivered by the polymer carrier into a solid tumour (targeting the tumour). This accumulation strongly depends on the molar mass and architecture of the polymer carrier and, together with dosing of the drug, has a crucial influence on the anti-tumour efficiency of these polymer drugs *in vivo*. It was also shown that the molar mass of the polymer, its structure and architecture influence the process of elimination of the polymer carrier from organism by glomerular filtration what would be very important for safety of the patients undergoing repeated treatment by the polymer cancerostatics. The thresholds for kidney elimination of the polymer HP-

MA-based carriers of a linear or star architecture were also found, which enabled the design of the structure of polymer cancerostatics fulfilling the most important requirements for efficient and safe treatment of tumours, i.e., specific delivery of the cytotoxic drug to a tumour tissue in its inactive (non-toxic) form and release of the active drug in the tumour or tumour cells followed by elimination of the carrier from organism by renal excretion. The obtained findings are substantial for construction of polymer cancerostatics suitable for pre-clinical and hopefully also clinical testing.

Cooperating entities: Martin-Luther University, Halle, Germany; Institute of Microbiology of the ASCR

Application of anaerobic fungi

(Institute of Animal Physiology and Genetics)



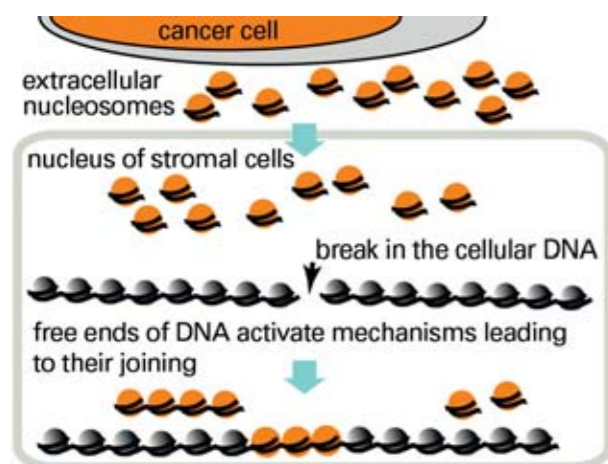
Application of anaerobic fungi. The ITS region was selected as the best barcode marker for successful identification of fungi. Addition of anaerobic fungi led to 4–22% increase of methane production in biogas fermenters fed with maize silage. After application of maize silage to the biogas station, *Clostridia* remain unchanged and *Bacteroides* counts were decreased. (Institute of Animal Physiology and Genetics)

Under the laboratory conditions of the Institute of Animal Physiology and Genetics, the influence of anaerobic fungi on the production of biogas from a mixture of swine manure and maize silage, which is commonly used for methane production in agricultural biogas stations. The results

showed that rumen anaerobic fungi significantly contribute to the decomposition of the substrate (maize silage), leading subsequently to the higher production of biogas. An increased production of biogas in the range of 4–22% was recorded by species of anaerobic fungus and by experimental arrangement. Rumen fungi hence significantly improve the efficiency of hydrolysis, although they were not able to reproduce in the laboratory biogas minifermentors.

Cooperating entity: Institute of Chemical Technology, Prague

Fragmented DNA released by leukemic cells contributes to the disruption of the bone marrow microenvironment
(Institute of Molecular Genetics)



Hypothesis
Possible consequences of the penetration of extracellular nucleosomes to the nuclei of the surrounding cells:
1. mutagenesis of stromal cells by double-strand break repair and integrated DNA; 2. death of stromal cells induced by excessive unintegrated DNA. (Institute of Molecular Genetics)

Fragmented chromatin composed of short DNA fragments associated with proteins has been often found to circulate in the blood of cancer patients. The origin and a potential biological role of this extracellular fragmented DNA have not been satisfactorily elucidated. Using the animal model of acute workers of the Institute of Molecular Genetics showed that unstable leukemic cells liberate fragmented

chromatin which enters nuclei of surrounding cells. Free ends of DNA fragments incite the DNA damage response in nuclei of acceptor cells, since they mimic DNA double-strand breaks, the most dangerous type of genomic DNA damage. The extensive DNA damage (or a high concentration of infiltrating DNA fragments) activates cell death mechanisms. On the other hand, low amounts of double-strand breaks (or low concentration of infiltrating DNA fragments) are processed by mechanisms which join free DNA ends together. During this process, the originally extracellular DNA fragments are rarely integrated into the genome of acceptor cells and mutate it. The published article shows that extracellular DNA liberated by tumour cells can significantly affect the tumour microenvironment, partly through induction of cell death and partly through mutation of genetic information of neighbouring cells. Both effects can support progression of a tumour.

Cooperating entities: Institute of Anatomy of the First Faculty of Medicine of Charles University in Prague, Institute of Animal Physiology and Genetics of the ASCR, Liběchov, Chambon s. r. o., Laboratory of Molecular Diagnostics, Prague

Human induced pluripotent stem cells improve stroke outcome and reduce secondary degeneration in the recipient brain
(Institute of Experimental Medicine)

Human induced pluripotent stem cells (hiPSCs) are an important source for cell replacement therapy in acute brain lesions (stroke). The hiPSCs-derived neural progenitor cells (NPCs) prepared from iPS cells were further transplanted into the post-ischemic striatum in the laboratories of the Institute of Experimental Medicine. The transplanted cells began to change into specialised neurons, which sent their fibres to the furthest areas of the brain. The graft also grew with the nerve fibres of a sewer rat. These changes in the structure of the brain led to a lessening of the movement problems of the sewer rat caused by a stroke and lesser necrosis of those areas of the brain whose connection is damaged after a stroke. The transplanted cells hence have a dual effect in the treatment of the model of stroke. In the first months, substances are released that reduce the necrosis of important parts of the brain and sup-

port renewal of the nerve tissue, which is manifested in a reduction of the movement problems caused by stroke. In further months, it leads to the integration of the newly created cells into the brain structures of the sewer rat and the renewal of the relevant nerve connections.

Cooperating entities: Inserm France; Lunds Universitet, Sweden; University of Southern Denmark, Denmark; Karolinska Institutet, Sweden; CEA France; Cellartis, Sweden; Leibniz Institute for Neurobiology, Germany; Inserm Transfert, France

The new material alpha-tocopheryloxyacetic acid due to its higher stability is superior to alpha-tocopheryl succinate in suppressing HER2-high breast carcinoma
(Biotechnology Institute)

Employees of the Biotechnology Institute in cooperation with Griffith University in Australia have tested a new material alpha-tocopheryloxyacetic acid, which kills cancer cells on the cell culture level with a similar efficacy as that of alpha-tocopheryl succinate. However, it is considerably more efficient *in vivo*, using the FVB/N c-neu mice with spontaneous formation of HER2-high breast carcinomas. The reason is its higher stability *in vivo* than that of the ester alpha-tocopheryl succinate, which is degraded faster by non-specific esterases.

Cooperating entity: Griffith University, Southport, Qld, Australia

Acidity controls on dissolved organic carbon mobility in organic soils
(Global Change Research Centre)

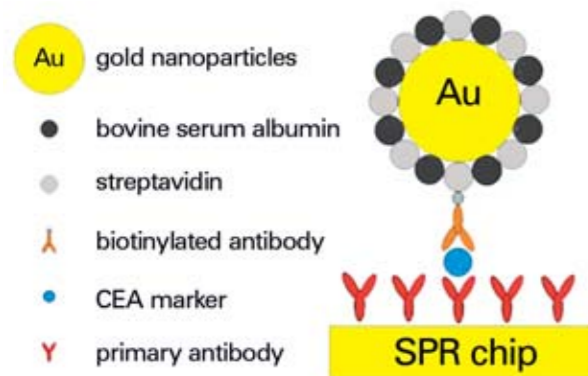
The long-term growth of the concentration of organic carbon in streams and lakes and the increase of its export from the mainland in the past several decades has been observed in many places of North America and Europe. The scientists of the Global Change Research Centre have tried to explain this phenomenon in many ways. They have put it in relation to climate change, to atmospheric deposition of nitrogen (increased temperature and the deposition of nitrogen stimulate the creation of organic matter)

or to land management changes. Later, through an analysis of a great number of long-term measurements, a close relation was proved between the reduction of the acidity of rain (the abatement of so-called 'acid rain') and the growth of dissolved organic carbon in surface waters. The drop in the concentration of sulphates in precipitation, the main cause of the acidity of precipitation, is the consequence of the technological measures adopted already in the 1970s thanks to the policy of reducing the emissions of polluting materials (Convention on Long-range Transboundary Air Pollution in Europe and The Clean Air Act in the USA). In the Czech Republic, the emissions of sulphur have decreased over the past 25 years by 90%, mainly thanks to the desulphurisation of brown-coal electric plants and the partial decline of heavy industry. The result of these positive changes in the field of protection of the atmosphere led to a growth of the concentration of organic carbon also in Czech brooks and water reservoirs. The treatment of drinking water with a high content of organic materials is a problem today with some reservoirs in the Ore Mountains.

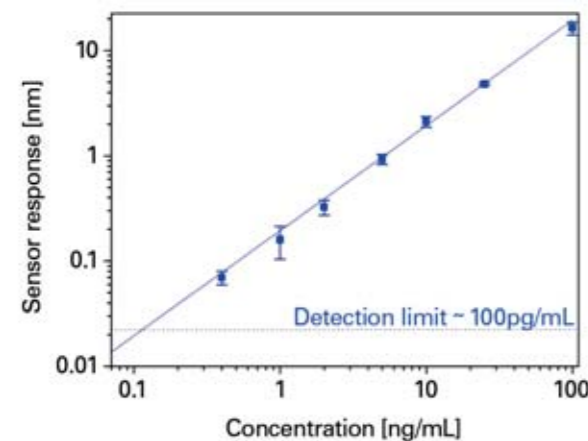
For the purpose of understanding and quantifying the factors influencing the mobility of dissolved organic carbon in soils and its subsequent export to rivers and oceans, a controlled field experiment was conducted that monitored the changes of the pH of soil – a simulation of acid and alkaline rains. As a result, we can clearly judge that the mobility of organic carbon in the soil environment is significantly influenced by changes of the soil pH. When the soil acidifies, organic carbon is less mobile and is held in the soils; on the contrary, with rising pH of the soil it is increasingly washed away. Since soil pH is a resultant not only of the chemical composition of precipitation, any change influencing the acidity of soils can have a significant impact on the carbon balance.

Acid rain accompanied Europe and North America for most of the 20th century. Thanks to efforts to limit the pollution of the atmosphere and acidification of the soils, it has been possible to reduce the deposition of acidic elements. One of the side and natural reactions to this change is the increased export of organic carbon from the mainland to the oceans observed today.

New biosensor with surface plasmons (Institute of Photonics and Electronics)



Detection format used for the detection of carcinoembryonic antigen (CEA). (Institute of Photonics and Electronics)



Calibration curve for the detection of CEA in 50% human blood plasma. (Institute of Photonics and Electronics)

Optical biosensors with surface plasmons allow the rapid and sensitive detection of biological materials with applications in medicine, monitoring the environment, inspecting foodstuffs or security. With the boom of nanosciences and nanotechnologies, the miniaturisation of plasmonic sensors (as low as the level of a single nanoparticle) has become an attractive goal. Scientists of the Institute of Photonics and Electronics have therefore focused their research on the study of various types of plasmonic nanostructures

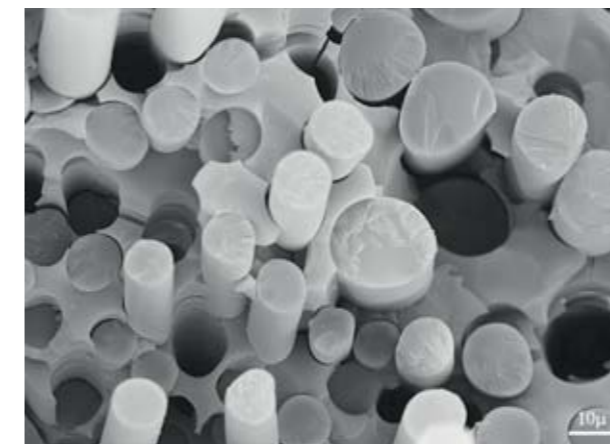
and their potential for the development of highly sensitive plasmonic biosensors. In cooperation with Karl-Franzens University in Graz, they studied the detection capabilities of sensors based on two types of structures – arranged on a field of gold nanorods and on a parallel, very thin layer of gold. It was demonstrated that despite the sensor based on nanorods being able to generate a response at a substantially lower number of captured molecules, the subsequent analytical sensitivity of these sensors is comparable. The scientists further analysed and described the influence of transport phenomena and the characteristics of the molecular interactions on the detection characteristics of the plasmonic nanosensors. The plasmonic nanostructures were used for the construction of new biosensors. For instance, a plasmonic biosensor for the detection of a carcinoembryonic antigen (CEA; elevated levels of CEA indicate gastrointestinal, breast, or lung carcinoma) and a vascular endothelial growth factor receptor (vascular endothelial growth factor receptor, VEGFR; applicable with myelodysplastic syndromes and acute myeloid leukemia) were developed. Using functionalised gold nanoparticles, which strengthen the response of the plasmonic sensor, it was able to measure extremely low concentrations of CEA. The achieved detection limit (100 pg/mL) was an order lower than the typical physiological values for healthy individuals.

Cooperating entities: Karl-Franzens University, Graz, Austria, and the Institute of Hematology and Blood Transfusion, Prague

Tough fibre reinforced composites based on ceramics prepared using economically acceptable inputs designed for high temperature, damage analysis at the interface with the latest techniques (Institute of Physics of Materials)

Materials suitable for use at high temperatures are generally based on ceramics. The fundamental problem of application of these materials is their brittleness. For several decades, considerable effort is devoted to their toughening. The most effective way is the use of reinforcement in the form of long ceramic fibres. This apparent paradox, i.e. the reinforcement of brittle material by another brittle material, uses a synergism effect of several reinforcing mechanisms and therefore fibre composites are of the highest resistance to the damage. Preparation of ceramic fibre reinforced

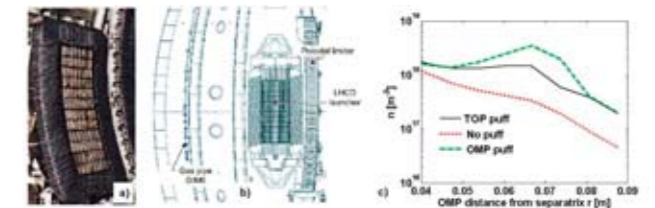
composites for long-term use at temperatures higher than 1000 °C is very costly, mainly due to high prices of inputs and expensive production. The development of the long fibre composites using economically advantageous raw materials and production processes together with maintaining sufficient mechanical properties was the main aim of the long-term cooperation between the Institute of Physics of Materials, the Institute of Rock Structure and Mechanics and the Institute of Macromolecular Chemistry of the ASCR. On the basis of the mechanical response of the individual components of the composite and consequently the composite itself was optimized its preparation. It was possible to skip expensive processing steps like surface treatment of the fibres. The unique high temperature properties are provided by the matrix consisting of SiOC glass prepared by pyrolysis of polymeric precursors based on polysiloxane resins. The advantage is not only the high temperature stability of matrices tested at temperatures of 1550 °C but also the possibility of adjusting of their physical properties by modification of the resin composition. Targeted tailoring of matrix properties obtained from the instrumented indentation tests and other methods allow optimizing of the composite function, where the basic toughening mechanism is the pull-out, which is clearly visible in the picture. Thanks to the undertaken properties optimisation of the fibre-matrix interface. High values of measured fracture toughness exceeding 20 MPa.m^{1/2} were achieved. These values of fracture toughness are comparable with top materials prepared by more expensive approaches.



Composite fracture
A composite fracture surface showing the fibre pull-out.
(Institute of Physics of Materials)

Cooperating entities: Institute of Rock Structure and Mechanics of the ASCR and the Institute of Macromolecular Chemistry of the ASCR

Optimization of the gas puff location in the JET tokamak and recommendation for ITER (Institute of Plasma Physics)

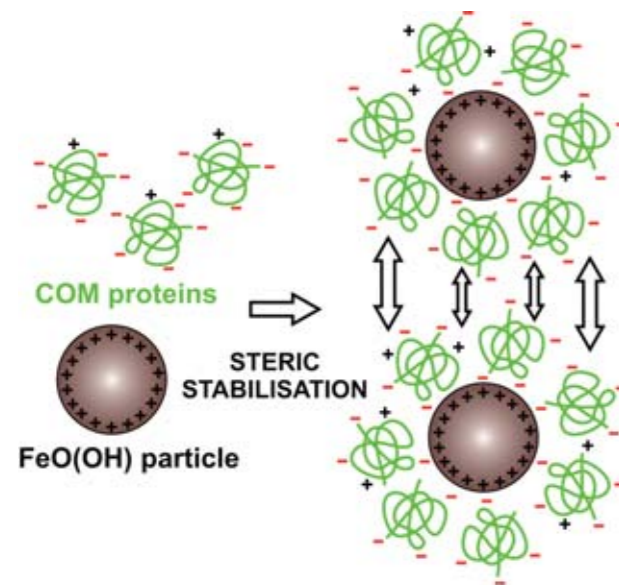


Lower-hybrid plasma heating in the JET tokamak
a) LH grill – “LHCD launcher” – viewed from the JET tokamak interior; b) LHCD launcher and gas injection (“Gas pipe GIM6”) positions; c) Calculated plasma density profile in the far SOL (scrape-off layer). The recommended OMP (outer mid-plane) gas injection results in a high density increase (green dashed line) needed for efficient coupling of the LH wave. (Institute of Plasma Physics)

In a future thermonuclear reactor of the Tokamak type, it is necessary to heat the plasma sufficiently for a temperature needed for the realisation of a thermonuclear (fusion) reaction. One of the possibilities is heating with a lower hybrid (LH) wave, which however must reliably spread in the scrape-off layer (SOL) plasma and then the interior of the reactor. The reliable spreading of the LH wave in the direction from the antenna (Fig. a) in the plasma of the JET tokamak is ensured by a system of gas injection, located near the outer wall. The injected gas is ionised by absorbing the energy of the LH waves in the SOL plasma. An experiment was carried out in JET, together with the SOL modelling near the LH antenna (Fig. a), with the aim to investigate whether a gas injection from the top, as it is foreseen for the gas injection in ITER, could also provide good coupling of the LH waves. The results show that a top gas injection was not efficient enough for providing a reliable LH power launching. Scientists of the Institute of Plasma Physics therefore recommend an additional gas injection system set in the outer mid-plane (Fig. b), in order to provide appropriate density growth, and reliable coupling for an LH antenna (Fig. c) in ITER.

Cooperating entity: Culham laboratory, JET (Joint European Torus) Tokamak, Great Britain

Water treatment through the content of organic materials produced by the cyanobacterium *Microcystis aeruginosa*
(Institute of Hydrodynamics)



Mechanism of steric stabilisation
Mechanism of steric stabilisation in the case of a high concentration ratio between the cellular organic matter (COM) produced by cyanobacterium *Microcystia aeruginosa* and coagulant particles – adsorption of COM polymers (peptides and proteins) onto Fe-oxide-hydroxides leading to coagulation inhibition. (Institute of Hydrodynamics)

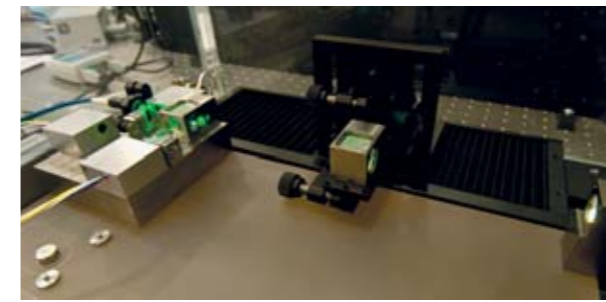
Conventional water treatment by means of coagulation is very sensitive to the sudden increase of algal organic matter (AOM) occurring mainly during algal blooms in raw water. Until now, two aspects of coagulation of AOM in drinking water treatment have been investigated: the efficiency of AOM removal from water and the influence of AOM on coagulation of other particulate impurities present in water. The research, which is still being performed, followed previous investigations aimed at the study of influence AOM isolated from cyanobacterium *M. aeruginosa* on the coagulation process in drinking water treatment. The results of the coagulation study imply that removability of AOM is highly dependent on pH value which determines charge characteristics of coagulation system compounds and therefore the mechanisms of interactions between them. The highest AOM removal was obtained in the pH range of 4-6 owing to charge neutralization of AOM negative surface by positively charged hydrolysis products of coagulant. Adsorption of peptides/proteins onto coagu-

lant particles, described as electrostatic patch model, was proved to enable the coagulation at pH 6-8 at low AOM/coagulant ratio. On the contrary, steric stabilization reduces coagulation at pH 6-8 if the ratio AOM/coagulant is high. Coagulation of peptides and proteins is disturbed at pH 6-7 as a consequence of coagulant-AOM complexes formation. The capacity of AOM to bound coagulant was found to be the highest at pH 6-7. It was also shown that high-molecular weight AOM is easily removable, whereas coagulation of low-molecular weight AOM proved to be very difficult, even in the pH range of the highest coagulation efficiency. Nearly the same low-molecular weight AOM as those identified as complex forming ones remain in the water after coagulation. This confirms the idea of complex formation to be the coagulation inhibition mechanism at this pH.

Interferometer with compensation of the fluctuations of the refractive index of air
(Institute of Scientific Instruments)

Scientists from the Institute of Scientific Instruments proposed and experimentally verified the concept of an interferometric measuring system, which almost entirely suppresses the influence of fluctuations of the refractive index of air. Laser interferometry is the most precise method of measuring distances (and all other geometric quantities). It is directly related to the definition of length, in which the speed of the spread of light in vacuum appears, but a practical measurement only makes sense in the presence of air. Air, however, influences the speed of light, which is expressed by the so-called refractive index. In the most precise measurements, it is precisely this influence that is the greatest source of measurement errors, primarily because air is inhomogeneous and microturbulence appears in it. The traditional conception of interferometry assumes the use of a laser with a very precise vacuum wavelength, whose individual wavelengths serve to measure out unknown distances. The correction for the air wavelength is done by an indirect measurement of the refractive index from the values of pressure, humidity and sometimes also the amount of carbon dioxide. It is not possible to capture rapid changes in that way, regardless of the fact that it is not measured directly in the path of the laser beam. The resolution of the Institute of Scientific Instruments on the contrary expects the stabilisation of the air wavelengths

in the whole measurement range. The control (tuning) of the laser then in real time compensates for the changes of the refractive index in the path of the beam. The stabilisation of the wavelength is derived from the length for instance of rods from a material with a very low thermal expansion. The actual interferometer is then an optic system measuring the position of a moveable cart from two directions and simultaneously observing the length of the whole measurement range, which it uses for stabilisation. This principle is covered by a patent of the institute and will be used within the European project "Metrology for movement and positioning in six degrees of freedom", in which the employees of the Institute of Scientific Instruments have become participants.



Interferometer with compensation of the fluctuation of the refractive index of air Interferometric setup with wavelength stabilization (Institute of Scientific Instruments)

Evaluation of the lime water and other strengthening agents consolidating impact on lime based porous substrates
(Institute of Theoretical and Applied Mechanics)

The Institute of Theoretical and Applied Mechanics of the ASCR has performed as the only one so far a truly correct research and objective measurement of the strengthening effect of lime water on carbonised lime mortar. Based on laboratory experiments, it was determined that lime water (a saturated solution of calcium hydroxide in water) improves the lime plaster strength significantly after applying high number of treatment cycles (161 applications). Besides lime water, also other agents used in monument care for the renewal of cohesion and consolidation of natural stones and plasters were tested, primarily agents based on silicic acid ester, and further, a today very modern and prospective suspension of nanoparticles of calcium hydroxide in ethanol or isopropylalcohol. "Nanolimes" already have a number of

important applications in saving significantly eroded monuments behind them in developed European countries. The form of the suspension of the lime particles in alcohols allows their application to damaged plasters in much greater concentrations of active material than is possible in the case of a water solution, moreover in many cases also a waterless form of suspension is advantageous. Consolidation technologies which with historical materials take into consideration the complexity of the whole system and do not attempt to resolve the problem with a single consolidation agent deserve special attention. In terms of time and the strength improvement, very good results were achieved by application of diluted silicic acid ester followed by multiple applications of nano-lime suspension in ethanol.



Testing of the flexural strength of the consolidated stone plate. Testing of mechanical characteristics of historic building materials before and after the treating with the liquid strengthening agents is a basic technique allowing the evaluation of the consolidation effect of these agents, which are often impregnated into weathered building facades for lifetime prolongation. (Institute of Theoretical and Applied Mechanics)

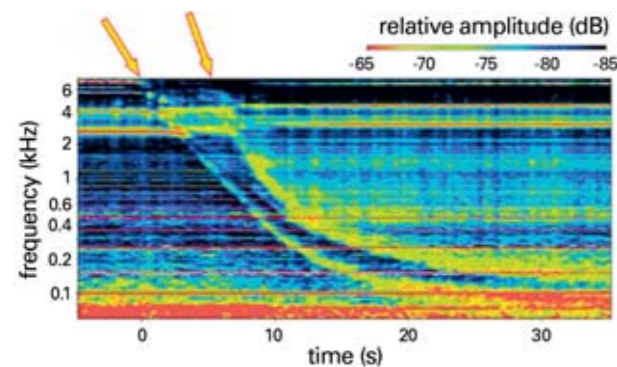
Coffee sound – a new principle of measurement of two-phase mixtures composition
(Institute of Thermomechanics)

This result has two levels, which complement one another. The first level is science popularization and a demonstration of the fact that experimental fluid mechanics and thermodynamics are not enclosed in sophisticated laboratories, but their manifestation is evident in a daily life.

A “kitchen experiment” during preparation of coffee is demonstrated. The submerged teaspoon is used to tap the bottom of the mug. One can hear a tone that slowly rises in pitch. The tone is generated by a standing wave in the liquid, similarly as tones in musical instruments (flute, organ) are generated by air wave. While the tone in air is constant at a given temperature, the tone of coffee slowly rises in pitch, because the speed of sound increases as the bubbles disappear. Another “kitchen experiment” demonstrates an inverse effect, when hot tap water is poured into a mug and the tapping starts. First, the tone lowers in pitch, followed by an increase found in the first experiment. The physical justification is the same: the speed of sound in a liquid is reduced by the presence of bubbles.

The second level of this study is aimed at specialists. The relatively simple experiment can be interpreted and quantified, revealing novel findings. The sound record has been analyzed using time-frequency signal processing. The theory describes the dynamics and reasons of the process, namely the nonlinear dependence of the speed of sound in a gas/liquid mixture on the volume fraction of the bubbles, and the nonlinear time dependences.

The described sound effect can find its application in laboratories and industry, e.g. for a contactless measurement of the composition of a two-phase mixture. Therefore, a third experiment was performed with an arrangement corresponding to vacuum degasification, a typical procedure in process engineering. A clearly distinguishable 6.3-octave decrease of the tone pitch was found, as is shown in the spectrogram.



Coffee sound and its visualisation. Time dependence of the drop of the frequency of sound (a spectrogram) during vacuum degasification of a liquid (Institute of Thermomechanics)

02.4 SCIENCE AND SOCIETY

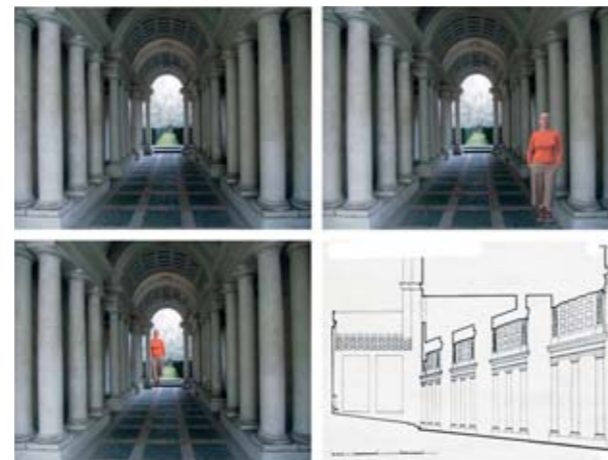
From the results from 2012, we present:

Who matters in coordination problems? (Economics Institute)

The Economics Institute in cooperation with the University of Edinburgh dealt with an analysis of the role of strategic uncertainty in coordination processes. This workplace provided the methodology, which can be used in seeking the optimal goals for various types of interventions in a large class of coordination problems with heterogeneous agents.

Cooperating entity: University of Edinburgh, School of Economics, Great Britain

Visual perception (Institute of Psychology)



Manipulation with perspective (Institute of Psychology)

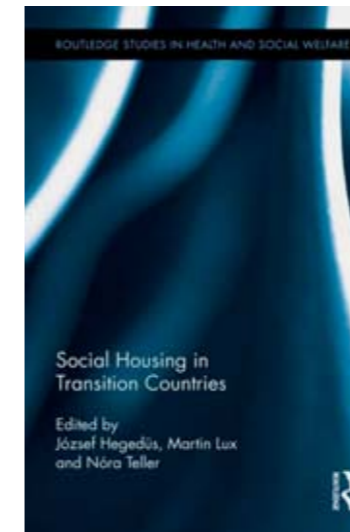
The monograph *Visual Perception* describes how through vision we come to know the surrounding world, shows the surprising complexity of the process of perception and helps to understand what role visual perception has in human life. The book provides encyclopaedic knowledge in the main areas of the field like the perception of colours, space and movement or the recognition of objects and faces and acquaints the reader with the results of

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crucial research projects of the employees of the Institute of Psychology. The publication simultaneously offers the possibility to look at selected issues in the wider interdisciplinary contexts (particularly in the context of the disciplines of the cognitive sciences – e.g. cognitive psychology, neuropsychology, neurosciences and comparative biology) and illustrates the presented information on examples from everyday experience. It attempts to answer questions of the type: What is a given sensory mechanism needed for in our everyday experience? What kind of problems it can solve? What are its limitations? The book *Visual Perception* is the first comprehensive work on the Czech book market mapping this extensive topic of diverse sciences on the brain and thought.

Šikl, R.: *Zrakové vnímání*. Grada, Praha 2012, 312 s.

Social housing in transition countries (Institute of Sociology)



The cover of the book *Social housing in transition countries* This publication attempts to fill in a gap in the studies dealing with the development of social housing in the countries of Central and Eastern Europe by offering a critical and methodologically unique assessment of the situation in 12 selected countries. (Institute of Sociology)

The book *Social housing in transition countries* is the result of cooperation of the Institute of Sociology and the Metropolitan Research Institute in Budapest. The publi-

cation endeavours to fill a gap in the studies dealing with the development of social housing in the countries of Central and Eastern Europe by offering a critical and methodologically unique assessment of the situation in 12 selected countries. Its geographical scope and the use of the methodology of the research are unique in the research of housing in post-socialist countries. Almost all of the new programmes for the support of social housing, which have been implemented since 1990, have proved to be unstable, unsustainable and ineffective. Among the main causes the authors list the following: the trap of privatisation, the paradox of decentralisation, the grey market, the rules of the global market influencing high costs of new blocks of flats, the critical discourse surrounding social housing in western countries, the socialist legacy in the systems of allotting public flats and also the fact that not-for-profit projects are often untrustworthy or connected with too high costs. The identification of these causes has clear and direct implications for flat policy.

Cooperating entity: Metropolitan Research Institute, Budapest, Hungary

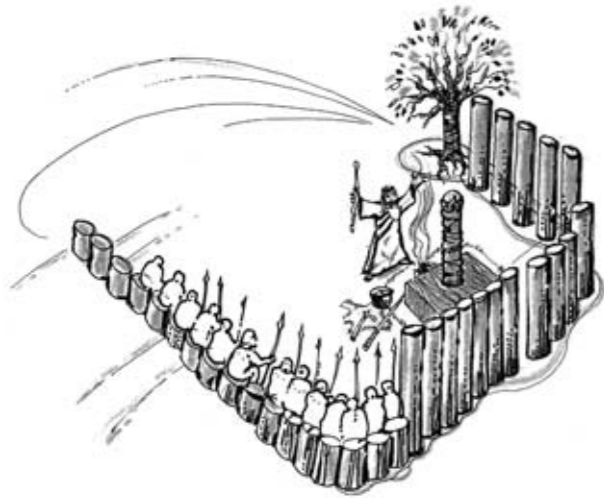
Hegedüs, J. – Lux, M. – Teller, N. (eds.). *Social housing in transition countries*. Routledge, New York, London 2012, 341 s.

International Migration, Compatriots and Suffrage. The Form and Electoral Boundaries of Modern Political Community in States of Central Europe (Institute of State and Law)

The publication of the Institute of State and Law deals with relations between international migration and the most recent trends in the development of suffrage in Central Europe. The issue of migration has always been connected to the issue of integration of immigrants into the community of their new home. However, the monograph does not pay attention only to the issue of electoral integration of immigrants but also to possibilities of participation of citizens – emigrants in political life of their native country.

Halász, I.: *Medzinárodná migrácia, krajanja a volebné právo. Podoba a volebné hranice moderného politického spoločenstva v štátoch strednej Európy. Ústav štátu a práva AV ČR, Praha 2012, 330 s.*

Silesia in the Times of the Early Middle Ages (Institute of Archaeology Brno)



Slavonic hillfort Chotěbuz-Podobora near Český Těšín. A hypothetical reconstruction of a cult complex from the 9th century. The structure revealed within the long-term archaeological research at the first bailey of the Slavonic fortification could be the place of Slavonic pre-Christian cults. (Institute of Archaeology Brno)

This work, practically the first modern synthesis of the earliest history of Silesia from the viewpoint of Bohemian medieval studies and historiography, also contains an extensive chapter on the history of Silesia from the Early Middle Ages to the start of the fundamental structural changes that occurred during the 13th century. The team of authors of the Institute of Archaeology in Brno proceeds from a combination of important written, material (architecture) and archaeological sources, with the results of archaeological excavations carried out by the Institute in recent years allowing us to considerably supplement and modify the current historical interpretations. This is true of both the period which saw the building of the primary social structures in the 6th–8th centuries (Vino hillfort) and also of the developed tribal districts of the 9th and early 10th centuries, during the continuing consolidation and increasing intensity of settlement, with a large number of fortifications in local power centres and perhaps also sacral and cultic centres (125 localities). This also allows us to follow the cultural and power expansion of the Mora-

vian state of the Mojmir from the south to the domestic Silesian (the Chotěbuz-Podobora hillfort, individual graves and necropoleis in Hradec nad Opavou, Stěbořice and Malé Hoštice).

Cooperating entities: Silesian University in Opava, Institute of Art History ASCR, Prague

Antonín, R. – Kouřil, P. – Prix, D.: *Slezsko v časech raného středověku*. In: Jirásek, Z. (ed.): *Slezsko v dějinách českého státu. Od pravěku do roku 1490*. Nakladatelství Lidové noviny, Praha 2012, pp. 95–163.

Early Modern archaeological assemblages from Prague Castle (Institute of Archaeology Prague)

(Institute of Archaeology Prague)

The archaeological research at Prague Castle that has lasted for 85 years so far has accumulated a collection of assemblages from early modern cesspools (16th–17th centuries). An assemblage of eight cesspools from the ouses along the north and west sides of the third Courtyard was selected for a detailed analysis. Their content with an emphasis on finds of ceramics and glass was confronted with an analysis of the written and iconographic sources. It was possible to prove that the cesspools were filled by a diverse group of people connected with the common castle milieu (a blacksmith), members of the St. Vitus Chapter and persons connected with the imperial court (the imperial tailor).

Blažková, G. – Frolík, J. – Žegklitzová, J.: *Raně novověké archeologické soubory z Pražského hradu a dobové písemné a ikonografické prameny*. *Studies in Post-Medieval Archaeology* 2012/4, pp. 189–232.

The Genocide of the Czech after the Assassination of Reinhard Heydrich (Institute of History)

(Institute of History)

In the book entitled *Without Reproaches... The Genocide of the Czech after the Assassination of Reinhard Heydrich*, the author Vojtěch Kyncl analyses the memories of witnesses and perpetrators of war crimes. The results of his-

torical and forensic studies of the attack on Reinhard Heydrich in May 1942 did not answer questions of the social, legal and transnational disputes in Central Europe that have lasted for decades. The investigation of participants of martial courts was initiated immediately after the liberation of Czechoslovakia in May 1945. Many criminals have never been brought to justice, even though their actions, identity and post-war life were known to the police on both sides of the Iron Curtain. The book answers the questions of how their past was judged by those, who caught parachutists, dragged hundreds of Czechs to the execution sites and exterminated two Czech villages? Can we understand the behaviour of the Nazis or even explain their moral identity in the context of the Nazi extermination policy? And what exactly does a widely used term “overcoming the past” mean?

Kyncl, V.: *Bez výčitek – Genocida Čechů po atentátu na Reinharda Heydricha*. *Historický ústav AVČR*, v. v. i., Praha 2012, 415 s.

The Artistic Heritage of Prague: Greater Prague A–L (Institute of Art History)

(Institute of Art History)



The cover of the publication Vlček, P. (ed.): *Umělecké památky Prahy, Velká Praha A–L*. The Artistic Heritage of Prague: Greater Prague A–L. (Institute of Art History)

The four volumes dedicated to the Prague towns (Old Town, New Town, Lesser Town, Prague Castle and Hradčany) are followed by the first of the two volumes of the artistic topography, dedicated to the later attached parts of the town, communes and settlements. Besides many monuments of the modern era, the volume includes also a lot of interesting monuments from earlier times (medieval churches, monasteries, chateaus, fortresses, farmsteads etc.).

Vlček, P. (ed.): *Umělecké památky Prahy, Velká Praha A–L*. *Academia*, Praha 2012, 1080 s.

Czech Society after 1945 (Institute of Contemporary History)

(Institute of Contemporary History)

The set of studies published in three volumes of the book series *Czech Society after 1945* examines a wide variety of topics related to the changes and development of the Czech society during the Communist Regime. One study analyzes the political, social and economic transformations of the Czech countryside during collectivization while the others focus on the period of so-called normalization, dealing with the relationship between citizens and regime institutions, the position of women in the “socialist society”, workers’ situation in the context of attempts at building a social state, the manners in which the regime used to regulate and manipulate travelling to the West. It also includes a case study on the development of one of the most important industrial concerns – Škoda Car Company in Mladá Boleslav.

Kaplan, K.: *Proměny české společnosti 1948–1960. Část druhá. Ústav pro soudobé dějiny ASCR*, v. v. i., 2012, 468 s.

Rychlík, J.: *Devizové přísliby a cestování do zahraničí v období normalizace. Ústav pro soudobé dějiny ASCR*, v. v. i., Praha 2012, 178 s.

Černá, M. – Cuhra, J. et al.: *Prověrky a jejich místo v komunistickém vládnutí. Československo 1948–1989. Ústav pro soudobé dějiny ASCR*, v. v. i., Praha 2012, 139 s.

Courtship, love and wedding in the Czech folk culture (Institute of Ethnology)

The monograph reveals the basic socio-cultural schemata of romantic relationships and the wedding ceremony from the key moments in the lifecycle of the individual and family. It relies on sources and literature in the region of Bohemia, Moravia, and Silesia mostly from the turn of the 20th century.



The cover of the book Navrátilová, A.: *Namlouvání, láska a svatba v české lidové kultuře*
An extensive ethnological monograph of Czech and Moravian culture. (Institute of Ethnology)

Navrátilová, A.: *Namlouvání, láska a svatba v české lidové kultuře*. Vyšehrad, Praha 2012, 421 s.

History of Political Thought II, vol. 1–2 (Institute of Philosophy)

In the first book of the second volume of the History of Political thought series, a systematic and critical presentation of the political thought from its beginning to the High Middle Ages is presented. Significant attention is paid to early Christianity, St Augustine, Byzantine, Arab and Jewish political thought, the beginning of Czech political thought, struggle between secular and ecclesiastical powers in

1050-1200 and to St. Thomas Aquinas. In the second book of the second volume of the History of Political Thought series, a systematic and critical presentation of the political thought from the crisis of the Middle Ages to the European Reformation is provided. Significant attention is paid to Dante, Ockham, Marsilius, the state theology of the Emperor Charles IV, beginnings of conciliarism, ideological roots of the Bohemian reformation, John Hus, the Hussite movement, Peter Chelčický, Nicholas of Cusa and to the European Reformation.

Cooperating entities: Charles University in Prague and J. E. Purkyně University in Ústí nad Labem

Herold, V.–Müller, I. – Havlíček, A. (eds.): *Politické myšlení raného křesťanství a středověku. Dějiny politického myšlení II/1. Oikúmené, Praha 2012, 647 s.*

Herold, V. – Müller, I. – Havlíček, A. (eds.): *Politické myšlení pozdního středověku a reformace. Dějiny politického myšlení II/2. Oikúmené, Praha 2012, 519 s.*

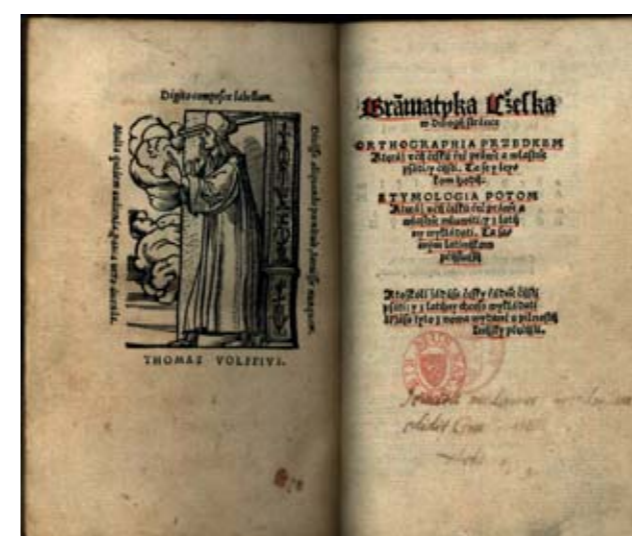
The Black Cat or the Subject of the Expert in Thinking on Literature and his or her Communication Strategies (Institute of Czech Literature)

The aim of this book study is to comprehend the rules that apply in the agonistic space into which literary experts enter as subjects with their discourse and texts, in which mutual comparisons, assessments and evaluations are made. The author bases himself on the assumption that thinking on literature is co-created by the suprapersonal memory of a particular collective (traditionally the nation, but increasingly scholarly community itself) and at the same time it is also a space for the individual creativity of specialists. Literary historians, theorists, critics and teachers are perceived as active participants in speech games, who have to formulate and promote their views and concepts in cooperation and competition with others, which also compels them to select certain roles and strategies. And because he is also aware that the rules of the game are variable over time, he also follows shifts in thinking on literature from the positivistic emphasis on facts to faith that the key to knowledge entails selecting the correct method, i.e. a generally applicable procedure, and to contemporary conceptual literary studies, which see higher value in one-

off demonstrations of novelty, creativity and unrepeatable uniqueness.

Janoušek, P.: *Černá kočka aneb Subjekt znalce v myšlení o literatuře a jeho komunikační strategie*. Academia, Praha 2012, 279 s.

Full launch and expansion of the module of digitized grammars via the Internet application “Vokabulář webový” (Institute of the Czech Language)

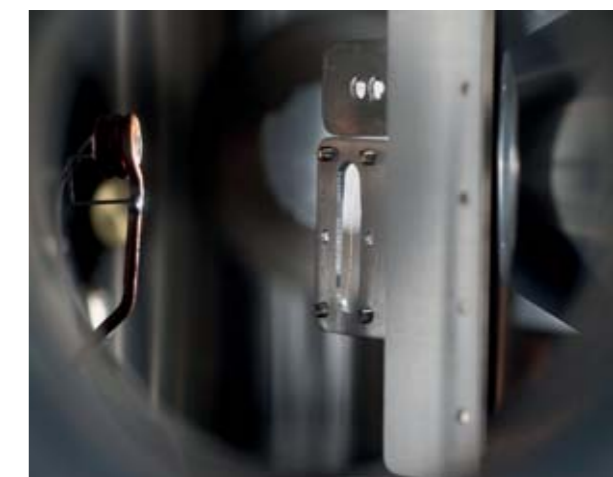


The opening two pages of the so called Grammar of Náměšť from 1533 (from the collections of the Library of the National Museum) (Institute of the Czech Language)

The institute of the Czech Language launched the module of digitized grammars into full operation. It contains electronic versions of grammars and similar manuals from the 16th through the 19th centuries. It brings together and makes available for the wider scholarly public a comprehensive set of sources, which otherwise would be very difficult to obtain, particularly for foreign researchers. Individual grammars are supplemented with annotations and complemented with scholarly descriptions. Their release and the supplied information provide the research community with an extremely valuable secondary source for understanding the Czech language of the 16th–19th centuries.

Modul digitalizovaných mluvnic [online]. Ústav pro jazyk český AV ČR, Praha 2012, < <http://vokabular.ujc.cas.cz/moduly/mluvnice/uvodni-stranka> >

The study of the remains of Tycho Brahe by nuclear analytical methods (Nuclear Physics Institute)



A hair of Tycho Brahe fixed on a holder. To study the content of the various elements with the aid of a Tandetron ion beam, the hair of Tycho Brahe had to be fixed on the holder. (Nuclear Physics Institute)

The world-renowned Renaissance astronomer Tycho Brahe, who also dealt with alchemy, died on 24 October 1601 in Prague after 11 days of a sudden illness. Several conspiracy theories regarding his death have been aired, the first shortly after his passing away. A key factor in the still lively debate is whether he was administered mercury – as medicine by his own hand or as poison by an enemy's hand. In 2010, Brahe's grave was reopened and samples of his bones, hair, teeth and the textiles were procured and assayed by a Danish-Czech consortium. At the Nuclear Physics Institute, mercury concentrations in hair samples using radiochemical neutron activation analysis (RNAA) and proton induced X-ray emission (PIXE) were examined. Results of RNAA of segmented hair samples and local analysis by μ -PIXE proved that Tycho Brahe was not exposed to toxicologically significant doses of mercury in the last two months before his death, whereas results of

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bone analysis, carried out in Denmark, showed no significant mercury exposure in the last 5-10 years. Thus, the evidence that Brahe did not die due to either acute or chronic poisoning by mercury was obtained.

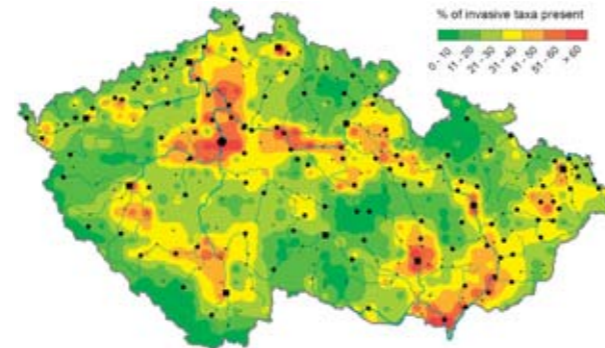
Cooperating entities: University of Southern Denmark, University of Copenhagen, Aarhus University, Denmark, National Museum, Institute of Chemical Process Fundamentals of the ASCR, Prague

Flora of the Czech Republic, its general features, endemism and modern dynamics: A new synthesis

(Institute of Botany)

As a new basis for further research on the flora of the Czech Republic and the surrounding lands, a comprehensive survey of its current knowledge was elaborated by the scientific employees of the Institute of Botany with a focus on the assessment of changes over the last few decades. A complete checklist of vascular plants of the flora of the Czech Republic was compiled for the very first time in the modern history of national botanical research; including all new findings and taxonomic novelties, the list contains 3557 taxa in total. The distribution of over 250 species and subspecies was mapped as a continuation of previously mapped 967 taxa. A critical synthesis of current knowledge resulted in the survey of general features of the Czech flora, including phytogeographic outline and assessment of its historical development. Special attention was paid to endemic species of the Czech flora. The proportion of endemics is rather low (2% of the flora), they are relatively young, having originated in the Quaternary. On the other hand, various groups of relic taxa, including arctic, boreal, alpine, and steppe elements, are present in the flora. The European glaciation substantially depauperated the Czech flora but the location of this region as a crossroad of migration pathways resulted in its enrichment, with almost all central-European migration elements now represented. About one third of the total plant diversity is accounted for by alien taxa introduced by humans; their long-term dynamics was evaluated in a new analytical checklist. The alien flora of the Czech Republic consists of to 1454 taxa, among which 350 (24%) are archaeophytes (introduced before the end of the Medieval Period), and 1104 (76%) neophytes, the modern invaders introduced after then. Forty-four alien taxa are recorded for the first time. Of the total

number of aliens, 985 are classified as casual, 408 as naturalized and 61 as invasive; the distribution of the latter was mapped. The synthesis of the flora is completed by a review of the history of botany on the territory of the Czech Republic, and also includes an updated checklist of lichenized fungi.



The intensity of the plant invasion in the Czech Republic expressed through the appearance of invasive species in a mapping network 6 x 10 minutes (geograph.). The most invaded are the surroundings of large urban agglomeration, the landscape disturbed by mining in the northern part of the country and the lowlands of large rivers in the climatically warm areas. Adopted from the work: (5) Pyšek et al. 2012. (Institute of Botany)

Cooperating entity: Department of Botany and Zoology of the Faculty of Science of Masaryk University in Brno

Educational Activity

EDUCATIONAL ACTIVITY

Contribution to the development and improvement of the quality of educational activities is one of the essential elements fulfilling the mission of the Academy of Sciences of the CR in society; therefore, we ascribe exceptionally high importance to this area. Primary attention is naturally paid to the education at higher education institutions (HEIs), particularly in relation to the training of doctoral candidates implemented as part of the broadened accreditation of doctoral study programmes. Nevertheless, we also want to devote ourselves thoroughly to participation in the education and training of secondary-school youth through direct instruction, by increasing the expertise of teachers, by assisting in organising specialised competitions, thematic Olympiads and specialised secondary-school activities or summer schools of various orientations. These educational activities make use of subsidies from suitably focused programmes of the European Social Funds. The educational events and activities are also aimed at the wider public in the form of specialised lectures, training courses and exhibitions or professional consultancy. An important component of this service to the public is extensive editorial activity developed at the publishing house Academia and at individual workplaces.

Education at Higher Education Institutions

For the Academy of Sciences, cooperation with higher education institutions is a fundamental pillar of the synergy with other institutions of research and development at a national level. This cooperation is coordinated by the **Council for Cooperation with Higher Education Institu-**

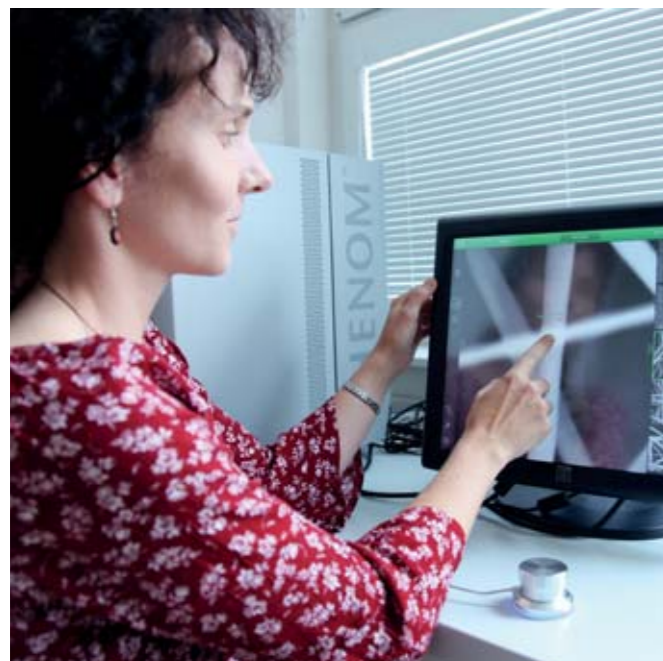
tions and the Preparation of Scientific Employees of the ASCR. The President of the Council of Higher education institutions, doc. Ing. Jakub Fišer, Ph.D. was invited at one of the sessions of the council last year where topical questions of the relations with the Academy of Sciences of the CR were discussed. The representative of the ASCR was a member of the Working Group consulting the preparation of a new act on higher education institutions.

Share in Instruction

The ASCR to a significant degree participates directly in higher education instruction. At various higher education institutions in 2012, employees of the institutes of the Academy of Sciences ensured a total of **3,722** individual **semestral cycles of lectures, exercises or seminars** in a total amount of 76,939 hours. The employees of the ASCR to a significant degree participate in the academic life of higher education institutions also through their participation in the sessions of their scientific councils, the councils of the doctoral study programmes or the examination and appointment commissions. The ASCR contributes to ensuring the quality of tertiary education through the membership of several of its employees in the Accreditation Commission. Representatives of the ASCR are regular guests at sessions of the Council of Higher Education Institutions. An important area for cooperation with higher education institutions in research and education is provided by **joint workplaces**, of which there is a total of 54. The specific results of the cooperation with university workplaces in the area of research are summarised in another section.

Tab. 1: An Overview of the Most Important Activities of Cooperation with Higher Education Institutions

An Overview of the Most Important Activities of Cooperation with Higher Education Institutions	2007	2008	2009	2010	2011	2012
Ph.D. students supervised at workplaces	2,154	2,162	2,157	2,153	2,182	2,064
MA/MS students supervised at workplaces	1,366	1,419	1,540	1,454	1,342	1,356
Newly accepted Ph.D. students	431	411	412	338	381	386
The number of completed doctoral dissertations	256	266	279	249	254	258
The number of semestral cycles of lectures, seminars and exercises provided by the employees of the ASCR at HEIs	3,195	3,571	3,487	4,360	3,853	3,722
The number of hours lectured	71,739	78,306	76,744	77,379	80,600	76,939



Jaroslava Morávková in the laboratory of the Nanocentre at the J. Heyrovský Institute of Physical Chemistry points out the potential of nanomaterials and the fact that nanotechnologies based on them have an ever expanding application in chemical catalysis, photocatalysis and electrochemistry.

Education of Students

The scientific employees of the ASCR share in a significant way in the **supervision of students** and the qualification theses are often created in the laboratories and institutes of the ASCR. In 2012, employees of the institutes of the ASCR supervised 1,356 students of Baccalaureate and Master's programmes and 2,064 students of doctoral studies. As of 31 December 2012 studies were successfully completed by 258 postgraduate students of doctoral study programmes trained at the workplaces of the Academy of Sciences of the CR. During the year, the ASCR concluded **22 framework contracts** on cooperation in the implementation of doctoral studies programmes with individual higher education institutions. In 2012, the contract with the University of South Bohemia in České Budějovice was updated. The majority of the institutes of the ASCR in a wide spectrum of fields have joint accreditation granted for their implementation. The data on the participation of the ASCR in tertiary education and the recent development of certain indicators are presented in *Table 1*, with more detailed statistics provided in *Appendix 6*.



During the Science and Technology Week festival, students find out about the latest knowledge in the area of science and technology from significant Czech researchers, physicians and other experts in an interesting way.

Course in the Fundamentals of Research Work Administered by ASCR

For a number of years, the ASCR has run successful and sought-after **Course in the Fundamentals of Research Work Administered by ASCR** for the students of doctoral study programmes. The courses are organised in Prague and Brno. In 2012, the course took place in Prague four times and a total of 137 students enrolled. Thanks to the organisational efforts of Dr. P. Svoboda from the Institute of Molecular Genetics, one of the sessions was reserved for students with a concentration in biomedicine and lecturers from the European Molecular Biology Organization (EMBO) took part in the instruction in this course. This targeted focus of the content of the course encountered great success with the students. The programme of the specialised course is also prepared for 2013. With the aim of improving the quality of the course content, the offer of the Centre of Academic Writing at the Cabinet of Language Study of the Institute of the Czech Language of the ASCR was accepted and the programme was enriched by a seminar

inar called Academic Writing for English Speaking Audiences. At the impetus of the students, a model Lecture for the Lay Audience was included in the course and a seminar Postdoc Interviews was added.

In Brno, four courses took place in 2012, of which two were organised within the project of the OP Education for Competitiveness. A total of 250 students from the higher education institutions in Brno, Ostrava, Olomouc, Opava and Zlín enrolled in these four courses. Long-term cooperation was established with the Janáček Academy of Music and Performing Arts and an independent special course is regularly prepared for the students of this higher education institute. In 2012, it was attended by 35 students. Also in the course in Brno, the entire programme is gradually updated and new lectures are included with a regard to the response and requirements of the students (e.g. Time management, Plagiarism, Physiology of Stress).

The activities connected with the Course of the Basics of Scientific Work are regularly discussed by the Council for Cooperation with Higher Education Institutions and the Preparation of Scientific Employees of the ASCR. The individual workplaces of the ASCR organise and ensure also further events, which are focused on the support of instruction at higher education institutions and its innovation.

Education at Secondary and Elementary Schools

The ASCR and its employees share in the education at secondary and elementary schools through direct instruction and diverse lecture activity. They focus in the long term on **the pedagogues of elementary and secondary schools**, for whom a wide range of seminars and accompanying activities are organised. All of the seminars are accredited at the Ministry of Education, Youth and Sports of the CR. These activities are also contributed to by the individual workplaces of the ASCR. The share of the employees of the Academy of Sciences of the CR in the creation and publication of secondary-school textbooks or e-learning courses is also considerable.

Significant attention of the workplaces of the ASCR is devoted to the utilisation of the financial means from the EU funds in the area of tertiary and secondary education. The projects are aimed at several target groups. Emphasis is



The conference "Open Science II", which took place at the National Technical Library in Prague in April, was attended by more than 200 participants.

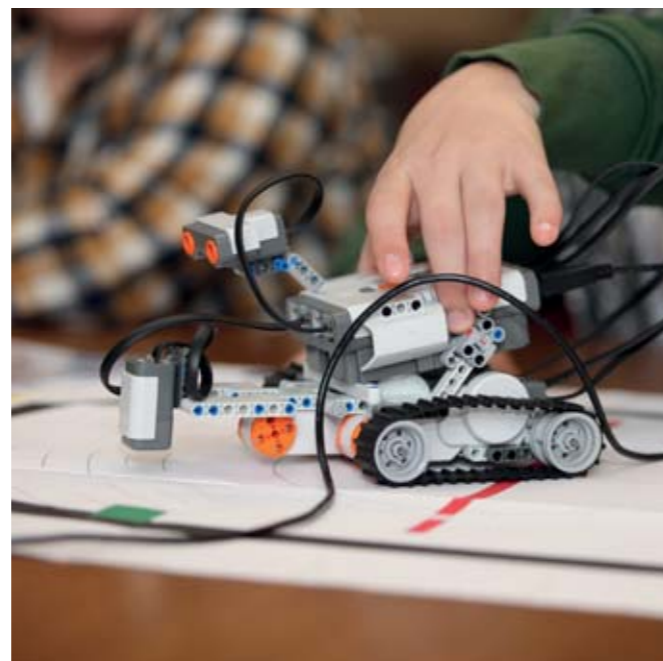
places on the education of pedagogues for whom several projects are implemented, e.g. **Open Science for Teachers**. All of the educational activities for teachers are accredited in the system of further education of pedagogical employees at the Ministry of Education, Youth and Sports of the CR. The **courses for secondary-school teachers of natural-science fields** have been a tradition already since 2005 and in November 2012 eighty teachers of secondary schools with qualifications in chemistry, physics and biology met at the Chateau Hotel in Třešť. The organisers prepared for them a series of lectures and practical exercises, which the researchers and scientists from the workplaces of the ASCR and higher education institutions ensured as lecturers.

The interest of secondary-school students in natural-science and technical sciences has noticeably declined in recent years. The projects **Open Science II** and **III** that have run for a long time are meant to increase the interest in natural sciences of secondary-school students outside Prague. The sense and aim is to engage students in the



The jury of experts from the ASCR and higher education institutions selected the winning proposals of the competition Czech Hope 2011 – Scopus Awards, whose aim was to engage the young generation of researchers in research and development. The creative activities of scientists up to age 35 was supported by the companies Suweco CZ and Elsevier B.V. – important global publishing house of professional and scientific literature and the producer of the global citation database Scopus. The authors of the awarded projects received besides professional recognition also a financial premium between EUR 1000 and 4000 on 23 February 2012 at the hotel The Four Seasons.

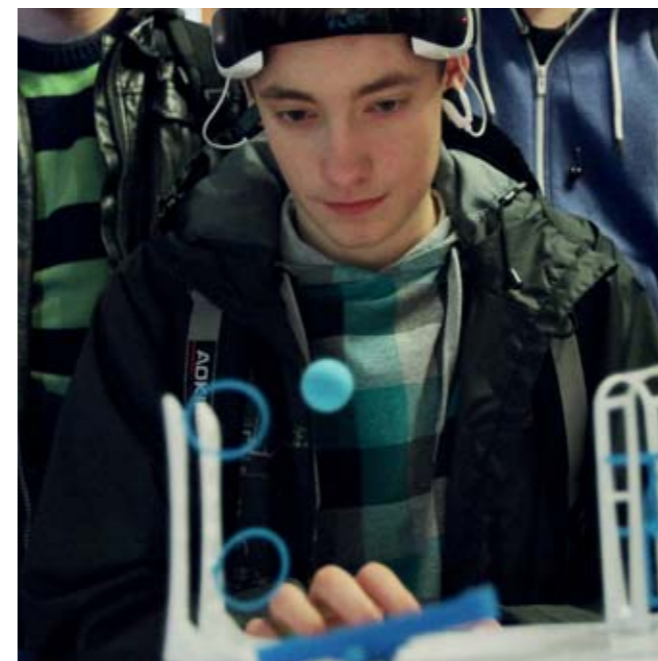
research projects at the institutes of the ASCR and specialised workplaces of higher education institutions, where students complete a two-year internship under the supervision of experienced scientists. They try and learn work in laboratories, participate in experiments but also in field research projects. So far, there have been 260 internships and in September 2012 the possibility of another 120 residences was opened. Within Open Science project, already the 2nd Student Scientific Conference, where participants presented their results from the internship to the public, took place in April 2012 in Prague. Some of the results of the students also received significant international awards. For the work *Quantum Structures and the Superlattice – the future of thermoelectricity*, the result of a residence at the Institute of Photonics and Electronics, the student O.



At a workshop by IBM within Science and Technology Week, pupils programmed Lego robots to go through a prepared maze according to their instructions as quickly and safely as possible.

Borovec won the gold medal in the worldwide competition of young technicians and scientists I-SWEEP in Houston, USA. The Open Science project was also presented at the international gathering of Europe-wide and global scientific elites ESOF 2012 and at the international event **Belgian EXPO Sciences**. The institutes of the ASCR provide secondary schools and their students also with a very wide range of other internships and excursions. Similar student residences at the institutes often serve for the elaboration of valuable works within secondary-school specialised activities.

In 2012, the monthly cycle of lectures **Don't Fear Science**, which is intended for secondary-school students and their teachers, traditionally took place in coopera-



The motto of the 12th Annual Science and Technology Week became the energy of science. The students often have to use their energy during the activities which were prepared for them at the building of the ASCR by the company Technet.

tion with Charles University in Prague. These educational courses have been organised by the ASCR since 2005 with the participation of leading scientists in the fields of biology, chemistry, physics, medicine, information science and others. The aim of educating pedagogues in the given field specialisation is to make instruction more attractive with captivating information from the backstage of top science, to help professional development of the teachers and to increase the quality of instruction in the area of the natural sciences. The courses also offer pedagogues the enrichment of their instruction with uncommon experiments sought by the young generation, which are often a motivating factor for further interest in the study of the natural sciences.



Neurosurgeon Vladimír Beneš at a lecture during European Brain Awareness Week

For teachers with a qualification in Czech language and literature, the ASCR organises an educational course, **School of the Czech Language and Literature**, which acquired the patronage of Miroslava Němcová, the President of the Chamber of Deputies of the Parliament of the CR. The aim of this specific course is to help the teachers of the Czech language and literature to orientate in the latest trends in the areas of grammar, prose and poetry and apply them in the instruction of the Czech language and literature. Other examples are the **Practical Courses of Biology, Chemistry and Physics** for secondary-school teachers, which acquaint the participants with novelties in the field and allow a look into the essentials of new laboratory techniques. For the teachers of history, civics and the basics of the social sciences, the **Summer School of Con-**



Svatava Raková presents new books of the Institute of History of the ASCR during an authorial reading at the Literary Café of the Academia Publishing House, which took place on 22 November 2012.



The Department for Studies and Editing of the Works by Comenius of the Institute of Philosophy of the ASCR presented three publications on Comenius on 26 January 2012 at the Literary Café of the Academia Publishing House on Wenceslas Square.

temporary History is organised. The aim of this school is to present to pedagogues the latest trends and interpretational methods in the area of contemporary history and in the area of didactics of contemporary history. In the selection of topics, the employees of the ASCR also take into account the deficit in the methods of interpretation of the period between 1948 and 1989. The programme is conceived to consider not only the main common aspects of contemporary history, which are normally taught at schools, but to remind participants also of topics seemingly marginal, which have not enjoyed the attention of school instruction. For geography teachers of elementary and secondary schools, the Astronomical Institute and the Institute of Atmospheric Physics organise a one-day seminar **Earth Sciences**, which is a part of the programme of Earth Day with the Academy of Sciences of the CR, which takes place every year in April on the occasion of the global celebrations of **Earth Day**. The Institute of Geophysics with a project for gifted pupils of elementary schools organised a special excursion with lectures; for students of Prague gen-

eral high schools, it created a special programme **Geology of the World**. For older children and students, the Institute of Computer Science prepared lectures in planetaria and schools on astronomical phenomena, on current topics from physics. The Institute of Information Theory and Automation focused on secondary-school fans of mathematics and physics and within the **Summer Specialised Camp for Secondary-School Students** promoted the study of technical fields. For biology students, the Biology Centre prepared a lecture weekend **Back to the School Desk**. The Institute of Organic Chemistry and Biochemistry shared in the implementation of the **Autumn School for Secondary-School Teachers of Natural Science Fields**, which was attended by 40 secondary-school pedagogues.

Education for the Wider Public

A significant element of the educational activities aimed at the wider public is **Science and Technology Week**, the

largest science festival in the Czech Republic, which is organised by the ASCR along with partner organisations. More detailed information on this event is presented in the part of this report devoted to popularisation activities.

The discussion evenings, informal meetings of scientific employees with the public, which occurred under the title of **Academic Cafés** at the Academia Bookshop on Wenceslas Square and at the Literary Café in the centre of Brno, took place traditionally. The Academic Cafés are organised by the Council for Science Popularisation in cooperation with the CAO (Centre for Administration and Operations).

Within the 14th Annual **European Brain Awareness Week**, a cycle of 11 lectures, at which experts presented new discoveries in brain research and informed on new trends in the areas of the neurosciences and the treatment of neurological illnesses, took place in April. The lectures were observed by more than **1000 interested people** from the ranks of students and the wider public. **Spring Excursion to the World of Science** offered those interested an excursion, exhibition and other accompanying events, attended by a total of **3,330** people. The well-established **Conversation Courses of the Czech Language** continued and the intensive **Summer School of the Czech Language**, intended for those interested from abroad, was held.

Presenting scientific results to the lay public is not simple. The project **Communication of Science** prepares science popularisers from the ranks of scientists to acquaint in a comprehensible way through the media the external milieu with the work of scientists and the results they have achieved. For the directors of the individual institutes of the ASCR, the educational cycle **Management of Science**, which was created at the Centre of Administration and Operations and is conceived with the aim of helping orientate in the changing legislative and economic environment, has become beneficial. The components of the programme include, e.g. a personnel topic, personal development of a manager, representation of the institute, marketing in science and research but also legal issues.

Editorial Activity of the ASCR

The ASCR subsidises the issuance of selected scientific and science-popularisation publications, in 2012 ASCR prepared the way for the publication of 49 book titles, of which 32 were issued by Academia Publishing House of the Centre for Administration and Operations of the ASCR and 17 other workplaces of the ASCR. The overall subsidy for the support of scientific and science-popularisation literature was CZK 11.5 million. At Academia Publishing House, many high-quality titles in proved editorial series could thus come out.

An Overview of the Fungi of Central Europe by Jan Holec, Antonín Bielich and Miroslav Beran, the monograph by Ferry Fediuk *The Castle Stone of the Premyslid Period in Bohemia with the Naked Eye and with a Microscope* (in cooperation with the institute GLÚ) and the publication of the fifth volume of the monumental work by Pavel Vlček et al. *The Artistic Heritage of Prague: Greater Prague A–L* can be included among the most fundamental editorial acts. A number of other publications were created in cooperation with higher education institutions, workplaces of the ASCR and other institutions. Employees of the ASCR often participated in their creation as reviewers, editors and translators.



In 2012, the Academia Publishing House attained singular publishing success – three awards in Magnesia litera, the most prestigious book competition in the Czech Republic. Others of Academia fs publications were awarded

ANNUAL REPORT OF THE ASCR 2012



On Wednesday, 7 March 2012, the ceremonial announcement of the 4th Annual Literary Awards of the Academia Publishing House took place. The project's aim is predominantly to draw the wider public's attention to the high-quality specialised literature, issued within the individual institutes of the ASCR or at Academia Publishing House. The absolute winner attaining the prize Book of the Year was the publication by Jiří Knapík, Martin Franc et al. *Guide to Cultural Events and Lifestyle in the Czech Lands, 1948–1967*. The authors are in the picture with Director of the Academia Publishing House Jiří Padevět.

the Miroslav Ivanov Prize for Nonfiction, Egon Ervin Kisch Prize, the State Prize for a Translation Work. In the competition Dictionary of the Year, the publication DAN took all three medal positions and one honourable mention in the category Jury's Prize for an encyclopaedic work. A number of publications were recognised within the granting of the Awards of Academia Publishing House, whose ceremonial announcement was already traditionally attended by President of the ASCR Prof. Jiří Drahoš.

Within the Policy of Open Access, the ASCR supported the publication in the form of Open Access with the amount of CZK 1 million. This programme, focused on increasing the access to scientific outputs and the faster exchange of scientific information, encountered clear positive interest at the workplaces of the ASCR.

In October, an internal specialised conference on the possibility and development of electronic books in the milieu of the ASCR was held, the aim of which was to acquaint the workplaces of the ASCR with the issue of the publication of e-books and with the possibilities of utilising this medium for the publication of the results of scientific work.

In 2012 the *Akademický bulletin* (Academic Bulletin), which provided information on events at the ASCR and at its workplaces, came out regularly. *AB* also informed on the international event Euroscience Open Forum in Dublin and on the ceremonial assembly for the 50th anniversary of ESO in Munich, paid attention to the visit of the Swedish delegation and the visit of four winners of the Nobel Prize in the CR (*Israeli Nobel Prize winners in Prague* and an interview with Ada Yonath). Of the important materials, we also mention the material of the Scientific Council of the ASCR called Experience from the Evaluation of the Institutes of the ASCR and its Divisions for 2005–2009 and recommendations of the Scientific Council for the next evaluation.

The Academy of Sciences of the CR and the Public



The meeting called “How is Czech Science Living?” was organised in the building of the ASCR on 18 January 2012 by Czech Radio Leonardo. How can Czech science be objectively assessed? What does Czech science mean in today’s globalised world? How are our scientists doing at home and abroad? Are young scientists willing to return to the Czech Republic? Robert Tamchyna asked his guests, who were President of the ASCR Jiří Drahoš, Pavel Jungwirth from the Institute of Organic Chemistry and Biochemistry of the ASCR and representative of the non-academic sphere Radek Špišek from the Institute of Immunology of the Second Faculty of Medicine of Charles University and Faculty Hospital Motol.

The ASCR considers popularisation of scientific fields and research results to be one of its priorities. Through the systematic popularisation of the results of scientific and research activities, the ASCR endeavours to convince the public that the one of the ways to increase and ensure the prosperity of the society is to increase the educatedness of all the age groups of the populace. The popularisation activity of the ASCR is recorded and documented continuously by the Centre for Administration and Operations. During 2012, technicians ensured **451 events** in the halls in the building of the ASCR on Národní třída, 14 external events, created **57 news reports** on the world of Czech science, which were presented on the internet and broadcast by satellite TV stations. The important events included the visit of the King of Sweden and the scientific conference



Not quite three months after the death of President Václav Havel, the Institute for Contemporary History of the ASCR held a conference, which focused on the reflections of the figure of one of the most important Czech personalities in (not only) contemporary history.

on the anniversary of the participation of the CR in CERN. The ASCR also used new means of presentation like social networks to increase interest in scientific results in the public. Last year, there were also spring **practical courses** for employees, who are dealing with science popularisation, and specialists of the media and press sections of the individual workplaces of the ASCR.

In selected media in 2012, nearly **12,300** reports were published with the headword ASCR, its images and other selected key words associated with the Academy of Sciences of the CR, i.e. more than **1,000** articles **a month** and on average about **35 a day**. President of the ASCR prof. J. Drahoš regularly commented on the essential questions, primarily the financing and assessment of science and research in



President of the ASCR Jiří Drahoš and General Director of Czech Radio Peter Duhan on 19 January 2012 announced the Memorandum on Mutual Support and Cooperation between the Academy of Sciences of the CR and Czech Radio. Its sense is to stimulate the development of the educational programmes of Czech Radio using the latest scientific results available at the institutes of the ASCR.



President of the ASCR Jiří Drahoš and President of the CD of the PCR Miroslava Němcová confirmed mutual cooperation with a signature of the Memorandum on Mutual Support and Cooperation between the Academy of Sciences and Chamber of Deputies of the Parliament of the CR on 15 March 2012 at the seat of the Chamber of Deputies.

the CR. Also radio listeners were acquainted throughout the year on the positions and opinions of the President of the ASCR, for instance in the programme entitled **Je jaká je** (It is what it is), which comments on current events, e.g. in science and research. The President of the ASCR also published articles with a similar theme in state-wide daily newspapers, provided interviews and answered questions. The media further informed on the signatures of the Memoranda of Mutual Cooperation of Czech Radio and the ASCR, on Cooperation of Czech TV and the ASCR, and between the Chamber of Deputies of the PCR and the ASCR. Space was acquired in it for studies and opinions of the employees of the ASCR on the changes of the pension and tax system in the CR, commentaries and interviews on education reform, form of school-leaving examinations and diverse discussions of other current events.

On Czech TV, the cycle **historie.cs**, in which the ASCR is presented by the employees of several institutes of a humanities focus, continued. An already traditional partner of Czech TV was the Institute of the Czech Language, whose employees participated in the programme **O češtině** (On Czech). In the cycle **Stará domovní znamení** (Old House Signs), employees of the Institute of Ethnology cooperated; the activity of the Institute of Atmospheric Physics and the Institute of Thermomechanics gave ideas to the programme of ČT 24 news service called **Turbulence**. The director of the Institute of Experimental Medicine Prof. Eva Syková was introduced in the broadcast of ČT 24 called **Kariéra** (Career). On Czech TV, Dr. R. Šrám, president of the **Commission for the Environment of the ASCR**, appeared repeatedly to warn of the consequences of poor air quality on the health of the population. The interest of Czech Television was also



On the occasion of Science and Technology Week, President of the ASCR Prof. Jiří Drahoš on 14 November 2012 awarded the Vojtěch Náprstek Medals for service in science popularisation to five outstanding figures. The medals were earned by Dr. Václav Cílek from the Institute of Geology of the ASCR, Dr. Jan Kolář from the Institute of Experimental Botany of the ASCR, Dr. Milena Secká from Náprstek Museum of Asian, African and American Cultures, Pavel Suchan from the Astronomical Institute of the ASCR (in the picture) and Doc. František Weyda from the Biology Centre of the ASCR.

aroused by N. Martínková from the Institute of Vertebrate Biology with the results of her research, so-called White Nose Syndrome in bats. Czech Radio 2 continued broadcasting the cycle **Jak to vidí?** (How do they see it?), in which the questions were answered by e.g. former President of the ASCR Prof. V. Pačes, Prof. E. Syková or Dr. V. Cílek. A number of appearances on various topics from the area of astronomy were created in cooperation between the Astronomical Institute and Czech Radio Leonardo. On Czech Radio 3 – Vltava, the programme **Eliška Přemyslovna a její královský život** (Elisabeth of Bohemia and her Royal Life) was aired, which was prepared by the Institute of Art History, The Institute of Philosophy participated in the cycle **Katedrála v siločárách času** (The Cathedral in the Flux Lines of Time) and the Institute for Czech Literature organised discussions **Česká literatura 2012: veřejná bilance, spolupráce**



The winners of the Second Annual SCIAP Competition in support of science popularisers, villa Lanna 28 November 2012

(Czech Literature 2012: Public Balance Sheet, Cooperation). The programme **Kritický klub** (Critical Club) was moderated by Director Dr. P. Janáček and other employees of the institute appeared as guests. Experts from the Institute of Ethnology prepared a cycle **Smrt a její rituály pohledem české minulosti** (Death and its Rituals through a Look at the Czech Past) for the listeners of Radio Clasic (Classic), for Czech Radio Brno a serial on pub facilities and for Czech Radio **Špalíček lidových písní – S Plzeňáky za folklorem** (A Tome of Folk Songs – With Pilsners for Folklore). The media devoted extensive and long-term publicity to the gold medal won by the Institute of Scientific Instruments at the international engineering fair or the new **electron microscope Magellan 400** developed at that institute. During the year, the media regularly published the results of the public opinion research **CVVM** of the Institute of Sociology.



The students, who attended the European Days of Science for Youth on 15 March 2012, could hear from experts themselves a lecture on the topic of Astronomy and Time – The Secrets of the Mayan Calendar.



On 6 August 2012, "Ondřejov's Double Standard" was named after Czech astronomer Doc. Luboš Perek, who was a leading figure of its establishment in 1967 and to this day is an emeritus scientific employees of the Astronomical Institute of the ASCR. The ceremonial act took place in the cupola of the telescope on the occasion of the 45th anniversary of this gigantic telescope's being put into operation and was attended by the top representatives of the ASCR, important guests from the allied mathematical-physical universities and representatives of the "Ondřejov community" headed by the new Director of the Astronomical Institute Vladimír Karas.

Science and Technology Week (STW) has been the **largest science festival in the CR** already for 12 years, which the ASCR organises along with partner organisations. Between 1 and 15 November 2012, the public visited **410 events** all around the CR – **94,245** people expressed interest in Open Houses, lectures, seminars, exhibitions, science cafés and documentary films. The website of the STW 2012 was viewed by over **43,000** people in one month. A record number of articles and other media outputs – more than **145** – informed on it. All of the institutes of the ASCR and over 50 cooperating organisations took part in the 12th annual event. Within STW, the ceremonial awarding of the **Vojtěch Náprstek medals for Service in Science Popularisation** from the hand of the President of the ASCR again took place.

The ASCR was once again abundantly represented at the second annual international competition for science popularisers **FameLab 2012**, which was organised by the British Council in Prague. A scientist from the ASCR again this year became a finalist of the competition. An exceptionally successful event for science popularisers in the CR in 2012 was the competition show **SCIAP**, organised by the Centre for Administration and Operations. In the second year, 39 projects, introducing science to the Czech public, were presented in the science promotion competition. In the course of the evening, 15 awards were given in five categories to the competitors and two awards were presented to partners. These results were also presented to the public abroad. The project **SCIAP 2011** was presented at the 12th Annual **Conference of EUSEA** (European Science Event



The 190th anniversary of the birth of Gregor Johann Mendel was commemorated by the Mendel 190 activity, which was under the patronage of Masaryk University and the Augustinian abbacy in Staré Brno. The initiative was joined also by the National Technical Museum in Prague, which made accessible a homonymous exhibition from June to October. Patronage of the exposition was assumed by President of the ASCR Prof. Jiří Drahoš along with the Abbot of Staré Brno Lukáš Evžen Martinec, OSA.

Association) in Dublin, which was an associated event of **ESOF 2012** (European Science Open Forum). At the conference, the ASCR had its own exhibition booth and half-hour presentation in which the best results achieved in all of the scientific areas and the ongoing popularisation-educational projects were summarised.

Great attention was devoted to popularisation events, which enable direct contact with the audience and individual interested persons. Like in past years, the ASCR organised **Academic cafés**, informal gatherings of scientific employees with the public. Significant interest was aroused especially by the talk **Secrets of the Vatican Archives or Are Historians Playing at Dan Brown?** In 2012, it was complemented by an entirely new popularisation activity – the



Astronomers pointed out the nonsense connected with the apocalypse, which was to occur on 21 December 2012, in a meeting with journalists in the building of the ASCR in Národní třída in Prague on 18 January 2012. Pavel Suchan and Jan Vondrák from the Czech Astronomical Society presented the information on the correct level. In the photograph from the press conference, there is a "Mayan Calendar" from the satirical teaser for a programme of the planetarium in Brno.

regular meeting of **Třetí dimenze** (The Third Dimension) of Czech Radio, which took place every third Wednesday of the month in the building of the ASCR.

The employees of the **Astronomical Institute** prepared for the youth observations of the Sun, competitions and talks. Excursions for school and hiking groups and the public to the observatory in Ondřejov took place every Saturday and Sunday and on public holidays. The total attendance rate was about 5,000 people. Popularisation at the J. Heyrovský Institute of Physical Chemistry is systematically carried out by the project called **Three Instruments** intended for the wider public. The events of this project were visited by a total of **5,470** interested people including children from preschool institutions. In September 2012, the ASCR



An exceptional figure of world science – Marie Skłodowska-Curie – was presented to the public in May 2012 by an extensive exhibition at the headquarters of the Academy of Sciences of the CR in Prague. It took place under the patronage of President of the ASCR Prof. Jiří Drahoš and Ambassador of the Polish Republic in the CR Jan Pastwa. Marie Skłodowska-Curie is a two-time Nobel Prize laureate and for many years was the only woman who attended the Solvay conferences – the meeting of the leading scientific capacities. The exhibition was loaned to the Academy of Sciences by Jagiellonian University in Cracow.

again joined in organising the **European Nights of Scientists**. A component of this event was e.g. a lecture **Saturn and its Strange Children** by Prof. P. Martinec from the Institute of Geonics or an excursion to the ecosystem station White Cross Centre for Research of Global Changes. The Institute of Sociology repeated **sociological Documentary-Mondays** in the cinema Světozor, whose concept is based on the projection of a film and a subsequent discussion with the director and a sociologist, the Institute of Art History accommodated adherents of architecture with the lectures **Week with Pavel Janák**; for those interested in **Night of Churches**, it offered a guided tour of the Church of Sts Peter and Paul in Kralovice. In Brno, the Institute of Scientific Instruments fascinated curious children and adults with a programme called **Infrashow – Experiments with**

Close and Far Infrared Radiation, which took place within the **Festival of Sciences with RWE** and the **Days with Scientists**. The Biology Centre in České Budějovice participated in the realisation of the event **Water Day**. The institutes in Prague courted the favour of viewers at **Prague Museum Night** at the National Technical Library or at the **Chemical Fair 2012**. The employees of the Institute of the Czech Language again organised courses, seminars and lectures, focused on the **culture of the language**. They ensured **language consultation activity** and answered the questions of the public. During the year, they complied with 58 written requests for a language statement from state and commercial entities as well as people and daily answered 50 questions by telephone.

By organising regular **exhibitions** not only in the CR, but also abroad, the ASCR claims the legacy of its predecessors. Its workplaces either organised exhibitions themselves or participated in them once again last year. An exceptional exhibition **The Golden Bull of Sicily 1212 – 800 Years between Reality and Myths** with accompanying lectures was prepared by the Institute of History. The Institute of Archaeology in Prague participated in the exhibition **Europa Jagellonica: Art and Culture in Central Europe under the Reigns of the Jagiellonians** in Kutná Hora. The Institute of Slavonic Studies assisted as a specialised consultant in the preparation of the exhibition called **Ilya Yefimovich Repin** in the Picture Gallery of Prague Castle and the Institute of Archaeology in Brno cooperated in the exhibition **On the Trail of the Roman Legion in Moravia**. The Institute of Macromolecular Chemistry cooperated in the exhibition called **Otto Wichterle**, which was held in Ostrava and Bratislava. In the main building of the ASCR, last year's exhibition season was begun by 17 Czech sculptors, who displayed their works under the title **Above the Surface**. Deserved attention was enjoyed by the exhibition **Marie Curie-Skłodowska – An Uncommon Woman**. The media drew attention also to the exhibition **Live Memories – Children at the Time of the Holocaust**, as they were captured by the students of graphic design from the CR, Israel and France. The exhibition year at the Academy of Sciences was concluded by an exhibition of glass statues and drawings by Blanka Adensamová. Those interested had the possibility to see a total of **16 exhibitions** in the main building of the ASCR on Národní třída.

The ASCR continued also in its educational cooperation **with bodies of the public administration**, the Institute of History for instance prepared for the Senate of the PCR a lecture **Displacement of the Population in the Czech Lands during World War II**. Significant events of the Economics Institute and CERGE-EI were public lectures of the president of the economic consultation group of the White House A. Krueger, Nobel Prize laureate for Economics C. Sims or P. Milgrom from Stanford University.

EURAXESS Centrum of the CR last year helped particularly foreign scientific-research employees and their employers in arranging stays in the host country. The Centre, in cooperation with the employers of foreign researchers (workplaces of the ASCR, higher education institutions) and the Ministry of Interior of the CR, furnished **218** applications for long-term stay for the purpose of scientific research. The employees of the EURAXESS Centrum provided foreign scientists personal assistance at the offices of the Ministry of Interior of the CR in **624** cases. The cultural-social events for foreign scientists and their family members were attended by **265** people.

The mentioned activities are only examples of the extensive popularisation activities of the ASCR. However, the statistics prove that their spectrum expands every year and the interest in them grows not only among the lay but also the specialised public. The attention given to them by all of the media, the trust, which they return and refer to the scientists and representatives of the ASCR, prove that the ASCR is a respected partner in the popularisation of the results of scientific fields not only in the Czech Republic but also abroad.

Practical Activity



Research in the group of the Dynamics of Molecules and Clusters of the J. Heyrovský Institute of Physical Chemistry of the ASCR endeavours through the study of free clusters and nanoparticles in molecular beams to answer some fundamental questions – whether they are practical questions related to the chemistry of the atmosphere, the photostability of biomolecules or the understanding of nature and the processes in it on the molecular level. The picture shows Michal Fárnik in his laboratory.

The ASCR permanently considers the transfer of the results of research into practice as its priority. It supports the reinforcement of the existing contacts and establishment of new ones between ASCR's workplaces and companies and other entities. The main partners of the ASCR for cooperation with the user sphere are the Engineering Academy of the CR (primarily its Czech Knowledge Transfer Office), the Association of Research Organisations, the Association of Innovative Entrepreneurship, the Union of Industry and Transport of the Czech Republic and CzechInvest, then on the regional level the regions themselves and the regional innovation centres.

That is facilitated also by the Council for Cooperation of the ASCR with the Industrial and Application Sphere and the synergy with the Technological Centre of the ASCR and with the Centre for Administration and Operations of the



The Nanocentrum of the J. Heyrovský Institute of Physical Chemistry of the ASCR on 13 September 2012 presented the results of research and development for the last year – i.e. the second year of the period of the so-called five-year phase of sustainability. Besides the application-oriented teams from the ÚFCH JH also companies working on the market of nanotechnologies settled in the Centre for Innovation in the field of nanomaterials and nanotechnologies, created in 2008–2010.

ASCR, v. v. i. The utilisation of the results of research in practice was supported in 2006–2012 also within the programme Nanotechnology for Society. In 2010–2012 the project Transfer of Knowledge and Technologies in Selected Regions (Biology Centre of the ASCR, MEYS) was also focused on the commercialisation of discoveries and findings.

The most extensive cooperation takes place between the institutes of the ASCR and companies and other entities. In 2012, the institutes of the ASCR along with companies resolved eight joint projects subsidized with the programme Nanotechnology for Society. Cooperation between the institutes of the ASCR and companies and other entities was also supported by the Grant Agency of the ASCR, the Czech Science Foundation and the Technology Agency of the CR.



The Institute of Physiology of the ASCR on 16 October 2012 introduced its new peak mass spectrometer QTRAP 5500. The new magnifying device, which is one of the hybrid mass spectrometers, systems merging a triple quadrupole and a linear ion trap, allow a detailed analysis of the activity of consumed foods or medicines on the tissue and cellular metabolic systems.

Other institutions interested in research results included the authorities of the public administration (Office of the Government, Ministry of Finance, Ministry of Interior, Ministry of Education, Youth and Sports, Ministry of the Environment, Ministry of Agriculture, Ministry of Transport, Ministry of Labour and Social Affairs, Ministry of Industry and Trade, Ministry of Health, Ministry of Foreign Affairs and Ministry of Culture), Chamber of Deputies and Senate of the Parliament of the CR, organisational bodies of the state (Radioactive Waste Depository Authority, Land Fund of the CR, Czech Statistical Office, offices of self-government (municipalities, municipal authorities, towns, regions) and other entities (NGOs). This cooperation took place not only on the basis of grant projects but also based on more than 500 economic contracts.

The following selected examples of cooperation implemented within joint projects or based on economic con-

tracts document the activities that in 2012 led to the application of research results achieved by the institutes of the ASCR in practice:

- The Institute of Photonics and Electronics cooperated with the company Safibra, s. r. o., on the assembly of a prototype of a broadband source of radiation based on strengthening the spontaneous emissions in ytterbium fibre drawn through the cladding. The research and development of the device was conducted within the European project scan4surf (program mnt-era.net, part of the 7th FP), whose aim was to develop a measuring system for monitoring the laser-structured surfaces of moulding forms used predominantly in the automobile industry. The project was resolved by nine partner workplaces under the leadership of Fraunhofer Institute for Production Technology and the company Precitec from Germany. The prototype of the measuring device integrated into an industrial laser system on structured surfaces was displayed at the exhibition Laser – World of Photonics in Munich 13–16 May 2013.

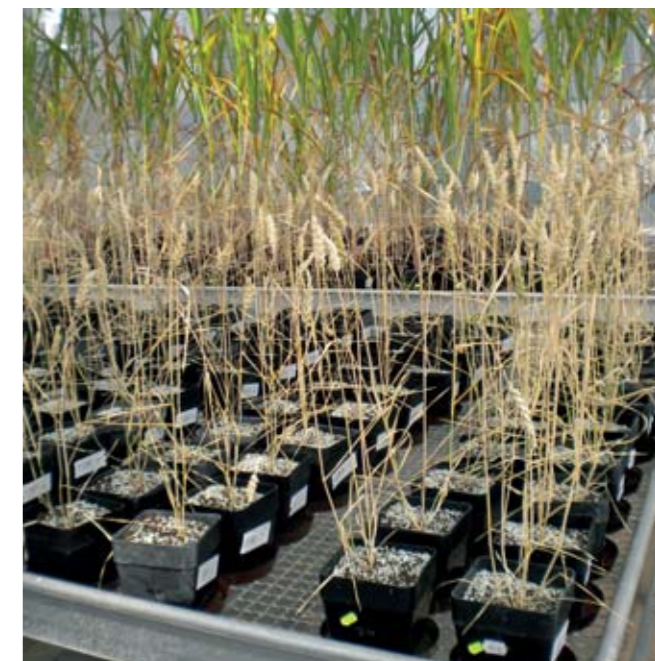
- The Institute of Thermomechanics cooperated with UNICA Technologies, a. s., and the Faculty of Civil Engineering of the Czech Technical University in Prague on a project **Detection of the development of cracks in concrete with the aid of nonlinear ultrasonic spectroscopy**. The modern methodology of non-destructive testing allows the very sensitive capture of the origin and development of cracks also in structurally and geometrically very complicated bodies. Based on this methodology, a new way of assessing the level of damage of concrete parts with the aid of the analysis of the higher harmonic frequencies and intermodular products of the echo of the sample on a defined excitation with ultrasound was elaborated. In the stress tests of the concrete parts, the amplitude-dependent spectral changes of the ultrasonic signals passing through the tested bodies were assessed. Based on a theoretical analysis, the observed asymmetry of the side bands in two-frequency excitation was clarified and subsequently an area image of the localised defects in the early stages of damage was acquired. The elaborated methodology of the non-destructive diagnostics of concrete is another step in the development of nonlinear ultrasonic tomography of construction buildings.

- The Institute of Botany cooperated on the project **Development of strigolactone (STRGL) application technolo-**



The purple-flowered Striga parasites in warm areas on grains – the newly discovered phytohormone strigolactone, which has the potential to increase the productivity of agricultural crops, was named after this plant.

gies for their agrotechnical use with Symbiom Ltd., and the Research Institute of Organic Syntheses, a. s. The certified methodology serves as the background material for the usage of agricultural preparations with effects similar to the activity of phytohormones from the group of strigolactones in the cultivation of wheat, barley, maize, rape plant and poppy. These agricultural preparations increase the yield and influence other biometric parameters of the crops. At the same time, however, it does not burden the environment but influences in a targeted way the physiological processes in the plants, already already at a very low concentration. The use of these agricultural preparations also fits into the concept of long-term sustainable management and ecologically friendly agriculture, because they are attained from non-toxic wastes of plant production or processed biomass of invasive plants. The methodology presented is based on a number of studies, when trial experimental exam-



A greenhouse experiment for the selection of the most effective agricultural preparation

ination with developed stimulation materials was conducted in laboratories, greenhouses and field conditions on commonly used cultivated varieties of economically important crops of wheat, barley, maize, rape plants and poppy. The methodology was submitted at the Ministry of Agriculture.

- The Institute of Archaeology Brno cooperated with Masaryk Museum in Hodonín on a revision research of the Great Moravian sacral buildings in Mikulčice within the project **Archaeological Park Mikulčice-Kopčany**. Based on the revision survey, it will be possible to present in a new way the uncovered remnants of the early medieval churches in Mikulčice to visitors from the widest public within newly built sightseeing paths around the national cultural monument of the Great Moravian fortified settlement of Mikulčice-Valy. The knowledge will be further used in the preparation of the background materials for the management plan of the renewed nomi-

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nation of the NCM Mikulčice-Valy for inscription in the UNESCO register and inclusion in the prepared systematic popularisation publication (Poláček, L.: Slované hradiště v Mikulčicích / The Slavonic Fortified Settlement in Mikulčice).

- The Institute of Sociology cooperated with the Municipal Authority (MA) of Prague 2 on the project **Approximate Estimate of Social Housing for MA Prague 2 to the year 2050**. The aim of the study was to help in setting the system of social housing allotted for senior citizens in the MA of Prague 2, or conduct a demographic prognosis revealing the number of people (households) at the age of 65 years and older for 2010–2050, conduct an estimate of the necessary number of social flats for this group of households in 2010–2050 and estimate the necessary number of municipal flats for the effective functioning of such a sector of social housing so that the financial sustainability of the operation of social housing and desired social mixing of the households of senior citizens with other households was ensured.

PRACTICAL ACTIVITY

Tab. 2: Summary of the Intellectual Property Rights of the Workplaces of the ASCR for 2012

	2012	
	number	licences
Invention applications submitted in the CR	50	
Patents granted in the CR	37	1
Utility models submitted in the CR	22	
Utility models registered in the CR	32	
Protected trademarks registered in the CR	4	
Industrial designs submitted in the CR	2	
Industrial designs registered in the CR	2	
Invention applications submitted abroad		
International application – ‘PCT’	9	
National or regional phase of ‘PCT’	8	
National or regional route	4	
Patents granted abroad		
Regional (at EPO, EAPO, OAPI, ARIPO)	6	
of which national patents	5	2
national	13	

International Cooperation

INTERNATIONAL COOPERATION

a) Cooperation with EU Structures

Investment in science, research and innovation in the financial period 2014–2020 realised besides the Framework Programme Horizon 2020 also in the programmes supported from the structural funds, are to significantly contribute to the fulfilment of the main economic agenda of the EU, the Europe 2020 strategy.

The bills of legislative regulation and decision-making for the Framework Programme **Horizon 2020**, published by the European Commission at the end of 2011, were discussed by the Council of the EU and the Committee on Industry, Research and Energy of the European Parliament ITRE in 2012. In 2013, the discussion of Horizon 2020 will be completed by the jointly approved legislative documents for joint deliberation of the EC (European Commission), EP (European Parliament) and Council of the EU. In 2012, discussions continued on a **multi-annual financial framework**, from which also the amount of the budget for Horizon 2020 and the cohesion policy are derived.

In the area of the **cohesion policy** in 2012, the European Commission presented the **Common Strategic Framework**, a document important for the formulation of the future investment priorities of the member states. These priorities will be incorporated into the “Partnership Agreements” with the European Commission, in which the member states pledge to fulfil the specific aims of the strategy Europe 2020.

The ASCR through its consultative and specialised boards joined in the preparations of the key documents on the national and European levels. The positions and interests of

the workplaces of the ASCR were formulated through the **Council for European Integration** of the ASCR and implemented most frequently through the **Committee for the European Research Area** at the Ministry of Education, Youth and Sports (on Horizon 2020) and the **Working Group of the Steering and Coordination Committee on the Future Cohesion Policy** at the Ministry of Regional Development (on the cohesion policy). The partners of the ASCR in the discussions on the future cohesion policy were besides the Ministry of Regional Development also Ministry of Education, Youth and Sports (the project team for the future Operation Programme Research, Development and Education) and Municipality of the Capital City Prague (preparation of the new Operation Programme Prague – Pole of Growth of the Czech Republic).

In April 2012, the Government of the CR adopted the **National Reform Programme of the Czech Republic 2012**, which formulates the contribution of the Czech Republic to the fulfilment of the strategy Europe 2020 and is also one of the essential background materials for the contract on partnership with the EU. The preparation of the document took place under the authority of the Office of the Government with the participation of representatives of the ASCR.

The Government of the CR in November 2012 adopted the **“Background Material for the Preparation of the Agreement on Partnership for the Programme Period – Definition of the Programmes and Further Approach to the Preparation of the Czech Republic for Effective Drawing of Funds of the Joint Strategic Framework”**. Eight operational programmes are proposed there for the future programme period; as against the period 2007–2013, the

Tab. 3: Participation of the Institutes of the ASCR in the Main Instruments of the Framework Programmes in 2012

Type of Instrument	Total Projects
CP (Collaborative research projects)	60
MCA (Marie Curie Actions – support for training and career development for researchers)	37
CSA (Coordination and Support Actions)	15
CP-CSA-INFRA (Support of research infrastructure)	23
ERC (Grants)	5
Other (e.g. Networks of Excellence, Joint Technology Initiatives)	5

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number of operational programmes and key priorities is significantly reduced.

A prerequisite for the agreement on partnership with the EU is also the prepared **Smart Specialisation Strategy**. The ASCR also here promotes its long-term declared priorities, which include the support of the sustainability of the newly built research infrastructures, development of human resources in science and research and strengthening the experimental research base in Prague.

Within the Centre for Administration and Operations of the ASCR, the project of the centre **EURAXESS CR**, supporting the mobility of scientific-research employees, is being successfully implemented. Its importance is growing in connection with the building of the large scientific infrastructures on the territory of the Czech Republic (ELI, BIOCEV, CEITEC, IT4INNOVATIONS, etc.).

Participation of the ASCR in Framework Programmes

As of the end of 2012, the workplaces of the ASCR had participated in 145 projects, the amount of contractually negotiated financial means reached EUR 7 million. The highest number of projects in the individual areas of science was resolved by the Institute of Physics (17), Biology Centre (12) and Institute of Philosophy (4). For 2012, it was possible to obtain one ERC grant (Prof. RNDr. Eduard Feireisl, DrSc.); scientists from the workplaces of the ASCR acquired two of the five grants of the Ministry of Education, Youth and Sports from the follow-up ERC CZ Programme.

Synergy of the Framework Programmes and Structural Funds

The strife of the European Commission for synergy is important for the Czech Republic, who is one of the significant recipients of subsidies from the structural funds. For achieving synergy, the usage of entirely new instruments anticipated; the "ERA Chairs" programme is in the pilot phase. For the support of synergy also a second programme is being prepared entitled "Teaming and Twinning". The possibility of co-financing the activity of the EIT from the structural funds is being discussed.

Centres of Excellence Financed from the Structural Funds

In the Czech Republic, eight projects of European centres of excellence are financed from the Operational Programme Research and Development for Innovation (RDIOP). With four of those, the recipients are institutes of the ASCR:

ELI Beamlines, a unique laser infrastructure for interdisciplinary applications for CZK 6.8 billion, is being built in Dolní Břežany by the Institute of Physics of the ASCR. In October 2012, the cornerstone of the building was laid with the participation of Prime Minister Petr Nečas and President of the ASCR Jiří Drahoš. Other parts of the European research facilities of the ELI will be located in Romania and Hungary.



Logo of the ELI-Beamlines project



Bishop of Prague Václav Malý, Prime Minister of the Czech Republic Petr Nečas, Minister of Education Petr Fiala, Executive Director of the ELI Project Vlastimil Růžička and President of the ASCR Jiří Drahoš tap on the cornerstone of the ELI Centre.

The Biotechnology and Biomedical Centre (BIOCEV) is being built in Vestec near Prague within a project of six institutes of the ASCR and Charles University in Prague. The total costs of the project are CZK 3.1 billion (of which a subsidy of the EU of CZK 2.3 billion). The Centre will be completed by the end of 2014.

INTERNATIONAL COOPERATION



On the occasion of the launch of the research programme **Functional Genomics** with the participation of Minister of Education Petr Fiala, Chancellor of Charles University Václav Hampl, President of the ASCR Jiří Drahoš and other important persons of Czech scholarship lived to see the beginning of the Biotechnology and Biomedicine Centre (BIOCEV).

In October 2012, the **Centre of Excellence Telč (CET)** of the Institute of Theoretical and Applied Mechanics of the ASCR was ceremonially opened. The total costs for the project are CZK 216.6 million. It is a new workplace in the area of the interdisciplinary research of materials, technologies and methods for the long-term sustainability of the material cultural heritage.



The new workplace of the Institute of Theoretical and Applied Mechanics of the ASCR – the Centre of Excellence Telč: specialised employee Vladimír Novák is preparing samples of materials for microscopy.



The climate tunnel in the Centre of Excellence Telč. In the picture, the climate chamber with a 200kW ventilator. The chamber is prepared for attaching the samples into the openings in the flooring. The moveable ceiling allows operational manipulation with the water nozzles or radiant lamps.

The project **Czech Globe – Centre for the Study of the Impacts of Global Climate Changes**, building on the long-term tradition of basic research of the issue of global change, the carbon cycle and the ecophysiology of the production processes of plants, is in an advanced stage at the Global Change Research Centre of the ASCR. The total costs for the project are CZK 647.9 million.

b) Cooperation with International Government Scientific Organisations

The ASCR further deepened cooperation with European and world scientific organisations with the aim of supporting the integration of Czech scientific employees in important international projects, enabling in the long-term and systematically the access to singular research facilities, experience and results, and presenting Czech results at highly prestigious scientific forums.

European Centre for Nuclear Research (CERN) – Czech scientists and technicians from the Institute of Physics, the Nuclear Physics Institute and higher education institutes (Charles University in Prague, Czech Technical University in Prague and Palacký University in Olomouc) share in the LHC (Large Hadron Collider) programme. An analysis of the huge amount of experimental data acquired since the launch of the LHC accelerator (2009) led in 2012 to the discovery of a new particle with a very high probability, the so-called Higgs boson, hence a theoretically predicted particle, which plays a key role in today's conception of the origin of mass of elementary particles. The question of the existence and characteristics of this fundamental particle is one of the main motives of the extensive LHC project.



LHC accelerator at CERN

European Space Agency (ESA) – The scientific projects of the ESA are participated in by several of the workplaces of the ASCR, particularly the Astronomical Institute, Institute of Atmospheric Physics, Institute of Geophysics and Institute of Plasma Physics, predominantly within the PRODEX programme. Currently, the ASCR most participates in the

project of the probe to the Sun "Solar Orbiter". During its flight to the Sun, the probe will investigate the physical circumstances in the heliosphere and then it will observe the Sun from close proximity. The ASCR shares in the realisation of three on-board units of the probe. In 2012, the ESA selected for final realisation also the probe JUICE to Jupiter's moons (L-mission). The HW components will be supplied by the Astronomical Institute and Institute of Atmospheric Physics. The ESA further plans to test the so-called flight in formation of two satellites around the Earth; the Astronomical Institute and Institute of Plasma Physics along with the Aeronautical Research and Test Institute Prague actively participate in the Proba-3 project. The institutes of the ASCR share in a wide range of other space projects of the ESA, but also NASA and the Japanese JAXA. The employees of the ASCR are actively engaged in space research steering and information structures in the CR and are active in a number of foreign committees and consortia. The Academic Council of the ASCR established a consultative body – the Council for Space Activities – for the coordination of space activities and increasing the awareness of its workplaces.

European Southern Observatory (ESO) – This top inter-governmental organisation was founded with the aim of organising the international cooperation of the member states, connecting the personnel and financial possibilities for the construction of an observatory equipped with first-class instruments and strengthen the competitiveness of Europe in the field of astrophysics, in which the USA dominated until then. The agreement on the entry of the CR into the ESO was signed on 22 December 2006. The ESO implements an ambitious programme focused on projecting, constructing and operating efficient surface observation facilities, which should enable important scientific discoveries in astronomy. The ESO also plays a leading role in the support and organisation of cooperation in astronomical research. In March 2012, the ASCR and MEYS shared in the organisation of the 80th Session of the Committee of ESO Council, which took place in Prague. In October 2012, the celebrations of the 50th anniversary of the foundation of the European Southern Observatory took place in Munich.

c) Cooperation with International Non-government Scientific Organisations

The representatives of the ASCR contributed to the building of the European Research Area and forming of the global scientific strategy through their active participation in a number of important European organizations (particularly the European Science Foundation – ESF, All European Academies – ALLEA, European Academies Science Advisory Council – EASAC) as well as global organisations (specifically the International Council for Science – ICSU, Inter Academy Panel – IAP and Union Académique International – UAI).

European Science Foundation (ESF) – The ASCR in 2012 engaged in all of the key activities, particularly in the resolution of 18 Research Networking Programmes and in the activities of 4 Expert Boards. The representatives of the ASCR were actively involved in creation of the scientific strategy at Member Organization Fora, particularly **Scientific Foresight for Joint Strategy Development and European Strategy Forum on Research Infrastructures**. No less important was their participation in the project: *Mapping of European Research Infrastructure Landscape*.

International Council for Science (ICSU) – The involvement of the ASCR in the activities of the ICSU significantly contributes to the establishment and deepening of cooperation with the European and global scientific community, supports the modernisation of the Czech research environment, opens access to unique research facilities, experience and results to which the Czech scientific community did not have access, increases the effectiveness of the quality of research and expands the possibilities for the application and visibility of the results of Czech research. A representative of the Czech Republic in the ICSU, PhDr. Zdenka Mansfeldová, CSc., was elected in 2012 as a member of the Management Group of the European group of the ICSU, which allows the Czech scientific community to influence more the activity of this important international organisation.

European Academies Science Advisory Council (EASAC) – In cooperation with the ASCR, it published and distributed expert studies on the topic of food security, sustainable energy, genetic testing and infectious diseases to policy makers and the competent actors in research and industry in 2012. The ASCR in that way contributed to the resolution of topical problems and the creation of a Europe-wide strategy in the area of the application of scientific knowledge.



80th Meeting of the Committee of the ESO (European Southern Observatory) took place in Prague in March 2012

d) Cooperation within International Bilateral Agreements

Within this agenda, the development of relations further continued with partners from 45 countries based on 66 bilateral agreements. Updated agreements were signed, namely with the British Academy of the Humanities and Social Sciences, the National Research Council of Italy (CNR) and the National Council on Science and Technology of Mexico (CONACYT). Cooperation took place in the form of exchanges within joint projects, thematic cooperation, study stays and participation in conferences. At total of 11 calls for the submission of new projects were announced. At workplaces of the ASCR, 487 foreign scientific employees were accepted in an amount of 4,140 days and 424 Czech scientific employees in total amount of 3,967 days were sent to foreign partner institutions.



The deepening of the scientific cooperation between the Academy of Sciences of the Czech Republic and partner organisations in Mexico was contributed to by the Agreement between the National Council for Science and Technology (CONACYT) and the ASCR, which was signed on 14 March 2012 at the headquarters of the ASCR on Národní třída in Prague by the ASCR's President Jiří Drahoš. The ceremonial transfer of the act was attended by the Ambassador of the United States of Mexico J. E. José Luis Bernal Rodríguez and President of the Council for Foreign Affairs of the ASCR Prof. Jan Palouš.

Through the **Programme of the Internal Support of Projects of International Cooperation of the ASCR**, the targeted support of long-term visits of research employees from the workplaces of the ASCR at renowned workplaces abroad and top experts at workplaces of the ASCR as well as the support for up to three years of research projects resolved by researchers from the ASCR in cooperation with important scientific institutions continued. A total of CZK 34.9 million was allocated for the resolution of 114 research projects and the realisation of 13 long-term stays in 2012.

e) Other Important Activities within International Affairs

In May, the ASCR shared in the preparation and implementation of the **visit of the Royal Technology Mission**, to the Czech Republic under the patronage of H. M. King Carl XVI Gustaf of Sweden.



King of Sweden Carl XVI Gustaf and President of the ASCR Jiří Drahoš upon arrival at the headquarters of the ASCR in Národní třída in Prague, where the members of the Swedish Royal Technology Mission were acquainted with the academic workplaces and discussed the possibilities of cooperation.

On the programme of the regular **meeting of the leadership of the ASCR and the Slovak Academy of Sciences** (October 2012, Stará Lesná), there was the exchange of experience from the area of the transfer of knowledge from research into practice, the possibilities of financial and expert assurance of the activity of young scientific employees and the accreditation and evaluation of science.

At its session (October 2012, Mátraháza), the **academies of the Visegrad Group countries** discussed predominantly institutional reforms, national initiatives and coordination of the preparation of the programme Horizon 2020 on the European and national levels. Within the session, a prize was awarded to young scientific employees from the area of medical sciences. Also other representatives of European non-university research were invited to attend.

Also the traditional meeting of the leadership of the ASCR with the diplomatic corps and leadership of universities **"Academic Prague"** (May 2012, villa Lanna) contributed to the development of international relations.

In 2012, a vice-president of the ASCR attended the session of the **International Human Rights Network of Academies and Scholarly Societies** in Taiwan. There, the representatives of the academies *inter alia* signed a resolution against the mass violation of human rights of scientists in Syria and Bahrain. At the instigation of this world organisation, the President of the ASCR also sent a protest letter to the highest state representatives of Turkey and Equatorial Guinea against the imprisonment of scientists there; an African physician was released via amnesty after three months.

At the National Technical Library in Prague, there was a meeting of four Israeli Nobel Prize laureates with other significant scientific personalities and the public in May 2012. The Israeli Nobel Prize laureates Ada Yonath, Aaron Ciechanover, Avram Hershko and Dan Shechtman thus presented their research work within the multidisciplinary conference **Prague Nobel Get-Together**.



The four Israeli Nobel Prize laureates Ada Yonath, Aaron Ciechanover, Avram Hershko and Dan Shechtman along with other significant figures of chemical biology, material science and structural biology presented their research work at the multidisciplinary conference, **Prague Nobel Get-Together**, which took place at the National Technical Library in Dejvice, Prague on 30-31 May 2012.

In October 2012, the **16th Annual Forum 2000 Conference** was held in Prague, in whose organisation also the ASCR took part. This already 16th conference was devoted at the wish of former President of the CR Václav Havel to the relationship between democracy and the media.



Since 1996, leading world figures, Nobel Prize laureates, thinkers and brave individuals from all areas of life have met in Prague within the Forum 2000 conference. At the wish of the late president and founder of the idea of the discussion forum Václav Havel, the 16th annual conference was devoted to the issue of the relationship between democracy and the media. In the picture, from the right Ambassador of the USA Norman L. Eisen, Petr Pokorný and Zygmunt Bauman.

The **Czech Historical Institute in Rome (ČHÚ)**, a joint workplace of the Institute of History of the ASCR and the Faculty of Arts of Charles University in Prague, is a component of an international network of workplaces associated in the Unione Internazionale degli Istituti di Archeologia, Storia e Storia dell'Arte in Rome. The ČHÚ in Rome focuses on the systematic source research of the *Bohemica* in Roman, Vatican but also in the other Italian archives and libraries. In 2012, 24 stipend stays took place at the ČHÚ in Rome. In November 2012, there was a meeting there of Prof. Jiří Drahoš and Cardinal Dominik Duka; the representatives of both institutions declared their shared interest in supporting scientific research in the field of church and religious history.

Research, Development and Innovation Projects

RESEARCH, DEVELOPMENT AND INNOVATION PROJECTS



The Institute of Experimental Botany of the ASCR, which celebrated the fiftieth year of its existence in 2012, opened new research areas in the Lysolaje complex in Prague 6 on 20 November 2012. Everything good for the next fifty years was wished for the institute also by President of the ASCR Jiří Drahoš, who attended the ceremonial event along with other top representatives of the ASCR.

As a consequence of the implementation of the Reform of the System of Research, Development and Innovation in the CR, the ASCR lost in 2008 its status as a provider of special-purpose support. In 2012 it therefore provided special-purpose support only for continuing grant projects through its open Grant Agency of the ASCR (hereinafter only GAAS) and programme projects within Nanotechnologies for Society programme. With ever-deepening European integration, the workplaces of the ASCR are placing greater emphasis on acquiring financial support from the operational programmes of the structural funds. Within the programme period of 2007–

–2013, the ASCR workplaces are involved especially in the Operational Programme: Education for Competitiveness, Operational Programme: Prague Competitiveness and Operational Programme: Research and Development for Innovation.

Grant Projects

As a consequence of the implementation of the Reform of the System of Research, Development and Innovation in the CR, in 2012 the Grant Agency of the ASCR financially supported only continuing grant projects begun before 2010. From the budget of the ASCR, a total of CZK 97.97 million was used for these purposes. Special-purpose financial means were provided for the resolution of 98 standard research grant projects (of which nine interdisciplinary) and three junior research grant projects, which were extended by one year because of maternity, or paternity, leave of the investigators. One standard research project from the area of the medical and molecular biological sciences was further financed from the means provided for this purpose by PRO.MED.CS Praha a. s. The amount of this support in 2012 was CZK 1,070,000.

Detailed data on the numbers of projects resolved within the individual fields and the amounts of financial support allotted are shown in Tables 4 and 5.

Tab. 4: Standard Research Grant Projects Resolved in 2012

Field	Total number of projects supported	Of which completed in 2012	Subsidy provided in thousands of CZK
1 Mathematical and Physical Sciences, Information Science	11	8	8,342
2 Technical Sciences and Cybernetics	6	3	6,429
3 Earth and Space Sciences	8	6	7,207
4 Chemical Sciences	19	15	18,099
5 Medical and Molecular Biological Sciences *	16	7	16,623
6 Ecological-Biological Sciences	20	13	23,175
7 Social and Economic Sciences	2	1	276
8 Historical Sciences	4	3	944
9 Humanities and Philological Sciences	3	3	1,713
X Interdisciplinary Projects	9	5	14,782
Total	98	64	97,590

* The data given include also a grant project financed from the means of PRO.MED.CS Praha a. s.

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Tab. 5: Junior Research Grant Projects Resolved in 2012

Field	Total number of projects supported	Of which completed in 2012	Subsidy provided in thousands of CZK
1 Mathematical and Physical Sciences, Information Science	1	1	328
6 Ecological-Biological Sciences	1	1	667
7 Social and Economic Sciences	1	1	457
Total	3	3	1,452

At their session in January through March 2012, the Field Councils of the GAAS conducted final evaluations of the level of resolution and quality of the results of the grant projects completed as of 31 December 2011. The background materials for the assessments were the final reports on the resolution and results of the projects, complemented with copies of the already published results or offprints of the most significant works created in their resolution. There were 141 completed standard research grant projects evaluated with a resolution period of two to five years and 64 junior research grant projects resolved for one to three years. In the category of standard research projects, 61 projects were assessed as fulfilled with outstanding results, 77 as fulfilled and 3 projects were evaluated as unfulfilled, particularly for the reason of insufficient publication activities. For the entire time of the resolution of the successfully completed standard research projects, an average of sixteen publications was issued per project, primarily in prestigious peer-reviewed foreign periodicals. In the category of junior research grant projects, 24 projects were evaluated as fulfilled with outstanding results, 38 as fulfilled and two projects were assessed as unfulfilled, because they had not achieved the given aims and the results of the resolution had not been published. On average, six results per project were implemented with the junior research projects. This number is lower in comparison with the results of standard research projects, but it is necessary to take into consideration the shorter period of resolution and the smaller size and less experience of the investigating junior teams. Although the topics of the grant projects by their character fall into the area of basic research, also 34 applied outputs were achieved in their resolution, of which 4 with the junior projects. Six fundamental results of standard research projects were patented.

Programme Projects

The ASCR's programme entitled Nanotechnologies for Society, which sets its aim at achieving significant progress in the development of publication and practical use of nanotechnologies and nanomaterials in Czech society, continued in the last year of the resolution of the eight projects begun in 2008. A special-purpose subsidy of a total amount of CZK 61.6 million was allotted for their support in 2012.

In February 2012, the Council of the Nanotechnologies for Society Programme evaluated the fulfilment of the aims and quality of the results achieved with the 15 projects completed as of 31 December 2011. All of the projects were assessed as fulfilled, seven of them were evaluated as "fulfilled with outstanding results" based on the high number of very high-quality results. Contracts on the utilisation of the results of research and development were concluded with the recipient of the completed programme projects; their fulfilment will be monitored each year for a period of three years after the end of the resolution.

Projects of the Operational Programmes of the Structural Funds

The involvement of the workplaces of the ASCR in the operational programmes is monitored on an ongoing basis through the internal electronic information system "Register of the Participation of the Workplaces of the ASCR in the Operational Programmes of the CR". This register provides detailed information on the prepared, current and completed projects within the operational programmes and hence creates important background materials for the decision-making process of the ASCR in engaging in the operational programmes financed from the structural funds.

RESEARCH, DEVELOPMENT AND INNOVATION PROJECTS

At workplaces of the ASCR in 2012, 44 new projects of the operational programmes began to be resolved, 25 projects continued in resolution for the entire year and nine projects were concluded during the year. A total of 78 projects were thus resolved. An overview of the participation of the workplaces of the ASCR in the resolution of projects of the operational programmes divided into the individual operational programmes is listed in Table 6. More detailed data on the 42 projects begun in 2012, whose coordinator is a workplace of the ASCR, are shown in Table 7. The total amount of approved support for their resolution was CZK 1.29 billion.



According to the statement of Jiří Drahoš, the ELI will be the very first top international research infrastructure of this type east of the Iron Curtain.

Tab. 6: Participation of the Workplaces of the ASCR in the Resolution of Operational Programme Projects in 2012

Operational programme	Projects begun	Projects ongoing	Projects completed	TOTAL
OP Czech Republic – Poland	0	1	0	1
OP Czech Republic – Austria	0	0	1	1
OP Supranational Cooperation	0	1	0	1
OP Entrepreneurship and Innovations	1	5	0	6
OP Prague – Adaptability	2	0	0	2
OP Prague – Competitiveness	2	4	2	8
OP Research and Development for Innovation	2	8	0	10
OP Education for Competitiveness	36	6	5	47
OP Environment	1	0	1	2
TOTAL	44	25	9	78

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Tab. 7: Operational Programme Projects begun in 2012

Recipient-coordinator	Project title	Total amount of the approved support for the project in thousands of CZK
OP Entrepreneurship and Innovations		
BÚ	Cyanobacterium	1,200
OP Prague – Adaptability		
SSČ	Academic Centre for Pre-School Children	2,023
ÚTAM	Development of the entrepreneurial environment in science and research in Prague through education in the FC method	4,948
OP Prague – Competitiveness		
FGÚ	Microscopic System	3,803
ÚMG	Label-Free Technological Platform	5,000
OP Research and Development for Innovation		
FZÚ	Centre for Technology Innovation and Transfer	50,910
ÚŽFG	ExAM Experimental Animal Models – PIGMOD centre	174,557
OP Education for Competitiveness		
BC	Centre for the ecological potential of fish communities of reservoirs and lakes	18,457
BC	Science for the Public – Path to Sustainable Development	15,643
BC	Creation of post-doctoral positions in the Biology Centre of the ASCR for the development of biological disciplines and achieving global competitiveness	85,236
BFÚ	Development of human resources for the area of cellular biology	49,193
BFÚ	Development of modern trends in experimental biology: the importance of biomolecular interactions for the function of cellular structures	37,246
BTÚ	Biotechnology expert	4,999
BTÚ	Biotechnology expert in the area of structural biology and gene expression	4,990
BÚ	Integration of experiment and population biology with the help of new methods in an interdisciplinary issue – the path to excellence with young scientists	36,620
CVGZ	The latest technologies of remote survey of the Earth in the services of research, education and applications for regional development	32,158
CVGZ	Partnership in the area of the research of climate and adaptation strategies	29,812
CVGZ	Creation of an interdisciplinary team with a focus on the research of drought	32,330
CVGZ	Creation of a team for the complex assessment of the biophysical and socioeconomic impacts of the adaptation measures to the conditions of climate change	4,839
CVGZ	Creation of a research team and international consortium for a computer model of the cells of cyanalgae	35,497

RESEARCH, DEVELOPMENT AND INNOVATION PROJECTS

FGÚ	Centre of Biomedical Research (Czech acronym: CBV)	44,498
FZÚ	Strengthening the capacity of scientific-research teams in the area of the physical sciences	50,788
FZÚ	Peak steering employees of ELI Beamlines	35,777
FZÚ	Development and Application of Highly Intensive Laser Sources of X-Ray Impulses and Proton Beams	34,617
FZÚ	Research and Development of a New Generation of High Energy, Diode Pumped Lasers for applications	39,698
MBÚ	Algain	35,547
MBÚ	IMPULS, Innovation in Microbiology – post-doctoral instruction and laboratory centre	58,191
MBÚ	Creation of teams for the Centre of Microbiology and Immunology	28,376
SSČ	Open Science III – the popularisation of natural-science and technical fields and communication of research and development in society	24,646
ÚBO	NextGenProject: Technology of the new generation in evolutionary genetics	19,805
ÚBO	Science in All Senses	17,248
ÚEM	Human resources for neuroscience research in the Hradec Králové and Ústí Regions	6,400
ÚEM	Preparation of science teams of the ÚEM of the ASCR for the BIOCEV project	9,188
ÚFM	Gifted post-doctoral candidates for scientific excellence in the area of the physics of materials	9,500
ÚFM	Development of human resources in the research of the physical and material features of model, newly developed and engineering applied materials	28,000
ÚI	100 scientists to secondary schools	16,295
ÚJF	Long-Term Assurance of High Quality Research in the Area of the Study of Extreme States of Nuclear Matter	17,078
ÚMG	Creation of a Centre of Transgenic Technologies	46,431
ÚMG	Establishment of an expert platform for phenotypic and imaging technologies	45,511
ÚMCH	BIOPOL – BIOPolymer Post-doctoral laboratory and education centre	65,822
ÚOCHB	Centre of Medicinal Chemistry	25,772
ÚPT	Personnel Development of Research Teams	4,945
ÚTAM	Popularisation of research and development in the area of care for the cultural legacy	10,722
OP Environment		
BÚ	Chateau Park Průhonice – Proposal of the Stabilisation Measures for the Individual Trees – 1 st Stage	24,474

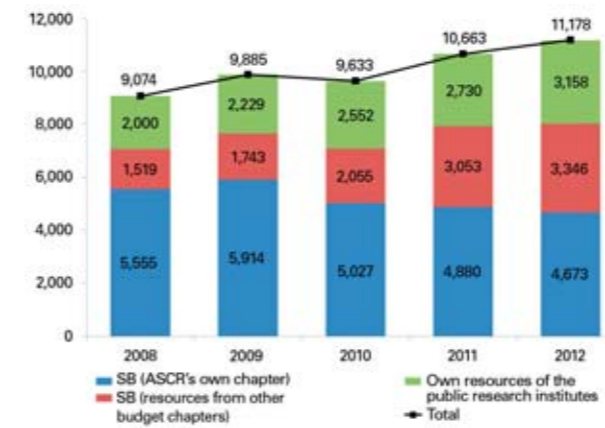
08

Overview of the Economic Management of Financial Means

OVERVIEW OF THE ECONOMIC MANAGEMENT OF FINANCIAL MEANS

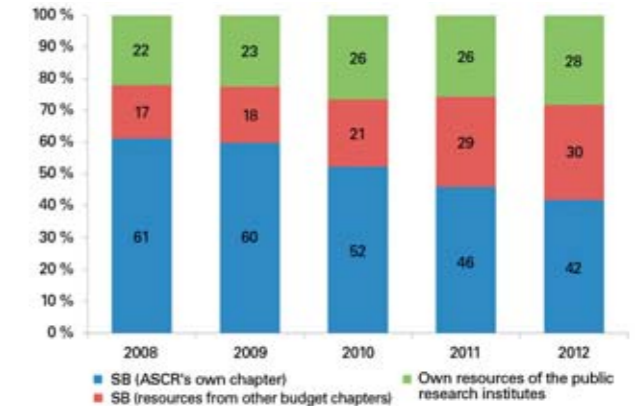
In 2012, the ASCR managed a total of CZK 11,178,000,000, of which CZK 4,673,000,000 came from its own budget chapter. Since 2008, there has been a gradual growth of the total financial means of the ASCR by more than CZK 2 billion, despite the decrease of the means of its own state budget chapter by approximately CZK 1 billion. This total growth was partially caused both by the increase of means from the state budget from other budget chapters (almost CZK 1.8 billion) and partly by an increase of their own means of the public research institutes (by CZK 1.2 billion).

Graph 1: Financial Sources of the ASCR (in millions of CZK)



The percentage of subsidy from its own budget chapter to the total financial sources of the ASCR dropped from 61% in 2008 to a mere 42% in 2012. This reduction could in the near futures unfavourably influence or make impossible generating of its own means.

Graph 2: Financial Means of the ASCR (in %)



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Financial sources coming from the budget of the chapter, from subsidies from other budget chapters and from extra-budgetary sources as the whole Academy of Sciences of the CR are summarised in the following overview:

The Structure of the Financial Sources (in millions of CZK):	Non-investment means	Investment means
Approved budget of the chapter	3,852.4	816.0
Transfer of non-investment means into investment	-64.9	64.9
Transfer outside the chapter of the ASCR	-1.5	
Subsidies from other budget chapters	3.0	
Amended budget of the chapter of the ASCR	3,789.0	880.9
of which subsidies to public research institutions	3,629.8	882.2
to the Head Office of the ASCR	159.2	0.7
Use of claims from unused expenses	0.9	0.0
of which grants of the Grant Agency of the ASCR	0.6	0.0
Financial Mechanisms of EEA/Norway	0.0	0.0
projects of the European Union	0.1	0.0
material costs of the OSS (Operational Support System)	0.3	0.0
Resources of the reserve fund of ASCR chapter	1.8	2.4
Transfer to files of claims from unused expenses	-1.7	0.0
Total resources from the ASCR budget chapter	3,790.0	883.3
Subsidies from other budget chapters (pursuant to Act No. 130/2002 Coll.)	2,413.4	933.0
of which Czech Science Foundation grants	1,294.2	46.5
projects of other ministries	1,119.2	886,5
Own R&D&I resources	3,157.8	
of which main activity orders	172.8	
sales of publications	108.8	
sales of goods and services	127.0	
licences	1,775.7	
conference fees	14.5	
foreign grants and donations	272.1	
rent	88.7	
interest, exchange-rate profits	76.1	
own fund resources	153.6	
other	368.5	
Total resources	9,361.2	1 816.3

OVERVIEW OF THE ECONOMIC MANAGEMENT OF FINANCIAL MEANS

The **institutional** means provided for the support of research plans, institutional support of research organisations according to the results achieved by them and for ensuring the research infrastructure comprised 96.4% of the total amount of the budgetary means and 40.3% of all the sources of the ASCR. The amount of special-purpose means intended for the resolution of the grant and programme projects which are provided from the chapter of the Academy of Sciences of the CR based on the results of public tenders was reduced by 60.3% as compared to 2011. The special-purpose means formed 3.5% of the total amount of budgetary means and 1.5% of all of the sources of the ASCR. From other budget chapters pursuant to Act No. 130/2002 Coll., a total of CZK 3,346.4 million, i.e. 9.5% more than in 2011, was transferred directly without budget measures to workplaces of the ASCR. Means from other budget chapters comprised 29.9% of all of the sources of the ASCR. The total amount of the special-purpose means acquired for the resolution of projects from the Czech Science Foundation was CZK 1,340,700 and from providers from the other ministries there was CZK 2,005.7 million. Its own, i.e. extrabudgetary sources, were 3,157.8 million (a year-on-year increase of 15.7%).

The **non-investment** sources of the ASCR were comprised by 40.5% of the means of its own chapter of the state budget, by 24.8% of transfers from the other chapters of the state budget and by 33.7% from its own revenue and extrabudgetary means. The percentage of non-investment sources acquired by transfer from the other chapters of the state budget increased as against the year before by 10.3%.

For the **investment** sources of the ASCR, it had 48.6% from the means from its own chapter of the state budget and 51.4% from transfers from the other chapters of the state budget.

The joint expenditures intended particularly for foreign contacts, computer networks, membership contributions to international scientific organisations and the subsidies to 75 scientific societies associated at the Council of Scientific Societies of the CR were covered from the budget of the Head Office of the ASCR, through which also went all of the special-purpose means intended for extra-academic entities for the resolution of the grant projects of

the Grant Agency of the ASCR and programme projects within the programme of Research, Development and Innovation of the ASCR Nanotechnology for Society.

From their total revenues of CZK 9,202.8 million, the workplaces of the ASCR (public research institutions) used CZK 8,130.3 million to cover their expenses (more detail is provided in Appendix 7.1. titled The Economic Management of the Public Research Institutes of the ASCR in 2012). Improved economic results totalling CZK 1,072.5 million will be used primarily for the supplementation and renewal of instruments and equipment essential for the actual scientific activities of the workplaces.

Considering that the workplaces of the ASCR are managed economically as public research institutions in the system of non-state organisations, they do not conclude their accounting until 30 June of the following year and the final account must be verified by an auditor. It is hence necessary to take the following analysis as preliminary.

As against 2011, the total expenditures of the workplaces of the ASCR increased by 5.1%. The costs for repairs and maintenance (24.4%), for travel (1.8%) and for the purchase of material (3.4%) decreased year-on-year. The costs for the purchase of energy, water and fuel (4.1%) and personnel costs (2.6%) rose slightly. The costs for the purchase of services (10.5%) and other costs (35.3%) rose distinctly. The creation of a fund of special-purpose means increased as against last year by 45.1%.

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The Structure of the Expenses of the Workplaces of the ASCR (in millions of CZK):

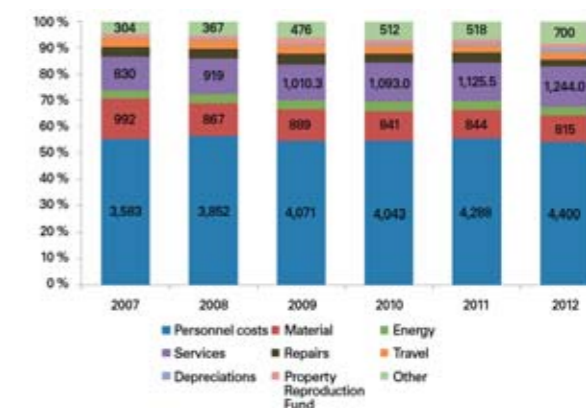
Personnel costs (labour costs, mandatory insurance paid by the employer, health-insurance benefit compensation)	54.12 %	4,399.9
Purchase of material	10.02 %	815.0
of which books, journals		57.4
small material property		177.3
use of material, protective aids		502.6
other material costs		30.0
work of a production character (press)		47.7
Purchase of energy, water and fuels	3.35 %	272.3
of which electrical energy		154.1
water, steam, gas		99.9
fuels, fuel substances		18.3
Purchase of services	15.30 %	1,244.0
of which services of the post, telecommunication and radiocommunication		41.7
purchase of small non-material property		15.9
rent		44.8
computer technology performances		32.0
costs for representation		10.5
preliminary budget		7.5
conference fees		39.0
sewage fees		8.5
other services		1,044.1
Repairs and maintenance	2.74 %	223.1
of which repair and maintenance of property		163.0
repair and maintenance of moveable assets		60.1
Total travel costs	2.72 %	221.1
of which foreign travel expenditures		202.4
domestic travel expenditures		18.6
Depreciation of fixed assets	1.29 %	105.0
Creation of a fund of special-purpose means	1.84 %	149.5
of which special-purpose means from the chapter of the ASCR		3.5
institutional means		101.0
special-purpose means from other providers		45.0
Total other costs	8.62 %	700.4
of which transfers to the Social Fund and other social costs		138.9
taxes and fees		216.3
exchange-rate losses		53.7
injury insurance, fines, penalties, shortfalls, damages		291.5
The workplaces of the ASCR used a total of	100.00 %	8,130.3

OVERVIEW OF THE ECONOMIC MANAGEMENT OF FINANCIAL MEANS

From the means spent on 'purchase of services', (CZK 1,244.0 million), the item 'other services' comprised CZK 1,044.1 million. The expenditures on other services are specific for each workplace of the ASCR. They are contribution abroad within international cooperation, scientific measurements and analyses for projects, publication costs, training, seminars, payments for the professional preparation of grant requests, legal and tax consultation, payments for electronic access to the databases of foreign journals etc.

The analysis listed does not include the accounting depreciation of property taken from subsidies of the total amount of CZK 931,519,000, which are an expenditure item only from an accounting perspective; pursuant to Decree No. 504/2002 Coll., as later amended, however, they do not comprise a source of the fund for the reproduction of property and do not influence the economic result.

Graph 3: The Use of Non-Investment Means (in millions of CZK)



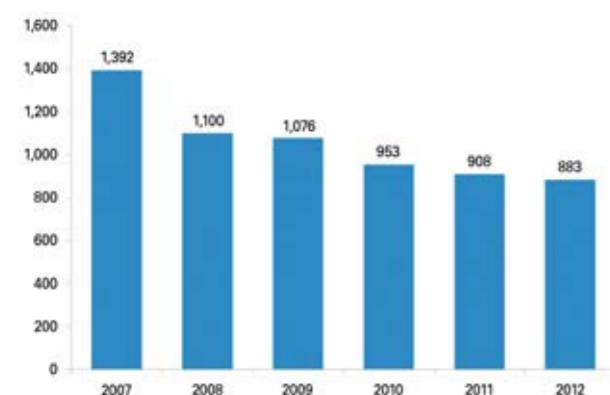
From a comparison of the ratios of the non-investment means of the workplaces of the ASCR spent during the observed period from 2007 to 2012, it is clear that the percentage of the items to the total amount of means spent does not change very much.

The sources of investment means are comprised predominantly of the institutional and special-purpose subsidies from the state budget and foreign grants. They serve particularly for the purchase or appraisal of buildings and instruments, or for their maintenance and repairs. The data for the entire Academy of Sciences of the CR may be summarised as follows:

Total Investment Resources (in millions of CZK)	2,370.4
of which depreciation	101.0
transfer from improved outcome from operations	12.6
recipients; joint recipients (pursuant to Act No. 130/2002 Coll.)	933.1
foreign grants and donations	374.2
revenues from sales of fixed assets	50.1
combining funds for the acquisition of fixed assets	16.9
subsidies from the state budget	institutional 882.5
	special-purpose 0.0
These resources were used to fund	
building financing	886.8
acquisition of instruments and equipment	1,572.7
maintenance and repairs	12.9
other	83.7
Total used on the acquisition of fixed assets	2,556.1
Acquisition of the Property Reproduction Fund	-185.7
Returned to the state budget	0.0

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Graph 4: The Investment Means of the Budget Chapter of the ASCR (in millions of CZK)



Of the most important of the construction events which were provided with an investment subsidy (in thousands of CZK) from the budget of the ASCR in 2012, it is possible to mention:

Reconstruction and completion of the complex of the Institute of Organic Chemistry and Biochemistry	86,500
The research base Mikulčice-Trapíkov of the Institute of Archaeology, Brno	49,100
Construction of Building 2 of the Institute of Experimental Botany in Prague-Lysolaje	26,080
Repair of the HVAC system in Building G of the Institute of Physics	13,700
The annex and construction adaptation of Building 231 VdG at the Nuclear Physics Institute	13,400
Completion of the complete reconstruction of Building Xb of the Institute of Microbiology	7,700

Despite the significantly limited possibilities, the ASCR endeavoured to ensure the renewal of instrumental equipment also in 2012. The amount of CZK 170 million was set aside for this purpose in the budget of the ASCR. Through a system of internal competitions for apparatuses up to CZK 5 million, the amount of CZK 109 million was distributed to the workplaces and the rest (CZK 61 million) for instrumental equipment at a cost above CZK 5 million. Another source of investments was the amount of CZK 15 million for the instrumental equipment of the laureates of *Praemium Academiae*. An important item is the allocation of a subsidy for the reproduction of property (Czech acronym: DRM), in 2012 it was CZK 260 million. The institutes further significantly contributed to all of these subsidies from their own resources.

In Appendix 7.2, the investment sources and their uses at the individual workplaces of the ASCR in 2012 are shown.

Employment and Drawing on Wage Resources

The total number of employees of the ASCR (what is always shown here is the number as the average number of employees recalculated as full-time jobs, i.e. Full Time Equivalent – FTE) increased in 2012 from 7,709 to 7,821, of which 2,463 employees (which is 31.49% as against 27.28% in 2011) are paid from special-purpose and extrabudgetary means. The number of university-educated employees of research units who passed the demanding certification following the Career Rules for University Educated Employees of the Academy of Sciences of the CR and were put in the relevant qualification grade rose from 4,456 to 4,489.

The ASCR in total spent CZK 3,207,810,000 on salaries and wages and CZK 130,039,000 on other payments for work performed. The total average monthly income at the ASCR was CZK 34,179 with a year-on-year increase as against 2011 of 0.78%.

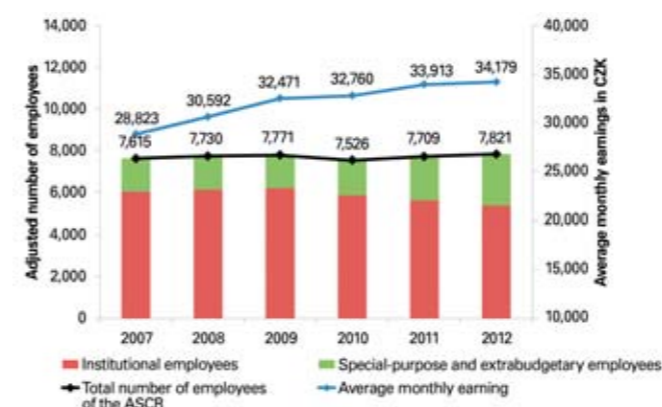
OVERVIEW OF THE ECONOMIC MANAGEMENT OF FINANCIAL MEANS

Tab. 8: The Number of Employees (FTE) and the Average Monthly Earnings in CZK (of the ASCR as a whole)

The Number of Employees (FTE) and the Average Monthly Income in CZK (of the ASCR as a whole)

Year	2007	2008	2009	2010	2011	2012
Number of Employees of the ASCR	7,615	7,730	7,771	7,526	7,709	7,821
of which institutional	6,021	6,120	6,190	5,850	5,606	5,358
of which special-purpose and extrabudgetary	1,594	1,610	1,581	1,676	2,103	2,463
Average income	28,823	30,592	32,471	32,760	33,913	34,179

Graph 5: The Number of Employees (FTE) and Average Earnings (of the ASCR as a whole)



A more detailed overview of total number of employees of the ASCR is provided by the following categorisation into employees of the Head Office of the ASCR and the employees of all of the research workplaces of the ASCR.

Tab. 9: The Number of Employees (FTE) at the ASCR

The Number of Employees (FTE) at the ASCR

Year	2007	2008	2009	2010	2011	2012
At the research workplaces of the ASCR	7,511	7,629	7,683	7,466	7,645	7,752
At the Head Office of the ASCR	104	101	88	60	64	70
Total of the ASCR	7,615	7,730	7,771	7,526	7,709	7,821*

* The total sum of the ASCR of 7,821 came about from the following numbers without rounding: at the research workplaces of the ASCR 7,751.70 employees; at the Head Office of the ASCR 69.51 employees.

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At the Head Office of the ASCR, CZK 36,852,000 was spent for the wages of 70 employees and CZK 1,493,000 for the other payments for work performed, a total thus of CZK 38,345,000.

The total average monthly earnings of the employees of the Head Office of the ASCR without elected functionaries of the ASCR in 2012 were CZK 37,000. If we also include the elected functionaries of the ASCR among the employees of the Head Office of the ASCR, we come to average earnings of CZK 44,181. The average earnings as against the previous year decreased. Unlike the other chapters of the state budget, the elected representatives of the Academy of Sciences (President, Vice Presidents and members of the Academic Council) are rewarded according to Government Decree No. 564/2006 Coll., On the Salaries of Employees in Public Services and Administration. Hence (again unlike the other chapters of the state budget), they are included in the binding indicators – the limit of the means for sala-

ries and the limit of the number of employees of the Head Office of the ASCR. This leads to a distorted (upwards) display of the average earnings shown for the organisational unit of the government of the Academy of Sciences of the Czech Republic.

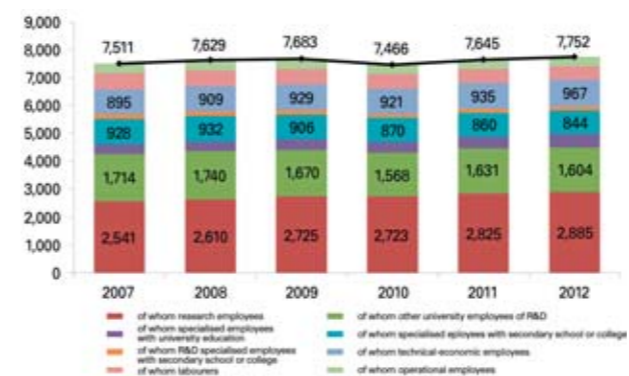
At all of the institutes of the Academy of the Sciences (public research institutions), CZK 3,170,958,000 was spent on 7,752 employees in 2012, CZK 128,546,00 for the other payments for work performed, thus a total labour cost of CZK 3,299,504,000. The total average monthly earning was CZK 34,089 with a year-on-year increase as against 2011 of 0.87%.

A more detailed overview of the average monthly earning at the public research institutions (including all sources – institutional, special-purpose and extrabudgetary) divided by the categories of employees is provided in the following table:

Category	Average adjusted number of employees	Average monthly earnings in CZK
Research employees	2,885	45,897
Other university-educated employees of research units	1,604	28,496
Specialised employees with university education	481	32,238
Specialised employees with secondary school or college	844	22,888
Specialised R&D employees with secondary school or college	134	26,705
Technical-economic employees	967	34,280
Labourers	500	17,987
Operational employees	337	16,547
Total	7,752	34,089

OVERVIEW OF THE ECONOMIC MANAGEMENT OF FINANCIAL MEANS

Graph 6: The number of Employees (FTE) at the research workplaces of the ASCR



The numbers of employees, paid wage means divided by resources and average gross monthly earnings for the individual workplaces of the ASCR are given in Appendix 8.1. The number of workplaces and employees of the ASCR by section are listed in Appendix 8.2.

Audit Activity

Audit activity within the ASCR is ensured by an independent audit department, which is directly subject to the President of the ASCR, takes place pursuant to the Act on Financial Control in Public Administration and its aim is:

- guarantee the observance of the legal regulations and adopted internal measures in the financial management of public means in the performance of activities in the area of research and development;
- ensure the protection of public means from risks, discrepancies or other insufficiencies caused particularly by legal regulations, wasteful, purposeless and ineffective management of public means, or criminal activity;
- prompt and reliable informing of the steering bodies of the Academy of Sciences on the management of public means, on the operations performed, on their conclusive accounting processing for the purpose of the effective directing of the activity of the Academy of Sciences in accord with the set tasks in the area of research and development.

Public-administration audits were conducted based on the approved annual plan. They were thematically focused mainly on the effectiveness of the internal control system, the correctness and conclusiveness of the accounting, the correctness of the use, registration and manifestation of the special-purpose and public means, administration and economic management with property, and observance of the Labour Code.

In 2012, six planned audits of academic workplaces were conducted of the seven originally approved. Based on the request of the Director of the Global Change Research Centre of the ASCR, v. v. i., the President of the Academy of Sciences approved the postponement of this planned audit from 2012 to 2013. Audits of the subsidies provided to 13 projects in five scientific societies were conducted. The amount of these subsidies was CZK 666,000 of the total provided of CZK 5,500,000. Six of 67 resolved research plans were verified in a total audited amount of CZK 114,439,000, nine of 309 resolved grant projects in a total audited amount of CZK 24,287,000 and two of 23 resolved programme projects in a total audited amount of CZK 66,838,000. The financial controls in the course of 2012 verified the drawing of the special-purpose supports provided for the period of the duration of selected grant or programme projects, or until 31 December 2011.

At workplaces of the ASCR, four subsequent audits were performed to inspect fulfilling the measures to remove insufficiencies discovered by audits of the economic management in 2011. Repeating insufficiencies were not found.

Based on the approval by the competent body of the EU, the audit department of the Head Office of the ASCR conducts internal audits of the accounting of projects of the EU Framework Programmes. In 2012, the volume of verified financial means was CZK 83,646,388.13 and four audit certificates were issued.

The leadership of the Academy of Sciences devoted greater attention to the activity of the internal control system. The individual protocols on resulting audits were submitted and discussed at sessions of the Academic Council.

Appendices

APPENDIX 01

Appendix 01

List of the Research Plans Resolved by the Workplaces of the ASCR in 2012

Ident. code	Recipient	Title
AV0Z00950701	Centre for Administration and Operations of the ASCR	Implementation of the infrastructure of research and development at the ASCR, an indispensable prerequisite of the quality development of the scientific fields of the ASCR
AV0Z50040702	Institute of Biophysics of the ASCR	Genome and epigenome: 1D and 3D Structure, Dynamics, Interactions with Proteins and Functions
AV0Z50390703	Institute of Experimental Medicine of the ASCR	New biotechnologies, nanomaterials and stem cells for usage in regenerative medicine
AV0Z50520701	Institute of Biotechnology of the ASCR	Building the Institute of Biotechnology of the ASCR

APPENDIX 02

Appendix 02.1

Total Publication Results at the ASCR

(The specific data including their categorisation by section will be handed out at the Session of the Academic Assembly of the ASCR)

Publication type	Publication results			
	Year of Issue 2011		Year of Issue 2012*)	
	Czech	Foreign language	Czech	Foreign language
Books	246	79	121	50
Treatises in books	655	483	371	422
Articles in scientific journals	1,018	3,969	798	3879
Conference proceedings	21	28	11	21
Papers in anthologies	319	1177	247	1041
Translations	30	22		
Reviews	354	249		
Specialised articles in the daily press	206	113		
Research reports	322	292		

*) The data for 2012 are incomplete, because the publications with the given year of issue are also published during the next year.

NB: The aggregate data for the ASCR are not a sum of the data by area of science given the fact that staff from more than one institute can participate in a single item. Such work is included for each institute and in the total only once.

Appendix 02.2

Publication Results in the Science Areas

Type of publication	1 st -3 rd Section		4 th -6 th Section				7 th -9 th Section					
	Year of Issue 2011		Year of Issue 2012*)		Year of Issue 2011		Year of Issue 2012*)		Year of Issue 2011		Year of Issue 2012*)	
	Czech	Foreign lang.	Czech	Foreign lang.	Czech	Foreign lang.	Czech	Foreign lang.	Czech	Foreign lang.	Czech	Foreign lang.
Books	26	20	12	12	14	8	5	11	207	49	105	27
Treatises in books	34	115	18	80	15	116	28	99	606	255	328	244
Articles in scientific journals	137	1694	132	1643	155	2101	108	2043	729	220	560	211
Conference proceedings	11	14	5	10	4	9	1	8	6	5	5	3
Papers in anthologies	116	778	110	743	81	323	45	244	127	87	94	65
Translations	1	0	0	1	29	21						
Reviews	2	0	2	4	350	245						
Specialised articles in the daily press	56	21	30	23	120	69						
Research reports	100	66	10	6	181	194						

*) The data for 2012 are incomplete, because the publications with the given year of issue are also published during the next year.

APPENDIX 05

Appendix 03

Examples of Cooperation with the User Sphere within Joint Projects or Based on Economic Contracts

- Development of a low-voltage source for the RPW experiment on the probe for the research of the Sun Solar Orbiter
Astronomical Institute of the ASCR, ESA PRODEX, CSRC spol. s r. o., Sprinx Systems, a. s.
- Development and operation of a powerful computer system, Amalka, serving in the development of satellite experiments and the interpretation of the measured data, *Astronomical Institute of the ASCR, ESA PRODEX, ESA EMITS, Sprinx Systems, a. s.*
- Development of a low-voltage source for the RPWI experiment on the probe for the research of the planet Jupiter JUICE and the development of a magnetometer for the same mission, *Astronomical Institute of the ASCR, ESA PRODEX, CSRC spol. s r. o., Sprinx Systems, a. s., ESA EMITS*
- Magnetic nanoparticles for diagnostics and therapy, *Institute of Physics of the ASCR, Institute of Experimental Medicine of the ASCR, SYNPO, a. s., VŠCHT, IKEM*
- Assessment of the light yields of rapid scintillators based on aluminium garnets, *Institute of Physics of the ASCR, CRYTUR, spol. s r. o.*
- New x-ray monochromators, *Institute of Physics of the ASCR, ABB, s. r. o.*
- Technology of drawing monocrystals BaWO₄, *Institute of Physics of the ASCR, CRYTUR, spol. s r. o.*
- Boroscope, *Institute of Physics of the ASCR, Indel, s. r. o., Trystom, s. r. o.*
- Colour marking of automobile springs, *Institute of Physics of the ASCR, Mubea, s. r. o.*
- Software for data collection from ion sorption pump, *Institute of Physics of the ASCR, Vakuum Praha, spol. s r. o.*
- R-software, *Institute of Computer Science of the ASCR, BARCO, s. r. o.*
- Update and improvement of models of typical diagrams of load, *Institute of Computer Science of the ASCR, RWE Plynoprojekt, s. r. o., OTE, a. s.*
- Development of models for the estimation of loss in the provision of natural gas, *Institute of Computer Science of the ASCR, RWE GasNet, s. r. o.*

- Audits of the system information security management, the system of information services management and management of quality in IT companies, *Institute of Computer Science of the ASCR, CQS (Electrotechnical Testing Institute)*
- The content of the elements in the cable materials of security systems of nuclear power stations and the degradation of cable materials by reactor radiation, *Nuclear Physics Institute of the ASCR, ÚJV Řež, a. s.*
- Residual stress determination by neutron diffraction in a car gear-shaft made of 20NiCrMo2 alloyed case hardening steel, *Nuclear Physics Institute of the ASCR, Rogante Engineering Office*
- The regulations of the activities of chemical forms of 14C in the air of the technological parts of the Temelín nuclear power plant, *Nuclear Physics Institute of the ASCR, ČEZ, a. s.*
- Analyses of the condenser foil by the RBS a PIXE methods for the customer's needs, *Nuclear Physics Institute of the ASCR, HYDRA, a. s.*
- The derivation of elastic conform transformation for the registration of digital images and its implementation in the form of the Web Map Service, *Institute of Information Theory and Automation of the ASCR, Geodézie Ledec nad Sázavou, s. r. o.*
- An apparatus for the automatic evaluation of images of yeast colonies, *Institute of Information Theory and Automation of the ASCR, Charles University, Brno University of Technology, CAMEA, spol. s r. o.*
- Optimisation of fuel consumption while driving, *Institute of Information Theory and Automation of the ASCR, Škoda auto, a. s.*
- A new strategy of managing traffic proposed on calibrated microsimulations of the city traffic network, *Institute of Information Theory and Automation of the ASCR, ELTODO dopravní systémy, s. r. o.*
- Implementation of the prototype of smart cameras in a template with a FPGA circuit and ARM microprocessor, *Institute of Information Theory and Automation of the ASCR, CEA Commissariat à l'Énergie Atomique, France, and another 27 project partners*
- LLVM Translator of the language C for the PicoBlaze processor, *Institute of Information Theory and Automation of the ASCR, CEA Commissariat à l'Énergie Atomique, France, and another 27 project partners*

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- Simulator of the EdkDSP platform for the PC platform, *Institute of Information Theory and Automation of the ASCR*, CEA Commissariat à l'Énergie Atomique, France, and another 27 project partners
- Implementation of the UTLEON3 processor in FPGA circuit, *Institute of Information Theory and Automation of the ASCR*, Universiteit van Amsterdam, Holland, Aeroflex-Gaisler, Sweden, University of Hertfordshire, Great Britain, University of Ioannina, Greece, Advanced Compiler Experts
- AXI_PB_DMA communication interface replacing the NPI-DMA model in Xilinx circuits of a new generation supporting only AXI busbars, *Institute of Information Theory and Automation of the ASCR*, CEA Commissariat à l'Énergie Atomique, France, and another 27 project partners
- A prototype of a broad-band source of radiation based on strengthening the spontaneous emission in ytterbium fibre drawn through the cladding – development of a measuring system for monitoring the laser-structured surfaces of moulding forms used predominantly in the automobile industry, *Institute of Photonics and Electronics of the ASCR*, Safibra, s. r. o., IMS Dražňar, s. r. o., Precitec Optronik GmbH and another five partners from Germany.
- A prototype of equipment for comparing the time scales through the signals of satellite navigation systems of a new generation (GPS, GLONASS, Galileo, SBAS), *Institute of Photonics and Electronics of the ASCR*, Dicom, spol. s r. o.
- An internet application for comparing the time scales through the GPS method CGGTTS and state etalon time and frequency, it creates a national time scale UTC(TP), *Institute of Photonics and Electronics of the ASCR*, Czech Office for Standards, Metrology and Testing
- Research of the fatigued behaviour of casts from superalloys produced by a newly developed method of precise casting, *Institute of Physics of Materials of the ASCR*, První brněnská strojírna, a. s.
- Prediction of the degradation of the fracture behaviour of heterogeneous welded joints, *Institute of Physics of Materials of the ASCR*, ÚAM, s. r. o.
- Testing and evaluating new types of shafts of hip replacements, *Institute of Physics of Materials of the ASCR*, Medin, a. s.
- Determination of the lifespan of railroad double tracks, *Institute of Physics of Materials of the ASCR*, Bonatrans, a. s.
- Development of new compositions of hard metals based on a WC and cobalt matrix *Institute of Physics of Materials of the ASCR*, Pramet Tools, s. r. o.
- Adjustment of the evaluation of fracture resilience and the implementation of tests of fracture resilience including an evaluation of the measured values, *Institute of Physics of Materials of the ASCR*, Pramet Tools, s. r. o.
- Development of a method of testing and implementing a test of the deformation and solidity characteristics of Al tins used for lightening the packaging for drinks, *Institute of Physics of Materials of the ASCR*, MoraviaCans, a. s.
- Measurement of the mechanical characteristics, fatigue characteristics, influence of heat treatment, determination of the types of operational degradation, including the identification of cracks in several materials used, or developed in airplane motors, *Institute of Physics of Materials of the ASCR*, GE Aviation, s. r. o.
- Phase analysis of bearing steels, *Institute of Physics of Materials of the ASCR*, Kovo Bearing Česká republika, s. r. o.
- Phase analysis of the products found in the mechanical components of motors, *Institute of Physics of Materials of the ASCR*, Honeywell, s. r. o.
- Development of large diameter active and adaptive optics, *Institute of Plasma Physics of the ASCR*, 5M, s. r. o., Czech Technical University in Prague
- Research and development of a new generation of plasmatron for plasma technology utilising the unique principle of water stabilisation of the circuit, *Institute of Plasma Physics of the ASCR*, ProjectSoft, a. s.
- Determination of the characteristics of the plasma stream of a hybrid plasmatron in plasma sprays, Diagnostics conducted of the interaction of the plasma stream with particles and testing of sprays of metal materials, *Institute of Plasma Physics of the ASCR*, Research and Testing Institute Pilsen, s. r. o.
- Preparation of special plasma sprayed ceramic tubes, *Institute of Plasma Physics of the ASCR*, JSP, s. r. o., and other companies
- Ceramic layers intended for the protection of moulding areas from corrosion and abrasions, development of moulding forms of heat-resistant raw materials and products, *Institute of Plasma Physics of the ASCR*, P-D Refractories CZ, a. s.
- Special ceramic coatings for the blades of turbines, *Institute of Plasma Physics of the ASCR*, GE Aviation Czech, s. r. o.

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- Complex rheological description of the flow behaviour of viscoelastic substances treated with a new technology and confirmed significant influence of viscoelasticity and normal stress in its processibility, *Institute of Hydrodynamics of the ASCR*, Hydrosystem PROJECT, a. s.
- A hydromechanical analysis of the movement of concretions, *Institute of Hydrodynamics of the ASCR*, Wrocław University of Environmental and Life Sciences, Poland, HYDROSYSTEM project, a. s.
- Flowing and slide speed of complex suspensions containing polymetallic concretions and resolution of the technology of their hydraulic transport from the ocean floor from a depth of 4.5 km, *Institute of Hydrodynamics of the ASCR*, InterOceanMetal, j. o.
- Measurement of the spread of dangerous materials from a point source in the complex of the company Flexcon in SW flow and measurement of the direction of the spread of hazardous materials and their spatial concentration in the atmosphere after an industrial accident in the built-up area of the town of Pardubice, *Institute of Hydrodynamics of the ASCR*, Association of the Municipality of Orlicko
- Automated system of the classification of living cells according to their fluorescence and spectroscopic responses, *Institute of Scientific Instruments of the ASCR*, PSI, s. r. o.
- Proposal and verification of units for measuring atmospheric quantities and a very precise determination of the refractive indices of air during measurement with an AFM microscope, *Institute of Scientific Instruments of the ASCR*, MESSING, s. r. o.
- A two-axis tilt table with a size of 6 mm with resolution on the nanometre scale, *Institute of Scientific Instruments of the ASCR*, MESSING, s. r. o.
- Passivation anti-reflection layers for photovoltaic panels of a new generation, *Institute of Scientific Instruments of the ASCR*, Solartec, s. r. o.
- Modified diamond-like carbon (DLC) layers forming composite films for electrochemical sensors analysing complex biochemical and inorganic matrices, *Institute of Scientific Instruments of the ASCR*, BVT Technologies, a. s.
- Electron jets for the MEBW-60/2 electron beam welder, *Institute of Scientific Instruments of the ASCR*, Focus GmbH, Germany
- Development of inseparable connections of metal materials and usage of electron beam welding in the assembly of the mechanical units for nuclear energy, *Institute of Scientific Instruments of the ASCR*, ÚJP Praha, a. s. (*Nuclear Physics Institute*)
- Construction and production of various types of interference filters for instruments for biology/ecology, *Institute of Scientific Instruments of the ASCR*, Photon Systems Instruments, spol. s r. o.
- Development of inseparable connections of metal materials, the assembly of the mechanical units for nuclear energy using electron beam welding and vacuum soldering in the area of electron microscopy, *Institute of Scientific Instruments of the ASCR*, TESCAN, a. s.
- Methodology of the preparation and display of powders in high-resolution SEM with the need to galvanise the surface, *Institute of Scientific Instruments of the ASCR*, EID Industrial Diamonds, Haris division, s. r. o.
- Construction and production of laser eyewear for the range of 630–900 nm for use in health care, *Institute of Scientific Instruments of the ASCR*, VAMEL Meditec, s. r. o.
- Development of connections, development and production of electric vacuum grommets, assembly of the mechanical units using electron beam welding and vacuum soldering in the area of x-ray equipment, *Institute of Scientific Instruments of the ASCR*, Rigaku Innovative Technologies Europe, s. r. o.
- Size standards for the adjustment of electron microscopes prepared by electron lithography and subsequent operations, *Institute of Scientific Instruments of the ASCR*, FEI Czech Republic, s. r. o., TESCAN, a. s.
- Development of inseparable connections of metal materials, the assembly of the mechanical units using electron beam welding and vacuum soldering, *Institute of Scientific Instruments of the ASCR*, První brněnská strojírna Velká Bíteš, a. s.
- Methodology of depicting inorganic nanoparticles used for the pharmaceutical industry with the STEM method with very high resolution under 1 nm. A methodology of the EDX analysis of nano particles on TEM networks was elaborated, *Institute of Scientific Instruments of the ASCR*, Contipro, s. r. o.
- Methodology of the observation and analysis of organic pigments in SEM, *Institute of Scientific Instruments of the ASCR*, Synthesia, a. s.
- Development of inseparable connections and welding mechanical units using electron beam welding, *Institute of Scientific Instruments of the ASCR*, Honeywell, spol. s r. o.
- Anti-reflection layers for perpendicular effect, *Institute of Scientific Instruments of the ASCR*, KVANT, s. r. o.

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- Determination of the dynamic characteristics of masts and the fatigue of mooring ropes, *Institute of Theoretical and Applied Mechanics of the ASCR, EXCON, a. s.*
- Dynamic assessment of bridges for pedestrians and cyclists over the River Morava in terms of the acceptability of vibrations from the bearing of pedestrians and a report on the dynamic test of the bridge Děvinská Nová Ves – Schlossohof, after the installation of absorber, *Institute of Theoretical and Applied Mechanics of the ASCR, EXCON, a. s.*
- Consultation activity in the construction of a new bridge over the River Vltava in Prague-Troja, *Institute of Theoretical and Applied Mechanics of the ASCR, METROSTAV, a. s.*
- Thermal analysis of the plasters from Castle Karlštejn, the monastery in Sázava and Estates Theatre in Prague, *Institute of Theoretical and Applied Mechanics of the ASCR, GEMA ART GROUP, a. s.*
- Detection of the progression of cracks in concrete using nonlinear ultrasonic spectroscopy, *Institute of Thermomechanics of the ASCR, UNICA Technologies, a. s., Czech Technical University in Prague*
- Diagnostics of transmission of a helicopter using continuous acoustic emission, *Institute of Thermomechanics of the ASCR, AURA, a. s., LOM (VTUL) Praha, s. p.*
- A system of controlling the flow of a floating condenser in a multilevel voltage transformer, *Institute of Thermomechanics of the ASCR, ČKD ELEKTROTECHNIKA, a. s.*
- Figures of the flow fields and measurements of the aerodynamic characteristics of selected profile lattices for the long blades of the last level of low-pressure parts of the high performance turbine and visualisation of the flow and measurement of the pressure losses in the model of a steam valve of 135 MW under proposed and unproposed conditions, *Institute of Thermomechanics of the ASCR, ŠKODA POWER, s. r. o.*
- Measurement of the magnetic characteristics and demagnetisation of the blades of a 1000 MW turbine and the installation at the institute of an advanced system of VDS-UT for the long-term monitoring of the vibrations of the blades of the 1000 MW turbine at Temelín nuclear power plant, *Institute of Thermomechanics of the ASCR, ŠKODA POWER, s. r. o.*
- Research of the frequency-modal characteristics of an orbital bladed disc with a diameter of 1220 mm under rotation in a balancing tunnel of Škoda Power and the time-frequency characteristics of the vibration of the blades of the M5 module in the pilot instrument Campbell, *Institute of Theoretical and Applied Mechanics of the ASCR, ŠKODA POWER, s. r. o.*
- Measurement of the statistical moments of the fluctuations of speeds, pressures and temperatures of the flowing steam in an air and steam turbine and in an air aerodynamic tunnel, *Institute of Thermomechanics of the ASCR, ŠKODA POWER, s. r. o.*
- Research of the relationships between pressure fluctuations and the vibrations of 1000 MW turbine blades in the Temelín nuclear power plant at the institute with the advanced monitoring system VDS-UT, *Institute of Thermomechanics of the ASCR, ČEZ, a. s.*
- Innovation of control for a 4-level high voltage transformer, *Institute of Thermomechanics of the ASCR, ČKD ELEKTROTECHNIKA, a. s.*
- Experimental identification of the attenuation, frictional ratios and micro-movements of a frictional ring in the groove of a railway wheel hoop and creation of a computational model of the influence of the dimension parameters of the wire and groove on the contact and friction ratios with the aim to reduce vibrations and noise of railway wheels, *Institute of Thermomechanics of the ASCR, BON-ATRANS, a. s.*
- Checking calculations of tension, strength and lifetime of various pumps (high-pressure, oil and sewage water), *Institute of Thermomechanics of the ASCR, VAMET, s. r. o.*
- Method of preparation of singlet oxygen suitable as a source of energy for continual laser with power in the order of 100 kW, *Institute of Thermomechanics of the ASCR, Institute of Physics of the ASCR, LASTEC, Delhi, India*
- Measurement of shock resistance of car windscreens, *Institute of Thermomechanics of the ASCR, AGC Automotive Czech, a. s.*
- Modelling of the transport of harmful substances in the atmosphere in Jablonné nad Orlicí, *Institute of Thermomechanics of the ASCR, Association of the Municipality of Orlicko*
- Gravimetric research of the phonolite body Albert in Bili-na mine provided data for localisation of a sought volcanic body and a possibility of its practical use for the needs of the mine, *Institute of Geophysics of the ASCR, Severočeské doly, a. s.*

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- Inclination and hydrologic measurements in Jezeří gallery monitor slope stability of ČSA mine, *Institute of Geophysics of the ASCR, LUAS, a. s.*
- Overview of the seismic activity of the Czech Republic, *Institute of Geophysics of the ASCR, RWE, a. s.*
- Overview of the seismic activity of West Bohemia, *Institute of Geophysics of the ASCR, VODNÍ DÍLA-TBD, a. s.*
- Proposal of security criteria for placement of new nuclear facilities and very important sources of ionising radiation following the accident at Fukushima 2 NPP, *Institute of Geology of the ASCR, State Office for Nuclear Safety*
- Monitoring of rainfall water chemism on the territory of České Švýcarsko National Park. Overview of the important geological, palaeontological and geomorphological localities and phenomena of Brdy military area as a basis for the proposing of zoning, management plan and a proposal of small-area, specially-protected zones in the prepared protected area Brdy. *Institute of Geology of the ASCR, Nature and Landscape Conservation Agency of the Czech Republic*
- Analysis of the flow in Bílina mine and its surroundings with the aim to estimate the amount of PM10 dust that remains in the mine and that spreads into its neighbourhood, *Institute of Atmospheric Physics of the ASCR, Severočeské doly, a. s.*
- Updated estimate of the practicable potential of wind energy on the territory of the Czech Republic from 2012 perspective, *Institute of Atmospheric Physics of the ASCR, Czech Wind Energy Association, Ministry of Industry and Trade*
- Assessment of the wind circumstances of a locality based on mathematical models, *Institute of Atmospheric Physics of the ASCR, Ostwind CZ, s. r. o., HAMA Solar, s. r. o.; Halada Aleš; Chalupa Štěpán*
- Assessment of the wind circumstances of a locality based on evaluation of wind measuring, *Institute of Atmospheric Physics of the ASCR, E. E., a. s., ELDACO, a. s., Vivent česká, s. r. o.; V. E. Dožice, s. r. o., KAA-inženýři, s. r. o., RE-SEC, s. r. o.*
- Methodology of dimensioning of mine tunnel and holing reinforcement, *Institute of Geonics of the ASCR, OKD, a. s.*
- Thermal analysis of a reference proposal of a used nuclear fuel disposal site, *Institute of Geonics of the ASCR, SÚRAO*
- Experimental measurement of seismic manifestations in structures caused by mining-induced seismicity in the surroundings of Darkov mine (at two stations), *Institute of Geonics of the ASCR, OKD, a. s.*
- Working out of a unifying physical model of function and effect of individual types of reinforcements of mining works, *Institute of Geonics of the ASCR, OKD, a. s.*
- Evaluation of the quality of a mountain massif and geotechnical survey for the plan of building of underground gas storage Millasín – Bukov, *Institute of Geonics of the ASCR, DIAMO, s. p., o. z. GEAM*
- Petrographical analyses of a set of samples of decorative stone, *Institute of Geonics of the ASCR, VÚANCH, a. s.*
- Material analyses of embankment slags, *Institute of Geonics of the ASCR, Arcadis Geotechnika, a. s.*
- Monitoring of ecosystems in the interest area of uranium ore mining and treatment at Rožná deposit and in the basin of the Stream Bukovský potok in 2012, *Institute of Geonics of the ASCR, DIAMO, s. p., o. z. GEAM*
- Geomorphological research and field measurements of Ledové sluje caves using 3D underground laser scanning technology, *Institute of Geonics of the ASCR, Administration of Podyjí National Park*
- Working out of the methodology of preparation and practical verification of a process of pressing of C-composites with various orientation of reinforcement, *Institute of Rock Science and Mechanics of the ASCR, 5M, s. r. o., TTS, s. r. o.*
- Adjustment and practical measurements during dielectric analysis of the course of hardening of the binder at a continual pulling line in 5M, s.r.o. company, Kunovice with processing of data gained from measurement in 2012., *Institute of Rock Science and Mechanics of the ASCR, 5M, s. r. o.*
- Method of determination of health-harmful polycyclic aromatic hydrocarbons in ashes from biomass burning, *Institute of Rock Science and Mechanics of the ASCR, REAL ECO Technik, s. r. o., CZ Biom – Czech Association for Biomass, o. s., Czech Development Agency, o. p. s., Czech University of Life Sciences, Prague*
- Abrasive materials and tools with geopolymeric binders, *Institute of Rock Science and Mechanics of the ASCR, Czech Development Agency, o. p. s.*
- Evaluation of the transfer of knowledge of geopolymeric technologies into practice, *Institute of Rock Science and Mechanics of the ASCR, Czech Development Agency, o. p. s.*
- Assessment of the gel structure of corrosive layers of coating pipes from the zirconium alloy Zr1Nb of a fuel element of a nuclear power plant, *Institute of Rock Science and Mechanics of the ASCR, ÚJP Praha, a. s.*

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- Methodology of controlled hydration of the alloy Zr1Nb, *Institute of Rock Science and Mechanics of the ASCR, ÚJP Praha, a. s.*
- Micropetrographical and chemical evaluation of overlying sediments in Bilina and Tušimice area focusing on the content and composition of organic matter, *Institute of Rock Science and Mechanics of the ASCR, Severočeské doly, a. s.*
- Assessment of the quality of charcoal briquettes in accordance with the European standard EN 1860-2:2005, *Institute of Rock Science and Mechanics of the ASCR, TÜV NORD Czech, s. r. o.*
- Evaluation of the seismic activity in the neighbourhood of underground gas storage Příbram-Háje, *Institute of Rock Science and Mechanics of the ASCR, RWE Transgas, s. r. o.*
- Assessment of the seismic danger to Temelin and Dukovany NPPs, *Institute of Rock Science and Mechanics of the ASCR, ČEZ, a. s.*
- Development of the technology of geopolymers for copying of microscopically structured surfaces, *Institute of Rock Science and Mechanics of the ASCR, IQ Structures, s. r. o.*
- Development of fast and reproducible methods of the characterisation and identification of fungi of the Monilia type based on established analytical techniques including CZE, CIEF, gel IEF, SDS-PAGE and MALDI-TOF MS, *Institute of Analytic Chemistry of the ASCR, State Phytosanitary Administration*
- Pigment production technology based on kaolin and meta-kaolin with surface finish by oxides of transition metals, *Institute of Inorganic Chemistry of the ASCR, České lupkové závody, a. s.*
- Development of a method of preparation of photovoltaic materials based on Cu, Zn and Ag sulphides suitable for industrial use, *Institute of Inorganic Chemistry of the ASCR, Rokospol, a. s., Nanogies, s. r. o.*
- Development of a method of preparation of luminescent and photocatalytic composites based on ZnO nanoparticles suitable for industrial use, *Institute of Inorganic Chemistry of the ASCR, Synpo, a. s.*
- Microscopic characterisation of changes in electric cables as a consequence of intense radiation, *Institute of Inorganic Chemistry of the ASCR, ÚJV Řež, a. s.*
- Gasification of small wooden pellets and chips by innovative way in a facility with slowly pushed ascendant layer, *Institute of the Fundamentals of Chemical Processes of the ASCR, UJEP, D.S.K., s. r. o.*
- Proposal of waste decontamination technology by combination of thermic desorption and catalytic burning, *Institute of the Fundamentals of Chemical Processes of the ASCR, Dekonta, a. s.*
- Proposal of chemical barriers for decontamination of strongly polluted subsurface waters, *Institute of the Fundamentals of Chemical Processes of the ASCR, Dekonta, a. s.*
- Research and development of pilot-production microreactors, *Institute of the Fundamentals of Chemical Processes of the ASCR, Procter & Gamble*
- Optimisation of the texture of dentures, *Institute of the Fundamentals of Chemical Processes of the ASCR, LASAK s. r. o.*
- Development of a methodology of measurement of the efficiency of new types of nanofilters against nanoparticles and measurement of the efficiency of filters against nanoparticles, *Institute of the Fundamentals of Chemical Processes of the ASCR, SPUR, a. s.*
- Determination of nanoparticle penetration through personal protective means, *Institute of the Fundamentals of Chemical Processes of the ASCR, National Institute for Nuclear, Chemical and Biological Protection, v. v. i.*
- Development of a contactless and non-destructive method for identification of explosives, *J. Heyrovský Institute of Physical Chemistry of the ASCR, Explosia, a. s.*
- Prototype of a new 3D Li battery containing optimised nanomaterials, *J. Heyrovský Institute of Physical Chemistry of the ASCR, HE3DA, s. r. o.*
- Measuring and assessment of reflection and transmission UV-vis-NIR spectra of thin layers of substrates for the construction of new types of photovoltaic cells, *J. Heyrovský Institute of Physical Chemistry of the ASCR, NANOGIES s. r. o.*
- Electrochemical sensor of NO₂ gas prepared by means of serigraphy for the construction of an alarm system monitoring the quality of the atmosphere, *Institute of Macromolecular Chemistry of the ASCR, Centre for Organic Chemistry Ltd.*
- Development of a procedure of determination of full crystal structure of pharmaceutically active compounds, *Institute of Macromolecular Chemistry of the ASCR, TEVA Pharmaceuticals, s. r. o.*
- Development of synthetic vaccines – proposal of the structure and synthesis of polymeric conjugates on the basis of HPMA copolymers containing Pam2Cys and Pam3Cys lipopeptides stimulating specific immunity response

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- of the organism against protein haptens, *Institute of Macromolecular Chemistry of the ASCR, PsiOxus Therapeutics Ltd., Great Britain*
- Development of highly resistant car paints with very low content of organic volatile substances hardened under normal temperature, *Institute of Macromolecular Chemistry of the ASCR, SYNPO, a. s., for DuPont, U.S.*
- Development of a testing method of accelerated ageing of polyurethane materials in an environment simulating waste waters, *Institute of Macromolecular Chemistry of the ASCR, Vodní energie, s. r. o.*
- Research into degradation of cable polymer materials and development of methods for testing their qualification in the conditions of a severe accident of nuclear power plants of the new generation, *Institute of Macromolecular Chemistry of the ASCR, ÚJV Řež, a. s. (Nuclear Physics Institute)*
- Development of antibacterial preparations as a tool of protection of the population against bioterrorism, *Institute of Organic Chemistry and Biochemistry of the ASCR, Central Military Health Institute, Prague, Ministry of Defence*
- Testing of immunomodulating effects of the hyaluronic acid and other polysaccharides, *Institute of Biophysics of the ASCR, CPN Dolní Dobrouč, spol. s r. o.*
- Development of new materials for the construction of replacements of big joints on the basis of alloys of titanium, niobium and tantalum, *Institute of Physiology of the ASCR, Beznoska, s. r. o., Faculty of Mathematics and Physics of Charles University*
- Development of nanostructured covers of bone implants and other orthopaedic aids above all on the basis of TiO₂ in pineapple form, *Institute of Physiology of the ASCR, Prospan, s. r. o., Mikropur, s. r. o., Faculty of Mathematics and Physics of Charles University, Faculty of Mechanical Engineering of Czech Technical University in Prague*
- Software for analysis of microscopic image, *Institute of Physiology of the ASCR, Institute of Microbiology of the ASCR, DEL, a. s.*
- Development of a nanoparticle set for a photodynamic therapy of tumours, *Institute of Physiology of the ASCR, Nanotrade, s. r. o.*
- Development of a medicine based on photodynamic therapy, *Institute of Physiology of the ASCR, Wake s. r. o.*
- Determination of the efficiency of bacterial and virus vaccines, above all those used in mandatory vaccination of children, *Institute of Physiology of the ASCR, Sevapharma, a. s.*
- Testing of potential cytotoxicity of material obtained by abrasion tests of metal joint implants of the thumb, *Institute of Physiology of the ASCR, Beznoska s. r. o.*
- Methodology of the evaluation of environmental samples (groundwater, surface water, soil and sediments) from the viewpoint of diffusion pollution, *Institute of Microbiology of the ASCR, AECOM CZ, s. r. o.*
- Development of a biorefinery for the processing of waste containing chitin, *Institute of Microbiology of the ASCR, Apronex spol. s r. o.*
- Production, scale-up and DSP of extracellular recombinant lipases and beta-lactamases for pharmaceutical purposes, *Institute of Microbiology of the ASCR, Eucodis BioScience GmbH, Vienna, Austria*
- Development of a technology and production of the auxiliary bacterial preparation PROMETHEUS® for the treatment of the oilseed rape Brassica napus, winter and spring forms, *Institute of Microbiology of the ASCR, Monas Technology*
- Cultivation of aerobic and anaerobic microorganisms as immunostimulants, scale-up technologies, use as food supplements, *Institute of Microbiology of the ASCR, Pharmaceutical Biotechnology spol. s r. o.*
- Study of the biodegradation of biodegradable plastics, *Institute of Experimental Botany of the ASCR, Eko-kom, a. s.*
- Pilot system of waste water decontamination, *Institute of Experimental Botany of the ASCR, Dekonta, a. s., Chrámce farm*
- Development of nanofibre materials with targeted releasing designated for skin covers, *Institute of Experimental Medicine of the ASCR, Institute of Macromolecular Chemistry of the ASCR, Institute of Molecular Genetics of the ASCR, Elmarco, s. r. o.*
- Comparison of the biological activities of recombinant and synthetic teriparatide in tissue cultures of bone marrow cells, *Institute of Molecular Genetics of the ASCR, ZENTIVA, a. s.*
- Working out of biomedical models on miniature pigs for testing of new medical procedures of traumatic damage to the spinal cord and neurodegenerative diseases, *Institute of Animal Physiology and Genetics of the ASCR, BioTest, s. r. o.*
- Determination of the representation of basic lymphocyte subpopulations in peripheral blood of oncologic patients who use the Ovosan food supplement, *Institute of Animal Physiology and Genetics of the ASCR, Areko, s. r. o.*

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- Testing of genetic analyses of breeds, lines and species of fish for a gene source programme and for fulfilment of the pertinent provisions of the law on breeding, *Institute of Animal Physiology and Genetics of the ASCR*, Rybníkářství Pohořelice, a. s., Rybníkářství Nové Hradky, s. r. o., Rybníkářství Třeboň, a. s., KINSKÝ Žďár, a. s., Faculty of Fisheries and Protection of Water of University of South Bohemia
- Proposal of a method of transfer of a preparation between fluorescent or confocal microscope and SEM and its drying during the transfer without loss of orientation on the sample for the purposes of correlation microscopy, *Biology Centre of the ASCR, Institute of Scientific Instruments of the ASCR, Institute of Macromolecular Chemistry of the ASCR, Institute of Molecular Genetics of the ASCR*, FEI Czech Rep. s. r. o., Delong Instruments a. s., CRYTUR, spol. s r. o., Research and Testing Institute Pilsen, s. r. o.
- Development of a vaccine against pathogen transfer by ticks, *Biology Centre of the ASCR*, Bioveta, a. s.
- Verification of the possibility of use of various types of substrates as a repository of egg strips of European perch with the aim of strengthening its population, *Biology Centre of the ASCR*, Palivový kombinát Ústí nad Labem, s. p.
- Microbiological monitoring of three selected karst caverns in the regions of Velká Fatra (Harmanecká jaskyňa), Považský Inovec (Modrovská jaskyňa) and Strážovské vrchy (Pružinská Dúpna jaskyňa), *Biology Centre of the ASCR*, State Conservation of Nature of the Slovak Republic, Slovak Caves Administration, Liptovský Mikuláš, Slovakia
- Study of the influence of various types of woody plants on the renewal of soils and other extra-production services of ecosystems restored at mine disposal sites after coal mining, *Biology Centre of the ASCR*, ENKI, o. p. s.
- Methodology of the determination of OH radicals and methods of oestrogen detection in waste and surface waters. Another key result is the complex ecotoxicology testing of zero-valent nano-iron and tests of 4 to 6-valent iron, *Institute of Botany of the ASCR*, ASIO, spol. s r. o., Faculty of Science of Palacký University, RAWAT consulting spol. s r. o.
- Certified methodology – base for the use of agropreparations with effects similar to the effect of phytohormones from the group of strigolactones in the growing of wheat, barley, maize, rape and poppy, *Institute of Botany of the ASCR*, Symbio-m, spol. s r. o., Research Institute of Organic Syntheses, a. s.
- Participation in the proposal of the final construction solution of the microclimatic station TMS2 and testing of prototypes in real conditions; long-term measurement of microclimate at a large number of stations of the previous series (TMS1) as the basis for the development of hardware and firmware of the new version, *Institute of Botany of the ASCR*, TOMST, spol. s r. o., Czech Technical University in Prague
- Maintenance of cultures of vanished or critically threatened species of plants established in the past four years in Třeboňsko protected area, their reproduction and repatriation to suitable and registered biotopes, *Institute of Botany of the ASCR*, Nature and Landscape Conservation Agency of the Czech Republic, Třeboňsko protected area
- Functional sample – portable device for measurement of vegetation reflectivity, *Global Change Research Centre of the ASCR*, Agrotest fyto, s. r. o., GRYF HB, spol. s r. o.
- Model of prediction of electricity production from wind farms based on numeric weather forecast; model of prediction of electricity production from solar power plants based on numeric weather forecast. Set of professional maps with prospective monthly and yearly totals of incident solar energy in the area of the distribution system, system of combined operating prediction of electricity production from renewable (atmospheric) sources, expert study of the efficiency and predictability of wind and solar power plants with the framework of the distribution system, *Global Change Research Centre of the ASCR*, EO.N ENERGIE, a. s.
- Collection of material and preparation of data for the implementation of the EU Framework Directive on Waters for fish component, *Institute of Vertebrate Biology of the ASCR*, Povodí Odry, s. p.
- Evaluation of the consequences of the release of Ondrášov mineral waters on Hanácké Bystřice biota, *Institute of Vertebrate Biology of the ASCR*, AQUA Enviro, s. r. o.
- Creation of a Macroeconomic Prognostic System (FPAS) for a Greater Number of Developing Countries in Africa, *Economics Institute of the ASCR*, TCX Management Company
- Migration and Its Consequences in Ukraine, *Economics Institute of the ASCR*, European Bank for Reconstruction and Development
- Influence of the Public Support of Research and Development on Private Investments in R&D, *Economics Institute of the ASCR*, Office of the Government of the Czech Republic

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- Opportunities Resulting for the Czech Republic from the People's Republic of China's Initiative Towards SVE Countries, *Economics Institute of the ASCR*, Ministry of Foreign Affairs
- Economic Impact of Greece's Exit from the Euro Area on the Czech Republic, *Economics Institute of the ASCR*, Ministry of Foreign Affairs
- Analysis of Gender Impacts of Pension Reforms in the Czech Republic, *Economics Institute of the ASCR*, Gender Studies, o. p. s.
- Regulatory Impact Assessment (RIA) of a Proposal of a Law on the Real Property Acquisition Tax, *Economics Institute of the ASCR*, Ministry of Finance
- Analysis of the Impacts of Recession on the Czech Republic's Regional Economy on the Level of a Selected Region (South Moravia). Analysis of the Impact of Selected Proposals of Changes in Value Added Tax on the Budget of a Selected Region (Zlín), *Economics Institute of the ASCR*, Český Institut Aplikované Ekonomie, s. r. o.
- Analysis of the Pension Reform in the Czech Republic, *Economics Institute of the ASCR*, ČSOB Penzijní fond Stabilita, a. s.
- ESeC Construction and ESeG Prototypes, *Institute of Sociology of the ASCR*, Czech Statistical Office
- Special Survey of the Attitude of the Inhabitants of Seven Localities Considered for the Establishment of Underground Nuclear Waste Repository, *Institute of Sociology of the ASCR*, Radioactive Waste Repository Authority
- Approximate Estimate of Social Housing for Prague 2 Municipal Part until 2050, *Institute of Sociology of the ASCR*, Prague 2 municipal part
- Survey of People's Attitude to the Office of the President of the Czech Republic, *Institute of Sociology of the ASCR*, Czech TV
- Audit of the Methodology of Radio Listener Rating in Slovakia and a Check of the Implementation of Research Carried Out in 2011 and 2012, *Institute of Sociology of the ASCR*, Median, s. r. o.
- METRIS II. Overview of the Latest Development in Social Sciences and Humanities in the Czech Republic, Including Information on the Management, Organisation and Financing of Research, Main Directions of Research, Chief Institutional Actors and Their Scientific and Pedagogical Activity, *Institute of Sociology of the ASCR*, ERAWATCH NETWORK, Belgium
- Cooperation in the Evaluation of the Government Policy Conception for the Sphere of Children and Youth in the Time Period of 2007-2013, *Institute of Sociology of the ASCR*, Ministry of Education, Youth and Sports
- Human Resources Operational Programme – Measurement of Efficiency, *Institute of Sociology of the ASCR*, Navreme Boheme, s. r. o., Člověk v tísni, o. p. s.
- Radio Frequency Allotment. Legal Interpretation of Article 23 of Act No. 127/2005 on Electronic Communications Before Its Amendment – Act No. 153/2010 – Took Effect as of 1 July 2010, *Institute of State and Law of the ASCR*, České Radiokomunikace, a. s.
- Standpoint of the Institute of State and Law of the ASCR, v. v. i. on the Compatibility of Article 18 and Act No. 218/2000 as amended by Act No. 171/2012 with EU Law and on the Ways of Bridging Prospective Incompatibility, *Institute of State and Law of the ASCR*, Office for Personal Data Protection
- Interpretation of the Legal Regulations of Financing of the Capital City of Prague – Public Commissions, *Institute of State and Law of the ASCR*, Capital City of Prague, Municipal Authority of the Capital City of Prague
- Legal Standpoint on the Issue of Whether or Not a Public Commission Can Be Awarded in Negotiation Proceedings without Publication according to Article 23, Paragraph 4, Item d) of the Public Procurement Act for the Purposes of Procurement of Evidence in Arbitration Proceedings, *Institute of State and Law of the ASCR*, Road and Motorway Directorate
- Revision Research of Great Moravian Sacral Objects in Mikulčice within EU Project 'Archaeological Park Mikulčice-Kopčany', *Institute of Archaeology of the ASCR*, Brno, Masaryk Museum in Hodonín
- Salvage Archaeological Research on the Cadastral Area of the Municipality of Novosedly, *Institute of Archaeology of the ASCR*, Brno, Land Fund of the Czech Republic
- Workshop 'Roman Holocaust – Why Have We Forgotten?', *Institute of History of the ASCR*, Chamber of Deputies of the Parliament of the Czech Republic
- Analyses 'Anti-Semitism in the Czechoslovak Army in 1939-1945', *Institute of History of the ASCR*, Jewish Museum in Prague – Judaica Bohemica
- Pelhřimovy (Today's Slezské Rudoltice, Municipal Part Pelhřimovy), Bruntál District, St George's Church, Monument Reg. No. 8-174/1, Assessment of the Origin of a Vanished Brick Section of Sacristy Masonry, *Institute of Art History of the ASCR*, National Heritage Institute, ú.o.p. Ostrava

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- Opinion on the Reconstruction and Extension of House No. 40, Leoše Janáčka Street, Písek, *Institute of Art History of the ASCR*, Municipal Authority of Písek
- Catalogue of Conservationally Valuable Elements and Details of Colloredo-Mansfeld Palace for a Planned Reconstruction of the Palace, *Institute of Art History of the ASCR*, Gallery of the Capital City of Prague
- Preparation of the Permanent Exposition 'Crime and Punishment 1938–1947' for Panenské Břežany Museum (Completion in 2013), *Institute for Contemporary History of the ASCR*, Central Bohemia Regional Authority
- Report on National Minorities and Education in Kralicko Region, *Institute for Contemporary History of the ASCR*, Association of the Municipality of Orlicko
- Preparation of Music Sources, Accompanying Text and Cooperation in the Realisation of Three CD Recordings within the Project Music from the Eighteenth Century Prague, Issued in 2012 (Jan Dismas Zelenka: Melodrama di Sancto Wenceslao – Sub olea pacis et palma virtutis conspicua orbi regia Bohemiae corona (ZWV 175), SU 4113-2; Jan Dismas Zelenka: Missa Nativitatis Domini (ZWV 8), Magnificat in C (ZWV 107), O magnum mysterium. Motet-to pro Nativitate (ZWV 171), Praise the Strong Lord (ZWV 165), SU 4111-2; Musici da camera (Caldara, Fasch, Jiránek, Orschler, Reichenauer, Postel, Tůma, Vivaldi), SU 4112-2, *Institute of Ethnology of the ASCR*, Supraphon, a. s.
- Analysis of the State Integration Programme for Asylum Seekers, *Institute of Ethnology of the ASCR*, European Union, Ministry of Interior
- Course Efficiency in Written Communication for the Employees of Vodafone Czech Republic a. s., *Institute of the Czech Language of the ASCR*, OTTIMA, a. s.
- Course Communication Skills: E-Mail Written Communication for the Employees of SODEXO, s. r. o., *Institute of the Czech Language of the ASCR*, OTTIMA, a. s.
- Czech for Foreigners – Courses of Practical Language, *Institute of the Czech Language of the ASCR*, AZZI, s. r. o., Faculty of Humanities of Charles University in Prague

APPENDIX 04

Appendix 04.1

Overview of the Activities of International Scientific Cooperation of the Workplaces of the ASCR

1. Number of conferences with the participation of foreign scientists (workplace as organiser or co-organiser)
2. Number of foreign visits by scientific employees of the institute
- 2a. of which excepting bilateral agreements
3. Number of active participations of employees of the institute at international conferences
- 3a. Number of lectures given at these conferences
- 3b. of which invited lectures
- 3c. Number of poster presentations
4. Number of lectures at foreign universities
5. Number of memberships in editorial boards of international journals
6. Number of memberships in bodies of international scientific governmental and non-governmental organisations (societies, committees)
7. Number of lectures by foreign guests at the institute
8. Number of grants and projects financed from abroad
- 8a. of which from EU programmes

	1	2	2a	3	3a	3b	3c	4	5	6	7	8	8a
I. Area of Mathematics, Physics and Earth Sciences													
1 st Section	53	2,828	2,437	1 092	761	241	322	46	174	100	235	63	38
2 nd Section	28	893	807	628	474	76	226	14	53	110	91	26	20
3 rd Section	19	618	534	430	271	43	216	8	66	56	28	23	18
TOTAL	100	4,339	3,778	2,150	1,506	360	764	68	293	266	354	112	76
II. Area of Life Sciences and Chemical Sciences													
4 th Section	26	1,299	1,072	1 024	414	105	639	16	88	92	83	43	30
5 th Section	31	1,395	866	1 091	435	196	721	68	197	136	242	60	53
6 th Section	29	879	826	572	304	60	326	14	129	54	55	47	29
TOTAL	86	3,573	2,764	2,687	1,153	361	1,686	98	414	282	380	150	112
III. Area of the Humanities and Social Sciences													
7 th Section	26	329	322	265	214	45	29	19	42	58	64	17	12
8 th Section	39	285	182	226	208	110	19	12	38	62	28	20	6
9 th Section	39	420	327	369	354	162	3	12	137	78	83	12	8
TOTAL	104	1,034	831	860	776	317	51	43	217	198	175	49	26
ASCR TOTAL	290	8,946	7,373	5,697	3,435	1,038	2,501	209	924	746	909	311	214

APPENDIX 04

Appendix 04.2

Selected International Projects Resolved by the Workplaces of the ASCR

Projects of the 6th and 7th Framework Programme of the European Commission

Eurosphere

- coordinator and researcher: University of Bergen, Norway
- co-researchers: *Institute of Psychology* and another 15 co-researchers from the countries of Europe

Actinide Separation by Partitioning and Transmutation (ASCEPT)

- coordinator: Commissariat à l'Énergie Atomique (CEA), France
- co-researchers: *Institute of Analytic Chemistry* and another 36 co-researchers from 12 countries

Genomics for Triticeae Improvement

- coordinator: INRA
- co-researchers: *Institute of Experimental Botany* and 17 other co-researchers from 8 states of the world

Integrated Carbon Observation System

- coordinator: Commissariat à l'Énergie Atomique (CEA), France
- co-researchers: *Global Change Research Centre* and 16 other co-researchers from 10 countries

Regime and Society in Eastern Europe (1956–1989). From Extended Reproduction to Social and Political Change

- coordinator: Sophia University St. Kliment Ohridski, Bulgaria
- co-researchers: *Institute for Contemporary History* and another five co-researchers

AXREGEN – Axonal regeneration, plasticity and stem cells

- coordinator/researcher: University of Cambridge, Great Britain
- co-researchers: *Institute of Experimental Medicine* and 12 other co-researchers from nine European states

Projects of the European Commission within the Research Fund for Coal and Steel

Improvement of coal carbonization through the optimization of fuel in coking coal blends

- coordinator: University of Silesia in Katowice, Poland
- co-researchers: *Institute of Geonics* and another co-researchers from two European states

Cooperation within the COST Network (Cooperation in Science and Technology) of the European Commission

Rich-Model Toolkit – an Infrastructure for Reliable Computer Systems

- coordinator: IMDEA Software Facultad de Informatica (UPM), Spain
- co-researchers: *Institute of Computer Science* and 40 institutions from 15 European states

European Systems Genetics Network for the Study of Complex Genetic Human Diseases using Mouse Genetic Reference Population (SYSGENET)

- coordinator: Centre for Infection Research (Germany)
- co-researchers: *Institute of Molecular Genetics* and 20 other co-researchers from 10 European states

Transport of cations and protons across cell membranes – molecular structure and the mechanism of activity of Na⁺/H⁺ antiporter of lower eukaryotes

- coordinator: *Institute of Physiology*
- co-researchers: 20 European countries

Cooperation on Experiments in Large International Laboratories

Umbrella organisation: CERN – the European Organization for Nuclear Research

- Project: **ALICE**
- coordinator/researcher: CERN, Switzerland
 - co-researchers: *Nuclear Physics Institute* and another 93 institutions from 28 countries

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Umbrella organisation: CERN – the European Organization for Nuclear Research

- Project: **ATLAS**
- coordinator/researcher: CERN, Switzerland
 - co-researchers: *Institute of Physics* and another 170 institutions from 50 countries

Umbrella organisation: ESA – the European Space Agency

- Program: PECS – Plan for European Cooperating States
- Project: **Black holes in active galactic nuclei and in our galaxy in observations using the XMM-Newton satellite**
- coordinator/researcher: *Astronomical Institute*
 - co-researchers: Spain, Italy, France

ESO – the European Organisation for Astronomical Research

- Project centre: **ESO-ALMA**
- coordinator: *Astronomical Institute*
 - co-researchers: five European states associated in ESO

Umbrella organisation: ESS AB – the European Spallation Source

- Project: **ESS – contribution to partnership in large research infrastructure of pan-European importance**
- coordinator: *Nuclear Physics Institute*
 - co-researchers: institutions from 17 European states

Umbrella organisation: ESRF – the European Synchrotron Radiation Facility

- Project: **Origin of jumping in frogs**
- coordinator: *Institute of Geology*, University of Poitiers, France
 - co-researcher: partner institution from Belgium

Cooperation within the Programme of Internal International Cooperation of the ASCR

Literature and Knowledge

- coordinator and researcher: *Institute of Slavonic Studies*
- other co-researchers from the CR, Sweden and Germany

Other Cooperation

SCOSTEP Programme – Towards a more complete assessment of the impact of solar variability on Earth's climate

- coordinator: University of Orléans, France
- co-researchers: *Institute of Atmospheric Physics* and another 22 institutions from 16 countries

Institutional Bilateral Agreement

- Medicinal chemistry, development of new medicines**
- cooperating institutions: *Institute of Organic Chemistry and Biochemistry* and Gilead Sciences, Inc., USA

An investigation and comparison of fluorescent activity among three classes of bats: naive, presumed survivors and European

- umbrella organisation: NSS/USA
- coordinator: *Institute of Vertebrate Biology*
- co-researchers: two institutions from the USA

Genomic, transcriptomic and proteomic view of photosynthetic algae, an evolutionary missing link to the human malaria parasite

- coordinator: King Abdullah University of Science and Technology (KAUST), Saudi Arabia
- co-researchers: *Biology Centre* and one foreign partner

Functionalisation of plasmonic nanostructures for biosensing

- umbrella organisation: Office of Naval Research (ONR), USA
- researcher: *Institute of Photonics and Electronics*

Stationarity and regularity in variational analysis with application to optimization programme

- coordinator: *Institute of Information Theory and Automation*, University of Ballarat, Australia
- co-researchers: workplaces from two European states

SCIEX 11.152, Transport phenomena in continuum fluid dynamics programme

- coordinator: University of Zürich, Switzerland
- co-researcher: *Institute of Mathematics*

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Cradles of European Culture – the Francia Media Project

- umbrella programme: Culture Programme
- coordinator and researcher: Ename expertise centrum; ZVKDS Ljubljana, Slovenia
- co-researchers: *Institute of Archaeology of the ASCR Prague* and another 8 institutions from 8 European countries

Monitoring of Psychophysiological State and Mental Capabilities

- umbrella organisation: Russian Federal Space Agency, Russia
- coordinator and researcher: Institute for Biomedical Problems RFSA, Russia
- co-researcher: *Institute of Psychology* and another 22 co-researchers

Linguistic Atlas of Europe

- umbrella organisation: UNESCO
- coordinator and researcher: The Romanian Academy, Romania
- co-researcher: *Institute of the Czech Language* and another cca. 60 co-researchers from European countries

Metamorphoses of Law in the Visegrad Countries

- umbrella programme: Visegrad Fund
- coordinator: *Institute of State and Law*
- co-researchers: three other institutions from V4 countries

Analytic Theology Cluster Initiative – Trinity and the Divine Attributes

- umbrella organisation: John Templeton Foundation, Great Britain
- coordinator and researcher: *Institute of Philosophy*
- co-researchers: another 8 co-researchers from six countries of the world

Corpus of Roman Findings on the Territory of Moravia

- umbrella organisation: Roman-German Commission Frankfurt a. M., Germany
- coordinator: Roman-German Commission Frankfurt a. M., Germany
- co-researchers: *Institute of Archaeology Brno* and another 20 co-researchers from European countries

Creation of the Czech Node of the pan-European Project of the Large Research Infrastructure European Social Survey (ESS – survey)

- umbrella organisation: Centre for Comparative Social Surveys, City University, London, Great Britain
- coordinator: Centre for Comparative Social Surveys, City University, London, Great Britain
- co-researchers: *Institute of Sociology* and another 34 co-researchers

Etnofolk

- financed from the structural funds, OP Supranational Cooperation Central Europe
- coordinator: *Institute of Ethnology*
- researchers: another five institutes from Slovakia, Austria, Slovenia and Hungary

Historical Town's Atlas of the Czech Republic

- umbrella organisation and coordinator: International Commission for the History of Towns
- researchers: *Institute of History* and further institutions from 14 European countries

APPENDIX 05

Appendix 05

Overview of the Significant Conferences with International Participation Organised by Workplaces of the ASCR

The employees of the institutes of the ASCR actively participate in international scientific meetings abroad and also themselves organise a number of international scientific congresses and conferences in the CR. These activities assist in spreading scientific cooperation, increasing the prestige of Czech science on an international scale, make it possible to establish new scientific contacts and the engagement of the Czech scientific community into the European Research Area. These gatherings are also a significant occasion for the presentation of new results of scientific research and the exchange of opinions. The overview shown below contains examples of significant scientific events with international participation which the workplaces of the ASCR organised or in whose organisation they took part in 2012.

I. Area of Mathematics, Physics and Earth Sciences

15th International Conference on Non-Contact Atomic Force Microscopy, Český Krumlov

- main organiser: *Institute of Physics*; number of participants 153, of whom 140 foreign

Summer School of Evolutionary Equations, EVEQ 2012, Prague

- main organiser: *Institute of Mathematics*; number of participants 60, of whom 40 foreign

Auger Analysis Meeting, Prague

- main organiser: *Institute of Physics*; number of participants 181, of whom 160 foreign

ARTEMIS Brokerage Event Call 2012

- co-organiser: *Institute of Information Theory and Automation*; number of participants 259, of whom 221 foreign

12th Astrophysical Colloquium Hvar

- co-organiser: *Astronomical Institute*; number of participants 91, of whom 78 foreign

XII. GAMM Workshop Applied and Numerical Linear Algebra

- main organiser: *Institute of Computer Science*; number of participants 64, of whom 37 foreign

Engineering Mechanics 2012 – 18th International Conference

- main organiser: *Institute of Theoretical and Applied Mechanics*; number of participants 223, of whom 31 foreign

New trends in Low-Energy QCD in the Strangeness Sector: Experimental and Theoretical Aspects (ECT* workshop)

- co-organiser: *Nuclear Physics Institute*; number of participants 40, of whom 38 foreign

Cellular Fields 2012

- co-organiser: *Institute of Photonics and Electronics*; number of participants 60, of whom 45 foreign

International Travelling School of Microwaves and Lightwaves

- main organiser: *Institute of Scientific Instruments*; number of participants 62, of whom 51 foreign

EUROMECH Colloquium 540 – Modern Methods of Modeling the Expansion of Waves in Solid Materials

- main organiser: *Institute of Thermomechanics*; number of participants 67, of whom 51 foreign

13th Conference on Paleomagnetism, Rock Magnetism and Environmental Magnetism

- co-organiser: *Institute of Geophysics*; number of participants 55, of whom 50 foreign

SPOMECH Workshop 2012 on Supercomputing and Computational Solid and Fluid Mechanics

- co-organiser: *Institute of Geonics*; number of participants 50, of whom 10 foreign

Geopolymer Camp

- co-organiser: *Institute of Rock Science and Mechanics*; number of participants 82, of whom 76 foreign

II. Area of Life and Chemical Sciences

4th EuCheMS Chemistry Congress

■ main organiser: Czech Chemical Society, co-organiser *Institute of Organic Chemistry and Biochemistry*; number of participants 1,771, of whom 1,500 foreign. Significant presentation: *Jean-Marie Lehn*, Nobel Prize laureate

63rd Annual Meeting of the International Society of Electrochemistry (ISE)

■ main organiser: ISE in cooperation with the *J. Heyrovský Institute of Physical Chemistry*, number of participants 1,704, of whom 1,643 foreign

20th International Congress of Chemical and Process Engineering CHISA 2012

■ main organiser: Czech Society for Chemical Engineering and the *Institute of the Fundamentals of Chemical Processes*, number of participants 1,200, of whom 800 foreign

Zoological Days Olomouc 2012

■ organiseré: *Institute of Vertebrate Biology* and Faculty of Science Palacký University Olomouc, number of participants 457, of whom 64 foreign

8th European Conference on Ecological Restoration

■ main organiser: Faculty of Science, University of South Bohemia České Budějovice, co-organiser *Institute of Botany*, number of participants 328, of whom 240 foreign

7th International Conference on Nanostructured Polymers and Nanocomposites

■ main organiser: *Institute of Macromolecular Chemistry*, number of participants 280, of whom 242 foreign

International Conference on Polyploidy, Hybridization, and Biodiversity

■ main organiser: *Institute of Botany*, number of participants 217, of whom 143 foreign.

10th International Conference Solid State Chemistry

■ main organiser: University of Pardubice, Faculty of Chemical Technology, co-organiser: *Institute of Inorganic Chemistry*, number of participants 200, of whom 120 foreign

9th International Interdisciplinary Meeting on Bioanalysis – CECE 2012

■ main organiser: *Institute of Analytic Chemistry*, number of participants 160, of whom 36 foreign

45th Heyrovsky Discussion: Electrochemistry of Biopolymers and Bioactive Compounds

■ main organiser: *Institute of Biophysics*, number of participants 99, of whom 40 foreign

III. Area of the Humanities and Social Sciences

Scientific Cosmopolitanism and Local Cultures: Religions, Ideologies, Societies. 5th International Conference of the European Society for the History of Sciences

■ co-organiser: *Institute for Contemporary History*; 450 participants, of whom 430 foreign

The XVth International Conference of Historical Geographers

■ one of the main organisers: *Institute of History*; 329 participants, of whom 280 foreign

Theory and Method in the Prehistoric Archaeology of the Central Europe

■ one of the main organisers: *Institute of Archaeology Praha*; 200 participants, of whom 150 foreign

INFORUM

co-organiser: *Library of the ASCR*; 500 participants, of whom 100 foreign

20th Conference Philosophy and Social Science

■ organiser: *Centre of Global Studies of the Institute of Philosophy*; 165 participants, of whom 98 foreign

The Cities and Societies in the Comparative Perspective, XIth Conference of European Association for Urban History

■ one of the main organisers: *Institute of History*; 700 participants, of whom 50 foreign

Student Germanistic Conference

■ organiser: *Institute for Czech Literature*; 100 participants, of whom 40 foreign

ESEI Market Design Conference

■ organiser: *Economics Institute*; 41 participants, of whom 34 foreign

Metamorphoses of Law in the Visegrad countries. Quo vadis central Europe?

■ organiser: *Institute of State and Law*; 65 participants, of whom 30 foreign

Ageing in Central Europe

■ organiser: *Institute of Sociology*; 98 participants, of whom 28 foreign

44th Annual International Conference on Medieval Archaeology. Material Culture of the Bohemian Lands from the 10th to the 13th Century in the Context of Central Europe

■ organiser: *Institute of Archaeology Brno*; 105 participants, of whom 23 foreign

4th International Conference Grammar and Corpus 2012

■ organiser: *Institute of the Czech Language*; 110 participants, of whom 22 foreign

Hans von Aachen in Context

■ organiser: *Institute of Art History*; 30 participants, of whom 21 foreign

International Conference Diversity and Local Contexts: Urban Space, Borders and Migration

■ organiser: *Institute of Ethnology*; 30 participants, of whom 20 foreign

International Conference T. G. Masaryk and Slavs

■ organiser: *Masaryk Institute and Archive of the ASCR*; 25 participants, of whom 14 foreign

APPENDIX 06

Appendix 06

Overview of the Most Important Activities of Cooperation with Higher Education Institutions

1.	Number of PhD. graduates supervised at the workplaces
2.	Newly accepted PhD. students
3.	MS/MA students supervised at the workplaces
4.	Not-yet graduated students at workplaces sharing in scientific activities
5.	Number of hours lectured by employees of the ASCR at HEIs, 5a – Spring Semester, 5b – Fall Semester
6.	Number of cycles of semester lectures, seminars and exercises led by employees of the ASCR at HEIs, 6a – Spring Semester, 6b – Fall Semester

Workplace of the ASCR	1.	2.	3.	4.	5a	5b	6a	6b
1st SA								
1 ASÚ	1	6	14	17	257	184	15	15
1 FZÚ	21	24	24	25	929	1,689	87	116
1 MÚ	3	1	17	0	1,064	1,147	49	43
1 ÚI	0	8	24	2	847	1,155	30	49
1 ÚJF	7	5	14	15	585	615	18	26
1 ÚTIA	4	8	25	16	1,164	1,092	52	48
	36	52	118	75	4,846	5,882	251	297
2 ÚFE	1	4	6	8	190	116	5	3
2 ÚFM	6	8	13	12	249	352	12	11
2 ÚFP	6	19	26	14	374	337	65	37
2 ÚPT	1	9	14	12	95	47	17	14
2 ÚH	2	1	4	0	138	54	6	2
2 ÚTAM	0	3	5	2	280	477	26	28
2 ÚT	6	8	6	10	1,080	1,079	33	33
	22	52	74	58	2,406	2,462	164	128
3 GFÚ	0	1	5	6	69	146	2	8
3 GLÚ	4	1	9	2	320	578	17	26
3 ÚFA	3	3	10	12	240	313	14	15
3 ÚGN	4	2	1	2	266	382	25	28
3 ÚSMH	2	1	4	7	78	233	3	12
	13	8	29	29	973	1,652	61	89

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Workplace of the ASCR	1.	2.	3.	4.	5a	5b	6a	6b
2nd SA								
4 ÚIACH	3	0	10	0	40	20	2	2
4 ÚACH	4	3	6	10	108	178	3	6
4 ÚCHP	6	9	9	24	574	627	24	33
4 ÚFCH J.H.	10	11	17	11	306	905	14	42
4 ÚMCH	5	11	14	6	259	297	6	8
4 ÚOCHB	11	27	62	27	544	516	18	36
	39	61	118	78	1,831	2,543	67	127
5 BFÚ	15	20	45	33	599	717	40	41
5 BTÚ	0	4	10	10	51	196	2	6
5 FGÚ	6	10	43	22	818	914	24	26
5 MBÚ	27	17	61	68	454	780	20	32
5 ÚEB	10	9	21	30	968	1,161	35	40
5 ÚEM	7	14	17	17	203	267	20	17
5 ÚMG	12	15	35	31	246	209	25	24
5 ÚŽFG	9	9	22	25	446	484	34	22
	86	98	254	236	3,785	4,728	200	208
6 BC	17	26	96	71	1,787	2,345	75	105
6 BÚ	4	3	62	21	490	406	12	16
6 ÚBO	3	7	81	81	576	526	54	48
6 CVGZ	6	11	14	10	600	1,000	3	5
	30	47	253	183	3,453	4,277	144	174
3rd SA								
7 KNAV	0	0	1	1	0	32	0	7
7 NHÚ	10	39	5	0	1,584	1,492	15	31
7 PSÚ	2	6	51	5	720	540	30	23
7 SOÚ	6	1	90	37	1,353	1,220	50	45
7 ÚSP	1	1	0	0	1,117	1,325	53	186
	19	47	147	43	4,774	4,609	148	292
8 ARÚB	4	1	5	12	450	354	21	19
8 ARÚ	2	3	4	6	1,024	1,284	40	50
8 HÚ	0	1	52	0	1,360	1,443	84	96
8 MÚA	0	0	57	52	1,594	1,569	69	61
8 ÚDU	0	1	0	0	454	536	25	27
8 ÚSD	0	1	77	20	1,172	1,258	43	38
	6	7	195	90	6,054	6,444	282	291

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Workplace of the ASCR	1.	2.	3.	4.	5a	5b	6a	6b
9 EÚ	1	2	11	11	721	875	38	53
9 FLÚ	2	8	87	5	4,653	4,631	221	239
9 OÚ	0	0	4	0	214	218	8	8
9 SLÚ	0	2	10	1	396	348	33	29
9 ÚČL	0	0	32	0	667	962	29	39
9 ÚJČ	4	2	24	13	1,327	1,208	50	52
	7	14	168	30	7,978	8,242	379	420
S 1	36	52	118	75	4,846	5,882	251	297
S 2	22	52	74	58	2,406	2,462	164	128
S 3	13	8	29	29	973	1,652	61	89
S 4	39	61	118	78	1,831	2,543	67	127
S 5	86	98	254	236	3,785	4,728	200	208
S 6	30	47	253	183	3,453	4,277	144	174
S 7	19	47	147	43	4,774	4,609	148	292
S 8	6	7	195	90	6,054	6,444	282	291
S 9	7	14	168	30	7,978	8,242	379	420
	258	386	1356	822	36,100	40,839	1,696	2,026
SA total	258	386	1356	822	36,100	40,839	1,696	2,026

APPENDIX 07

Appendix 07.1

Economic Management of the Public Research Institutes of the ASCR in 2012

Workplace	Total revenues	of which		Total expenses	of which		Income form operations (profit +) (loss -)
		transfers from the SB	own resources		personnel costs	material costs	
		a	1		2	3	
1 ASÚ	130,623	101,622	29,001	129,529	80,387	49,142	1,093
1 FZÚ	797,751	662,908	134,843	784,984	478,232	306,752	12,767
1 MÚ	61,115	55,359	5,756	61,115	44,794	16,321	0
1 ÚI	81,990	68,565	13,425	80,172	57,588	22,584	1,818
1 ÚJF	241,819	171,448	70,371	231,699	113,541	118,158	10,120
1 ÚTIA	124,827	107,245	17,583	124,240	95,801	28,439	587
2 ÚFE	111,929	86,913	25,016	109,991	66,111	43,880	1,938
2 ÚFM	130,333	72,887	57,446	128,987	77,159	51,828	1,346
2 ÚFP	191,325	138,096	53,230	188,453	101,124	87,328	2,873
2 ÚH	47,575	39,494	8,081	46,509	29,497	17,012	1,067
2 ÚPT	152,558	111,470	41,088	151,833	81,615	70,218	725
2 ÚT	147,475	114,607	32,868	147,252	95,466	51,786	223
2 ÚTAM	86,374	71,066	15,307	85,648	51,066	34,582	726
3 GFÚ	98,712	78,503	20,209	97,836	58,839	38,997	876
3 GLÚ	64,368	44,053	20,316	64,198	35,971	28,227	170
3 ÚFA	85,109	64,539	20,570	84,359	53,086	31,273	750
3 ÚGN	86,165	68,718	17,446	86,164	55,714	30,450	1
3 ÚSMH	94,266	75,827	18,439	94,159	53,967	40,191	108
4 ÚACH	74,194	56,772	17,421	73,447	37,655	35,792	746
4 ÚFCH JH	219,547	155,418	64,129	219,547	112,478	107,069	0
4 ÚCHP	169,116	134,931	34,185	168,617	89,931	78,686	499
4 ÚIACH	67,994	56,435	11,559	67,950	40,975	26,975	44
4 ÚMCH	271,381	214,305	57,076	268,276	169,287	98,989	3,105
4 ÚOCHB	2,389,585	273,246	2,116,338	1379,524	273,696	1,105,828	1,010,061

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Workplace	Total revenues	of which		Total expenses	of which		Income form operations (profit +) (loss -)	ths. of CZK
		transfers from the SB	own resources		personnel costs	material costs		
		1	2		3	4		5
5 BFÚ	166,541	135,804	30,737	165,705	95,295	70,409	836	
5 BTÚ	57,817	45,388	12,429	57,709	34,666	23,044	108	
5 FGÚ	317,512	235,579	81,933	315,143	162,976	152,167	2,369	
5 MBÚ	474,646	306,690	167,956	471,302	228,174	243,128	3,344	
5 ÚEB	212,199	134,877	77,322	212,165	104,258	107,907	34	
5 ÚEM	176,116	137,394	38,722	175,749	77,874	97,875	367	
5 ÚMG	435,983	310,946	125,037	435,982	175,219	260,763	1	
5 ÚŽFG	118,866	77,307	41,560	114,388	57,861	56,527	4,478	
6 BC	389,011	303,736	85,275	388,494	216,337	172,157	517	
6 BÚ	196,837	155,698	41,139	196,344	122,132	74,212	493	
6 ÚBO	70,209	54,024	16,185	70,168	40,300	29,868	41	
6 CVGZ	179,590	141,033	38,558	179,369	98,799	80,570	221	
7 NHÚ	77,291	55,720	21,571	75,960	38,884	37,076	1,331	
7 PSÚ	30,335	27,437	2,898	30,331	21,884	8,447	4	
7 SOÚ	80,494	68,659	11,835	80,494	57,571	22,923	0	
7 ÚSP	24,171	19,479	4,692	24,168	17,786	6,382	4	
8 ARÚ	96,652	58,765	37,887	96,352	53,570	42,782	300	
8 ARÚB	47,717	36,141	11,576	46,202	29,317	16,886	1,514	
8 HÚ	57,972	54,607	3,365	57,008	40,182	16,827	964	
8 MÚA	34,026	30,010	4,016	33,224	23,204	10,021	801	
8 ÚDU	38,971	34,508	4,463	38,966	25,208	13,758	5	
8 ÚSD	42,276	37,221	5,055	42,274	33,078	9,196	2	

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Workplace	Total revenues	of which		Total expenses	of which		Income form operations (profit +) (loss -)	ths. of CZK
		transfers from the SB	own resources		personnel costs	material costs		
		1	2		3	4		5
9 EÚ	42,631	35,864	6,767	43,149	27,495	15,653	-517	
9 FLÚ	102,374	92,821	9,552	102,374	76,858	25,516	0	
9 OÚ	13,897	13,262	635	13,796	11,190	2,606	101	
9 SLÚ	18,982	17,870	1,112	18,738	14,261	4,477	243	
9 ÚČL	53,018	47,421	5,597	53,018	39,344	13,674	0	
9 ÚJČ	78,218	72,843	5,375	75,263	58,611	16,652	2,956	
7 KNAV	138,700	94,130	44,570	138,699	38,592	100,108	0	
O SSČ	435,211	185,351	249,861	434,809	163,820	270,989	402	
ASCR total	10,134,395	6,045,013	4,089,382	9,061,831	4,538,727	4,523,104	1,072,564	
Book depreciation of PRI *)	-931,519		-931,519	-931,519		-931,519		
ASCR total	9,202,876	6,045,013	3,157,863	8,130,312	4,538,727	3,591,585	1,072,564	

*) Book depreciation of assets acquired from grants which do not comprise a resource of the asset reproduction fund

APPENDIX 07

Appendix 07.2
Investment Resources and Their Use in 2012

Workplace	Investment resources total	Use of investment resources total	of which				FRM at the end of the period (source by 2013)	ths. of CZK
			buildings	instruments	mntn and repairs	other		
			3	4	5	6		7
a	1	2	3	4	5	6	7	
1 ASÚ	18,079	9,103	1,352	7,401	0	350	8,976	
1 FZÚ	504,465	404,788	150,091	243,632	0	11,066	99,677	
1 MÚ	7,983	4,304	3,819	49	0	436	3,679	
1 ÚI	8,924	1,039	239	646	0	153	7,885	
1 ÚJF	74,030	50,136	12,736	35,356	0	2,044	23,894	
1 ÚTIA	6,285	4,614	1	4,058	0	555	1,671	
2 ÚFE	66,192	50,429	6,257	44,173	0	0	15,762	
2 ÚFM	90,647	18,236	8,027	9,891	0	318	72,411	
2 ÚFP	187,111	153,101	7,044	145,036	0	1,021	34,009	
2 ÚH	12,479	2,614	0	2,614	0	0	9,865	
2 ÚPT	281,147	257,838	20,286	237,552	0	0	23,309	
2 ÚT	40,600	10,444	3,518	5,579	0	1,347	30,156	
2 ÚTAM	115,491	95,869	12,776	83,093	0	0	19,623	
3 GFÚ	15,414	7,554	4,038	2,660	0	856	7,860	
3 GLÚ	15,389	9,048	0	9,048	0	0	6,341	
3 ÚFA	7,691	3,662	126	2,449	462	625	4,029	
3 ÚGN	44,906	39,778	4,075	34,817	0	886	5,128	
3 ÚSMH	8,905	6,841	0	6,803	0	38	2,064	
4 ÚACH	13,401	10,033	0	9,985	0	49	3,368	
4 ÚFCH JH	48,145	37,165	6,215	30,950	0	0	10,980	
4 ÚCHP	12,880	12,615	1,212	11,275	0	128	265	
4 ÚIACH	25,752	24,061	1,199	22,775	0	87	1,691	
4 ÚMCH	106,513	50,119	19,073	27,413	0	3,634	56,394	
4 ÚOCHB	2,042,073	244,556	135,200	109,356	0	0	1,797,516	

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Workplace	Investment resources total	Use of investment resources total	of which				FRM at the end of the period (source by 2013)	ths. of CZK
			buildings	instruments	mntn and repairs	other		
			3	4	5	6		7
a	1	2	3	4	5	6	7	
5 BFÚ	22,749	14,961	1,148	13,813	0	0	7,788	
5 BTÚ	6,543	6,543	0	6,543	0	0	0	
5 FGÚ	72,426	50,448	15,215	14,757	0	20,477	21,978	
5 MBÚ	174,691	154,648	34,758	118,497	0	1,393	20,043	
5 ÚEB	212,351	203,099	183,475	16,806	0	2,817	9,252	
5 ÚEM	44,483	43,730	19,463	21,318	0	2,949	753	
5 ÚMG	163,467	162,956	91,362	71,593	0	0	511	
5 ÚŽFG	30,978	19,250	7,106	11,536	0	608	11,729	
6 BC	53,668	33,591	3,788	29,802	0	0	20,078	
6 BÚ	25,417	22,668	9,182	12,828	0	659	2,749	
6 ÚBO	15,939	8,953	4,686	4,130	0	137	6,986	
6 CVGZ	352,297	166,126	10,766	134,802	0	20,558	186,172	
7 NHÚ	4,147	2,551	369	0	1,671	511	1,596	
7 PSÚ	4,099	66	66	0	0	0	4,033	
7 SOÚ	10,617	3,727	3,393	334	0	0	6,890	
7 ÚSP	2,345	1,696	0	0	0	1,696	649	
8 ARÚ	20,631	8,744	0	8,744	0	0	11,887	
8 ARÚB	80,954	80,336	74,683	2,852	0	2,800	618	
8 HÚ	3,577	2,203	0	2,203	0	0	1,374	
8 MÚA	5,200	4,485	2,533	1,952	0	0	715	
8 ÚDU	6,214	2,868	1,634	1,234	0	0	3,346	
8 ÚSD	3,437	0	0	0	0	0	3,437	

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Workplace	Investment resources total	Use of investment resources total	of which				FRM at the end of the period (source by 2013)	ths. of CZK
			buildings	instruments	mntn and repairs	other		
			a	1	2	3		
9 EÚ	3,308	800	71	84	0	645	2,508	
9 FLÚ	16,840	3,239	3,059	0	180	0	13,601	
9 OÚ	628	0	0	0	0	0	628	
9 SLÚ	2,362	1,193	0	1,193	0	0	1,169	
9 ÚČL	9,879	743	0	743	0	0	9,136	
9 ÚJČ	14,440	665	0	665	0	0	13,775	
7 KNAV	16,670	920	52	0	231	637	15,749	
O SSČ	59,924	46,991	22,717	9,643	10,400	4,231	12,933	
ASCR total	5,194,782	2,556,148	886,811	1,572,684	12,945	83,708	2,638,634	

APPENDIX 08

Appendix 08.1
Number of Employees, Salary Means and Earnings in 2012

Workplace	Adjusted number of employees total	Means for wages and salaries in thous. of CZK			Other personnel costs in thous. of CZK			Average monthly earning in CZK
		of which		of which				
		total	institutional	special-purpose and extra-budgetary	total	institutional	special-purpose and extra-budgetary	
1 ASÚ	126.20	57,621	42,305	15,316	1,330	709	621	38,048
1 FZÚ	742.49	340,159	194,140	146,019	5,696	1,734	3,963	38,178
1 MÚ	68.62	32,235	27,081	5,153	730	191	539	39,146
1 ÚI	90.36	38,292	28,862	9,430	2,947	287	2,660	35,314
1 ÚJF	189.23	79,284	56,026	23,258	2,288	1,255	1,034	34,915
1 ÚTIA	135.58	66,725	45,954	20,771	2,378	866	1,512	41,012
2 ÚFE	92.04	47,116	36,287	10,829	950	506	444	42,659
2 ÚFM	126.03	54,642	30,526	24,116	955	380	575	36,130
2 ÚFP	161.73	70,822	35,341	35,481	2,198	1,469	729	36,492
2 ÚH	46.78	20,898	16,114	4,784	763	175	588	37,228
2 ÚPT	137.66	55,592	27,345	28,248	2,907	754	2,154	33,653
2 ÚT	176.98	67,723	51,690	16,034	1,033	174	859	31,888
2 ÚTAM	79.04	35,928	16,671	19,257	1,016	314	702	37,879
3 GFÚ	96.88	42,338	31,656	10,682	809	388	421	36,418
3 GLÚ	68.68	25,591	23,326	2,265	788	495	293	31,051
3 ÚFA	81.89	37,056	24,852	12,204	753	245	508	37,709
3 ÚGN	98.40	39,181	23,380	15,801	1,326	303	1,023	33,182
3 ÚSMH	103.61	38,034	28,666	9,368	1,404	426	979	30,591
4 ÚACH	62.49	26,012	20,313	5,699	958	548	410	34,689
4 ÚFCH JH	162.44	78,309	46,575	31,734	2,857	290	2,566	40,173
4 ÚCHP	152.01	63,870	36,460	27,410	1,435	379	1,056	35,014
4 ÚIACH	64.48	29,099	17,735	11,364	712	224	488	37,608
4 ÚMCH	246.70	122,492	81,651	40,841	1,333	385	948	41,377
4 ÚOCHB	447.25	192,882	125,740	67,142	3,486	1,687	1,800	35,939

APPENDIX 08

Workplace	Adjusted number of employees total	Means for wages and salaries in thous. of CZK			Other personnel costs in thous. of CZK			Average monthly earning in CZK	
		of which			of which				
		total	institutional	special-purpose and extra-budgetary	total	institutional	special-purpose and extra-budgetary		
5	BFÚ	146.88	67,962	43,436	24,526	1,775	428	1,347	38,558
5	BTÚ	59.07	24,663	15,399	9,263	386	205	181	34,793
5	FGÚ	298.67	115,763	70,970	44,793	3,426	1,530	1,896	32,300
5	MBÚ	434.42	162,586	86,968	75,618	2,304	794	1,510	31,188
5	ÚEB	190.30	73,963	40,187	33,777	1,624	529	1,095	32,389
5	ÚEM	139.16	55,876	32,072	23,804	1,269	515	755	33,460
5	ÚMG	303.90	124,486	68,385	56,101	1,843	952	891	34,136
5	ÚŽFG	118.89	40,271	26,383	13,887	914	268	646	28,227
6	BC	411.65	150,848	97,453	53,394	8,845	1,162	7,683	30,537
6	BÚ	252.75	85,920	53,551	32,368	2,491	822	1,669	28,328
6	ÚBO	74.43	26,439	14,589	11,850	2,713	393	2,320	29,602
6	CVGZ	174.02	67,279	19,090	48,189	5,137	1,394	3,743	32,218
7	KNAV	79.72	25,961	23,594	2,367	2,039	1,299	741	27,137
7	NHÚ	70.58	26,499	16,789	9,710	2,192	557	1,634	31,287
7	PSÚ	33.27	14,888	10,626	4,261	1,070	384	686	37,290
7	SOÚ	86.59	37,105	20,247	16,858	5,538	2,534	3,004	35,710
7	ÚSP	31.50	12,276	10,916	1,360	444	370	74	32,475
8	ARÚ	98.29	34,258	26,089	8,169	5,216	1,177	4,039	29,045
8	ARÚB	66.86	18,723	14,383	4,339	3,251	849	2,402	23,336
8	HÚ	68.01	25,422	23,091	2,331	4,068	1,759	2,309	31,149
8	MÚA	39.68	15,150	11,842	3,308	2,177	820	1,357	31,817
8	ÚDU	46.81	16,814	14,696	2,118	1,424	795	629	29,933
8	ÚSD	48.40	21,469	15,457	6,012	2,957	1,499	1,457	36,964

APPENDIX 08

Workplace	Adjusted number of employees total	Means for wages and salaries in thous. of CZK			Other personnel costs in thous. of CZK			Average monthly earning in CZK	
		of which			of which				
		total	institutional	special-purpose and extra-budgetary	total	institutional	special-purpose and extra-budgetary		
9	EÚ	53.51	18,228	14,363	3,865	1,713	892	821	28,387
9	FLÚ	153.90	53,876	45,114	8,762	2,685	1,227	1,458	29,172
9	OÚ	20.19	7,347	7,347	0	694	694	0	30,323
9	SLÚ	24.94	9,202	7,546	1,656	1,535	1,024	511	30,748
9	ÚČL	79.60	27,252	20,864	6,388	1,679	841	838	28,530
9	ÚJČ	108.82	40,040	29,906	10,134	3,357	1,564	1,792	30,662
O	SSČ	279.32	108,494	68,604	39,890	12,724	7,940	4,784	32,369
	KAV	69.51	36,852	36,695	157	1,493	1,345	148	44,181
	RDI total	7,751.70	3,170,958	2,018,650	1,152,307	128,546	49,400	79,145	34,089
	ASCR total	7,821.21	3,207,810	2,055,346	1,152,464	130,039	50,745	79,293	34,179

APPENDIX 08

Appendix 08.2 Number of the Workplaces and Employees of the ASCR by Section

	Number of workplaces in 2012	Average adjusted number of employees in 2011				Average adjusted number of employees in 2012			
		total		of whom university educated employees of research units		total		of whom university educated employees of research units	
		number	%	number	%	number	%	number	%
1 st Section of Mathematics, Physics and Information Science	6	1,321.8	17.2	800.7	18.0	1,352.5	17.3	781.8	17.4
2 nd Section of Applied Physics	7	800.1	10.4	453.5	10.2	820.2	10.5	474.9	10.6
3 rd Section of Earth Sciences	5	446.2	5.8	281.7	6.3	449.5	5.7	288.8	6.4
4 th Section of Chemical Sciences	6	1,141.0	14.8	765.8	17.2	1,135.4	14.5	761.5	17.0
5 th Section of Biological and Medical Sciences	8	1,683.0	21.8	1,051.5	23.6	1,691.3	21.6	1,050.6	23.4
6 th Section of Biological-Ecological Sciences	4	880.1	11.4	455.9	10.2	912.8	11.7	481.3	10.7
7 th Section of Social-Economic Sciences	5	296.6	3.8	134.2	3.0	301.7	3.9	131.6	2.9
8 th Section of Historical Sciences	6	363.3	4.7	204.3	4.6	368.0	4.7	200.4	4.5
9 th Section of the Humanities and Philological Sciences	6	440.0	5.7	308.4	6.9	441.0	5.6	318.5	7.1
SSČ of the ASCR, v. v. i.	1	272.6	3.6	0.0	0.0	279.3	3.6	0.0	0.0
KAV of the ASCR	1	63.9	0.8	0.0	0.0	69.5	0.9	0.0	0.0
ASCR total	55	7,708.6	100.0	4,456.0	100.0	7,821.2	100.0	4,489.4	100.0

APPENDIX 09

Appendix 09.1 Awards for Researchers Granted by the ASCR

Praemium Academiae 2012 was received by:

- doc. Ing. Jaroslav Doležel, DrSc. (Institute of Experimental Botany of the ASCR),
- RNDr. Pavel Spurný, CSc. (Astronomical Institute of the ASCR).

Doc. Ing. Jaroslav Doležel, DrSc., deals with the structure and evolution of the genome of plants and is one of the absolute world tops in this field. He played an essential part in the elaboration of new methods of the analysis of the nuclear genome of plants, including flow cytometry, which has found extensive application for instance in taxonomy, ecology and in practical cultivation. In the area of structural genomics, doc. Doležel formulated and developed the concept of chromosome genomics, which thanks to a connection with the methods of cytometry, cytogenetics and genomic allows the analysis of large and complex genomes.

The financial praemium will significantly support successful research project of the laboratory focused on the study of the hereditary information of plants including the changes, which accompanied the emergence of new types of domestication. The praemium will contribute to increasing the competitiveness on the international scale and *inter alia* significantly support participation in the global project of reading the genome of wheat. Besides clarifying the general processes of the development of hereditary information of plants, the knowledge attained contributes to increasing the efficiency of the cultivation of new varieties using the advanced methods of biotechnology and genomics.

RNDr. Pavel Spurný, CSc., deals with the study of small bodies of the Solar System – meteoroids and their interaction with the atmosphere of the Earth (the phenomenon of a meteor and bolide). He has led his research team for almost twenty years already. He proposed and significantly shared in the development of the automatic bolide camera, a unique device for the complex observation of bolides. He participated in the successful land exhibitions in an international project of observing meteor showers. His most important results include the discovery of the radiation of rapid meteors at very high heights and its diffuse character. In addition, he has recently participated in the analysis of other important meteor falls.



President of the ASCR Prof. Jiří Drahoš presented the prestigious Academic Praemium to Doc. Jaroslav Doležel (on the right) from the Institute of Experimental Botany of the ASCR and Dr. Pavel Spurný from the Astronomical Institute of the ASCR. The session, during which trilateral contracts were signed between the Academy of Sciences, the laureates of the Academic Praemium and their employer (academic workplace), took place on 26 June 2012 in the building of the ASCR.

Doctor Spurný will use the Academic Praemium for a fundamental modernisation of observation, ensuring and improving the quality of the operation of the bolide networks and for expansion of the team by such employees who will suitably complement and strengthen the existing team. In the future, it will bring a number of valuable results and publication outputs for the maintenance of the leading position of the Czech school in this interesting field of science.

The Awards of the ASCR achieving outstanding results of great scientific significance were received by:

- Ing. Pavel Jelínek, Ph.D. (Institute of Physics of the ASCR) for the scientific result: **Theoretical description and development of raster microscopes;**
- **authorial team:** RNDr. Petr Kotlík, Ph.D., prof. Ing. Petr Ráb, DrSc., Ing. Marie Rábová, CSc., RNDr. Vlastimil Šlechta, CSc., Ing. Věra Šlechtová, CSc., Mgr. Karel Janko, Ph.D., Dr. Jörg Bohlen, Ph.D., Mgr. Vendula Bohlen Šlechtová, Ph.D., Bc. Jana Kopecká, Bc. Šárka Pelikánová, RNDr. Lukáš Choleva, Ph.D. (employees of the Institute of Animal Physiology and Genetics of the ASCR),

APPENDIX 09



The presentation of the Awards of the ASCR – villa Lanna 10 October 2012. In the first category, the prizes were taken by the authorial teams and researchers for outstanding results achieved in the resolution of scientific tasks and grant, programme and international projects financed by the ASCR; in the second category the prizes were taken by young researchers up to 35 years of age. In the picture, Věra Šlechtová from the Institute of Animal Physiology and Genetics of the ASCR.



The first laureates of the newly granted Awards of the President of the ASCR for the promotion or popularisation of research, experimental development and innovation were Jiří Grygar, Karel Hudec and Jaroslav Šebek. At the proposal of a specialised jury and the recommendation of the Academic Council of the ASCR, the award was ceremonially presented by Jiří Drahoš on 23 October 2012 at the headquarters of the ASCR in Prague. The award is granted once a year to a maximum of three research employees and is connected with a financial reward.

doc. Ing. Martin Flajšhans, Dr. rer. agr. (University of South Bohemia in České Budějovice), doc. Ing. Lukáš Kalous, Ph.D. (University of West Bohemia in Pilsen), RNDr. Zdeněk Lajbner, Ph.D. (Australia), Ing. Jan Kohout, Mgr. Alena Kohoutová Šedivá, Ph.D. (Slovak Academy of Sciences) for the scientific result: Clonal vertebrates: discovery, mechanisms, biodiversity and reconstruction upon a model of cobitid loaches;

■ **authorial team:** doc. RNDr. Soňa Štrbářová, CSc., PhDr. Antonín Kostlán, CSc., Mgr. Tomáš Hermann, Ph.D., Mgr. Michal Šimůnek, RNDr. Jiří Jindra, CSc. (employees of the Institute of Contemporary History of the ASCR), PhDr. Milena Josefovičová, Ph.D., PhDr. Jan Hálek, Ph.D., prom. hist. Nataša Kmochová (employees of the Masaryk Institute and Archive of the ASCR), RNDr. Karel Závěta, CSc. (Institute of Physics of the ASCR), prof. RNDr. Jaroslav Spížek, DrSc. (Institute of Microbiology of the ASCR) for the scientific result: **Czech Scientists in Exile, 1948–1989.**

The awards of the Academy of Sciences of the CR for young scientific employees up to 35 years of age for outstanding results of scientific work were received by:

- Ing. Tomáš **Kroupa**, Ph.D., 1978 (Institute of Information Theory and Automation of the ASCR) for the scientific result: **Every State on Semisimple MV-algebra is Integral: Fuzzy Sets and Systems;**
- Ing. Václav **Mahelka**, Ph.D., 1977 (Institute of Botany of the ASCR) for the scientific result: **Genomes of polyploid grasses: Tracing unexpected antecedents;**
- PhDr. Martin **Holý**, Ph.D., 1978 (Institute of History of the ASCR) for the scientific result: **In the services of the aristocracy: Educators of the nobility from the Czech lands (1500–1620).**

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On 13 June 2012, the Otto Wichterle Award, which is granted annually by the ASCR to outstanding and exceptionally talented researchers up to 35 years of age to support their future careers, entered the second decade of its existence.

The Award of the President of the ASCR for the promotion or popularisation of research, experimental development and innovation were received for the first time in 2012 by:

- RNDr. Jiří **Grygar**, CSc.,
- doc. RNDr. Karel **Hudec**, DrSc.,
- doc. Mgr. Jaroslav **Šebek**, Ph.D.

Otto Wichterle Award for young scientific employees of the ASCR was received by:

- I. in the mathematics, physics and earth sciences
 - Mgr. Jan **Jurčák**, Ph.D. Astronomical Institute
 - Mgr. Antonín **Černoch**, Ph.D. Institute of Physics
 - Mgr. Oldřich **Kepka**, Ph.D. Institute of Physics
 - Mgr. Lukáš **Ackerman**, Ph.D. Institute of Geology
 - RNDr. Jan **Kalina**, Ph.D. Institute of Computer Science
 - Ing. Vít **Jakubský**, Ph.D. Nuclear Physics Institute
 - PhDr. Josef **Baruník**, Ph.D. Institute of Information Theory and Automation



On the occasion of the ceremonial seminar for the life jubilee of Prof. Blanka Říhová, the President of the ASCR Jiří Drahoš presented the 'De scientia et humanitate optime meritis' Honorary Medal – the highest award the ASCR grants – for the exceptional scientific and human qualities of this eminent Czech researcher in the area of immunology. The encounter took place on 15 November 2012 in the cinema hall of the Institute of Physiology of the ASCR.

II. in the life sciences and chemical sciences

- RNDr. Ivan **Fiala**, Ph.D. Biology Centre
- Mgr. Hana **Pivoňková**, Ph.D. Institute of Biophysics
- Mgr. Ing. Pavel **Trávníček**, Ph.D. Institute of Botany
- Mgr. Lubomír **Košťál**, Ph.D. Institute of Physiology
- RNDr. Ivo **Rudolf**, Ph.D. Institute of Vertebrate Biology
- Mgr. Vendula **Bohlen Šlechtová**, Ph.D. Institute of Animal Physiology and Genetics
- Mgr. Karel **Janko**, Ph.D. Institute of Animal Physiology and Genetics

III. in the humanities and social sciences

- PhDr. Lucie **Storchová**, Ph.D. Institute of Philosophy
- Mgr. Petr **Urban**, Ph.D. Institute of Philosophy
- Mgr. Jiří **Lukavský**, Ph.D. Institute of Psychology
- Mgr. Radka **Dudová**, Ph.D. Institute of Sociology
- Mgr. et Mgr. Matěj **Spurný**, Ph.D. Institute for Contemporary History



Peter Jenni (on the right) from CERN accepted the Ernst Mach Honorary Medal for Merit in the Physical Sciences from President of the Scientific Council of the ASCR, prof. Jiří Čtyroký.



President of the ASCR Prof. Jiří Drahoš on 12 September 2012 presented Prof. Ulrich G. Leinsle OPraem from the Faculty of Catholic Theology at the University of Regensburg the Josef Dobrovský Honorary Medal for Merit in the Philological and Philosophical Sciences.

Medals awarded to Czech and foreign scientists in 2012

'De scientia et humanitate optime meritis' Honorary Medal

- prof. RNDr. Blanka Říhová, DrSc. (Institute of Microbiology of the ASCR);

Bernard Bolzano Honorary Medal for Merit in the Mathematical Sciences

- prof. Gilles Godefroy (Institut de Mathématiques, Jussieu, Paris, France),
- prof. RNDr. Michal Křížek, DrSc. (Institute of Mathematics of the ASCR);

Ernst Mach Honorary Medal for Merit in the Physical Sciences

- prof. Allan Hugh Mac Donald, Ph.D. (University of Texas at Austin, Texas, USA),
- prom. fyz. Milada Glogarová, CSc. (Institute of Physics of the ASCR),
- Dr. Peter Jenni (CERN, Geneva, Switzerland);

J. Heyrovský Honorary Medal for Merit in the Chemical Sciences

- prof. Ing. Miloš Marek, DrSc. (Institute of Chemical Technology);

Gregor Johann Mendel Honorary Medal for Merit in the Biological Sciences:

- prof. RNDr. Helena Illnerová, DrSc. (Institute of Physiology of the ASCR),
- prof. RNDr. Václav Pačes, DrSc. (Institute of Molecular Genetics of the ASCR),
- prof. Steven M. Reppert, MD (University of Massachusetts Medical School, Worcester, USA);

Jan Evangelista Purkyně Honorary Medal for Merit in the Biomedical Sciences

- RNDr. Jaroslava Folbergrová, DrSc. (Institute of Physiology of the ASCR);

Josef Dobrovský Honorary Medal for Merit in the Philological and Philosophical Sciences

- Ludmila Norajrovna Budagovová, DrSc. (Institute of Slavistics, Russian Academy of Sciences, Moscow, Russia),

- prof. Dr. Ulrich G. Leinsle, Dr. (Universität Regensburg, Fakultät für Katholische Theologie, Regensburg, Germany);

František Palacký Honorary Medal for Merit in the Historical Sciences

- prof. Johann P. Arnason, Ph.D. (La Trobe University, Melbourne, Australia);

Vojtěch Náprstek Honorary Medal for Merit in Science Popularisation

- RNDr. Václav Cílek, CSc. (Institute of Geology of the ASCR),
- Mgr. Jan Kolář, Ph.D. (Institute of Experimental Botany of the ASCR),
- PhDr. Milena Secká, CSc. (National Museum – Náprstek Museum of Asian, African and American Cultures),
- Pavel Suchan (Astronomical Institute of the ASCR),
- doc. RNDr. František Weyda, CSc. (Biology Centre of the ASCR);

Honorary Medal for Merit to the Academy of Sciences of the Czech of the Czech Republic

- Mgr. Eva Žižková, CSc. (Head Office of the ASCR);

The support of the **J. E. Purkyně Fellowship for distinguished and prospective scientific employees** was obtained by:

- Dr. Héctor Vázquez Melis for scientific activity focused on the area of nanoelectronics and nanomaterials,
- Mgr. Martin Friák, Ph.D., for scientific activity focused on the most progressive trends in the multi-level modelling of the structure and features of advanced materials,
- Mgr. Marek Kapička, Ph.D., for scientific activity focused on macroeconomics and public economy,
- prof. Georg Pavlakos, Ph.D., LL. M., for scientific activity focused on expanding research in the field of legal science from the national to the international level,
- Mgr. Dr. phil. Tomasz Derlatka, for scientific activity focused on the western Slavic novel of the 20th century.

A Letter of Appreciation for long-term work in the ASCR was received from the hand of President of the ASCR prof. J. Drahoš by 35 employees from 13 workplaces of the ASCR.

APPENDIX 09

Appendix 9.2 Awards of the Employees of the ASCR by Non-Academic Entities in 2012

In 2012, many outstanding employees of the ASCR attained awards and medals from domestic and foreign non-academic entities for their work. Researchers received recognition from state and public bodies, domestic and foreign higher education institutions and universities but also scientific societies, private companies, and foundations. In 2012, outstanding researchers of the ASCR were granted five awards and medals of the Ministry of Education, Youth and Sports and three commemorative medals by the Senate of the Parliament of the CR. *Inter alia*, awards for scientists of the ASCR were also granted by the Mayors of the Capital City of Prague and České Budějovice and the President of the Czech Science Foundation. In 2012, the important private trade companies that support science and research in the Czech Republic and regularly award the scientists of the ASCR included also: ČEZ, Siemens and L'Oréal. The most well-known private foundations which traditionally recognise Czech researchers annually include the Foundation of Josef, Marie and Zdeňka Hlávka, the Karel Janeček Foundation and the Rand Foundation.

State and public bodies in 2012 issued a **total of 15 awards**, of which three of them were acquired by employees of Science Area I (1st SA), eight of those awarded from Science Area II (2nd SA) and four from Science Area III (3rd SA).

Foreign higher education institutions and universities granted scientists from the ASCR a **total of 12 awards**, of which seven to scientists from the 1st SA, one of those awarded was from the 2nd SA and four awarded scientists were from the 3rd SA.

Higher education institutions and universities in the CR granted employees of the ASCR a **total of eight awards**, of which two were received by scientists of the 1st SA, four by scientists from the 2nd SA and two from the 3rd SA.

Domestic and foreign scientific societies in 2012 awarded a **total of 17** scientific employees of the ASCR, of whom seven scientists were from the 1st SA, eight from the 2nd SA and two from the 3rd SA.



On 22 June 2012, Prof. Antonín Holý received the Silver Medal of the Capital City of Prague in Brožík Hall of the Old Town Hall.

Private companies awarded a **total of seven scientists** of the ASCR, of whom six were from the 1st SA and one from the 3rd SA.

Private foundations in 2012 awarded a **total of eight scientific employees** of the ASCR, of whom three were from the 1st SA, two from the 2nd SA and three from the 3rd SA.

On 15 July 2012, Prof. Antonín Holý, one of the most important Czech researchers of the 20th century, died at the age of 75. Prof. Holý was a laureate of the Descartes Prize of the European Union for scientific research (2001), the state award of the Medal for Service (2002), the National Award of the Government Česká hlava (Czech Head, 2007) and a number of other awards and distinctions.

APPENDIX 10

Appendix 10 Annual Report of the Learned Society of the Czech Republic for 2012

The Learned Society of the Czech Republic (hereinafter referred to as the 'Society') associates prominent scientists of all scientific fields. Membership is possible in two ways: regular and honorary. The prerequisite for membership is a distinctive and creative contribution to science and moral integrity. Regular members of the Society are elected significant domestic scientific figures from the higher education institutions, ASCR as well as ministry workplaces. The Society associates outstanding researchers from the areas of natural sciences and the humanities working in various organisations. The other category is that of honorary members, elected from among the significant foreign researchers who have exceptional ties to the Czech scientific community. The Society is tightly selective. The aim of the Society is to stimulate the free cultivation of science in all of its manifestations, to encourage the desire for knowledge and enjoyment from it, to spread scientific knowledge in society, to support the increasing of the level of education and a creative, rational and humanly responsible social environment in the Czech Republic.

From the beginning of the year until 14 May 2012, the Society was governed by an eight-member Council comprising: prof. RNDr. Václav Pačes, DrSc. (President), prof. ThDr. Petr Pokorný, DrSc. (1st Vice President), prof. RNDr. Helena Illnerová, DrSc. (2nd Vice President), RNDr. Zdeněk Jiráček, CSc. (Scientific Secretary), prof. RNDr. Aleš Pultr, DrSc. (President of the Section of Mathematical-Physical Sciences), doc. Mgr. Pavel Jungwirth, DSc. (President of the Section of Chemical Sciences), doc. RNDr. Jan Konvalinka, CSc. (President of the Section of Biological-Medical Sciences), prof. PhDr. Ivan Hlaváček, CSc. (President of the Section of Social Sciences and the Humanities). On 15 May 2012, there was an election to the Council at the working part of the 18th General Assembly. The current council works in the following composition: prof. ThDr. Petr Pokorný, DrSc. (President), prof. RNDr. Jiří Bičák, DrSc. (1st Vice President), prof. RNDr. Václav Pačes, DrSc. (2nd Vice President), RNDr. Zdeněk Havlas, DrSc. (Scientific Secretary), prof. RNDr. Tomáš Jungwirth, DrSc. (President of the Section of Mathematical-Physical Sciences), prof. Mgr. Pavel Jungwirth, DSc. (President of the Section of Chemical Sciences), prof. MUDr. Helena Tlaskalová, DrSc. (President of

the Section of Biological-Medical Sciences), prof. PhDr. Jan Bouzek, DrSc. (President of the Section of Social Sciences and the Humanities). At the end of the year, the Society had 102 regular and 40 honorary members.

The Society has developed lecture activities on current questions of science, education etc., including specialised lectures and profiles at plenary sessions, further public lectures on topical issues, and the lectures at the 18th General Assembly and discussion sessions. It held eight working meetings. It organised a public debate "Chemistry in Foodstuffs and in the Environment". It organised an excursion for its members to the Šumava Mountains with the aim of acquiring an independent view of the problems of this beautiful National Park. The Society further had the narrative history of science in the memories of its selected members recorded in the form of interviews. An important source of information both on the activities of the Society and on its members is the website <http://www.learned.cz>. Here there are (*inter alia*) lectures, or their presentations published. It issued a publication by its honorary member Zdeněk Sekanina "Gigantic Explosions, Cascading Fragmentations and Episodic Ageing of Comets". Members represented the Society at meetings with the representatives of foreign learned societies and scientific institutions. Cooperation developed between the Learned Society the Heidelberg Academy of Sciences (HAW), both scientific societies seek to support joint scientific work and research. Along with the HAW, the Learned Society organised a competition of interdisciplinary teams of scientific employees up to 35 years of age, which encountered a terrific reception.

In May, the Society organised the 18th General Assembly in the Karolinum in Prague, at which a moderated discussion (moderated by Prof. Jan Palouš) took place on the topic "Enough of Everything and For Everyone?" with contributions by domestic and foreign scientists.

The prestigious Society awards and medals for 2012 were presented ceremonially. The financial aspect of the awards is taken care of by the Endowment Fund for the Support of Science associated with the Learned Society of the Czech Republic, led by Prof. RNDr. Jiří Krajíček, DrSc. The awards were received by:

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18th General Assembly of the Learned Society of the Czech Republic: The Medal of the Learned Society of the CR for contribution to Czech and international astronomy and generally science and its dissemination was received from Václav Pačes by Jiří Grygar.

Category of Scientific Employee

RNDr. Jaroslav Stejskal, CSc.

Institute of Macromolecular Chemistry of the ASCR for outstanding results in the area of the research of conductive polymers

Prof. Dr. Petr Čornej, DrSc.

Literary Academy of J. Škvorecký for exceptional research contribution to Czech historiography

Category of Young Scientific Employee

RNDr. Jan Veselý, Ph.D.

Přírodovědecká fakulta UK in Prague for the development of new chemical transformation with the aid of organocatalysis

Mgr. Otakar Frank, Ph.D.

J. Heyrovský Institute of Physical Chemistry for a fundamental study of the mechanical deformation of graphene



18th General Assembly of the Learned Society of the Czech Republic: The Award of the Learned Society of the CR in the category of secondary-school student was received in the Great Hall of the Karolinum on 14 May 2012 from Václav Pačes by Terezie Svobodová.

Award for Pedagogues

RNDr. Jana Dobroruková

Gymnázium Dvůr Králové nad Labem

Mgr. Miroslav Stulák

Gymnázium Cheb
Collective of employees

Mgr. Petr Cígler, Ph.D.

Institute of Organic Chemistry and Biochemistry of the ASCR

RNDr. Petr Holzhauser, Ph.D.

Institute of Chemical Technology in Prague

RNDr. Michal Kolář

Institute of Organic Chemistry and Biochemistry of the ASCR

Doc. RNDr. Jan Kotek

Faculty of Science of Charles University in Prague

RNDr. Tomáš Kubař, Ph.D.

Institut für Physikalische Chemie, Karlsruher Institut für Technologie, Germany

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Bc. Luděk Míka

Faculty of Science of Charles University in Prague

Doc. RNDr. Petr Slavíček

Institute of Chemical Technology in Prague

In the category of 'secondary-school student', a total of ten awards were issued.

Medals were awarded to **Jiří Grygar** (Institute of Physics of the ASCR) for contribution to Czech and international astronomy and generally science and its dissemination; further to **Martin Hilský** (Faculty of Arts and Philosophy of Charles University) for his scientific, translation and teaching activities.

APPENDIX 11



Doc. RNDr. Lubomír Hrouda, CSc., President of the Czech Botanical Society.



Prof. MUDr. Ivo Hána, CSc., President of the Council of Scientific Societies of the CR.

Appendix 11

The Council of Scientific Societies of the CR and the Scientific Societies Associated within It

The Council of Scientific Societies of the Czech Republic (CSSCR) is an independent, not-for-profit, voluntary association of scientific societies active in the Czech Republic, constituted for the formulation, implementation and advocacy of the interests of its scientific societies as well as science as a whole, for the support of their activities and mutual cooperation. It works in connection with and with the support of the ASCR. In 2012, it associated 75 scientific societies with more than 25,000 members – experts, students as well as people interested in science. The orientations move from basic research all the way to application and technical directions. Through their activities, the CSSCR and the scientific societies associated in it fulfil an irreplaceable role in the support of science and its applications and hence complement and broaden the activity of the ASCR in a number of directions, particularly in its popularisation activities.

In 2012, the CSSCR with its scientific societies focused on strengthening the support of science in the CR also in areas where neither public nor non-public scientific and research institutes are active. It advanced the interest in knowledge and development of science and technology, which is not

always sufficiently applied in areas where commercial interests, industry, financial investment, political influences and social pressures dominate. Information on the activities of the CSSCR and the societies associated in it are published at the websites <http://www.cas.cz/rvs> and <http://rvs.paleontologie.cz>.

The spectrum of the activities implemented in 2012 was very broad. The societies themselves or with the support or direct participation of the CSSCR organised and co-organised a total of 244 international and national congresses, conferences and seminars, of which 81 were joint Czech-Slovak events.

The societies actively supported instruction at elementary, secondary and tertiary schools through a total of 1,197 events of the type of mathematical, chemical, natural-science or astronomical students' Olympiad contests, field courses for secondary-school and university students, doctoral-candidate seminars, preparatory courses for doctoral study and other competitions. They participated in the creation of teaching materials, textbooks as well as legal norms. They presented a total of 30 awards to significant personalities of scientific fields or talented young researchers as recognition of their outstanding work. The scientific societies associated in the CSSCR also significantly represented Czech science at the international level. The socie-

APPENDIX 11

ties themselves as well as through their members are involved in the activities of 114 international organisations, which is allowed particularly by the financial support of the ASCR. A number of the representatives of our societies are at the same time members of the steering bodies of these associations.

A no less important element of the activities of the majority of the societies is their publication activity. For dozens of years, scientific societies have often issued not only a number of very important journals but also non-periodical publications. In 2012, they issued or participated in the publication of 28 internationally distinguished journals and 86 national journals and bulletins, of which four are high-impact and 20 are included in the RIV (Register of Research Plans) database. In the absolute majority, the journals issued fulfil an irreplaceable role in mediating the current research results to the wider specialised public, in providing information on the activities of the societies and on interesting domestic and foreign events, seminars, congresses etc. There were also 197 conference proceedings, books or other non-periodical publications issued.

The centre of the activity of the majority of the societies, however, lies in their lecture, popularisation and other societal, often interdisciplinary activities. In 2012, the societies organised 1,199 lectures, excursions or seminars and dozens of media inputs and broadcasts, which stimulate the interest of the public and particularly students in scientific work and support also the application of new information.

A significant activity of the societies of the CSSCR is also the creation and accessibility of their internet pages. The absolute majority of the societies administer their own websites, which contain a great deal of important information not only for those interested in scientific research but also for the media. In 2012, the CSSCR evaluated and in opponent proceedings approved a total of 115 applications for the provision of a subsidy from the ASCR for projects of scientific societies. Subsidies from the ASCR allow the societies to expand their publication as well as lecture activities considerably. Within Science and Technology Week 2012, the CSSCR organised lectures for secondary-school students and the Czech Botanical Society prepared and exhibition for the 100th anniversary of its foundation – Botany Known Unknown.

Based on the above overview of the activities provided for 2012, it is possible to state that the CSSCR and the scientific societies associated in it through their activities fulfil their important role for Czech society. They thus distinctly improve not only the interest in science but assist also research itself, knowledge, and the attainment of excellence.

APPENDIX 12

Appendix 12

Annual Report of the Academy of Sciences of the Czech Republic on the Provision of Information according to Act No. 106/1999 Coll., on Free Access to Information, as Subsequently Amended, for the Period from 1 January to 31 December 2012

a) Number of requests for information filed	5
Number of decisions issued to dismiss the request	0
b) Number of appeals submitted against the decision to dismiss the request	0
c) Number of court judgments on the review of the legality of the request dismissal	0
d) Number of exclusive licences granted	0
e) Number of complaints submitted according to Section 16a of the Act	0



APPENDIX 14

Appendix 14 Regional Distribution of the Workplaces of the ASCR



- 1st Section
- 2nd Section
- 3rd Section
- 4th Section
- 5th Section
- 6th Section
- 7th Section
- 8th Section
- 9th Section
- Centre for Administration and Operations

LIST OF ACRONYMS USED

List of Acronyms Used

Acronym Name of the Workplace, or Section

S1	Section of Mathematics, Physics and Information Science	S5	Section of Biological and Medical Sciences
ASÚ	Astronomical Institute of the ASCR, v. v. i.	BFÚ	Institute of Biophysics of the ASCR, v. v. i.
FZÚ	Institute of Physics of the ASCR, v. v. i.	BTÚ	Institute of Biotechnology of the ASCR, v. v. i.
MÚ	Institute of Mathematics of the ASCR, v. v. i.	FGÚ	Institute of Physiology of the ASCR, v. v. i.
ÚI	Institute of Computer Science of the ASCR, v. v. i.	MBÚ	Institute of Microbiology of the ASCR, v. v. i.
ÚJF	Nuclear Physics Institute of the ASCR, v. v. i.	ÚEB	Institute of Experimental Botany of the ASCR, v. v. i.
ÚTIA	Institute of Information Theory and Automation of the ASCR, v. v. i.	ÚEM	Institute of Experimental Medicine of the ASCR, v. v. i.
		ÚMG	Institute of Molecular Genetics of the ASCR, v. v. i.
S2	Section of Applied Physics	ÚŽFG	Institute of Animal Physiology and Genetics of the ASCR, v. v. i.
ÚFE	Institute of Photonics and Electronics of the ASCR, v. v. i.	S6	Section of Biological-Ecological Sciences
ÚFM	Institute of Physics of Materials of the ASCR, v. v. i.	BC	Biology Centre of the ASCR, v. v. i.
ÚFP	Institute of Plasma Physics of the ASCR, v. v. i.	BÚ	Institute of Botany of the ASCR, v. v. i.
ÚH	Institute of Hydrodynamics of the ASCR, v. v. i.	CVGZ	Global Change Research Centre of the ASCR, v. v. i.
ÚPT	Institute of Scientific Instruments of the ASCR, v. v. i.	ÚBO	Institute of Vertebrate Biology of the ASCR, v. v. i.
ÚTAM	Institute of Theoretical and Applied Mechanics of the ASCR, v. v. i.	S7	Section of Social-Economic Sciences
ÚT	Institute of Thermomechanics of the ASCR, v. v. i.	KNAV	Library of the ASCR, v. v. i.
		NHÚ	Economics Institute of the ASCR, v. v. i.
S3	Section of Earth Sciences	PSÚ	Institute of Psychology of the ASCR, v. v. i.
GFÚ	Institute of Geophysics of the ASCR, v. v. i.	SOÚ	Institute of Sociology of the ASCR, v. v. i.
GLÚ	Institute of Geology of the ASCR, v. v. i.	ÚSP	Institute of State and Law of the ASCR, v. v. i.
ÚFA	Institute of Atmospheric Physics of the ASCR, v. v. i.	S8	Section of Historical Sciences
ÚGN	Institute of Geonics of the ASCR, v. v. i.	ARÚB	Institute of Archaeology of the ASCR, Brno, v. v. i.
ÚSMH	Institute of Rock Science and Mechanics of the ASCR, v. v. i.	ARÚ	Institute of Archaeology of the ASCR, Praha, v. v. i.
		HÚ	Institute of History of the ASCR, v. v. i.
S4	Section of Chemical Sciences	MÚA	Masaryk Institute and Archive of the ASCR, v. v. i.
ÚIACH	Institute of Analytic Chemistry of the ASCR, v. v. i.	ÚDU	Institute of Art History of the ASCR, v. v. i.
ÚACH	Institute of Inorganic Chemistry of the ASCR, v. v. i.	ÚSD	Institute for Contemporary History of the ASCR, v. v. i.
ÚFCH JH	J. Heyrovský Institute of Physical Chemistry of the ASCR, v. v. i.	S9	Section of the Humanities and Philological Sciences
ÚCHP	Institute of the Fundamentals of Chemical Processes of the ASCR, v. v. i.	EÚ	Institute of Ethnology of the ASCR, v. v. i.
ÚMCH	Institute of Macromolecular Chemistry of the ASCR, v. v. i.	FLÚ	Institute of Philosophy of the ASCR, v. v. i.
ÚOCHB	Institute of Organic Chemistry and Biochemistry of the ASCR, v. v. i.	OÚ	Oriental Institute of the ASCR, v. v. i.
		SLÚ	Institute of Slavonic Studies of the ASCR, v. v. i.
		ÚČL	Institute for Czech Literature of the ASCR, v. v. i.
		ÚJČ	Institute of the Czech Language of the ASCR, v. v. i.
		KAV	Head Office of the ASCR
		SSČ	Centre for Administration and Operations of the ASCR, v. v. i.

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