Questionnaire
Summary of the main activities of a research institute of the Slovak Academy of Sciences

Period: January 1, 2012 - December 31, 2015

1. Basic information on the institute:

1.1. Legal name and address

Institute of Experimental Physics SAS (IEP SAS)
(Ústav experimentálnej fyziky SAV (ÚEF SAV))
Watsonova 47
040 01 Košice
Slovenská republika

1.2. URL of the institute web site

http://uef.saske.sk/

1.3. Executive body of the institute and its composition

Directoriat	Name	Age	Years in the position
Director	Peter Kopčanský	60	1990 - 2006, since 2015
Deputy director	Alena Juríková	49	since 2011
Scientific secretary	Pavol Szabó	48	since 2011

1.4. Head of the Scientific Board

Pavol Farkašovský, age 53, since 2015

1.5. Basic information on the research personnel

1.5.1. Number of employees with university degrees (PhD students included) engaged in research projects, their full time equivalent work capacity (FTE) in 2012, 2013, 2014, 2015, and average number of employees in the assessment period

	2012		2013		2014		2015		total		
	number	FTE	number	FTE	number	FTE	number	FTE	number	averaged number per year	averaged FTE
Number of employees with university degrees	104,0	77,630	111,0	78,730	114,0	81,420	114,0	85,410	**443,0**	**110,8**	**80,798**
Number of PhD students	19,0	14,500	22,0	16,000	21,0	17,050	17,0	14,850	**79,0**	**19,8**	**15,600**
Total number	123,0	118,500	137,0	133,000	135,0	98,470	131,0	100,260	**522,0**	**130,5**	**96,398**

1.5.2. Institute units/departments and their FTE employees with university degrees engaged in research and development

Research staff	2012		2013		2014		2015		average	
	No.	FTE	No.	FTE	No.	FTE	No.	FTE	No.	FTE
Organisation in whole	104,0	77,630	111,0	78,730	114,0	81,420	114,0	85,410	**110,8**	**80,798**
Department of Low Temperature physics	13,0	10,120	13,0	10,030	16,0	11,340	14,0	12,270	**14,0**	**10,940**
Laboratory of Materials Physics	8,0	6,010	8,0	6,680	8,0	7,010	7,0	6,770	**7,8**	**6,618**
Department of Metal Physics	3,0	3,000	3,0	2,820	3,0	2,350	3,0	2,500	**3,0**	**2,668**
Laboratory of Nanomaterials and Applied Magnetism	4,0	4,000	4,0	4,000	4,0	4,000	4,0	4,000	**4,0**	**4,000**
Department of Magnetism	21,0	18,310	23,0	20,200	26,0	21,220	25,0	19,000	**23,8**	**19,683**
Department of Biophysics	13,0	10,230	16,0	11,850	18,0	12,420	18,0	12,110	**16,3**	**11,653**
Laboratory of Experimental Chemical Physics	6,0	3,200	5,0	2,750	3,0	3,000	3,0	3,000	**4,3**	**2,988**
Department of Theoretical Physics	17,0	10,400	19,0	8,980	19,0	9,000	21,0	9,690	**19,0**	**9,518**
Department of Space Physics	14,0	10,150	14,0	10,430	12,0	10,060	11,0	10,050	**12,8**	**10,173**
Department of Subnuclear Physics	12,0	8,510	15,0	8,490	14,0	8,820	15,0	10,520	**14,0**	**9,085**

1.6. Basic information on the funding of the institute

Institutional salary budget and others salary budget

Salary budget	2012	2013	2014	2015	average
Institutional Salary budget *[thousands of EUR]*	1 080,000	1 093,000	1 088,000	1 104,000	**1091,250**
Other Salary budget *[thousands of EUR]*	329,000	314,000	309,000	339,000	**322,750**

1.7. Mission Statement of the Institute as presented in the Foundation Charter

The areas of interest at the Institute of Experimental Physics (IEP) include, but are not limited to, basic research in condensed matter physics, sub-nuclear physics, space physics, biophysics as well as in selected areas of chemical, biological sciences, and nanotechnolgies.

In the field of condensed matter physics studies on transport, optical, thermal, mechanical and magnetic properties of condensed matter (metallic materials, superconductors, quantum liquids, magnetic fluids, molecule-based magnets, nano structures, *etc.*) are carried out at the IEP with the premise to elucidate and understand the magnetic properties from atomic to microscopic levels and properties of the matter at very low temperatures.

In the area of sub-nuclear physics, the researchers from IEP actively participate in experimental projects carried out at leading particle physics laboratories (for example, CERN Geneva, CDF, Switzerland).

In the field of space physics, IEP scientists perform studies on the energy distribution of space particles and space radiation in measurements carried out on space satellites as well as on land observatories (especially at Lomnicky stit in High Tatras Mountains, Slovakia).

The interests of the biophysical research groups include, but are not limited to, study of the structure, conformation and dynamics of biological macromolecules, their intra- and inter molecular interactions and other physical forces leading to self assemblies, aggregation and transport phenomena, thus helping to understand the physics behind many diseases.

The research carried out by the members of the theoretical physics department is focused mainly on non-linear stochastic dynamics in addition to elucidating answers to questions raised by other active research areas within the Institute (as mentioned above) by employing theoretical physics.

The Institute has established and maintains production, storage and distribution of liquid helium; this facility does not only support the needs of IEP and other institutes within the Slovak Academy of Sciences, but also supply national commercial customers.

The Institute provides IT recommendations and support, expertise and securities for network/Internet services for all SAS institutes of in Košice.

The research carried out by the scientific community of the Institute is in accordance with all ethical recommendations and legal laws. Scientific results are publically disclosed at national and international level in form of abstract/poster submissions at conferences and as original research articles published in peer reviewed periodic and non-periodic journals. Intellectual properties that can lead to successful patent applications are non-disclosed and submitted to Slovak and International Patent Offices.

1.8. Summary of R&D activity pursued by the institute during the assessment period in both national and international contexts, (recommended 5 pages, max. 10 pages)

Department of Low Temperature Physics (DLTP) - Superconductors with competing orders represent a major challenge in recent condensed mater physics. Many superconductors as heavy fermions, cuprates, transition metal chalcogenides, and iron pnictides, etc. have complex phase diagram *Temperature vs. doping* that reflects the delicate balance of competing ground states that generate their unique properties. Even more remarkable is the occurrence of *superconductivity close to the quantum critical point* in these systems. The characteristic phase diagram of such quantum critical systems has a superconducting region, so called dome, whose maximum transition temperature coincides with the suppression of long-range magnetic or charge order. The DLTP has addressed by several unique experimental techniques developed in the lab three

classes of such materials. In iron pnictides where superconductivity competes with spin density waves, we continued our previous successful studies that proved for example an existence of two distinct superconducting gaps in (Ba,K)Fe_2As_2 [P. Szabó, et al., Phys. Rev. B 79, 012503 (2009) - 80 ISI]. Our recent measurements of the specific heat and the penetration depth in $Ba(Ni_xFe_{1-x})_2As_2$ single crystals has shown that pair-breaking effects are important. The observed scaling strongly suggested that those pair-breaking effects could be associated with quantum fluctuations near the three-dimensional superconducting critical points [1]. In a series of papers we studied the $SrPd_2Ge_2$ crystals which are isostructural with 122 iron pnictides. Our subKelvin scanning tunnelling spectroscopy (STM) developed in Košice and combined with ARPES experiment (Berlin) and density functional calculation (Dresden) have shown that despite the multiband character similar to pnictides the absence of iron ion and SDW in $SrPd_2Ge_2$ cause that the superconductivity is conventional [2, 3]. In addition, the STM provided a textbook example of *s*-wave superconducting density of states and also the vortex lattice has been detected. In the copper doped $TiSe_2$ the superconductivity occurs together with the charge density waves (CDW). By a combined studies of subKelvin STM and ac calorimetry we have shown that superconductivity and CDW coexist to much higher copper doping that it was extrapolated from previous studies. The superconductivity has a BCS character with a single s-wave gap for all dopings from underdoped to overdoped regime [4]. The recent Hall-probe magnetization studies discovered a strong lock-in effect of the vortex lattice in the basal planes indicating a possible modulation of the order parameter along the c-axis. The results on copper doped $TiSe_2$ have been presented as invited lectures at several important conferences, including International Conference of Superconductivity and Magnetism, Fethyie 2016 and Superstripes, Ischia 2016. We also have investigated several superconductors close to the transition to insulating state. In the intrinsic insulators of silicon and diamond superconductivity is induced by boron doping. Thickness dependence of the superconducting critical temperature in heavily doped Si:B epilayers have been studied in [5]. The influence of high pressure on superconductivity of thin Nb films has been studied [6]. In YB_6 we have shown, that the low energy Y phonon mode near 8 meV energy is responsible for the superconducting coupling [7]. In the same system we studied a suppression of superconductivity by pressures up to 32 GPa via resistive, magnetization and X-ray measurements. The softening of the phonon mode responsible for superconductivity was observed and compared with theory [8]. We have started a new project focusing on the superconductor-insulator transition (SIT) in homogeneously disordered ultrathin superconducting films. These studies are aimed to better understanding of this transition by the probe with atomic resolution (STM/STS providing local disorder and DOS maps) combined with dc and GHz transport measurements. The first results indicating the fermionic mechanism of SIT and a strong pair-breaking effect have been obtained [9]. In **superfluid 3He-B** at zero temperature limit, there is a possibility to create a state with extremely long-lived coherent spin precession known as persistent precessing domain (PPD). This unique statue is described in terms of a Bose-Einstein condensate of magnons and in terms of Q-balls in the field theory. We have experimentally investigated the properties of the PPDs over a broad temperature range. The results were compared with our theoretical predictions for the spin-wave models including processes of the energy dissipation, where we have suggested and discussed various mechanisms. However, surprisingly, we have found that at ultra low temperatures and at certain conditions a dissipation mechanism associated with the surface dominates [10]. We have developed a complex theory of the collective oscillations modes on homegeneously precessing domain (HPD) in superfluid 3He-B which we have confirmed experimentally. We have showed that the presence of high frequency excitation field used to excite the HPD lifts the degeneracy of the precessing state with respect to the phase of the precession, that it violates U(1) symmetry of the magnon condensate, and any former Goldstone oscillation modes of the HPD become non-Goldstone ones, as they acquire the energy gap (or “mass”) in their spectrum [11]. In order to increase the sensitivity of the electrical current measurements of various types of pizza-resonators in vacuum and in quantum fluids at low temperatures we have designed and made a special current-to-voltage converter with broad freuqency bandwidth and adjustable gain [12]. **Strongly correlated electron systems:** an interesting problem is related with the question whether SmB_6 can be considered as a topological Kondo insulator, the first strongly correlated electron system to exhibit topological surface conduction states. In our contribution [13] results of electrical resistivity measurements between 10 K and 0.04 K of various SmB_6 single crystalline samples were analyzed. The results imply that the residual conductivity of SmB_6 below about 4 K is of non-activated (metallic-like) nature, and that this metallic-like behavior can be

attributed both to surface (2D) conduction states, as may be expected in case of a topological insulator, as well as to the highly correlated many-body (3D) bulk ground state which is formed within the gap of this compound. Overall, this suggests, that in SmB_6 in addition to surface conductivity states, there is in parallel probably also a bulk contribution to residual electrical conductivity originating from the strongly correlated electron system with valence fluctuations. The magnetoresistance $\Delta\rho/\rho$ of LuB_{12} with a various concentration of magnetic Ho-ions (model diluted magnetic compounds $Lu_{1-x}Ho_xB_{12}$) has been studied concurrently with magnetization and Hall effect investigations between 1.9 and 120 K and in magnetic field up to 80 kOe [14]. The undertaken analysis allowed us to conclude that the large negative magnetoresistance observed in the vicinity of Néel temperature is caused by scattering of charge carriers on magnetic clusters of Ho^{3+} ions, and that these clusters / nanosize regions with antiferromagnetic exchange may be considered as short-range-order domains. An alternative scenario to the Kondo-type behavior has been proposed to explain the nature of these many body states. On the other hand, also changes of the geometrically frustrated antiferromagnet HoB_{12} influenced by substitution of magnetic Ho atoms through diamagnetic Lu ions was studied [15]. In this case, in $Ho_{1-x}Lu_xB_{12}$ solid solutions, both chemical pressure and magnetic dilution take place. The above mentioned observations are strong indications for the existence of a critical point close to $x \approx 0.9$. This critical point separates the region of magnetic order and the region without ordering (ending with superconducting LuB_{12}).

Laboratory of Materials Physics (LMP) - Bulk superconductors represent a new category of superconducting materials with unique properties suitable for applications due to levitation effect of superconductor/permanent magnet couple and extremely high trapped magnetic field. The members of the LMP focused on the growth processes of REBCO bulk single-grain superconductors, the development of their microstructure in the growth process and formation of nanosize pinning centres. We are also involved in the studies of MgB2 and pnictide superconductors. Based on our experimental observation of growth of bulk $YBa_2Cu_3O_x$ (Y123) crystals with trapped Y_2BaCuO_5 (Y211) particles in the system with nominal composition $Y_{1.5}Ba_2Cu_3O_x$ (mixture of $YBa_2Cu_3O_x$ a Y_2O_3 compounds) and addition of 1 wt. % CeO_2 we optimised growth parameters for growth of high quality crystals and characterised phase and structural changes in this system during crystallization [16]. The most important contribution from this study is the explanation why the growth stops at isothermal conditions. This phenomenon has been related to the excess of copper oxide in the system, which is formed by reaction of the starting compounds, and increases in the rest of the meld during the growth of the bulk Y123 crystal [16]. Thermal analysis experiments confirmed the decrease in peritectic temperature and undercooling below the peritectic temperature. This effect finally stops the growth of the bulk Y123 crystal, while thereafter the growth of the crystal can only continue at additional undercooling of the system. Application of slow cooling from the temperature of isothermal growth allows preparation of high quality Y123 bulk crystals. Furthermore, spheroidal crystallization in the system and analysis of final microstructures formed at cooling from different isothermal temperatures were described [17]. Bulk single-grain Y123/Y211 superconductors with substitution of Cu, Y or Ba in the crystal lattice of Y123 compound were prepared in order to study chemical pinning [18]. These substitutions onto Y123 compound influence the size, volume fraction and space distribution of the pinning centres in the form of Y211 particles, as determined from the microstructure analysis by methods of polarised light microscopy, scanning electron microscopy and X-ray diffraction pattern. Magnetisation measurements confirmed that the studied substitutions led to changes in transition temperature to superconducting state and appearance of peak effect in the dependence of critical current density on magnetic field. Furthermore, we have shown that the optimum concentration of Sm dopant leads to 43 percent increase of trapped magnetic field at 77 K, which can be related to the single-atom pinning of magnetic flux lines. These results have been submitted as a patent application. The dependence of critical current density in the binary doped superconductor on the ratio of Gd/Sm has been further studied and the obtained results have been incorporated into patent application. The $GdBa_2Cu_3O_x$ single-grain superconductors doped with aluminium and silver addition have been prepared and these samples exhibited high values of trapped field at 77 K comparable with the best Gd based samples [19]. The FeSe pnictide superconductor prepared by crystallization from the melt showed presence of martensitic like athermic transformation in the system as determined by microscopic, X-ray diffraction and thermal analyses [20]. During the evaluation period, members of the LMP contributed to 20 publications in international journals registered by CC database and 9 publications registered by WOS database, 3 invited talks, international collaborations with SIT Tokyo (Japan), IFW Dresden (Germany), University of

Cambridge (UK), CNRS Grenoble (France), University of Caen (France), JT University Shanghai (PRC), NCK University Tainan (Taiwan), KAERI Daejeon (South Korea) and participation in Centre

Department of Metal Physics

Processes of low temperature plastic deformation and failure are the major scientific interest, with focused on the specific behaviour of amorphous and nanocrystalline alloys prepared by intensive plastic deformation. The study of plastic deformation and failure of nanocrystalline Pd-10 at.% Au alloy with the average grain size of 14 nm loaded at uniaxial tension in the wide temperature interval from 4,2 to 300 K showed, that with the decreasing the grain size from 10 um to 14 nm the strength increases by the factor of 4,7-6,4 [21]. It was concluded that the local shearing at the grain boundaries is the micromechanism responsible for the strength increase. The failure is macroscopic brittle, but at microscopic level the ductile mechanism of plastic deformation is in the analogy to failure mechanisms in amorphous metals [21]. Some peculiarities of the failure of high strength metallic glasses were described using the fractographic analysis. The length of periodic corrugation was connected with the accelerated crack tip propagation velocity. The structural changes of the powder material at solidification in the wide range of cooling rates were described using thermoanalytical methods in collaboration with University of Groningen. Based on obtained result the structure after solidification at extended heating rates used in laser ablation technology was predicted [22]. The thermal analysis of magnetic nanoparticles modified with PEG polymers with different molecular weight showed that the increase of feed PEG/magnetite ratio leads to the increase of adsorbed amount of PEG up to the maximal value for a given MFPEG system. The increasing PEG molecular weight tends to a decrease in maximal PEG amount adsorbed on magnetic nanoparticles. *In vitro* toxicity of the magnetic fluids on cells from mouse skin cancer lines (B16) were tested in order to assess the biocompatibility of the prepared magnetic fluids [23]. Many of the project described above were performed in collaborations with the Institute of Low Temperature Physics Kharkov (Ukraine).

The research activities of **Laboratory of Nanomaterials and Applied Magnetism** (LNAM) were closely connected with the participation in the project “Small energy harvester based on magnetostrictive amorphous and nanocrystalline materials” (STREAM) supported by 7-fp EU program MNT-ERANET II, (2012–2014) and with solving several domestic projects. The most important results can be summarized as follows (i) A multilayer core based on glued together pieces of $Fe_{73.5}Si_{13.5}B_9Nb_3Cu_1$ nanocrystalline soft magnetic ribbons was implemented to build the coil for an electromagnetic energy harvesting device with superior characteristics (voltage and power) compared to piezoelectric or pure magnetostrictive devices. Two different configurations were realized and tested for the energy harvester: vibrating core and vibrating magnets. The highest power density achieved for our harvesters using nanocrystalline ribbons is 45 mW/cm^3 at 1 g (resonant frequency 47 Hz) and seems to be among the highest reported in literature [24]. (ii) The functional properties of HITPERM-type soft magnetic nanocrystalline alloys were tailored for potential applications by thermal processing in external magnetic field. Samples in different structural stages were prepared by varying the parameters of thermomagnetic treatment (temperature, time, intensity and orientation of magnetic field). The highest sensitivity of magnetic characteristics to the field annealing was observed in HITPERM alloys with approx. equal concentration of Fe and Co atoms. This suggests an important role of directional ordering of magnetic atoms in development of induced anisotropy. Addition of Cu to Nb-containing Hitperm-type alloys is a key factor to refine the microstructure in order to reach very low coercivity values. Annealing in a transverse magnetic field produces samples with sheared hysteresis loops suitable for sensor and high frequency applications. [25]. (iii) An adjusted temper rolling process was used for development of particular textures in non-oriented (NO) FeSi steels. The main idea behind the improvement of soft magnetic properties relies on deformation induced grain growth and heat transport phenomena, promoting the preferable formation of columnar grains with pronounced intensity of rotating cube and Goss texture components during a dynamic final annealing. The obtained microstructural and textural state of sample leads to a significant reduction of coercivity and low losses [26]. In the case of grain oriented (GO) FeSi steels we have utilized a novel approach for the abnormal growth of Goss grains that employs the system of VC nano-precipitates in combination with a phenomenon of the deformation induced grain growth [27] (iv) The FINEMET-type soft magnetic FeCuNbSiB/FeNbSiB bilayer ribbons were prepared by novel double-nozzle melt-spinning technique and subsequently annealed to produce a composite with a tailored nano/micro-crystalline structure. The overall magnetic behaviour of this composite was characterized by butterfly high field hysteresis loops and positively biased low field ones. In order

to separate the global magnetic behavior of the bilayer into the individual contributions of each layer, we performed FORC analysis which enabled distinctly identify two phases, of ultrasoft and soft magnetic nature, whose mutual predominant interaction is the magnetostatic coupling [28].

Department of Magnetism In the **Centre of Nanofluids m**agnetic fluids (MF) were the focus of three areas of research: biomedical application, composite of MF and liquid crystal (ferronematics) and MF for technical applications. In the field of biomedical application, we prepared spherical magnetic nanoparticles (MNPs) of different sizes coated with different surfactants and consequently modified with biocompatible materials and characterized by standard and various modern techniques like small-angle X-ray (SAXS) and neutron (SANS) scattering [29]. The effect of nanoparticles sizes and coating with different surfactants and modifying agents on self-assembly structures with proteins (protein amyloid aggregation) were investigated with the aim to identify nanoparticles able to affect formation of amyloid aggregation [30, 31, 32]. Promising results were obtained for encapsulation of aliskiren, an antihypertensive drug to poly-L-lactide nanospheres. *In vivo* experiments have indicated that encapsulated aliskiren decreased blood pressure in male hypersensitive rats significantly compared to commonly administered drug [28]. An important parameter for application of magnetic nanoparticles in medicine is their toxicity, therefore we investigated the cytotoxicity of differently coated of magnetite nanoparticles [33]. For the prepared nanoparticles under study, we observed no significant toxic effect on chinese hamster lung fibroblast cell line V79, while there was a substantial toxicity in mouse melanoma B16 cell line [34]. The effect of magnetoferitin (size of ~ 12nm, synthetic derivative of ferritin, iron storage protein) on nanoparticles was studied and partial shell destruction depending on the iron core presence was confirmed by SANS and SAXS [35]. Internal structures of magnetoferitin and its applicability to diagnosis of neurodegenerative diseases like Alzheimer were analyzed by magneto-optical measurements [36]. Furthermore, the peroxidase-like activity of magnetoferritin was confirmed to depend upon iron content [37]. Feromagnetics are fluids with a large magnetic susceptibility obtained by mix nano-sized magnetic particles with nematic liquid crystals. We have theoretically and experimentally investigated structural transitions (so called Fredericksz transitions) of feromagnets [38]. Structural changes depend on the host liquid crystal, and on the shape, size and concentration of the magnetic particles. A linear magnetodielectric response has been detected in these systems up to low magnetic field [39,40]. Also we have shown that the isotropic-nematic phase transition of ferronematics may be influenced by different shape anisotropy as well as volume concentration of magnetic nanoparticles [41,42]. Behaviour of these systems in the presence of very small magnetic field opens the doors towards application possibilities such as low magnetic field sensors or basic logical elements for information storage technologies.

The research in field of transformer oil based magnetic fluids focused on enhancing the cooling and insulating properties of transformer oils. The prepared magnetic fluids were tested by measuring electrical breakdown field strength, partial discharge activity, electrical conductivity, permittivity, heat capacity *etc*. The presence of the nanoparticles enhanced the cooling and insulating properties of the oil, while the particle interfaces trap the free space charge, often represented by dissociated water, residual ions or even free electrons from the field ionization as determined by dielectric spectroscopy [43]. Strong indication of interparticle interactions and a reversible aggregate formation induced by the electric field are implied by the relaxation results [44]. Furthermore, nanoparticles form anisotropic structures greater than 300 nm as determined by SANS [45]. The well-known aggregation in magnetic fields was studied by acoustical methods [46,47]. Applied pressure was used as a testing tool for the study of magnetostructural correlations in magnetic sponges. Magnetic sponges belong to the family of multifunctional molecular magnets, where reversible dehydration in two steps is observed depending on temperature. In the case of $\{[Mn^{II}(pydz)(H_2O)_2][Mn^{II}(H_2O)_2][Nb^{IV}(CN)_8]3H_2O\}_n$ is dehydration process accompanied by local changes in the structure followed by the change of magnetic properties. In order to understand magnetic interactions in both systems, as prepared and dehydrated compounds, we studied magnetic properties, including magnetic phase transitions at atmospheric and high hydrostatic pressures, critical exponents and magnetocaloric effect. We have shown, that dehydration induced change in magnetic properties is of the same character as the one induced by applying external pressure [48,49,50]. In the field of manganites we have shown the possibility of tuning magnetic properties of $NdMn_{1-x}Fe_xO_3$ system by substitution of Fe on Mn sites [51]. Additionally, results of a systematic study of nonequilibrium dynamics in a strongly interacting super spin glass (SSG) nanoparticle La0.7Ca0.3MnO3 system by alternating current (ac) susceptibility measurements were shown in. Cole–Cole analysis of the obtained data

revealed the simultaneous existence of two separated relaxation processes, which were assigned to the relaxation of different magnetic entities. Along with the expected relaxation of the collective SSG phase, the existence of individual, nonagglomerated particles, which do not take part in the collective phase and relax independently, was proposed. A full dynamical scaling analysis was performed in order to elucidate the nature of the transition to a low-temperature SSG state in the interacting La0.7Ca0.3MnO3 nanoparticle sample. Important achievement in the field of electrical transport and tunnelling phenomena represents the proposition of the original model of valence-fluctuation induced hopping transport. The model explains the origin of metallic-like conduction of SmB_6 at lowest temperatures and indicates enhanced surface conduction [52]. Thus, it is agreement with experimental observations attempting to prove the existence of topologically protected surface state in SmB_6. Another result in this field provides evidence for the formation of mixed magnetic structure in $EuB_{5.99}C_{0.01}$ [53], thus supporting the previously proposed scenario of the magnetoresistance enhancement.

Department of Biophysics The main aim of this department is interdisciplinary research which encompasses experimental and theoretical studies of biomacromolecules and their models using biophysical methods. An example of current area of study is specific aggregation of proteins into amyloid fibrils which significantly affects the properties of poly/peptides and is associated with pathogenesis of currently incurable amyloid-related diseases in addition to imposing serious restriction in pharmaceutical utilization of proteins. Systems under study include amyloid aggregation of Aβ peptide associated with Alzheimer's disease, lysozyme involved in systemic lysozyme amyloidosis and insulin, which injection may lead to localized amyloidosis in diabetic patients. Polymorphism of amyloid fibrils is potentially crucial, as it may underlie the natural variability of amyloid diseases and could be important for understanding of the molecular basis of amyloid-related disorders. We have characterized the structural characteristics of amyloid fibrils formed under different experimental conditions. Analysis of the fibril morphology confirmed the structural diversity of the formed assemblies (in diameter and length of fibrils and the height of assembled bundles) [54]. This suggested that polymorphism occurs at the molecular level and it is caused by different alignments of lysozyme molecules within amyloid structure and content of beta-sheets in mature fibrils. The morphological differences of formed lysozyme fibrils have impact on their cytotoxicity [54]. Helical arrangement of lysozyme molecules in amyloid fibrils with defined parameters (diameter of molecules, pitch and diameter of fibril) were proposed based on experimental data and theoretical models. Furthermore, when the effect of Hofmeister anions on structural and morphological properties of the lysozyme amyloid fibrils was explored, it was found that type of the anion and its position in the Hofmeister series determined stability and the structure of the native lysozyme, kinetic of the fibril formation and morphology of amyloid fibrils. The efficiency of monovalent anions to accelerate fibrillization correlated with inverse Hofmeister series [55]. Amyloid aggregation of proteins *in vitro* and in the samples of the cerebrospinal fluid of the people with amyloid-related disease containing the protein aggregates formed *in vivo* were studied with the premise of identifying new approaches which would allow detection of Alzheimer's disease at an early stage. Concurrently we performed studies with the focus to identify compounds which would effectively inhibit amyloid self-assembly of proteins, thus could be used as lead candidates for the development of drugs for amyloid-related diseases. Using *in vitro* and *in silico* methods we have found small molecules (glyco-acridines, polyphenols, tripeptides) with high ability to inhibit protein amyloid aggregation. We have identified interactions responsible for the inhibitory effect as well as the relationship between the structure of small molecules and their anti-amyloid activity [56]. Nanoparticles were also analyzed for their ability to inhibit amyloid-formation and it was observed that the efficiency was affected by their physico-chemical properties. The most effective anti-amyloid activities were observed for magnetite nanoparticles modified by albumin [30], glutathione-covered gold nanoparticles [57] and magnetoferritine. We studied the fraction area of elastin, collagen and smooth muscle in porcine aorta which were estimated using quantitative histology and stereology in samples collected from five different segments of aorta. The results are suitable for planning further experiments and biomechanical modelling [58]. Immunoglobulin G (IgG) and its variants were subjects of the mathematical model of irreversible thermal denaturation, thereby allowing studying the effects of local mutations on the kinetic and thermodynamic stability. The IgG stability influences its production, storage and usability [59]. In the last four years we have continued to focus our attention on investigation of the role of protein-lipid interactions on mitochondrial electron transfer complexes and oxidative stress. This topic was described in our Review paper [60]. In our original manuscripts we have also demonstrated the effect of bound

phospholipids on proton transport activity and stability of mitochondrial Complex IV. Cardiolipin peroxidation and its effect on ferrocytochrome c disruption were revealed. Our effort was also concerned in the characterization of crowding and salt effects in protein solutions [61]. We proposed new method for structural characterization of unfolded proteins in the presence of novel biocompatible ionic liquids [62] and developed novel methods for preparing metal nanoparticles (Au, Ag, ZnO, Fe_3O_4, CuO) covered by various organic compounds, which were characterized by studies of their capability to create unique composites with biomolecules [63] or various organic molecules with advanced properties. The above mentioned studies could trigger novel applications, for example for magnetic composites serving as useful affinity matrices in the field of the separation technology or ZnO/CuO composites serving as novel sensors for amino acid detection. We also proposed a possible therapeutic way for detection of amyloid aggregates. The interests of our group also include preparation of biocompatible composite systems and characterization of their properties, *e.g.* organic molecular magnets, carbon composites with polymers and graphene/CuO composites for electrochemistry. In the previous period we also investigated the conversion of the photon into chemical energy in photosynthetic reaction centres. The study was focused on the efficiency of this conversion which is very high. The carbon nanoparticles were also studied. There is possibility to use such particles in the field as spintronic or phototronic [64]. Image analysis in biomedicine one of the research venues pursued in the department with activities converged into three main areas: a) Micromanipulation. Holographic Raman Tweezers (HRT) are able to manipulate individual microscopic particles by several laser traps controlled researcher through sequential mouse clicks. The goal was to control laser traps in parallel by fingertips of a hand captured by a special sensor (Leap Motion). This allows advanced modes of operation like *e.g.* indirect manipulation, fusion, Whispering Gallery Mode (WGM) mode, and more. Furthermore, hand tracking was supplied with other forms of Natural User Interface (NUI) like gaze tracking, voice and gesture recognition [65]. b) Biomechanical measurements. We participated in several experiments where the results of image analysis were correlated with the direct physiological measurements [66]. c) Image analysis of microscopic particles. The size distributions of magnetosomes obtained from SEM/TEM microscopes were calculated.

Two themes were elaborated in the **Laboratory of Experimental Chemical Physics** with combined basic research/applied research outcomes. The first theme concerned a new strategy for the preparation of nanoparticles by a bottom-up approach, namely by self-assembly of thermoresponsive and pH-responsive ionic polymers. The uniqueness is that this methodology allows to to build nanoparticles from homopolymers of one type only for the first time. Up to now, polymeric nanoparticles were prepared by self-assembly of copolymers or by self-assembly of mixtures of homopolymers. A peculiarity of our approach is that we even do not need any assembly-triggering additives. The driving force for the self-assembly is variation of solvent quality (solubility) via increasing temperature while macroscopic phase separation is suppressed by surface charge on the nanoparticles. The irreversibility of the self-assembly process upon cooling solution back to ambient temperature is achieved by hydrogen bonding. Two patents on this approach were granted by the Slovak patent office (Industrial Property Office of the Slovak Republic) in the assessment period [Patent No. 287951, Patent No. 288071 – see Chapter 2.1.7]. Aside the application potential, this work has also significance in the basic research on ionic polymers and led to three publications in journals with impact factors several times higher than the median in the field, including the paper in Advances in Colloid and Interface Science with 5-year IF = 10.42 [67]. The second theme concerned mesoscale segregation in ternary and multicomponent mixtures. It was found that contrary to the classical view, the phase separation of poorly miscible components can occur at a mesoscale level (larger than molecular scale and smaller than macroscopic scale). In addition to the traditional classical concept of solubility based on mixing at molecular level, concept of mesoscale solubility can be introduced based on our results. This phenomenon can be found in a huge number of systems and, in fact, is practically found almost everywhere in real life and research practice. The reason is that pure substances practically do not exist and hence solubilization of a substance in solvent (mostly water) means in fact solubilization of several components at once: the main substance and minor components present in the main substance that can be considered as “impurities” or “contaminants”. Hydrophobic contaminants upon solubilization of the main component in water nanoseggregate, i.e. remain “soluble” in the form of a large number (typically 10^8 – 10^{10} per mililiter) of small nanodroplets or nanoparticles (sized ~ 100nm). This is interesting from the point of view of basic research [68, 69] as well as applied research. Two patent applications were submitted to the Industrial Property Office of the

Slovak Republic [Patent No. PP50002-2014, Patent No. PP50001-2015 - see Chapter 2.1.7] and one international PCT (Patent Cooperation Treaty) application was filed [No. PCT/SK2015/050002 – see Chapter 2.1.6]. These applications concerned the utilization of these pehomena for a new method for determination of content of hydrophobic compounds (contaminants) in water-miscible organic liquids. A large number of environmentally important contaminants belong to this category (such as polycyclic aromatic hydrocarbons (PACs), dioxins, polychlorinated biphenyls (PCBs), phtalates) as well as very commonly presented hydrocarbons.

Department of Theoretical Physics (DTP) The basic scientific investigations cover mainly three areas: 1) Physics of condensed matter, 2) Non-linear stochastic dynamics and 3) Phenomenology of elementary particles. Theoretical studies in the area of condensed matter physics are focused mainly on a description of cooperative phenomena in the strongly correlated electron systems, electronic properties of the graphene as well as properties of the superfluid helium 3. We have proved numerically Bose-Einstein condensation of preformed excitons in the system of strongly interacting f and d electrons with small instability represented by weak d-f hybridization [70]. We have introduced a simple, but very realistic model for a stabilization of band ferromagnetism in strongly correlated electron systems [71]. This model is based on a generalized description of electron hopping and electron interactions on a lattice within a frame of the Hubbard Hamiltonian. Instead of the usual nearest-neighbour hopping and on-site Coulomb interaction we have considered the long-range electron hopping and the long-range Coulomb interaction both with exponentially decaying amplitudes. It is shown that the simultaneous presence of both long-range mechanisms leads to the stabilization of the ferromagnetic ground state for a wide range of Coulomb interactions and electron concentrations. In particular, it is found that the long-range interaction plays the crucial role in the stabilization of the ferromagnetic state for electron concentrations $n < 1$, while the long-range hopping for $n > 1$. This opens a new route towards the understanding of band ferromagnetism in strongly correlated electrons systems. We have provided the rigorous examination of the magnetic phase transitions in the correlated spin-electron model, where the existence of interesting magnetic reentrant behaviour was detected [72]. Other activities within the physics of condensed matter are related to investigation of the electronic properties of the graphene curved structures as wormhole, perturbed nanocylinder and as well as nanocones using two different methods: the continuum gauge field-theory model that deals with the continuum approximation of the surface and the Haydock recursion method that transforms the surface into a simplier structure and deals with the nearest-neighbor interactions. The very similar analogies between the investigated structures was find [73]. It is very important for the real applications in electronic nanodevice because the size of graphene wormhole is microscopic in contrary with the perturbed nanotube which can have macroscopic size. In this context of the strain induced potential and graphene wormhole deformations, we can speak about so-called “straintronics” and their real application into nanodevices. We have investigated the influence of a weak rotating magnetic field maintaining permanent precession of a homogeneously precessing magnetic domain in the superfluid B-phase of helium 3 on the spectrum of excitations within this domain. We have found that originally gapless spectrum of volume and surface spin-precession waves acquired a gap due to the presence of above magnetic field - the excitations acquired a "mass" [11]. Within non-linear stochastic dynamics (NLSD), we investigated the influence of hydrodynamic fluctuations on the scaling regimes of the models of the stochastic dynamics using the quantum field theory methods. The integro-differential equation for the density of chemically interacting particles was derived, while the simplest spatially homogeneous solution of this equation was found, and the influence of compressibility on the stability of the asymptotic solution on large temporal scales was determined [74]. The quantum field theory methods were used to influence the compressibility of the electrically conductive turbulent environment on the anomalous scaling of the single-time two-point correlation functions of the passively advected weak magnetic field in the framework of the Kazantsev-Kraichnan model of the kinematic magnetohydrodynamic turbulence. Nontrivial dependence of the corresponding critical dimensions on the compressibility parameter was determined and it was shown that large enough compressibility of the system can lead to the violation of the standard hierarchy among anisotropic critical indices [75]. The exact solution of the antiferromagnetic spin-1/2 Ising model in the presence of the external magnetic field on the tetrahedron recursive lattice was found. The existence of the unique solution of the model for arbitrary values of the model parameters was proven and all ground states of the model were found. The existence of the so-called single-point ground states was also proven [76]. Other activities in the framework of NLSD are related to utilization of the projections of the real exchange

rate dynamics onto the string-like topology. Our approach has been inspired by the contemporary movements in the string theory. Inter-strings information transfer was analyzed as an analogy with dynamic of prices or currency at specified exchange rate options. Within the phenomenology of elementary particles we studied manifestations of nuclear effects in interactions with nuclear targets. Hadronization process after a hard collision is accompanied by an intensive gluon radiation from a parton with large transverse momentum pT. This process cannot last long, if it ends up with production of a leading hadron carrying the main fraction zh of the initial parton momentum. So energy conservation imposes severe constraints on the length scale of production of a single hadron with high pT. As a result, the main reason for hadron quenching observed in heavy ion collisions, is not energy loss, but attenuation of the produced colorless dipole in the created dense medium. The latter mechanism was calculated with the path-integral method [77] as well as within the simplified model [78] and explains well the observed suppression of light hadrons and the elliptic flow in a wide range of energies, from the lowest energy of RHIC up to LHC, and in a wide range of transverse momenta. The values of the transport coefficient extracted from data range within 1-2 GeV^2/fm, dependent on energy, and agree well with the theoretical expectations.
During the evaluation period, members of the DTP contributed to almost 60 publications in Current Contents international journals and to other 30 publications registered within the WOS database.
Department of Space Physics (DSP) participates on the preparation of international experiment JEM-EUSO (Extreme Universe Space Observatory onboard Japanese Experimental Module). The main goal of this experiment is the determination of ultrahigh energy particles (UHECR) sources. JEM-EUSO detector will observe in the next decade the Earth's atmosphere from the International Space Station (ISS). The UHECR particles generate showers of secondary particles in the atmosphere and the detector registers its light spot. JEM-EUSO collaboration is created by 16 countries, 90 institutes and 365 people at present. IEP is a member of the collaboration since the year 2008. In the frame of its activities in JEM-EUSO collaboration IEP works on two tasks. It works on the development of UV background model and processing of data registered by collaboration precursor experiments and on pattern recognition of the showers created by UHECR particles. The main result of IEP in the frame of JEM-EUSO activities is the estimation of operational efficiency of JEM-EUSO experiment. The operational efficiency of the JEM-EUSO experiment is the key part of the present main article of JEM-EUSO collaboration (Adams et al. Astroparticle Physics) [79]. DSP has a significant contribution in a work on experiment operational efficiency estimation. The operational efficiency is the time during which is the JEM-EUSO detector onboard ISS able to observe ultrahigh energy cosmic rays (UHECR events) as the part of full time on orbit. The exposure of the experiment is determined from the operational efficiency and then the number of UHECR events registered by detector is estimated. Based on the number of registered events it can be estimated the period needed for the UHECR sources finding. The operational efficiency estimation is the part of several another articles besides the main collaboration article. JEM-EUSO collaboration activities are summarized in a special edition of the journal Experimental Astronomy, Special Issue on the JEM-EUSO Mission, November 2015, Vol 40. Long term measurement of cosmic rays (CR) by neutron monitor with high statistics and temporal resolution at Lomnický štít (LŠ, 1982-2015) allowed to : describe the quasi-periodic variations of CR intensity in wide frequency range [80]; obtain relations between CR decreases (Forbush decreases), parameters of interplanetary medium and geomagnetic activity at middle latitudes [81]; find that cloudiness at LŠ may have just very weak relation to CR intensity [82]; find that particles accelerated during GLE 70 (Ground Level Events) caused the changes in VLF (Very Low Frequency) electromagnetic wave transmission between Europe and America on the night side [83]; estimate possibilities and limitations of dosimetric measurements at LŠ during changes of primary CR intensity [84]. Measurements are coninuously utilized as one of characteristics of space weather state (e.g. for estimates of radiation dose at airplane altitudes). The Department of Space Physics of Institute of Experimental Physics contributed to construction of the critical service system ESS (Electrical Support System Processor Unit) of the Rosetta space probe. The ESS system provided the separation control of the lander Philae from the main (Orbiter) probe and also provided the digital communication between them. Rosetta was launched to space on 2 March 2004 and reached the comet 67P/Churyumov-Gerasimenko after 10 years of cruise flight. On 6 August 2014 the probe performed close encounter with the comet and synchronized its orbit with the comet’s orbit. The separation of the lander Philae and its landing on the comet surface was performed on 12 November 2014. Thus the date became an important milestone in the history of cosmonautics. The ESS system performed flawlessly during the operations. In compliance with the

flight dynamics requirements, the ESS initiated the separation of Philae with velocity of 19cm/s and provided a reliable communication between the Lander and the Orbiter until total discharge of the Lander batteries and its hibernation. The data obtained by Philae are currently analysed [85].

Department of Subnuclear Physics Between 2012 and 2015 the main focus of the department activities were on the following experiments: ALICE Experiment at the CERN LHC collider (CERN Geneva, Switzerland) and ATLAS experiment at the CERN LHC collider, with decreasing emphasis on the CDF experiment at the Tevatron collider (Fermilab, Batavia, USA). The ALICE experiment at LHC concentrates mainly on nonperurbative QCD physics and studying the properties of the quark gluon plasma. Our activities towards the development and maintenance of the infrastructure were centred on the Central Trigger Processor (CTP), LHC interface and the Inner Tracking System (ITS), by being responsible for the development and running of the on-line luminosity monitoring system which provided data for the feedback to the LHC. During the second half of the first long running period our monitoring system was incorporated into the information system at the ALICE control room, with its functionality continuously enhanced. In addition to the luminosity monitoring ability, it currently provides an independent data acquisition channel that is not affected by the deadtime of major subdetectors, and has therefore been used as a data source for the measurements of the normalization cross sections during dedicated Van der Meer scans for different collision systems (p-p, p-Pb, Pb-Pb) at various LHC operating energies. Another responsibility during the data taking taking is maintenance and modernization of the Central Trigger Processor, testing of spare parts (routers for pixel detectors) and upgrades for some trigger modules. For the planned upgrade on the Inner Tracking System (ITS) we provided measurements of the transmission characteristics of connectors and cables after irradiation with simulating radiation conditions expected as working conditions for the new ITS. The physics analysis our group participates in is oriented towards the study of strange particle production at the LHC energies. We analyzed several energies provided by the p-p, p-Pb and Pb-Pb collisions by comparison of the characteristics of produced strange particles in different colliding systems, which may provide information on the conditions suitable for the formation of the quark-gluon plasma. We developed an independent analysis software for the p-Pb system, with its main purpose to cross-check of the mainstream procedures, analyze possible systematic effects, understand the sources of background and debug the “official code”. One of our most recent activity is the study of the strange baryon production in p-p collisions at 13 TeV, which is the highest energy available at LHC. The selected results were published in papers [86-90] and one ALICE analysis note. Closely related physical topic would be the study of the production of resonances, where we contributed to the analysis of p-p data at c.m.s. energy of 2.76 TeV, and developed the analysis code for data at higher energies and larger colliding systems. The ATLAS experiment at LHC is optimized to study the strong and electro-weak processes at short distances, search for new particles and discover new building blocks of matter. In this respect, our team is responsible for electronic calibration of the ATLAS Liquid Argon (LAr) calorimeters (mainly the hadronic End Cap Calorimeter HEC), which includes development of calibration and monitoring procedures software implementation, preparation of the forward-backward calorimetry for high luminosity runs, monitoring and data quality control. By careful verification of the linear response of the LAr calorimeter electronics using data from dedicated runs we were able to explain and understand some unexpected effects observed in HEC. These steps were valuable contributions to the major discovery at the LHC accelerator - the discovery of a new particle consistent with the Standard Model Higgs boson, which was the last missing piece in the theory of strong, electromagnetic and weak interactions [91-95]. The importance of this discovery is proven by about 2600 responses to the paper [91]. The discovery is based on the data accumulated during the first long data taking period that lasted from 2009 till 2013. Our research team was directly involved in the application of the KIN method for the measurement of the top quark mass. The KIN method was developed for the CDF experiment at Tevatron for the top mass measurement in the dilepton channel and required extensive computation resources provided by the LHC Grid network (about 10,000 jobs which needed 2-4 days of CPU time each). The result was compatible with analysis performed by a different method by the MPI Munich, however the systematic error was about twice as large as given by the Munich method, with the progress documented in several ATLAS internal notes.The main hardware for the ATLAS experiment was the development of a fast radiation hardened low consumption 4 channels 12 bit A/D converter to be used in new calorimeters designed for operation in very high luminosity environment (if this chip is selected for future ATLAS calorimeter, about 10,000 chips will have to

be manufactured). Several test chips were produced and their parameters confirmed the expectations. This project is carried out in collaboration with the Nevis Labs at the Columbia University, USA. Another hardware development is aimed at the measurements of the luminosity in ATLAS interaction point using the Timepix sensors, and is performed in collaboration with the Czech Technical University in Prague. The research activities connected to the CDF collaborations were slowly decreasing during the assessment period and consisted mainly of manuscripts preparations. At the end of 2015, these collaborations ceased. The computing facility for the LHC grid was constantly modernized in hardware and software. Although it is operating as a batch processing farm, a small part (60 processors) was configured for fast interactive work on large data sets as Slovak Košice Analysis Facility (SKAF). Among the 132 institutions of the ALICE collaboration, only CERN and 6 other institutes built and developed ALICE Analysis Facility (AAF's). Due to increased demand for batch processing resources, SKAF resources had to be reallocated to the batch processing by 2013.

2. Partial indicators of main activities:

2.1. Research output

2.1.1. Principal types of research output of the institute: basic research/applied research, international/regional (ratios in percentage)

Type of the research outputs:

Basic research: 90 %

Applied research: 10 %

International: 100 %

2.1.2 List of selected publications documenting the most important results of basic research. The total number of publications listed for the assessment period should not exceed the average number of employees with university degrees engaged in research projects. The principal research outputs (max. 5, including Digital Object Identifier - DOI) should be underlined

[1] RODIÉRE, P. - KLEIN, T. - LEMBERGER, L. - HASSELBACH, K. - DEMUER, A. - KAČMARČÍK, Jozef - WANG, Z.S. - LUO, H.Q. - LU, X.Y. - WEN, H. - GUCMANN, Filip - MARCENAT, C. Scaling of the physical properties in Ba(Fe,Ni)2As2 single crystals: Evidence for quantum fluctuations. In *Physical Review B*, 2012, vol. 85, no. 21, art. no. 214506. (3.691 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.

[2] KIM, T.K. - YARESKO, A.N. - ZABOLOTNYY, V.B. - KORDYUK, A.A. - EVTUSHINSKY, D.V. - SUNG, N.H. - CHO, B.K. - SAMUELY, Tomáš - SZABÓ, Pavol - RODRIGO, J.G. - PARK, T. - INOSOV, D.S. - SAMUELY, Peter - BÜCHNER, B. - BORISENKO, S.V. Conventional superconductivity in SrPd2Ge2. In *Physical Review B*, 2012, vol. 85, no. 1, art. no. 014520. (3.691 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.

[3] SAMUELY, Tomáš - SZABÓ, Pavol - PRIBULOVÁ, Zuzana - SUNG, N.H. - CHO, B.K. - KLEIN, T. - CAMBEL, Vladimír - RODRIGO, J.G. - SAMUELY, Peter. Type II superconductivity in SrPd2Ge2. In Superconductor Science and Technology, 2013, vol. 26, no. 1, art. no. 015010. (2.758 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0953-2048.

[4] KAČMARČÍK, Jozef - PRIBULOVÁ, Zuzana - PAĽUCHOVÁ, Viktória - SZABÓ, Pavol - HUSANÍKOVÁ, Petra - KARAPETROV, Goran - SAMUELY, Peter. Heat capacity of single-crystal CuxTiSe2 superconductors. In *Physical Review B*, 2013, vol. 88, no. 2, art. no. R020507. (3.767 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.

[5] GROCKOWIAK, A. - KLEIN, T. - CERCELLIER, H. - LÉVY-BERTRAND, F. - BLASE, X. - KAČMARČÍK, Jozef - KOCINIEWSKI, T. - CHIODI, F. - DÉBARRE, D. - PRUDON, G. - DUBOIS, C. - MARCENAT, C. Thickness dependence of the superconducting critical temperature in heavily doped Si:B epilayers. In *Physical Review B*, 2013, vol. 88, no. 6, art. no. 064508. (3.767 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.

[6] PRISTÁŠ, Gabriel - GABÁNI, Slavomír - GAŽO, Emil - KOMANICKÝ, Vladimír - ORENDÁČ, Matúš - YOU, Hoydoo. Influence of hydrostatic pressure on superconducting properties of niobium thin film. In Thin Solid Films, 2014, vol. 556, p. 470-474. (1.867 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0040-6090.

[7] SZABÓ, Pavol - GIROVSKÝ, Ján - PRIBULOVÁ, Zuzana - KAČMARČÍK, Jozef - MORI, Takao - SAMUELY, Peter. Point-contact spectroscopy of the phononic mechanism of superconductivity in YB6. In Superconductor Science and Technology, 2013, vol. 26, no. 4, art. no. 045019. (2.758 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0953-2048.

[8] GABÁNI, Slavomír - TAKÁČOVÁ, Iveta - PRISTÁŠ, Gabriel - GAŽO, Emil - FLACHBART, Karol - MORI, Takao - BRAITHWAITE, D. - MÍŠEK, M. - KAMENEV, K.V. - HANDFLAND, M. - SAMUELY, Peter. High-pressure effect on the superconductivity of YB6. In *Physical Review B*, 2014, vol. 90, no. 4, art. no. 045136. (3.664 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.

[9] ŽEMLIČKA, M. - NEILINGER, P. - TRGALA, M. - REHÁK, M. - MANCA, Daniel - GRAJCAR, Miroslav - SZABÓ, Pavol - SAMUELY, Peter - GAŽI, Štefan - HÜBNER, U. - VINOKUROV, V. M. - ILICHEV, E.V. Finite quasiparticle lifetime in disordered superconductors. In *Physical Review B*, 2015, vol. 92, no. 22, art. no. 224506. (3.736 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.

[10] FISHER, S.N. - PICKETT, G.R. - SKYBA, Peter - SURAMLISHVILI, N. Decay of persistent precessing domains in 3He-B at very low temperatures. In *Physical Review B*, 2012, vol. 86, no. 2, art. no. 024506. (3.691 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.

[11] KUPKA, Martin - SKYBA, Peter. BEC of magnons in superfluid 3He-B and symmetry breaking fields. In *Physical Review B*, 2012, vol. 85, no. 18, art. no. 184529. (3.691 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.

[12] HOLT, S. - SKYBA, Peter. Electrometric direct current I/V converter with wide bandwidth. In *Review of Scientific Instruments*, 2012, vol. 83, no. 6, art. no. 064703. (1.367 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0034-6748.

[13] GABÁNI, Slavomír - PRISTÁŠ, Gabriel - TAKÁČOVÁ, Iveta - SLUCHANKO, N.E. - SIEMENSMEYER, K. - SHITSEVALOVA, N.Yu. - FILIPOV, V. - FLACHBART, Karol. Surface and bulk components of electrical conductivity in (presumably special topological) Kondo insulator SmB6 at lowest temperatures. In *Solid State Sciences*, 2015, vol. 47, p. 17-20. (1.839 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 1293-2558.

[14] SLUCHANKO, N.E. - KHOROSHILOV, A.L. - ANISIMOV, M.A. - AZAREVICH, A.N. - BOGACH, A.V. - GLUSHKOV, V.V. - DEMISHEV, S.V. - KRASNORUSSKY, V.N. - SAMARIN, N.A. - SHITSEVALOVA, N.Yu. - FILIPPOV, V.B. - LEVCHENKO, A.V. - PRISTÁŠ, Gabriel - GABÁNI, Slavomír - FLACHBART, Karol. Charge transport in HoxLu1−xB12: Separating positive

and negative magnetoresistance in metals with magnetic ions. In *Physical Review B*, 2015, vol. 91, no. 23, art. no. 235104. (3.736 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.

[15] GABÁNI, Slavomír - BAŤKO, Ivan - BAŤKOVÁ, Marianna - FLACHBART, Karol - GAŽO, Emil - REIFFERS, Marián - SHITSEVALOVA, N.Yu. - SIEMENSMEYER, K. - SLUCHANKO, N.E. Influence of Lu - Substitution on the frustrated antiferromagnetic system HoB12. In *Solid State Sciences*, 2012, vol. 14, no. 11-12, p. 1722-1724. (1.856 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1293-2558.

[16] VOLOCHOVÁ, Daniela - DIKO, Pavel - ANTAL, Vitaliy - RADUŠOVSKÁ, Monika - PIOVARČI, Samuel. Influence of Y2O3 and CeO2 additions on growth of YBCO bulk superconductors. In *Journal of Crystal Growth*, 2012, vol. 356, no. 1, p. 75-80. (1.726 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0022-0248.

[17] DIKO, Pavel - ŠEFČIKOVÁ, Martina - ZMORAYOVÁ, Katarína - KALMANOVÁ, Monika - VOLOCHOVÁ, Daniela - PIOVARČI, Samuel. Blocky and spheroidal growth in Y1.5Ba2Cu3Ox system. In *Journal of Crystal Growth*, 2012, vol. 338, no. 1, p. 239-243. (1.726 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0022-0248.

[18] VOLOCHOVÁ, Daniela - PIOVARČI, Samuel - RADUŠOVSKÁ, Monika - ANTAL, Vitaliy - KOVÁČ, Jozef - JUREK, Karel - JIRSA, M. - DIKO, Pavel. YBCO bulk superconductors doped with gadolinium and samarium. In *Physica C. Superconductivity and its applicacions*, 2013, vol. 494, p. 36-40. (0.718 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0921-4534. (ISS 2012 : International Symposium on Superconductivity).

[19] VOLOCHOVÁ, Daniela - DIKO, Pavel - PIOVARČI, Samuel - KALMANOVÁ, Monika - IIDA, K. - HOLZAPFEL, B. - CARRILLO, A.E. - BOZZO, Bernat - GRANADOS, X. Microstructure and trapped field of Al-doped GdBCO-Ag bulk superconductors. In *Superconductor Science and Technology*, 2012, vol. 25, no. 2, art. no. 025023. (2.662 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0953-2048.

[20] DIKO, Pavel - ANTAL, Vitaliy - KAVEČANSKÝ, Viktor - YANG, Ch. - CHEN, I. Microstructure and phase transformations in FeSe superconductor. In *Physica C. Superconductivity and its applicacions*, 2012, vol. 476, p. 29-31. (1.014 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0921-4534.

[21] IVANISENKO, Yu. - TABACHNIKOVA, E. D. - PSARUK, I.A. - SMIRNOV, S.N. - KILMAMETOV, A. - KOBLER, A. - KÜBEL, Ch. - KURMANAEVA, L. - CSACH, Kornel - MIŠKUF, Jozef - SCHERER, T. - SEMERENKO, Y.A. - HAHN, H. Variation of the deformation mechanisms in a nanocrystalline Pd–10 at.% Au alloy at room and cryogenic temperatures. In *International Journal of Plasticity*, 2014, vol. 60, p. 40-57. (5.971 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0749-6419.

[22] HEMMATI, Ismail - OCELÍK, Václav - CSACH, Kornel - DE HOSSON, J. Th. M. Microstructure and Phase Formation in a Rapidly Solidified Laser-Deposited Ni-Cr-B-Si-C Hardfacing Alloy. In *Metallurgical and materials transactions A : physical metallurgy and materials science*, 2014, vol. 45A, no. 2, p. 878-892. (1.730 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 1073-5623.

[23] JURÍKOVÁ, Alena - CSACH, Kornel - MIŠKUF, Jozef - KONERACKÁ, Martina - ZÁVIŠOVÁ, Vlasta - KUBOVČÍKOVÁ, Martina - KOPČANSKÝ, Peter - MÚČKOVÁ, Marta. Thermal Properties of Magnetic Nanoparticles Modified With Polyethylene Glycol. In *IEEE Transactions on Magnetics*, 2013, vol. 49, no. 1, p. 236-239. (1.422 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0018-9464.

[24] CHIRIAC, Horia - TIBU, M. - LUPU, Nicoleta - ŠKORVÁNEK, Ivan - ÓVÁRI, T.A. Nanocrystalline ribbons for energy harvesting applications. In *Journal of Applied Physics*, 2014, vol. 115, no. 17, art. no. 17A320. (2.185 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0021-8979.

[25] BLÁZQUEZ, J.S. - MARCIN, Jozef - VARGA, Marek - FRANCO, V. - CONDE, A. - ŠKORVÁNEK, Ivan. Influence of microstructure on the enhancement of soft magnetic character and the induced anisotropy of field annealed HITPERM-type alloys. In *Journal of Applied Physics*, 2015, vol. 117, no. 17, art. no. 17A301. (2.183 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0021-8979.

[26] PETRYSHYNETS, Ivan - KOVÁČ, František - MARCIN, Jozef - ŠKORVÁNEK, Ivan. Magnetic properties of temper rolled NO FeSi steels with enhanced rotation texture. In *IEEE Transactions on Magnetics*, 2013, vol. 49, no. 7, p. 4303-4306. (1.422 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0018-9464.

[27]. KOVÁČ, František - PETRYSHYNETS, Ivan - MARCIN, Jozef - ŠKORVÁNEK, Ivan. Effect of VC Nano-Inhibitors and Dynamic Continuous Annealing on the Magnetic Properties of GO Steels. In *IEEE Transactions on Magnetics*, 2013, vol. 49, no. 7, p. 4196-4199. (1.422 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0018-9464

[28] RIVAS, M. - MARTÍNEZ-GARCÍA, J.C. - ŠKORVÁNEK, Ivan - MARCIN, Jozef - ŠVEC, Peter - GORRIA, P. Magnetostatic interaction in soft magnetic bilayer ribbons unambiguously identified by first-order reversal curve analysis. In *Applied Physics Letters*, 2015, vol. 107, 132403. (3.302 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0003-6951.

[29] PETRENKO, Viktor I. - BULAVIN, Leonid A. - AVDEEV, Mikhail V. - KOPČANSKÝ, Peter. Structure diagnostics of biorelevant associates and complexes in liquid nanosystems by small-angle scattering. In *Nanobiophysics : Fundamentals and Applications*. - Singapore : Pan Stanford, 2015, chapter 5, p. 129-161. ISBN 9789814613965.

[30] ŠIPOŠOVÁ, Katarína - KUBOVČÍKOVÁ, Martina - BEDNÁRIKOVÁ, Zuzana - KONERACKÁ, Martina - ZÁVIŠOVÁ, Vlasta - ANTOŠOVÁ, Andrea - KOPČANSKÝ, Peter - DAXNEROVÁ, Z. - GAŽOVÁ, Zuzana. Depolymerization of insulin amyloid fibrils by albumin-modified magnetic fluid. In *Nanotechnology*, 2012, vol. 23, no. 5, art. no. 055101. (3.979 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0957-4484.

[31] AVDEEV, Mikhail V. - AKSENOV, Victor L. - GAŽOVÁ, Zuzana - ALMÁSY, László - PETRENKO, Viktor I. - GOJZEWSKI, Hubert - FEOKTYSOV, A. - ŠIPOŠOVÁ, Katarína - ANTOŠOVÁ, Andrea - TIMKO, Milan - KOPČANSKÝ, Peter. On the determination of the helical structure parameters of amyloid protofilaments by small-angle neutron scattering and atomic force microscopy. In *Journal of Applied Crystallography*, 2013, vol. 46, no. 1, p. 224-233. (3.343 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0021-8898.

[32] KOPČANSKÝ, Peter - ŠIPOŠOVÁ, Katarína - MELNÍKOVÁ, Lucia - BEDNÁRIKOVÁ, Zuzana - TIMKO, Milan - MITRÓOVÁ, Zuzana - ANTOŠOVÁ, Andrea - GARAMUS, Vasil M. - PETRENKO, Viktor I. - AVDEEV, Mikhail V. - GAŽOVÁ, Zuzana. Destroying activity of magnetoferritin on lysozyme amyloid fibrils. In Journal of Magnetism and Magnetic Materials, 2015, vol. 377, p. 267-271. (1.970 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0304-8853.

[33] ANTAL, Iryna - KUBOVČÍKOVÁ, Martina - ZÁVIŠOVÁ, Vlasta - KONERACKÁ, Martina - PECHANOVÁ, O. - BARTA, Andrej - CEBOVÁ, Martina - ANTAL, Vitaliy - DIKO, Pavel - ZDURIENČÍKOVÁ, Martina - PUDLÁK, Michal - KOPČANSKÝ, Peter. Magnetic poly(D,L-lactide) nanoparticles loaded with aliskiren: a promising tool for hypertension treatment. In *Journal of Magnetism and Magnetic Materials*, 2015, vol. 380, p. 280-284. (1.970 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0304-8853.

[34] ZÁVIŠOVÁ, Vlasta - KONERACKÁ, Martina - KOVÁČ, Jozef - KUBOVČÍKOVÁ, Martina - ANTAL, Iryna - KOPČANSKÝ, Peter - BEDNÁRIKOVÁ, Monika - MÚČKOVÁ, Marta. The cytotoxicity of iron oxide nanoparticles with different modifications evaluated in vitro. In *Journal of Magnetism and Magnetic Materials*, 2015, vol. 380, p. 85-89. (1.970 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0304-8853.

[35] MELNÍKOVÁ, Lucia - PETRENKO, Viktor I. - AVDEEV, Mikhail V. - GARAMUS, Vasil M. - ALMÁSY, László - IVANKOV, O.I. - BULAVIN, Leonid A. - MITRÓOVÁ, Zuzana - KOPČANSKÝ, Peter. Effect of iron oxide loading on magnetoferritin structure in solution as revealed by SAXS and SANS. In *Colloids and Surfaces B - Biointerfaces*, 2014, vol. 123, p. 82-88. (4.287 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0927-7765.

[36] KORALEWSKI, M. - KLOS, J.W. - BARANOWSKI, M. - MITRÓOVÁ, Zuzana - KOPČANSKÝ, Peter - MELNÍKOVÁ, Lucia - OKUDA, M. - SCHWARZACHER, Walther. The Faraday effect of natural and artificial ferritins. In *Nanotechnology*, 2012, vol. 23, no. 35, art. no. 355704. (3.979 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0957-4484.

[37] MELNÍKOVÁ, Lucia - POSPISKOVA, Kristyna - MITRÓOVÁ, Zuzana - KOPČANSKÝ, Peter - ŠAFAŘÍK, I. Peroxidase-like activity of magnetoferritin. In *Microchimica Acta*, 2014, vol. 181, no. 3-4, p. 295-301. (3.719 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0026-3672.

[38] TOMAŠOVIČOVÁ, Natália - KOPČANSKÝ, Peter - ÉBER, Nándor. Magnetically active anisotropic fluids based on liquid crystals. In *Anisotropy Research: new Developments*. - New York: Nova Science Publishers, 2012, chapt. 11, p. 245-275. ISBN 978-1-62081-977-7.

[39] TOMAŠOVIČOVÁ, Natália - TIMKO, Milan - MITRÓOVÁ, Zuzana - KONERACKÁ, Martina - RAJŇÁK, Michal - ÉBER, Nándor - TÓTH-KATONA, Tibor - CHAUD, Xavier - JADZYN, Jan - KOPČANSKÝ, Peter. Capacitance changes in ferronematic liquid crystals induced by low magnetic fields. In *Physical Review E. Statistical, Nonlinear and Soft Matter Physics*, 2013, vol. 87, no. 1, art. no. 014501. (2.313 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 1539-3755.

[40] TÓTH-KATONA, Tibor - SALAMON, P. - ÉBER, Nándor - TOMAŠOVIČOVÁ, Natália - MITRÓOVÁ, Zuzana - KOPČANSKÝ, Peter. High concentration ferronematics in low magnetic fields. In *Journal of Magnetism and Magnetic Materials*, 2014, vol. 372, p. 117-121. (2.002 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0304-8853.

[41] GDOVINOVÁ, Veronika - TOMAŠOVIČOVÁ, Natália - ÉBER, Nándor - TÓTH-KATONA, Tibor - ZÁVIŠOVÁ, Vlasta - TIMKO, Milan - KOPČANSKÝ, Peter. Influence of the anisometry of magnetic particles on the isotropic–nematic phase transition. In *Liquid Crystals*, 2014, vol. 41, no. 12, p. 1773-1777. (2.349 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0267-8292.

[42] TOMAŠOVIČOVÁ, Natália - TIMKO, Milan - ÉBER, Nándor - TÓTH-KATONA, Tibor - FODOR-CSORBA, Katalin - VAJDA, Anikó - GDOVINOVÁ, Veronika - CHAUD, Xavier - KOPČANSKÝ, Peter. Magnetically induced shift of the isotropic–nematic phase transition temperature in a mixture of bent-core and calamitic liquid crystals doped with magnetic particles. In *Liquid Crystals*, 2015, vol. 42, no. 7, p. 959-963. (2.486 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0267-8292.

[43] RAJŇÁK, Michal - KURIMSKÝ, Juraj - DOLNÍK, Bystrík - MARTON, Karol - TOMČO, Ladislav - TACULESCU, A. - VÉKÁS, Ladislau - KOVÁČ, Jozef - VÁVRA, Ivo - TÓTHOVÁ, Jana - KOPČANSKÝ, Peter - TIMKO, Milan. Dielectric response of transformer oil based ferrofluid in low frequency range. In *Journal of Applied Physics*, 2013, vol. 114, no. 3, art. no. 034313. (2.210 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0021-8979.

[44] RAJŇÁK, Michal - KURIMSKÝ, Juraj - DOLNÍK, Bystrík - KOPČANSKÝ, Peter - TOMAŠOVIČOVÁ, Natália - TACULESCU-MOACA, Elana Alina - TIMKO, Milan. Dielectric-spectroscopy approach to ferrofluid nanoparticle clustering induced by an external electric field. In

Physical Review E. Statistical, Nonlinear and Soft Matter Physics, 2014, vol. 90, no. 3, art. no. 032310. (2.326 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 1539-3755.

[45] RAJŇÁK, Michal - PETRENKO, Viktor I. - AVDEEV, Mikhail V. - IVANKOV, I. - FEOKTYSOV, A. - DOLNÍK, Bystrík - KURIMSKÝ, Juraj - KOPČANSKÝ, Peter - TIMKO, Milan. Direct observation of electric field induced pattern formation and particle aggregation in ferrofluids. In *Applied Physics Letters*, 2015, vol. 107, no. 7, art. no. 073108. (3.302 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0003-6951.

[46] HORNOWSKI, Tomasz - JÓZEFCZAK, Arkadiusz - KOLODZIEJCZYK, B. - TIMKO, Milan - SKUMIEL, Andrzej - RAJŇÁK, Michal. The effect of particle aggregate shape on ultrasonic anisotropy in concentrated magnetic fluids. In *Journal of Physics D: Applied Physics*, 2015, vol. 48, no. 17, art. no. 175303. (2.721 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0022-3727.

[47] KÚDELČÍK, J. - BURY, P. - KOPČANSKÝ, Peter - TIMKO, Milan. Structure of nanoparticles in transformer oil-based magnetic fluids, anisotropy of acoustic attenuation. In Journal of Magnetism and Magnetic Materials, 2015, vol. 388, p. 28-34. (1.970 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0304-8853

[48] FITTA, Magdalena - PELKA, Robert - BALANDA, Maria - CZAPLA, Mariusz - MIHALIK, Marián - PINKOWICZ, David - SIEKLUCKA, Barbara - WASIUTYNSKI, Tadeusz - ZENTKOVÁ, Mária. Magnetocaloric Effect in a Mn2-Pyridazine-[Nb(CN)8] Molecular Magnetic Sponge. In European Journal of Inorganic Chemistry, 2012, vol. 2012, no. 24, p. 3830-3834. (3.049 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1434-1948.

[49] PELKA, Robert - CZAPLA, Mariusz - ZIELINSKI, P.M. - FITTA, Magdalena - BALANDA, Maria - PINKOWICZ, David - PRATT, F.L. - MIHALIK, Marián - PRZEWOZNIK, J. - AMATO, A. - SIEKLUCKA, Barbara - WASIUTYNSKI, Tadeusz. Critical behavior of the Mn2[Nb(CN)8] molecular magnet. In Physical Review B, 2012, vol. 85, no. 22, art. no. 224427. (3.691 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1098-0121. .

[50] MIHÁLIK, Matúš - MIHALIK, Marián - FITTA, Magdalena - BALANDA, Maria - VAVRA, Martin - GABÁNI, Slavomír - ZENTKOVÁ, Mária - BRIANČIN, Jaroslav. Magnetic properties of $NdMn_{1-x}Fe_xO_{3+\delta}$ ($0 \le x \le 0.3$) system. In Journal of Magnetism and Magnetic Materials, 2013, vol. 345, p. 125-133. (1.826 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0304-8853.

[51] PEROVIC, M. - KUSIGERSKI, Vladan - SPASOJEVIC, Vojislav - MRAKOVIC, A. - BLANUSA, Jovan - ZENTKOVÁ, Mária - MIHALIK, Marián. An ac susceptibility study of spin dynamics in a super spin glass nanoparticle $La_{0.7}Ca_{0.3}MnO_3$ system: simultaneous relaxation processes. In Journal of Physics D: Applied Physics, 2013, vol. 46, no. 16, art. no. 165001. (2.528 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0022-3727.

[52] BAŤKO, Ivan - BAŤKOVÁ, Marianna. SmB_6: Topological insulator or semiconductor with valence-fluctuation induced hopping transport? In *Solid State Communications*, 2014, vol. 196, p. 18-23. (1.698 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0038-1098.

[53] BAŤKO, Ivan - BAŤKOVÁ, Marianna - TRAN, V.H. - KEIDERLING, U. - FILIPOV, V.B. Evidence for magnetic phase separation in colossal magnetoresistance compound $EuB_{5.99}C_{0.01}$. In *Solid State Communications*, 2014, vol. 190, p. 23-27. (1.698 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0038-1098.

[54] MOCANU, Maria-Magdalena - GANEA, Constanta - ŠIPOŠOVÁ, Katarína - FILIPPI, Alexandru - DEMJÉN, Erna - MAREK, Jozef - BEDNÁRIKOVÁ, Zuzana - ANTOŠOVÁ, Andrea - BARAN, Irina - GAŽOVÁ, Zuzana. Polymorphism of hen egg white lysozyme amyloid fibrils influences the cytotoxicity in LLC-PK1 epithelial kidney cells. In International Journal of Biological Macromolecules, 2014, vol. 65, p. 176-187. (3.096 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0141-8130..

[55] PONIKOVÁ, Slavomíra - ANTOŠOVÁ, Andrea - DEMJÉN, Erna - SEDLÁKOVÁ, Dagmar - MAREK, Jozef - VARHAČ, Rastislav - GAŽOVÁ, Zuzana - SEDLÁK, Erik. Lysozyme stability and amyloid fibrillization dependence on Hofmeister anions in acidic pH. In Journal of Biological Inorganic Chemistry, 2015, vol. 20, no. 6, p. 921-933. (2.538 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0949-8257.

[56] VUONG, Quan Van - ŠIPOŠOVÁ, Katarína - TRUC NGUYEN, Trang - ANTOŠOVÁ, Andrea - BALOGOVA, L. - DRAJNA, L. - IMRICH, Ján - SUAN LI, Mai - GAŽOVÁ, Zuzana. Binding of Glyco-Acridine Derivatives to Lysozyme Leads to Inhibition of Amyloid Fibrillization. In Biomacromolecules, 2013, vol. 14, no. 4, p. 1035-1043. (5.371 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 1525-7797. .

[57] ANTOŠOVÁ, Andrea - GAŽOVÁ, Zuzana - FEDUNOVÁ, Diana - VALUŠOVÁ, Eva - BYSTRENOVÁ, Eva - VALLE, Francesco - DAXNEROVÁ, Z. - BISCARINI, Fabio - ANTALÍK, Marián. Anti-amyloidogenic activity of glutathione-covered gold nanoparticles. In Materials Science and Engineering C, 2012, vol. 32, no. 8, p. 2529-2535. (2.686 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0928-4931.

[58] TONAR, Zbyněk - PRIOR, Claudia - DEMJÉN, Erna - LIŠKA, Václav - KRÁLIČKOVÁ, Milena - WITTER, Kirsti. Segmental and age differences in the elastin network, collagen, and smooth muscle phenotype in the tunica media of the porcine aorta. In Annals of Anatomy, 2015, vol. 201, p. 79-90. (1.483 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0940-9602.

[59] SEDLÁK, Erik - SCHAEFER, Jonas V. - MAREK, Jozef - GIMESON, Peter - PLÜCKTHUN, A. Advanced analyses of kinetic stabilities of IgGs modified by mutations and glycosylation. In Protein Science, 2015, vol. 24, no. 7, p. 1100-1113. (2.854 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0961-8368.

[60] MUSATOV, Andrey - ROBINSON, Neal C. Susceptibility of mitochondrial electron-transport complexes to oxidative damage. Focus on cytochrome c oxidase. In Free Radical Research, 2012, vol. 46, no. 11, p. 1313-1326. (2.878 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1071-5762.

[61] HEINEN, Marco - ZANINI, Fabio - ROOSEN-RUNGE, Felix - FEDUNOVÁ, Diana - ZHANG, Fajun - HENNIG, Marcus - SEYDEL, Tilo - SCHWEINS, Ralf - SZTUCKI, Michael - ANTALÍK, Marián - SCHREIBER, Frank - NÄGELE, Gerhard. Viscosity and diffusion: crowding and salt effects in protein solutions. In Soft Matter, 2012, vol. 8, no. 5, p. 1404-1419. (4.390 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1744-683X.

[62] PARNICA, Jozef - ANTALÍK, Marián. Urea and guanidine salts as novel components for deep eutectic solvents. In Journal of Molecular Liquids, 2014, vol. 197, p. 23-26. (4.244 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0022-3042.

[63] ŠIMŠÍKOVÁ, Michaela - ANTALÍK, Marián. Interaction of cytochrome c with zinc oxide nanoparticles. In Colloids and Surfaces B - Biointerfaces, 2013, vol. 103, p. 630-634. (3.554 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0927-7765.

[64] PUDLÁK, Michal – PICHUGIN, K. N. – NAZMITDINOV,R.G. Cooperative phenomenon in a rippled graphene: Chiral spinguide. In Phys.Rev.B, 2015, vol. 92, 20542.

[65] TOMORI, Zoltán - ANTALÍK, Marián - KESA, Peter - KANKA, Ján - JAKL, Petr - SERY, Mojmír - BERNÁTOVÁ, Silvie - ZEMÁNEK, Pavel. Holographic Raman Tweezers Controlled by Hand Gestures and Voice Commands. In Optics and Photonics Journal, 2013, vol. 3, no. 2B, p. 331-336. ISSN 2160-8881.

[66] NAVARRO, R. - JUHAS, Stefan - KESHAVARZI, Sassan - JUHASOVA, Jana - MOTLIK, J. - JOHE, Karl - MARSALA, Silvia - SCADENG, Miriam - LAZAR, P. - TOMORI, Zoltán - SCHULTEIS, Gery - BEATTIE, David Michael - CIACCI, Joseph D. - MARSALA, Martin. Chronic Spinal Compression Model in Minipigs: A Systematic Behavioral, Qualitative, and Quantitative Neuropathological Study. In Journal of Neurotrauma, 2012, vol. 29, no. 3, p. 499-513. (3.654 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0897-7151.

[67] SEDLÁK, Marián. A Novel Approach to Controlled Self-Assembly of pH-Responsive Thermosensitive Homopolymer Polyelectrolytes into Stable Nanoparticles. *Advances in Colloid and Interface Science,* 2015, http://dx.doi.org/10.1016/j.cis.2015.12.005 - published in the web 2015, in the printed form 2016

[68] SEDLÁK, Marián - RAK, Dmytro. Large-Scale Inhomogeneities in Solutions of Low Molar Mass Compounds and Mixtures of Liquids: Supramolecular Structures or Nanobubbles? In *Journal of Physical Chemistry B*, 2013, vol. 117, no. 8, p. 2495-2504. (3.607 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 1520-6106.

[69] SEDLÁK, Marián - RAK, Dmytro. On the Origin of Mesoscale Structures in Aqueous Solutions of Tertiary Butyl Alcohol: The Mystery Resolved. In *Journal of Physical Chemistry B*, 2014, vol. 118, no. 10, p. 2726-2737. (3.377 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 1520-6106.

[70] FARKAŠOVSKÝ, Pavol. The influence of the interband Coulomb interaction and the f-electron hopping on excitonic correlations in the extended Falicov-Kimball model. In *Europhysics Letters*, 2015, vol. 110, no. 4, art. no. 47007. (2.095 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0295-5075.

[71] FARKAŠOVSKÝ, Pavol. Ferromagnetism in the one-dimensional Hubbard model with long-range electron hopping and long-range Coulomb interaction. In *Europhysics Letters*, 2014, vol. 107, no. 5, art. no. 57010. (2.269 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0295-5075.

[72] STREČKA, Jozef - ČENČARIKOVÁ, Hana - LYRA, M.L. Phase diagrams and anomalous thermodynamic behavior of a correlated spin-electron system on doubly decorated planar lattices. In *Physics Letters A. General Atomic and Solid State Physics*, 2015, vol. 379, no. 45-46, p. 2915-2921. (1.683 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0375-9601.

[73] PINČÁK, Richard - SMOTLACHA, J. Analogies in electronic properties of graphene wormhole and perturbed nanocylinder. In *European Physical Journal B*. - New York : Springer, 2013, vol. 86, no. 11, art. no. 480. (1.282 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 1434-6028.

[74] HNATIČ, Michal - HONKONEN, Juha - LUČIVJANSKÝ, Tomáš. Two-loop calculation of anomalous kinetics of the reaction A + A - Ø in randomly stirred fluid. In *European Physical Journal B*, 2013, vol. 86, no. 5, art. no. 214. (1.282 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 1434-6028.

[75] JURČIŠINOVÁ, Eva - JURČIŠIN, Marián. Phase transitions of the p-spin model on pure Husimi lattices. In *Physical Review E. Statistical, Nonlinear and Soft Matter Physics*, 2013, vol. 88, no. 1, art.no. 012140. (2.313 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 1539-3755.

[76] JURČIŠINOVÁ, Eva - JURČIŠIN, Marián. Solution of the antiferromagnetic Ising model on a tetrahedron recursive lattice. In *Physical Review E. Statistical, Nonlinear and Soft Matter*

Physics, 2014, vol. 89, no. 3, art. no. 032123. (2.326 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 1539-3755.

[77] KOPELIOVICH, B.Z. - NEMČÍK, Ján - POTASHNIKOVA, I.K. - SCHMIDT, Ivan. Quenching of high-pT hadrons: Energy loss versus color transparency. In *Physical Review C. Nuclear physics*, 2012, vol. 86, no. 5, art. no. 054904. (3.308 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0556-2813.

[78] NEMČÍK, Ján - PASECHNIK, Roman - POTASHNIKOVA, I.K. A heuristic description of high-pT hadron production in heavy ion collisions. In *European Physical Journal C*, 2015, vol. 75, no. 2, art. no. 95. (5.084 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 1434-6044.

[79] ADAMS, J.H. Jr. - BOBÍK, Pavol - KUDELA, Karel - PASTIRČÁK, Blahoslav. An evaluation of the exposure in nadir observation of the JEM-EUSO mission. In *Astroparticle Physics*, 2013, vol. 44, p. 76-90. (4.777 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0927-6505.

[80] PARNAHAJ, I. - KUDELA, Karel. Forbush decreases at a middle latitude neutron monitor: relations to geomagnetic activity and to interplanetary plasma structures. In *Astrophysics and Space Science*, 2015, vol. 359, no. 1, art. no. 35. (2.263 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0004-640X

[81] KUDELA, Karel - LANGER, Ronald. On Quasi-periodic variations of low-energy cosmic rays observed near earth. In *Radiation Protection Dosimetry*, 2015, vol. 164, no. 4, p. 471-476. (0.913 - IF2014). (2015 - Current Contents, SCOPUS, WOS). ISSN 0144-8420.

[82] KANCÍROVÁ, M. - KUDELA, Karel. Cloud cover and cosmic ray variations at Lomnický štít high altitude observing site. In *Atmospheric Research*, 2014, vol. 149, p. 166-173. (2.421 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0169-8095.

[83] KUBANČÁK, J. - AMBROŽOVÁ, I. - BÜTIKOFER, R - KUDELA, Karel - LANGER, Ronald - DAVÍDKOVÁ, M. - PLOC, O. - MALUŠEK, A. Liulin silicon semiconductor spectrometers as cosmic ray monitors at the high mountain observatories Jungfraujoch and Lomnický štít. In *Journal of Instrumentation*, 2014, vol. 9, art. no. P07018. (1.526 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 1748-0221.

[84] ŽIGMAN, Vida - KUDELA, Karel - GRUBOR, Davorka. Response of the Earth's lower ionosphere to the Ground Level Enhancement event of December 13, 2006. In *Advances in Space Research*, 2014, vol. 53, no. 5, p. 763-775. (1.238 - IF2013). (2014 - Current Contents, SCOPUS, NASA ADS). ISSN 0273-1177.

[85] McKENNA-LAWLOR, S. – RUSYNAK, P. - BALAZ, JAN - SCHMITT, W. - FANITANI, C. - KUECHMAN O. - GEURTS K. Performance of the mission critical Electrical Support System (ESS) which handled communications and data transfer between the ROSETTA Orbiter and its Lander Philae while en route to and at comet 67P/Churyumov-Gerasimenko. *Acta Astronautica*, DOI:10.1016/ j.actaastro.2015.12.015, 2015 published in the web 2015, in the printed form 2016

[86] ABELEV, Betty - BÁN, Jaroslav - KALIŇÁK, Peter - KRÁLIK, Ivan -KRIVDA, Marián - ŠÁNDOR, Ladislav - VAĽA, Martin. Multiplicity dependence of pion, kaon, proton and lambda production in p–Pb collisions at SNN = 5.02 TeV (ALICE Collaboration). In *Physics Letters B*, 2014, vol. 728, p. 25-38. (6.019 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0370-2693.

[87] ABELEV, Betty - BÁN, Jaroslav - KALIŇÁK, Peter - KRÁLIK, Ivan - KRIVDA, Marián - ŠÁNDOR, Ladislav - VAĽA, Martin. Multi-strange baryon production at mid-rapidity in Pb–Pb collisions at SNN = 2.76 TeV (ALICE Collaboration). In *Physics Letters B*, 2014, vol. 728, p. 216-

227. (6.019 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0370-2693.

[88] ABELEV, Betty - BÁN, Jaroslav - KALIŇÁK, Peter - KRÁLIK, Ivan - KRIVDA, Marián - ŠÁNDOR, Ladislav - VAĽA, Martin. Kos and lambda Production in Pb-Pb Collisions at sNN = 2.76 TeV (ALICE Collaboration). In *Physical Review Letters*, 2013, vol. 111, no. 22, art. no. 222301. (7.943 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0031-9007

[89] ABELEV, Betty - BÁN, Jaroslav - KALIŇÁK, Peter - KRÁLIK, Ivan - KRIVDA, Marián - PASTIRČÁK, Blahoslav - ŠÁNDOR, Ladislav - VAĽA, Martin. Multi-strange baryon production in pp collisions at s = 7 TeV with ALICE (ALICE Collaboration). In *Physics Letters B*, 2012, vol. 712, no. 4-5, p. 309-318. (3.955 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0370-2693.

[90] ADAM, J. - ADAMOVÁ, D. - AGGARWAL, M.M. - AGLIERI RINELLA, G. - AGNELLO, M. - KALIŇÁK, Peter - KRÁLIK, Ivan - KRIVDA, Marián - MUŠINSKÝ, Ján - ŠÁNDOR, Ladislav - VAĽA, Martin. Precision measurement of themass difference between light nuclei and anti-nuclei. In *Nature Physics*, 2015, vol. 11, no. 10, p. 811-814. (20.147 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 1745-2473.

[91] AAD, G. - ANTOŠ, Jaroslav - BRUNCKO, Dušan - FERENCEI, Jozef - KLADIVA, Eduard - SEMAN, Michal - STRÍŽENEC, Pavol. Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC. In *Physics Letters B*, 2012, vol. 716, no. 1, p. 1-29. (3.955 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0370-2693.

[92] AAD, G. - ANTOŠ, Jaroslav - BRUNCKO, Dušan - FERENCEI, Jozef - KLADIVA, Eduard - SEMAN, Michal - STRÍŽENEC, Pavol. Combined search for the Standard Model Higgs boson using up to 4.9 fb−1 of pp collision data at s = 7 TeV with the ATLAS detector at the LHC (ATLAS Collaboration). In *Physics Letters B*, 2012, vol. 710, no. 1, p. 49-66. (3.955 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0370-2693.

[93] AAD, G. - ANTOŠ, Jaroslav - BRUNCKO, Dušan - FERENCEI, Jozef - KLADIVA, Eduard - SEMAN, Michal - STRÍŽENEC, Pavol. Measurements of Higgs boson production and couplings in diboson finalstates with the ATLAS detector at the LHC. In *Physics Letters B*, 2013, vol. 726, no. 1-3, p. 88-119. (4.569 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0370-2693.

[94] AAD, G. - ABBOTT, B. - ABDALLAH, J. - ABDINOV, O. - ABEN, R. - ANTOŠ, Jaroslav - BRUNCKO, Dušan - KLADIVA, Eduard - STRÍŽENEC, Pavol. Combined Measurement of the Higgs Boson Mass in pp Collisions at root s=7 and 8 TeV with the ATLAS and CMS Experiments. In *Physical Review Letters*, 2015, vol. 114, no. 19, art. no. 191803. (7.512 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0031-9007.

[95] AAD, G. - ABAJYAN, T. - ABBOTT, B. - ABDALLAH, J. - ABDEL KHALEK, S. - ANTOŠ, Jaroslav - BRUNCKO, Dušan - KLADIVA, Eduard - STRÍŽENEC, Pavol. A Particle Consistent with the Higgs Boson Observed with the ATLAS Detector at the Large Hadron Collider. In *Science*, 2012, vol. 338, no. 6114, p. 1576-1582. (31.201 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0036-8075.

Principal results excluding large-scale collaborations:

SEDLÁK, Marián. A Novel Approach to Controlled Self-Assembly of pH-Responsive Thermosensitive Homopolymer Polyelectrolytes into Stable Nanoparticles. *Advances in Colloid and Interface Science,* 2015 - published on the web in 2015, in the printed form in 2016 (vol. 232, p. 57–69). (10.420 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 0001-8686. http://dx.doi.org/10.1016/j.cis.2015.12.005

VUONG, Quan Van - ŠIPOŠOVÁ, Katarína - TRUC NGUYEN, Trang - ANTOŠOVÁ, Andrea - BALOGOVA, L. - DRAJNA, L. - IMRICH, Ján - SUAN LI, Mai - GAŽOVÁ, Zuzana. Binding of Glyco-Acridine Derivatives to Lysozyme Leads to Inhibition of Amyloid Fibrillization. In Biomacromolecules, 2013, vol. 14, no. 4, p. 1035-1043. (5.371 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 1525-7797.
DOI: 0.1021/bm301891q

NEMČÍK, Ján - PASECHNIK, Roman - POTASHNIKOVA, I.K. A heuristic description of high-pT hadron production in heavy ion collisions. In *European Physical Journal C*, 2015, vol. 75, no. 2, art. no. 95. (5.084 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 1434-6044.
DOI: 10.1140/epjc/s10052-015-3319-7

MELNÍKOVÁ, Lucia - PETRENKO, Viktor I. - AVDEEV, Mikhail V. - GARAMUS, Vasil M. - ALMÁSY, László - IVANKOV, O.I. - BULAVIN, Leonid A. - MITRÓOVÁ, Zuzana - KOPČANSKÝ, Peter. Effect of iron oxide loading on magnetoferritin structure in solution as revealed by SAXS and SANS. In *Colloids and Surfaces B - Biointerfaces*, 2014, vol. 123, p. 82-88. (4.287 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 0927-7765.
DOI: 10.1016/j.colsurfb.2014.08.032

GABÁNI, Slavomír - TAKÁČOVÁ, Iveta - PRISTÁŠ, Gabriel - GAŽO, Emil - FLACHBART, Karol - MORI, Takao - BRAITHWAITE, D. - MÍŠEK, M. - KAMENEV, K.V. - HANDFLAND, M. - SAMUELY, Peter. High-pressure effect on the superconductivity of YB6. In *Physical Review B*, 2014, vol. 90, no. 4, art. no. 045136. (3.664 - IF2013). (2014 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.
DOI:10.1103/PhysRevB.90.045136

Principal results - large-scale scientific collaborations

AAD, G. - ABAJYAN, T. - ABBOTT, B. - ABDALLAH, J. - ABDEL KHALEK, S. - ANTOŠ, Jaroslav - BRUNCKO, Dušan - KLADIVA, Eduard - STRÍŽENEC, Pavol. A Particle Consistent with the Higgs Boson Observed with the ATLAS Detector at the Large Hadron Collider. In *Science*, 2012, vol. 338, no. 6114, p. 1576-1582. (31.201 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0036-8075.
DOI: 10.1126/science.1232005

ADAM, J. - ADAMOVÁ, D. - AGGARWAL, M.M. - AGLIERI RINELLA, G. - AGNELLO, M. - KALIŇÁK, Peter - KRÁLIK, Ivan - KRIVDA, Marián - MUŠINSKÝ, Ján - ŠÁNDOR, Ladislav - VAĽA, Martin. Precision measurement of themass difference between light nuclei and anti-nuclei. In *Nature Physics*, 2015, vol. 11, no. 10, p. 811-814. (20.147 - IF2014). (2015 - Current Contents, WOS, SCOPUS). ISSN 1745-2473. DOI:10.1038/nphys3432

2.1.3 List of monographs/books published abroad

PINČÁK, Richard - PUDLÁK, Michal - SMOTLACHA, Ján. Electronic properties of single and double wall carbon nanotubes. In Carbon Nanotubes : Synthesis and Properties. - New York : Nova Science Publishers, Inc., 2012, chapter 10, p. 201-226. ISBN 978-1-62081-914-2.

TOMAŠOVIČOVÁ, Natália - KOPČANSKÝ, Peter - ÉBER, Nándor. Magnetically active anisotropic fluids based on liquid crystals. In Anisotropy Research : new Developments. - New York : Nova Science Publishers, 2012, chapter 11, p. 245-275. ISBN 978-1-62081-977-7.>

PINČÁK, Richard. With Strings Toward Safety Future on Financial Markets. In Financial Markets : Recent Developments, Emerging Practices and Future Prospects [elektronický zdroj]. - New York : Nova Publishers, 2014, chapter 6, p. 105-135. Názov z obrazovky. Dostupné na internete: <https://www.novapublishers.com/catalog/product_info.php?products_id=46503&osCsid=cfde2636167e44d2863bb9ce7154d020>.

PETRENKO, Viktor I. - BULAVIN, Leonid A. - AVDEEV, Mikhail V. - KOPČANSKÝ, Peter. Structure diagnostics of biorelevant associates and complexes in liquid nanosystems by small-angle scattering. In Nanobiophysics : Fundamentals and Applications. - Singapore : Pan Stanford, 2015, chapter 5, p. 129-161. ISBN 9789814613965.

DIKO, Pavel - VOLOCHOVÁ, Daniela - PIOVARČI, Samuel - ANTAL, Vitaliy - RADUŠOVSKÁ, Monika. Growth of Bulk Superconductors in Y1.5Ba2Cu3Ox System with CeO2 Addition. In Superconductivity: Applications Today and Tomorrow. - Nova Science Pub Inc, 2015, chapter 2. ISBN 978-163483-756-9.

DIKO, Pavel. Cracking caused by thermal and transformation stresses in YBCO composite superconductors. In International Journal of Materials and Product Technology, 2014, vol. 49, no. 2-3, p. 97-128. (0.282 - IF2013). (2014 - WOS, SCOPUS). ISSN 0268-1900.
DOI: 10.1504/IJMPT.2014.064043

TOMORI, Zoltán - VANKO, Peter - VAITOVIC, Boris. Using of low-cost 3D cameras to control interactive exhibits in science center. In Emergent Trends in Robotics and Intelligent Systems : Where is the Role of Intelligent Technologies in the Next Generation of Robots?. - Heidelberg : Springer, 2015, p. 273-282. ISBN 2194-5357.

LAZUTIN, Leonid L. - KUDELA, Karel. The Space Object of Magnetoplasma: Magnetosphere of Earth. In Interstellar Medium: New Research. - Nova Science Publishers, 2012, chapter 8, p. 159-196. ISBN 978-1-61470-807-0.
(https://www.novapublishers.com/catalog/product_info.php?products_id=22357)
*(**https://www.novapublishers.com/catalog/product_info.php?products_id=22357**)*

KOŽÁR, Tibor. GPU Computing in Biomolecular Modeling and Nanodesign. In Mathematical modeling and computational science. - Berlin : Springer, 2012, p. 276-283. ISBN 978-3-642-28211-9. ISSN 0302-9743.

PINČÁK, Richard - PUDLÁK, Michal - SMOTLACHA, Ján. Electronic properties of single and double wall carbon nanotubes. In Carbon Nanotubes : Synthesis and Properties. - New York : Nova Science Publishers, Inc., 2012, chapter 10, p. 201-226. ISBN 978-1-62081-914-2.

KUDELA, Karel. Variability of Low Energy Cosmic Rays Near Earth. In Exploring the Solar Wind. - Croatia : InTech, 2012, chapter 13, p. 285-314. ISBN 978-953-51-0339-4.
DOI: 10.5772/37482

LAZUTIN, Leonid L. - KUDELA, Karel. The Space Object of Magnetoplasma: Magnetosphere of Earth. In Interstellar Medium: New Research. - Nova Science Publishers, 2012, chapter 8, p. 159-196. ISBN 978-1-61470-807-0.

KUDELA, Karel - 4 chapters in book: The Coronas-F Space Mission, Key Results for Solar Terrestrial Physics, Editor V. D. Kuzntesov, Springer Berlin Heidelberg 2014 (http://link.springer.com/book/10.1007%2F978-3-642-39268-9):

4.1. Kuznetsov, S. N., Bogomolov, A. V., Galkin, V. I., Denisov, Y. I., Podorolsky, A. N., Ryumin, S. P., ... Kudela, K & Rojko, J. (2014). Scientific Set of Instruments "Solar Cosmic Rays". In The Coronas F Space Mission (pp. 289-299).

4.2. Kuznetsov, S. N., Kurt, V. G., Yushkov, B. Y., Myagkova, I. N., Galkin, V. I., & Kudela, K. (2014). Protons Acceleration in Solar Flares: The Results of the Analysis of Gamma emission and Neutrons Recorded by the SONG Instrument Onboard the CORONAS F Satellite. In The Coronas F Space Mission (pp. 301-325).

4.3. Kuznetsov, S. N., Myagkova, I. N., Muravieva, E. A., Yushkov, B. Y., Starostin, L. I., Denisov, Y. I., & Kudela, K. (2014). Dynamics of the Relativistic Electrons Flux of the Earth Outer Radiation Belt Based on the MKL Instrument Data. In T he Coronas F Space Mission (pp. 327-336).

4.4. Kuznetsov, S. N., Denisov, Y. I., Lazutin, L. L., Myagkova, I. N., Muravieva, E. A., Yushkov, B. Y., Kudela, K., Bucik, R. & Slivka, M. In T he Coronas F Space Mission (pp. 337–348).

2.1.4. List of monographs/books published in Slovakia

P. Farkašovský, H. Čencaríková;

Analytické a numerické metódy v teórii silne korelovaných elektrónových systémov

(Analytical and numerical methods in the theory of strongly correlated electron systems)

ISBN:978-80-89656-03-5, ÚEF SAV (2013).

M. Hnatič, T. Lučivjansky;

Stochastické modely rozvinutej turbulencie

(Stochastical models in turbulence)

ISBN 978-80-81520-34-1, vydavateľstvo Equilibria, 250 s., Univerzita Pavla Jozefa Šafárika v Košiciach (2013).

2.1.5. List of other scientific outputs specifically important for the institute, max. 10 items

Participation in ROSETTA mission of European Space Agency ESA to comet 67P/Churjumov-Gerasimenko. The Department of Space physics IEP-SAS (J. Baláž) has participated on the ESS construction in the frame of scientific-technical cooperation between IEP-SAS and STIL-NUIM, Maynooth, Ireland. The ESS unit (Electronic Support System) of the ROSETTA probe supported the Philae separation from the Orbiter and also provide bidirectional data-command communication between Philae and Orbiter.

Detached Observatory at Lomnický štít provide cosmic rays data to wide scientific comunity for decades. Lomnický štít Neutron Monitor of the Department of Space Physics is continually in operation from December 1981 when it replaced the older 4 NM 64 type. Two new detectors, Liulin and Sevan,start measurements during previous 4 years

2.1.6. List of patents, patent applications, and other intellectual property rights registered abroad, incl. Revenues

Registered patents:

Number:: UA 99100 U
Authors: Kopčanský Peter, Timko Milan, Závišová Vlasta, Tomašovičová Natália, I.P. Studenjak, O.V.Kovalcuk
Invention title: Method for increasing of ion conductivity of the liquid crystal based composite
Owner/ co-owner: Užhorodská Univerzita, Užhorod, Ukrajina
Country: Ukrajina

Number:: UA 99099 U
Authors: Kopčanský Peter, Timko Milan, Gažová Zuzana, Šipošová Katarína, I.P. Studenjak, O.V.Kovalcuk
Invention title: Method for the optimal lysozyme concentration determination to form a lyotropic magnetic liquid crystal
Owner/ co-owner: Užhorodská Univerzita, Užhorod, Ukrajina
Country: Ukrajina

Patent applications:

Number: PCT/SK2015/050002
Authors: Sedlák Marián, Rak Dmytro
Invention title: A Method for Determination of Content of Hydrophobic Compounds in Water-Miscible Organic Liquids
Owner/ co-owner: IEP SAS, Košice
Country: World

2.1.7. List of patents, patent applications, and other intellectual property rights registered in Slovakia, incl. revenues

Registered patents:

Number: 287951
Authors: Sedlák Marián, Koňák Čestmír
Invention title: Preparation method of polymeric nanoparticles on the basis of poly(ethylacrylic acid) homopolymers.
Owner/ co-owner: IEP SAS, Košice

Number: 288071
Authors: Sedlák Marián, Koňák Čestmír
Invention title: Polymeric nanoparticles on the basis of poly(propylacrylic acid) homopolymers and their preparation method.
Owner/ co-owner: IEP SAS, Košice

Number: 288322
Authors: Kováč František, Petryshynets Ivan, Stoyka Vladimír, Škorvánek Ivan, Tibor Kvačkaj
Invention title: Method of producing the non-oriented electrical FeSi steels having low watt losses
Owner/ co-owner: IMR SAS, Košice

Patent applications:

Number: PP50002-2014
Authors: Sedlák Marián, Rak Dmytro
Invention title: Measurement of the alkane content in alcohols by the method of nanoseggregation in aqueous solutions
Owner/ co-owner: IEP SAS, Košice

Number: PP50001-2015
Authors: Sedlák Marián, Rak Dmytro
Invention title: A Method for Determination of Content of Hydrophobic Compounds in Water-Miscible Organic Liquids
Owner/ co-owner: IEP SAS, Košice

Number: PP 00089-2015
Authors: Diko Pavel, Volochová Daniela, Antal Vitaliy, Piovarči Samuel
Title: YBCO superconductor doped with samarium and its fabrication.
Owner: IEP SAS

Number: PP 00067-2014
Authors: Diko Pavel, Piovarči Samuel, Antal Vitaliy
Title: YBCO superconductor treated by high pressure oxygenation.
Owner: IEP SAS

Number: PP 00105-2013
Authors: Diko Pavel, Volochová Daniela
Title: Binary doped YBCO superconductor
Owner: IEP SAS

2.1.8. Table of research outputs (as in annual reports).

Papers from international collaborations in large-scale scientific projects (Dwarf team, ALICE Collaboration, ATLAS collaboration, CD Collaboration, H1 Collaboration, HADES Collaboration, and STAR Collaboration) have to be listed separately.

Scientific publications	2012			2013			2014			2015			total			
	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	averaged number per year	av. No. / FTE	av. No. / salary budget
Scientific monographs and monographic studies in journals and proceedings published abroad *(AAA, ABA)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Scientific monographs and monographic studies in journals and proceedings published in Slovakia *(AAB, ABB)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Chapters in scientific monographs published abroad *(ABC)*	4,0	0,034	0,004	0,0	0,000	0,000	1,0	0,010	0,001	4,0	0,040	0,004	**9,0**	**2,3**	**0,023**	**0,002**
Chapters in scientific monographs published in Slovakia *(ABD)*	0,0	0,000	0,000	1,0	0,008	0,001	0,0	0,000	0,000	0,0	0,000	0,000	**1,0**	**0,3**	**0,003**	**0,000**
Scientific papers published in journals registered in Current Contents Connect *(ADCA, ADCB, ADDA, ADDB)*	69,0	0,582	0,064	92,0	0,692	0,084	121,0	1,229	0,111	64,0	0,638	0,058	**346,0**	**86,5**	**0,897**	**0,079**
Scientific papers published in journals registered in Web of Science Core Collection and SCOPUS *(ADMA, ADMB, ADNA, ADNB)*	10,0	0,084	0,009	16,0	0,120	0,015	20,0	0,203	0,018	13,0	0,130	0,012	**59,0**	**14,8**	**0,153**	**0,014**
Scientific papers published in other foreign journals (not listed above) *(ADEA, ADEB)*	0,0	0,000	0,000	10,0	0,075	0,009	3,0	0,030	0,003	0,0	0,000	0,000	**13,0**	**3,3**	**0,034**	**0,003**
Scientific papers published in other domestic journals (not listed above) *(ADFA, ADFB)*	0,0	0,000	0,000	5,0	0,038	0,005	0,0	0,000	0,000	1,0	0,010	0,001	**6,0**	**1,5**	**0,016**	**0,001**
Scientific papers published in foreign peer-reviewed proceedings *(AEC, AECA)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	2,0	0,020	0,002	**2,0**	**0,5**	**0,005**	**0,000**
Scientific papers published in domestic peer-reviewed proceedings *(AED, AEDA)*	0,0	0,000	0,000	8,0	0,060	0,007	2,0	0,020	0,002	0,0	0,000	0,000	**10,0**	**2,5**	**0,026**	**0,002**
Published papers (full text) from foreign and international scientific conferences *(AFA, AFC, AFBA, AFDA)*	45,0	0,380	0,042	28,0	0,211	0,026	23,0	0,234	0,021	8,0	0,080	0,007	**104,0**	**26,0**	**0,270**	**0,024**
Published papers (full text) from domestic scientific conferences *(AFB, AFD, AFBB, AFDB)*	4,0	0,034	0,004	21,0	0,158	0,019	1,0	0,010	0,001	3,0	0,030	0,003	**29,0**	**7,3**	**0,075**	**0,007**

- **Supplementary information and/or comments on the scientific outputs of the institute.**

The normalization of the Table 2.1.8 for the FTE of the whole institute (96,398) from Table 1.5.1 and the total salary budget is not correct, because in 2.1.8 the scientific outputs without large-scale collaborations of the Department of Subnuclear Physics are presented. The correct normalization must be calculated for FTE: 96.398 – 9.1 = 87.3, where FTE: 9.1 is the FTE of the department of Subnuclear Physics. The following Table 2.1.8 –suppl. represents correctly normalized outputs.

Scientific publications	2012			2013			2014			2015			total			
	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	averaged number per year	av. No. / FTE	av. No. / salary budget
Scientific monographs and monographic studies in journals and proceedings published abroad *(AAA, ABA)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	
Scientific monographs and monographic studies in journals and proceedings published in Slovakia *(AAB, ABB)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	
Chapters in scientific monographs published abroad *(ABC)*	4,0	0,034	0,000	0,0	0,000	0,000	1,0	0,010	0,000	4,0	0,040	0,000	**9,0**	**2,3**	**0,026**	
Chapters in scientific monographs published in Slovakia *(ABD)*	0,0	0,000	0,000	1,0	0,008	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**1,0**	**0,3**	**0,003**	
Scientific papers published in journals registered in Current Contents Connect *(ADCA, ADCB, ADDA, ADDB)*	69,0	0,582	0,000	92,0	0,692	0,000	121,0	1,229	0,000	64,0	0,638	0,000	**346,0**	**86,5**	**0,991**	
Scientific papers published in journals registered in Web of Science Core Collection and SCOPUS *(ADMA, ADMB, ADNA, ADNB)*	10,0	0,084	0,000	16,0	0,120	0,000	20,0	0,203	0,000	13,0	0,130	0,000	**59,0**	**14,8**	**0,169**	
Scientific papers published in other foreign journals (not listed above) *(ADEA, ADEB)*	0,0	0,000	0,000	10,0	0,075	0,000	3,0	0,030	0,000	0,0	0,000	0,000	**13,0**	**3,3**	**0,037**	
Scientific papers published in other domestic journals (not listed above) *(ADFA, ADFB)*	0,0	0,000	0,000	5,0	0,038	0,000	0,0	0,000	0,000	1,0	0,010	0,000	**6,0**	**1,5**	**0,017**	
Scientific papers published in foreign peer-reviewed proceedings *(AEC, AECA)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	2,0	0,020	0,000	**2,0**	**0,5**	**0,006**	
Scientific papers published in domestic peer-reviewed proceedings *(AED, AEDA)*	0,0	0,000	0,000	8,0	0,060	0,000	2,0	0,020	0,000	0,0	0,000	0,000	**10,0**	**2,5**	**0,029**	
Published papers (full text) from foreign and international scientific conferences *(AFA, AFC, AFBA, AFDA)*	45,0	0,380	0,000	28,0	0,211	0,000	23,0	0,234	0,000	8,0	0,080	0,000	**104,0**	**26,0**	**0,298**	
Published papers (full text) from domestic scientific conferences *(AFB, AFD, AFBB, AFDB)*	4,0	0,034	0,000	21,0	0,158	0,000	1,0	0,010	0,000	3,0	0,030	0,000	**29,0**	**7,3**	**0,083**	

Papers from international collaborations in large-scale scientific projects.

Numbers of papers published by the large high energy physics collaborations (ALICE and ATLAS at CERN, Geneva, Switzerland, CDF at Fermilab, Batavia, USA and H1 at DESY, Hamburg, Germany) are summarized in the following table. The first row contains the numbers provided by the Central Library of SAS, the second row is based on information from the Web of Science Core Collection. The most likely cause of the differences between the first and second row is the fact that the data for the Central Library were assembled before the end of each year (the first half of December) while the WOS data were extracted in March 2016. It was observed that papers published at the end of a given year may be visible in a database like WOS only at the beginning of the next year.

Scientific publications	2012	2013	2014	2015	Total	Averaged number per year
Scientific papers published in journals registered in Current Contents Connect In Central Library of SAS *(ADCA, ADCB, ADDB)*	186	126	117	138	567	141.75
Scentific papers published in journals registered in Web of Science Core Collection (ADMA, ADMB, ADNA, ADNB)	209	133	127	150	619	154.75

2.2. Responses to the research outputs (citations, etc.)

2.2.1. Table with citations per annum.

Citations of papers from international collaborations in large-scale scientific projects (Dwarf team, ALICE Collaboration, ATLAS collaboration, CD Collaboration, H1 Collaboration, HADES Collaboration, and STAR Collaboration) have to be listed separately.

Citations, reviews	2011		2012		2013		2014		total		
	number	No. / FTE	number	No. / FTE	number	No. / FTE	number	No. / FTE	number	averaged number per year	av. No. / FTE
Citations in Web of Science Core Collection (1.1, 2.1)	743,0	6,270	558,0	4,195	611,0	6,205	719,0	7,171	**2631,0**	**657,8**	**6,823**
Citations in SCOPUS (1.2, 2.2) if not listed above	79,0	0,667	61,0	0,459	37,0	0,376	58,0	0,578	**235,0**	**58,8**	**0,609**
Citations in other citation indexes and databases (not listed above) (3.2,4.2,9,10)	1,0	0,008	1,0	0,008	0,0	0,000	1,0	0,010	**3,0**	**0,8**	**0,008**
Other citations (not listed above) (3, 4, 3.1, 4.1)	22,0	0,186	4,0	0,030	1,0	0,010	4,0	0,040	**31,0**	**7,8**	**0,080**
Reviews (5,6)	1,0	0,008	1,0	0,008	2,0	0,020	1,0	0,010	**5,0**	**1,3**	**0,013**

- **Supplementary information and/or comments on responses to the scientific output of the institute.**

The normalization of the Table 2.2.1 for the FTE of the whole institute (96,398) from Table 1.5.1 is not correct, because in 2.1.8 the scientific outputs without large-scale collaborations of the Department of Subnuclear Physics are presented. The correct normalization must be calculated for FTE: 96.398 – 9.1 = 87.3, where FTE: 9.1 is the FTE of the department of Subnuclear Physics. The following Table 2.2.1 –suppl. represents correctly normalized citations.

Citations, reviews	2011		2012		2013		2014		total		
	number	No. / FTE	number	No. / FTE	number	No. / FTE	number	No. / FTE	number	averaged number per year	av. No. / FTE
Citations in Web of Science Core Collection (1.1, 2.1)	743,0	6,270	558,0	4,195	611,0	6,205	719,0	7,171	**2631,0**	**657,8**	**7,534**
Citations in SCOPUS (1.2, 2.2) if not listed above	79,0	0,667	61,0	0,459	37,0	0,376	58,0	0,578	**235,0**	**58,8**	**0,673**
Citations in other citation indexes and databases (not listed above) (3.2,4.2,9,10)	1,0	0,008	1,0	0,008	0,0	0,000	1,0	0,010	**3,0**	**0,8**	**0,009**
Other citations (not listed above) (3, 4, 3.1, 4.1)	22,0	0,186	4,0	0,030	1,0	0,010	4,0	0,040	**31,0**	**7,8**	**0,089**
Reviews (5,6)	1,0	0,008	1,0	0,008	2,0	0,020	1,0	0,010	**5,0**	**1,3**	**0,014**

Citations of papers from international collaborations in large-scale scientific projects.

The citation counts for the large collaborations in Particle physics (experiments ALICE and ATLAS at CERN, Geneva, Switzerland, CDF at Fermilab, Batavia, USA and H1 at Desy, Hamburg, Germany) are summarized in the following table. In the past it was found that manual self-citations

identification when author lists contain 1000+ authors and the number of cited papers is of the order of 1000 is impossible. Web of Science functionality accessible via WW interface does not provide necessary tools for reliable self-citation filtering. That is why we developed a software for analysis of the Web of Science records specifically tailored for identification and removal of the self-citations. Its algorithm is based on comparison collaboration names and of full author names (or initials when full names are not stored in the WOS records) for all authors.

Citations, reviews	**2011**	**2012**	**2013**	**2014**	**total**	
	number	**number**	**number**	**number**	**number**	**averaged number per year**
Citations in Web of Science Core Collection (1.1, 2.1)	1556.0	2780.0	3263.0	3283.0	**10882.0**	**2720.5**

2.2.2. List of 10 most-cited publications, with number of citations, in the assessment period (2011 – 2014).

KONERACKÁ, Martina - KOPČANSKÝ, Peter - ANTALÍK, Marián - TIMKO, Milan - RAMCHAND, C.N. - LOBO, D. - MEHTA, R.V. - UPADHYAY, R.V. Immobilization of proteins and enzymes to fine magnetic particles. In *Journal of Magnetism and Magnetic Materials*, 1999, vol. 201, no. 1-3, p. 427-430. (0.889 - IF1998). (1999 - Current Contents, WOS, SCOPUS). ISSN 0304-8853.

Citations: **49 (WOS-45, SCOPUS-4)**

BUSTARRET, Etienne - MARCENAT, C. - ACHATZ, P. - KAČMARČÍK, Jozef - LÉVY, F. - HUXLEY, A. - ORTÉGA, L. - BOURGEOIS, E. - BLASE, X. - DÉBARRE, D. - BOULMER, J. Superconductivity in doped cubic silicon. In *Nature*, 2006, vol. 444, no. 7118, p. 465-468. (29.273 - IF2005). (2006 - Current Contents, WOS, SCOPUS). ISSN 0028-0836
Citations: **47 (WOS-41, SCOPUS-6)**

GEMEINER, Peter - MISLOVIČOVÁ, Danica - TKÁČ, Ján - ŠVITEL, Juraj - PÄTOPRSTÝ, Vladimir - HRABÁROVÁ, Eva - KOGAN, Grigorij - KOŽÁR, Tibor. Lectinomics II. A highway to biomedical/clinical diagnostics. In *Biotechnology Advances*, 2009, vol. 27, no. 1, p. 1-15. (6.110 - IF2008). (2009 - Current Contents, WOS, SCOPUS). ISSN 0734-9750.
Citations: **44 (WOS-39, SCOPUS-5)**

SEDLÁK, Marián. Large-scale supramolecular structure in solutions of low molar mass compounds and mixtures of liquids: I. Light scattering characterization. In *Journal of Physical Chemistry B*, 2006, vol. 110, no. 9, p. 4329-4338. (4.033 - IF2005). (2006 - Current Contents, WOS, SCOPUS). ISSN 1520-6106.
Citations: **40 (WOS-37, SCOPUS-3)**

BLAAUWGEERS, R. - BLAZKOVA, M. - ČLOVEČKO, Marcel - ELTSOV, V.B. - DE GRAAF, R. - HOSIO, J. - KRUSIUS, M. - SCHMORANZER, D - SCHOEPE, W. - SKRBEK, Ladislav - SKYBA, Peter - SOLNTSEV, R.E. - ZMEEV, D.E. Quartz Tuning Fork: Thermometer, Pressure- and Viscometer for Helium Liquids. In *Journal of Low Temperature Physics*, 2007, vol. 146, no. 5-6, p. 537-562. (0.978 - IF2006). (2007 - Current Contents, WOS, SCOPUS). ISSN 0022-2291.
Citations: **36 (WOS-34, SCOPUS-2)**

SZABÓ, Pavol - PRIBULOVÁ, Zuzana - PRISTÁŠ, Gabriel - BUĎKO, S.L. - CANFIELD, P.C. - SAMUELY, Peter. Evidence for two-gap superconductivity in Ba0.55K0.45Fe2As2 from directional point-contact Andreev-reflection spectroscopy. In *Physical Review B*, 2009, vol. 79, no. 1, art. no. 012503. (3.322 - IF2008). (2009 - Current Contents, WOS, SCOPUS). ISSN 1098-0121

Citations: **35 (WOS-33, SCOPUS-2)**

KLEIN, T. - ACHATZ, P. - KAČMARČÍK, Jozef - MARCENAT, C. - GUSTAFSSON, F. - MARCUS, J. - BUSTARRET, Etienne - PERNOT, J. - OMNES, F. - SERNELIUS, Bo E. - PERSSON, C. - FERREIRA DA SILVA, A. - CYTERMANN, C. Metal-insulator transition and superconductivity in boron-doped diamond. In *Physical Review B. Condensed matter and materials physics*, 2007, vol. 75, no. 6, art. no. 165313. (3.107 - IF2006). (2007 - Current Contents, WOS, SCOPUS). ISSN 1098-0121.
Citations: **34 (WOS-30, SCOPUS-4)**

SZABÓ, Pavol - SAMUELY, Peter - KAČMARČÍK, Jozef - KLEIN, T. - MARCUS, J. - FRUCHART, D. - MIRAGLIA, S. - MARCENAT, C. - JANSEN, A.G.M. Evidence for Two Superconducting Energy Gaps in MgB2 by Point-Contact Spectroscopy. In *Physical Review Letters*, 2001, vol. 87, no. 13, art. no. 137005. (6.462 - IF2000). (2001 - Current Contents,WOS,SCPS). ISSN 0031-9007.
Citations: **33 (WOS-28, SCOPUS-5)**

MUSATOV, Andrey - ROBINSON, Neal C. Susceptibility of mitochondrial electron-transport complexes to oxidative damage. Focus on cytochrome c oxidase. In *Free Radical Research*, 2012, vol. 46, no. 11, p. 1313-1326. (2.878 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 1071-5762.
Citations: **33 (WOS-27, SCOPUS-6)**

SEDLÁK, Marián. Large-scale supramolecular structure in solutions of low molar mass compounds and mixtures of liquids: II. Kinetics of the formation and long-time stability. In *Journal of Physical Chemistry B*, 2006, vol. 110, no. 9, p. 4339-4345. (4.033 - IF2005). (2006 - Current Contents, WOS, SCOPUS). ISSN 1520-6106.

Citations: **30 (WOS-30)**

Large-scale collaborations:

AAD, G. - ANTOŠ, Jaroslav - BRUNCKO, Dušan - FERENCEI, Jozef - KLADIVA, Eduard - SEMAN, Michal - STRÍŽENEC, Pavol. Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC. In *Physics Letters B*, 2012, vol. 716, no. 1, p. 1-29. (3.955 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0370-2693.
Citations: **1737**

AAD, G. - ANTOŠ, Jaroslav - BRUNCKO, Dušan - FERENCEI, Jozef - KLADIVA, Eduard - SEMAN, Michal - STRÍŽENEC, Pavol. Combined search for the Standard Model Higgs boson using up to 4.9 fb−1 of pp collision data at s = 7 TeV with the ATLAS detector at the LHC (ATLAS Collaboration). In *Physics Letters B*, 2012, vol. 710, no. 1, p. 49-66. (3.955 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0370-2693.
Citations: **269**

AAD, G. - ANTOŠ, Jaroslav - BRUNCKO, Dušan - FERENCEI, Jozef - KLADIVA, Eduard - STRÍŽENEC, Pavol. Observation of a Centrality-Dependent Dijet Asymmetry in Lead-Lead Collisions at sqrt(S(NN))= 2.76 TeV with the ATLAS Detector at the LHC (ATLAS Collaboration). In *Physical Review Letters*, 2010, vol. 105, no. 25, art. no. 252303. (7.328 - IF2009). (2010 - Current Contents, WOS, SCOPUS). ISSN 0031-9007.
Citations: **197**

2.2.4. List of most-cited authors from the Institute (at most 10 % of the research employees with university degree engaged in research projects) and their number of citations in the assessment period (2011– 2014).

KAREL KUDELA
Scopus 400

PETER KOPČANSKÝ
WOS 378

MILAN TIMKO
WOS 360

MARTINA KONERACKÁ
WOS 342

MARIAN ANTALÍK
WOS 253

PETER SAMUELY
WOS 252

MARIAN SEDLÁK
WOS 246

JOZEF KAČMARČÍK
WOS 236

PAVOL SZABÓ
WOS 219

NATÁLIA TOMAŠOVIČOVÁ
WOS 202

TIBOR KOŽÁR
WOS 180

ZUZANA PRIBULOVÁ
WOS 164

COLLABORATIONS:

DUŠAN BRUNCKO
WOS 6744

JAROSLAV ANTOŠ
WOS 2386

IVAN KRÁLIK, LADISLAV ŠÁNDOR
WOS 1752

2.3. Research status of the institute in international and national contexts

- **International/European position of the institute**

2.3.1. List of the most important research activities demonstrating the international relevance of the research performed by the institute, incl. major projects (details of projects should be supplied under Indicator 2.4). Max. 10 items.

FP7 EU: *Microkelvin*, Duration: 2009-2013. Within the programme Capacities of FP7. The project covers the leading European microkelvin and nanotechnology laboratories. Investigator/national coordinator P. Skyba.

FP7 MNT-ERA-NET, *Engineering in Superconductivity*, 2010-2012, The project is dealing with two technological problems of applied supercondu. Partner: Institute of Physics, Academy of Sciences of Czech republic. National coordinator Peter Samuely.

COST MP1201 - *Nanoscale Superconductivity: Novel Functionalities through Optimized Confinement of Condensate and Fields (NanoSC -COST)***,** National coordinator Peter Samuely.

FP7 MNT-ERA-NET - *MACOSYS Magnetically activ anisotropic composite systems,* 2013-2016. The proposal targets basic research on composite materials (ferronematics) consisting of liquid crystals and various magnetic nanoparticles, which combine the anisotropic properties of liquid crystals with the magnetic properties of the nanoparticles, resulting in composites with potentially unique dielectric/magnetic and optical properties (that the component materials themselves do not possess). The proposed studies concentrate on the increase of the sensitivity of our composite soft matter materials to magnetic fields, and the ultimate goal of the proposal is to make a step forward towards potential applications of ferronematics in various magneto-optical or magneto-mechanical devices which can be used in the future, e.g., in telecommunication. National coordinator Peter Kopčanský.

COST - TD 1402 *RADIOMAG Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy,* 2014-2018. Our group in the frame of this project is participating on synthesis of magnetic particles, and coating by biocompatible organic agents containing appropriate functional groups, that allow binding of antibodies specific to tumour cells. By applying alternating magnetic field to the cells with magnetic particles, magnetic particles absorb energy and convers into a heat and the heating effect could help to destroy cancer cells. Moreover, our group will also prepare magnetosomes by biomineralization process which are thanks to higher SAR value suitable for hyperthermia. Tumour treatment after application of specially designed magnetic nanoparticles and application of magnetic hyperthermia would be potentially more efficient. National coordinator Peter Kopčanský.

FP 7 MNT-ERANET II *STREAM Small energy harvester based on magnetostrictive amorphous and nanocrystalline materials*, 2012–2014. The main goal of this project was to develop an electromagnetic energy harvesting device able to sustain wireless sensors monitoring systems by converting the mechanical energy from vibrations into electric energy. Our constructed prototype of such device consist of an arrangement of two NdFeB permanent magnets, bound to a nonmagnetic cantilever beam that oscillate in the proximity of a coil having a multilayer core that is achieved by gluing together pieces of ultra-soft magnetic nanocrystalline ribbons in a sandwich type structure. The maximum output power delivered by the energy harvesting device was around 30 mW for an acceleration of 1 g (g = 9.8m/s2). National coordinator Ivan Škorvánek.

COST 083/14 - Action BM1405 - Non-globular proteins - from sequence to structure, function and application in molecular physiopathology (NGP-NET), 08/2015 - 04/2019, The aim of the project is create a pan-European scientific network of groups that work on non-globular proteins (NGPs) to strengthen, focus and coordinate research in this field. Non-globular proteins encompass different molecular phenomena that defy the traditional sequence-structure-function paradigm. Although growing evidence suggests that NGPs are central to many human diseases, functional annotation is very limited. Therefore, a better understanding of NGPs is crucial to fully comprehend human molecular physiopathology. The progress can be obtained using a systematic approach to their study supported by this project. National coordinator Zuzana Gažová

SVK- Taiwan - Computational approaches to study the structure, folding and interactions of biopolymers, 1.1.2011 / 31.12.2013. The project was focused on understanding of mechanism of miRNA interactions from different organisms with their targets. Such interaction profile resulted from atomistic molecular dynamic simulations. In addition, the interaction studies of other ligands/biomacromolecules and/or nanoparticles were investigated with aim to increase our understanding of intermolecular interactions, helping thus the development of more effective drug-delivery systems.National coordinator Tibor Kožár.

JEM-EUSO (Japanese Experiment Module - Extreme Universe Space Observatory) is an experiment devoted to explore the origin of the ultra high energy cosmic rays. JEM-EUSO experiment is a common project of 16 collaborating countries including Slovak republic. Slovak contribution is represented by Department of Space Physics in Institute of Experimental Physics Slovak Academy of Sciences in Košice since 2008. National coordinator P. Bobik

CERN, CDF, JINR DUBNA

The participation of Slovakia in scientific programs of the CERN is supported at governmental level. The participation in the CERN experimental programm has been a backbone of our research activities in the field of high energy physics for almost 25 years. The research of the Department of Subnuclear physics has been mainly supported by the CERN / ME SR projects:

CERN ME ALICE: Duration 2011 - 2015, principal investigator L. Šándor, from 2013 I. Králik

CERN ME ATLAS: Duration 2011 - 2015, principal investigator D. Bruncko

During the evaluated period ISP SAS participated also in the CDF collaboration at the Tevatron collider in Fermilab, Batavia USA, but the activity was past its peak and there was no major project associated with CDF. At the end of the evaluation period this subject was closed due to the retirement of the only remaining researcher.

JINR Dubna: The Department of Theoretical Physics has a very fruitful collaboration with the Laboratory of Theoretical Physics in Dubna (Russian Federation) focused on the application of quantum field theory in stochastic dynamics. Department of Subnuclear Physics maintains contacts with a group participating at the ALICE experiment at CERN studying the production of resonances.

2.3.2. List of international conferences (co)organised by the institute.

2012

Microkelvin 2012, Kongresové centrum SAV Smolenice, 90 participants, 19.03.-24.03.2012.

Rozhovory o aktuálnych otázkach röntgenovej a neutrónovej štruktúrnej analýzy, Košice, 25 participants, 29.03.-29.03.2012

HADRON STRUCTURE '12, Tatranské Matliare, Tatranské Matliare, 40 participants, 30.06.- 04.07.2012.

Precision Physics and Fundamental Physical Constants, Stará Lesná, hotel ACADEMIA, 40 participants, 10.09.-14.09.2012.

Physics in Collision 2012, hotel Patria, Štrbské Pleso, Slovensko, 110 participants, 12.09.-15.09.2012

Material Physics, TUKE Košice, 60 participants, 17.10.-19.10.2012

International Conference - NANOFLUID, Nov 5-7, 2012, Stara Lesna, Slovakia

2013

Metallography 13, Stará Lesná, 176 participants, 24.04.-26.04.2013

CSMAG 13, Czech and Slovak Conference on Magnetism, Košice, 320 participants, 17.06.-21.06.2013

Structure and Stability of Biomacromolecules, SSB 2013, Košice, Košice, 69 participants, 09.09.-13.09.2013

STM 2013 - Small Triangle meeting on Theoretical Physics / Nanofluid VIII , Stará Lesná, Stará Lesná, 53 participants, 27.10.-30.10.2013

Nanoved 2013, Svit, 60 participants, 22.11.-25.11.2013

International Workshop on Structural aspects of biocompatible ferrocolloids (BIOFC 2013), Aug 26-28, 2013, IEF SAV, Košice, Slovakia

International Workshop on Precision Physics and Fundamental Physical Constants, Oct 7-11, 2013, St. Petersburg, Russia

International Conference "Mathematical Modeling and Computational Physics" (MMCP 2013), July 8-12, 2013, Dubna, Russia

2014

NANOFLUID IX, Stará Lesná, Hotel Academia, 40 participants, 29.09.-02.10.2014

XVI. SMALL TRIANGLE MEETING, Humenné - Ptičie, 32 participants, 05.10.-08.10.2014

Workshop on Precision Physics and Fundamental Physical Constants, Dec 1-5, 2014, JINR Dubna, Russia

The International School on Advanced Methods of Modern Theoretical Physics: Integrable and Stochastic Systems, Aug 3-8, 2014, JINR Dubna, Russia

The XVIII International Scientific Conference of Young Scientists and Specialists (AYSS-2014), Feb 24-28, 2014, JINR Dubna, Russia

2015

Structure and Stability of Biomacromolecules, SSB 2015, Košice, 60 participants, 30.06.-03.07.2015

Mathematical Modeling and Computational Physics 2015, Stará Lesná, 90 participants, 13.07.-17.07.2015

STM 2015 - Small Triangle Meeting on Theoretical Physics, Sveta Nedelja, 22 participants, 07.09.-11.09.2015

ATLAS meeting - HCW 2015, Bratislava, 80 participants, 14.09.-18.09.2015

3.Workshop on Dispersion Methods for Hadronic Contributions to QED Effects, Bratislava, 20 participants, 09.10.-10.10.2015

International Conference on Precision Physics and Fundamental Physical Constants, Oct 12-16, 2015, Budapest, Hungary

International Conference ''Hadron Structure 2015'' (HS 2015), June 29 - July 3, 2015, Horny Smokovec, Slovakia

V International Conference ''Models in Quantum Field Theory'' (MQFT 2015), Sept 21-25, 2015, St Petersburg, Russia

2.3.3. List of edited proceedings from international scientific conferences.

Book of Contributions, 9th International Conference Structure and Stability of Biomacromolecules SSB2015, June 30 - July 3, 2015, Košice, Slovakia
Editors: Ing. Jaroslava Bágeľová, CSc., RNDr. Diana Fedunová, PhD., RNDr. Zuzana Gažová, CSc., RNDr. Katarína Šipošová, PhD. Reviewers: Doc. MUDr. Marek Dudáš, PhD., Doc. RNDr. Erik Sedlák, PhD.

ISBN: 978-80-89656-08-0
EAN: 9788089656080

Book of Contribution, 8th International Conference Structure and Stability of Biomacromolecules SSB2013, September 10 - 13, 2013, Košice, Slovakia
Editors: Ing. Jaroslava Bágeľová, CSc., RNDr. Diana Fedunová, PhD., RNDr. Zuzana Gažová, CSc. Reviewers: Doc. MUDr. Marek Dudáš, PhD., Doc. RNDr. Erik Sedlák, PhD.

ISBN: 978 -80-89656-01-1
EAN: 9788089656011

Proceedings of the 15th Czech and Slovak Conference on Magnetism, Košice, Slovakia, June 17-21, 2013, Editors: Jozef Kováč and Rastislav Varga, in: Acta Physica Polonica A, Vol. 126, No. 1, July 2014, pp. 1 – 424

International Journal "Lecture Notes in Computer Science“ , LNCS 7125, Mathematical Modeling and Computational Science, Springer – Verlag Berlin, Heisenberg 2012
ISBN 978-3-642-28212-6. Guest Editors: G. Adam, J. Busa, M. Hnatič

"Conference on precision physics and fundamental physical constants", Stará Lesna, High Tatra Mountains, Slovakia, September 10-14, 2012, Book of abstracts, Košice 2012, Equilibria, Editors: J. Busa, M.Hnatič

Proceedings "The 13th Small Triangle Meeting on theoretical physics", November 13-16, 2011, Stará Lesná, Institute of Experimental Physics SAS, 2012. ISBN 9788089284887
Editors: J. Busa, M. Hnatič, P. Kopčanský

Proceedings "The 14th Small Triangle Meeting on theoretical physics", September 9-12, 2012, Hotel Academia, Stara Lesna, Institute of Experimental Physics SAS, 2013.
Editors: J. Busa, M. Hnatič, P. Kopčanský

Proceedings "The 15th Small Triangle Meeting on theoretical physics", October 27-30, 2013, Hotel Academia, Stara Lesna, Institute of Experimental Physics SAS, 2014.
Editors: J. Busa, M. Hnatič, P. Kopčanský

Proceedings "The 16th Small Triangle Meeting on theoretical physics", October 5-8, 2014, Hotel Merrys, Pticie, Institute of Experimental Physics SAS, 2015. ISBN 978808081431685
Editors: J. Busa, M. Hnatič, P. Kopčanský

"MMCP 2015 International Conference on Mathematical Modeling and Computational Physics" July 13-17, 2015, Stará Lesná, Slovakia Book of Abstract - 1. edition. Košice : TU - 2015. - 96 s.. - ISBN 978-80-553-2156-1.
Editors: J. Busa, M. Hnatič

2.3.4. List of journals edited/published by the institute:

2.3.4.1. WOS (IF of journals in each year of the assessment period)

2.3.4.2. SCOPUS

2.3.4.3. other databases

2.3.4.4. not included in databases

- **National position of the institute**

2.3.5. List of selected projects of national importance

Slovak infrastructure for high-performance computing - SIVVP project: The establishment of regional grid and supercomputing centers in Slovakia was the main objective of the SIVVP project entitled "Slovak infrastructure for high-performance computing". There were six partners involved in the project, IEP SAS being one of them. The SIVVP infrastructure is modular with expandable functionality in performance and storage. IEP SAS supports the scientific community of the Slovak Academy of Sciences and Slovak universities especially in physics/chemistry/biology oriented fields, such us quantum and molecular mechanics and molecular dynamics calculations and other high-performance demanding computations. Local coordinator: T. Kožár

JEM-EUSO (Japanese Experiment Module - Extreme Universe Space Observatory) is an experiment devoted to explore the origin of the ultra high energy cosmic rays. JEM-EUSO experiment is a common project of 16 collaborating countries including Slovak republic. Slovak contribution is represented by Department of Space Physics in Institute of Experimental Physics Slovak Academy of Sciences in Košice since 2008. National coordinator P. Bobik

Cooperation of the Slovak republic and CERN takes place not only on scientific level. Strong industrial and diplomatic ties of Slovakia with CERN underlines national significance of the following projects:

CERN ME ATLAS 777/2011 ATLAS experiment on LHC in CERN: deep-inelastic events and new physics at TeV energies. Duration: 1.1.2011 / 31.12.2015. Responsible person: **Dušan Bruncko** - principal investigator

CERN ME ALICE 778/2011 ALICE experiment at the CERN LHC: a study of strongly interacting matter properties at high energy densities. Duration: 1.1.2011 / 31.12.2015. Responsible person: **Ladislav Šándor** (2011-2012), **Ivan Králik** (2013-2015) - principal investigator

2.3.6. Projects of the Slovak Research and Development Agency (APVV)

General calls:

APVV-0171-10 Structuralization phenomena in systems with nanoparticles. Duration: 1.5.2011 / 31.10.2014. Responsible person: **Peter Kopčanský** – coordinator (C)

APVV-0515-10 Quantum electrodynamics of artificial nanostructures. Duration: 1.5.2011 / 31.10.2014. Responsible person: **Martin Kupka** – work package leader (WPL)

APVV – 0486-10 Advanced polymer technologies in biomedicine: Polymer microcapsules for immunoprotection of transplanted pancreatic islets in diabetes treatment. Duration: 1.5.2011 / 31.10.2014. Responsible person: **Marián Sedlák** - WPL

APVV-0132-11 Novel quantum states in nanoscopic magnetic systems. Duration: 1.7.2012 / 31.12.2015. Responsible person: **Slavomír Gabáni** – WPL

APVV - 0147-11 High strength electrotechnical composite steels. Duration: 1.7.2012 / 31.12.2015. Responsible person: **Ivan Škorvánek** - WPL

APVV-0050-11 Strongly interacting matter under extreme conditions. Duration: 1.7.2012 / 31.12.2015. Responsible person: **Ján Nemčík** - WPL

APVV 0742-10 The effect of aliskiren loaded nanoparticles in experimental hypertension. Duration: 1.5.2011 / 31.10.2014. Responsible person: **Martina Koneracká** - WPL

APVV-0036-11 Progressive materials with competing order parameters. Duration: 1.7.2012 / 31.12.2015.Responsible person: **Peter Samuely** – C

APVV-0266-10 Sensors based on magnetic microwires. Duration: 1.5.2011 / 30.12.2014. Responsible person: **Ivan Škorvánek** – WPL

APVV-0492-11 Nanocrystalline and quasicrystalline metallic systems with tailored structure and morfology. Duration: 1.7.2012 / 31.12.2015. Responsible person: **Ivan Škorvánek** – WPL

APVV-0526-11 Interactive methods of image acquisition and processing in microscopy using natural user interface. Duration: 1.7.2012 /31.12.2015. Responsible person: **Zoltán Tomori** – C

APVV-0282-11 Preparation of nanostructured interfaces, their integration with biomelements and subsequent use. Duration: 1.7.2012 / 31.12.2013. Responsible person: **Tibor Kožár** - WPL

APVV-0330-12 Bulk Superconductors. Duration: 1.10.2013 / 30.9.2017. Responsible person: **Pavel Diko** – C

APVV-0097-12 Collective phenomena in coupled electron and spin systems. Duration: 1.10.2013 / 31.12.2017. Responsible person: **Pavol Farkašovský** – C

APVV-14-0120 Graphene-based nanoplatform for detection of cancer. Duration: 1.7.2015 / 30.6.2019. Responsible person: **Martina Koneracká** - WPL

APVV-14-0932 Effects of nanoencapsulated simvastatin on cardiovascular system in experimental metabolic syndrome. Duration: 1.7.2015 / 30.6.2019. Responsible person: **Vlasta Závišová** - WPL

APVV-14-0605 Superconductor - insulator transition. Duration: 1.7.2015 / 30.6.2019. Responsible person: **Pavol Szabó** – C

Call for popularization 2009

LPP 0093-09 Enviromental nano-aplications closely to students. Duration: 1.9.2009 / 31.8.2012. Responsible person: **Mária Zentková** – C

LPP - 0270-09 Scicence - user friendly. Duration: 1.9.2009 / 31.8.2012. Responsible person: **Mária Zentková** – C

LPP-0124-09 Interactive activities to make physics attractive for basic school, their teachers and general public. Duration: 1.9.2009 / 31.12.2012. Responsible person: **Marián Mihalik** – C

2.3.7. Projects of the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA)

- VEGA 2/0025/12
  Supramolecular proteincomplexes
  Duration: 1.1.2012 / 31.12.2015
  Responsible Person: Marián Antalík / C

- VEGA 2/0094/10
  Spectrometry of space energetic particles on board of the scientific spacecraft
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Ján Baláž / C

- VEGA 2/0133/09
  Anomalous transport properties of strongly correlated electron systems
  Duration: 1.1.2009 / 31.12.2012
  Responsible Person: Ivan Baťko / C

- VEGA 2/0185/11
  Influence of structural changes on deformation and failure of amorphous and nanostructured alloys
  Duration: 1.1.2011 / 31.12.2013
  Responsible Person: Kornel Csach / C

- VEGA 2/0211/10
  Nanostructured complex oxides with perovskite structure
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Pavel Diko / C

- VEGA 2/0175/10
  The study of correlation effects in strongly interacting Fermi systems
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Pavol Farkašovský / C

- VEGA 2/0155/11
  Ionic liquids - influence on structure and stability of proteins
  Duration: 1.1.2011 / 31.12.2013
  Responsible Person: Diana Fedunová / C

- VEGA 2/0079/10
  Amyloid aggregation of proteins
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Zuzana Gažová / C

- VEGA 2/0173/09
  Study of anomalous scaling in stochastic and turbulent systems with symmetry breaking
  Duration: 1.1.2009 / 31.12.2012
  Responsible Person: Michal Hnatič / C

- VEGA 2/0148/10
  Magnetism and superconductivity. Experimental study at extreme conditions
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Jozef Kačmarčík / C

- VEGA 2/0041/12
  Structure-forming phenomena in self-assembly structures of proteins influenced by nanoparticles

Duration: 1.1.2012 / 31.12.2015
Responsible Person: Martina Koneracká / C

- VEGA 2/0077/09
  Influence of different nanoparticles on the structural transitions in ferronematics and dielectric properties of magnetic fluids
  Duration: 1.1.2009 / 31.12.2012
  Responsible Person: Peter Kopčanský / C

- VEGA 1/0861/12
  The influence of ferromagnetic particles for the magnetic properties of composite materials.
  Duration: 1.1.2012 / 31.12.2015
  Responsible Person: Jozef Kováč / I

- VEGA 2/0073/10
  Calculations of lectin-ligand interactions intended for new inhibitor design
  Duration: 1.1.2010 / 31.12.2013
  Responsible Person: Tibor Kožár / C

- VEGA 2/0081/10
  Energetic cosmic particles and its role in space weather
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Karel Kudela / C

- VEGA 2/0057/10
  Study of selected strongly correlated electron systems
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Marián Mihalik / C

- VEGA 2/0092/10
  Dynamics of particle production in high-energy hadronic collisions
  Duration: 1.1.2010 / 31.12.2013
  Responsible Person: Ján Nemčík / C

- VEGA 2/0069/10
  Electronic properties of the nanoscale structures
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Michal Pudlák / C

- VEGA 2/0070/12
  The influence of temperature, magnetic fields, high pressure and dimension on the ground state of compounds
  Duration: 1.1.2012 / 31.12.2015
  Responsible Person: Marián Reiffers / C

- VEGA 2/0215/10
  Self-assembly of water soluble polymers
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Marián Sedlák / C

- VEGA 2/0128/12
  Andreev-Majorana excitations in superfluid 3He-B
  Duration: 1.1.2012 / 31.12.2014
  Responsible Person: Peter Skyba / C

- VEGA 2/0097/12

Development and implementation of procedures for reconstruction and analysis of data from proton-proton interactions on LHC accelerator
Duration: 1.1.2012 / 31.12.2015
Responsible Person: Pavol Stríženec / C

- VEGA 2/0209/10
  Tailoring of functional properties of nanocrystalline magnetic materials by thermal processing in magnetic field
  Duration: 1.1.2010 / 31.12.2012
  Responsible Person: Ivan Škorvánek / C

- VEGA 2/0043/12
  Application of magnetic fluids in electrical engineering
  Duration: 1.1.2012 / 31.12.2015
  Responsible Person: Milan Timko / C

- VEGA 2/0191/11
  Interactive Image Processing Algorithms Based on Energy Minimization and "Graph-cuts" Method
  Duration: 1.1.2011 / 31.12.2013
  Responsible Person: Zoltán Tomori / C

- VEGA 2/0059/13
  Development of space energetic particle detectors for scientific satellites and support of the space technology infrastructure at the Institute of Experimental Physics SAS
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Ján Baláž / C

- VEGA 2/0184/13
  Thin films and thin film structures for sensoric and memristive applications Duration: 1.1.2013 / 31.12.2016
  Responsible Person: Marianna Baťková / C

- VEGA 2/0076/13
  Cosmic rays modulation in the Heliosphere
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Pavol Bobík / C

- VEGA 2/0090/13
  Superconducting and magnetocaloric ceramics with perovskite structure
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Pavel Diko / C

- VEGA 2/0077/13
  Theoretical study of cooperative phenomena in strongly correlated electron and spin systems
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Pavol Farkašovský / C

- VEGA 2/0106/13
  Quantum phase transitions. Influence of chemical and hydrostatic pressure on selected rare earth borides
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Slavomír Gabáni / C

- VEGA 2/0181/13
  Inhibitors of protein amyloid aggregation
  Duration: 1.1.2013 / 31.12.2016

Responsible Person: Zuzana Gažová / C

- VEGA 2/0093/13
  Study of properties of turbulent environments with symmetry breaking
  Duration: 1.1.2013 / 31.12.2016
  Responsible Person: Marián Jurčišin / C

- VEGA 2/0135/13
  Superconductors with non-conventional pairing
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Jozef Kačmarčík / C

- VEGA 2/0045/13
  Sensitivity of liquid crystals containing nanoparticles to external magnetic field Duration: 1.1.2013 / 31.12.2016
  Responsible Person: Peter Kopčanský / C

- VEGA 2/0082/13
  Development of novel real time methods of acquisition and data analysis in distributed experimental environment
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Ivan Králik / C

- VEGA 2/0040/13
  Variations of low energy cosmic rays and suprathermal particles: connections to space weather effects Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Karel Kudela / C

- VEGA 2/0192/13
  Progressive amorphous and nanocrystalline soft magnetic alloys for energy and magnetic cooling applications
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Jozef Marcin / C

- VEGA 2/0178/13
  Strongly correlated electron systems based on oxides of 3d metals and lanthanides
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Marián Mihalik / C

- VEGA 2/0037/13
  Electronic properties of carbon nanoparticles.
  Duration: 1.1.2013 / 31.12.2015
  Responsible Person: Michal Pudlák / C

- VEGA 2/0045/14
  Mechanical properties and stability of amorphous alloys and nanosized systems Duration: 1.1.2014 / 31.12.2017
  Responsible Person: Kornel Csach / C

- VEGA 2/0175/14
  Development and implementation of algorithms and methods for the study of fiber like objects using image processing and mathematical modeling
  Duration: 1.1.2014 / 31.12.2016
  Responsible Person: Erna Demjén / C

- VEGA 2/0176/14
  Study of the intrinsically disordered protein stability and aggregation

Duration: 1.1.2014 / 31.12.2017
Responsible Person: Diana Fedunová / C

- VEGA 2/0062/14
  Functionality and Structural Integrity of Proteins in Bicelles – Implications for Mitochondrial and Amyloidogenic Proteins
  Duration: 1.1.2014 / 31.12.2016
  Responsible Person: Andrey Musatov / C

- VEGA 2/0020/14
  Properties of nuclear matter created in interactions with nuclear targets at high energies
  Duration: 1.1.2014 / 31.12.2017
  Responsible Person: Ján Nemčík / C

- VEGA 2/0182/14
  Spontaneously occurring and induced target-oriented self-assembly of polymeric and nonpolymeric materials in liquid state
  Duration: 1.1.2014 / 31.12.2016
  Responsible Person: Marián Sedlák / C

- VEGA 2/0157/15
  Superfluid helium-3 as topological insulator
  Duration: 1.1.2015 / 31.12.2017
  Responsible Person: Peter Skyba / C

2.3.8. Projects of SAS Centres of Excellence

Centre excelence of SAS – Nanofluids

Duration: 1.2.2009 / 31.1.2013

Responsible Person: Kopčanský / C

Centre of Low Temperature Physics And Material Research at Extreme Conditions

Duration: 1.7.2011 / 30.6.2015

Responsible Person: Samuely / C

2.3.9. National projects supported by EU Structural Funds

- The Slovak Infrastructure for High Performance Computing (SIVVP)
  ITMS 26210120002
  Duration: 1/10 - 9/15
  WPL / Kožár

- New materials and technologies for energetics
  ITMS 262220220061
  Duration: 5/10 - 10/13
  C / Diko

- Research and Development of the Second Generation of YBCO Bulk Superconductors
  ITMS 26220220041
  Duration: 9/09 - 4/14
  C / Diko

- Infrastructure Improving of Centre of Excellence of Advanced Materials with Nano- and Submicron- Structure

ITMS 26220120035
Duration: 5/10 - 4/13
WPL / Škorvánek

- Centre for cooperative phenomena and phase transitions in nanosystems with perspective utilization in nano- and biotechnology II
  ITMS 26220120033
  Duration: 4/10 - 9/13
  C / Kopčanský

- Development of technological processes of magnetic fluids for biomedical applications
  ITMS 26220220005
  Duration: 1/10 - 6/12
  C / Kopčanský

- Center of Excellence for Research on Physiology of the Digestive Tract
  ITMS 26220120043
  Duration: 3/10 - 2/13
  WPL / Antalík

- Technology of the fabrication of electrical steels for the electric motors with higher efficiency
  ITMS 26220220037
  Duration: 1/10 - 6/12
  WPL / Škorvánek

- Center of Space Research: influence of space weather - I.
  ITMS 26220120009
  Duration: 5/09 - 10/12
  WPL / Kudela

- Extrem II - Center of advanced physical studies for materials in extreme conditions
  ITMS 26220120047
  Duration: 08/11 - 1/14
  WPL / Skyba

- Center of Space Research: influence of space weather - II.
  ITMS 26220120029
  Duration: 3/10 - 8/14
  WPL / Kudela

- Center of excellence for power electronics and their material components II
  ITMS 26220120046
  Duration: 10/10 - 10/13
  I / Timko

- Educational physical centre IEP SAS
  ITMS 26110230034
  Duration: 9/10 - 8/13
  C / Zentková

- Infrastructure improving for research of nanosystems with perspective utilization in technical and medical applications
  ITMS 26210120012
  Duration: 1/12 - 6/15
  C / Kopčanský

- Educational centre for Research and Development of complex nanosystems („ECVV - NANOKOP“)
  ITMS 26110230061
  Duration: 1/12 - 12/13
  C / Kopčanský

- International virtual laboratory of progressive material physics – PhysNet
  ITMS 26110230097
  Duration: 9/13 - 10/15
  C / Juríková

- Research Center of advanced materials and technologies for current and future applications "PROMATECH"
  ITMS 26220220186
  Duration: 7/13 - 12/15
  WPL / Samuely

2.3.10. List of journals (published only in the Slovak language) edited/published by the institute:

2.3.10.1. WOS (IF of journals in each year of the assessment period)

2.3.10.2. SCOPUS

2.3.10.3. Other databases

2.3.10.4. Not included in databases

- **Position of individual researchers in an international context**

2.3.11. List of invited/keynote presentations at international conferences, as documented by programme or invitation letter

2012

1. **BOBÍK, Pavol.** Propagation of Cosmic rays in the Heliosphere and in the Earth magnetic field. In Searching for the sources of Galactic cosmic rays, Paris, France, December 12 - 14, 2012, invited talk.

2. **DIKO, Pavel.** Growth and microstructure of YBCO bulk superconductors with Ce addition. In PASREG 2012 : 8th International Workshop on Processing and Applications of Superconducting (RE)BCO Large Grain Materials, Taiwan, 6 - 8 December, 2012, invited talk.

3. **GAŽOVÁ, Zuzana** - HAYRYAN, Shura - HU, Chin-Kun - **KOŽÁR, Tibor.** Effiency of GPGPU in Biomolecular Computing. In 17th Biophysics Conference, Taipei, Taiwan, May 23-25, 2012, invited talk IL-04, p.30.

4. **HNATIČ, Michal**. Field-Theoretic Approach to the Kinetics of Reaction Processes: Role of Density and Velocity Fluctuations. In NCTS Spring Workshop on Critical Phenomena and Complex Systems, Taipei, Republic of China, 13 - 16 April 2012, invited talk.

5. **KUDELA, Karel.** Cosmic rays and space weather. In ECRS 2012: 23rd European Cosmic Ray Symposium and 32nd Russian Cosmic Ray Conference, Moscow, Russia, July 2-6, 2012, invited talk.

6. **MARCIN, Jozef** - ŚNIADECKI, Zbigniew - **KOVÁČ, Jozef** - IDZIKOWSKI, Bogdan - **ŠKORVÁNEK, Ivan**. Magnetocaloric Effect in GdFeCo-Based Melt-Spun Ribbons. In TMS 2012 : 141st Annual Meeting and Exhibition, March 11 -15, 2012, Orlando, Florida, invited lecture.

7. **SZABÓ, Pavol - SAMUELY, Peter**. STM studies on the intrinsic Josephson junction behavior of the low temperature (LaSe) 1.14(NbSe2) superconductor. In SUPERSTRIPES 2012 : Quantum Phenomena in Complex Matter, Erice-Italy, 11-18 July 2012, invited talk.

8. **KAČMARČÍK, Jozef - PRIBULOVÁ, Zuzana - SZABÓ, Pavol - GABÁNI, Slavomír** - MORI, Takao - **SAMUELY, Peter.** YB6 - superconductor with an Einstein lattice. In Proceedings of the scientific conference Physics of Materials 2012, 17-19 October 2012, Košice, Slovakia. Editors Jana Tóthová, Vladimír Lisý. - Košice : TU, 2012, invited talk, p. 55-58. ISBN 978-80-553-1175-3.

9. **KOPČANSKÝ, Peter - TIMKO, Milan - TOMAŠOVIČOVÁ, Natália - KONERACKÁ, Martina - ZÁVIŠOVÁ, Vlasta - MITRÓOVÁ, Zuzana** - CHAUD, Xavier - JADZYN, Jan. Ferronematics: a way from thermovision camera to magnetovision camera. In 8th Workshop on Molecular Acoustics, Relaxation and Calorimetric Methods within the framework of the 41st Winter School on Wave and Quantum Acoustics, 28th February - 2nd March, 2012, Szczyrk, Poland, invited talk.

10. **KOPČANSKÝ, Peter - TIMKO, Milan - KONERACKÁ, Martina - ZÁVIŠOVÁ, Vlasta - TOMAŠOVIČOVÁ, Natália - GAŽOVÁ, Zuzana - ŠIPOŠOVÁ, Katarína - MITRÓOVÁ, Zuzana - HASHIM, Anežka** - ÉBER, Nándor - JADZYN, Jan. Complex systems (liquid crystals and amyloid structures) containing nanosized magnetic particles. In 10 CCC : 10th Conference on Colloid Chemistry, Budapest, Hungary, August 29-31, 2012, invited talk.

11. **TIMKO, Milan - HASHIM, Anežka - MOLČAN, Matúš - RAJŇÁK, Michal - KOPČANSKÝ, Peter** - MAKOWSKI, M. - GOJZEWSKI, Hubert - JÓZEFCZAK, Arkadiusz - SKUMIEL, Andrzej. The heating effect in bacterial magnetic nanoparticles prepared at various condition. In 8th Workshop on Molecular Acoustics, Relaxation and Calorimetric Methods within the framework of the 41st Winter School on Wave and Quantum Acoustics, 28th February - 2nd March, 2012, Szczyrk, Poland, invited talk.

12. **TIMKO, Milan - HASHIM, Anežka - MOLČAN, Matúš** - SKUMIEL, Andrzej - **KOVÁČ, Jozef - RAJŇÁK, Michal - KOPČANSKÝ, Peter** - GOJZEWSKI, Hubert - MAKOWSKI, M. - ROYER, F. Bacterial magnetic nanoparticles – aspects of preparation, characterization and applications. In 10 CCC : 10th Conference on Colloid Chemistry, Budapest, Hungary, August 29-31, 2012, invited talk.

13. **KONERACKÁ, Martina.** Medical applications of magnetic fluid. In Transformation of knowledge and technologies to the praxis obtained by research and development in the earth resources area, Stará Lesná, Slovakia, 3 - 5 June, 2012 : international conference, invited talk.

14. **KOPČANSKÝ, Peter.** Cooperative features and phases transfer in nanomaterials with of perspective of utilization in nano and biotechnologies. In Transformation of knowledge and technologies to the praxis obtained by research and development in

the earth resources area, Stará Lesná, Slovakia, 3 - 5 June, 2012 : international conference, invited talk.

15. **TIMKO, Milan.** Magnetic fluids for power transformers and hyperthermia. In Transformation of knowledge and technologies to the praxis obtained by research and development in the earth resources area, Stará Lesná, Slovakia, 3 - 5 June, 2012 : international conference, invited talk.

16. **TOMAŠOVIČOVÁ, Natália.** Ferronematics: combinations of liquid crystals with magnetic fluids. In Transformation of knowledge and technologies to the praxis obtained by research and development in the earth resources area, Stará Lesná, Slovakia, 3 - 5 June, 2012 : international conference, invited talk.

17. **ŠKORVÁNEK, Ivan - MARCIN, Jozef - CAPIK, Marek** - JANOTOVÁ, Irena - **KOVÁČ, Jozef** - ŠVEC, Peter - IDZIKOWSKI, Bogdan. Soft magnetic Fe-based alloys for energy applications. In Proceedings of the scientific conference Physics of Materials 2012, 17-19 October 2012, Košice, Slovakia. Editors Jana Tóthová, Vladimír Lisý. - Košice : TU, 2012, invited talk, p. 59-61. ISBN 978-80-553-1175-3.

18. ŠVEC, Peter Jr. - ŠVEC, Peter - **ŠKORVÁNEK, Ivan** - HOŠKO, Jozef - VLASÁK, Gabriel. Structure and magnetic properties of Fe-Ni-Nb-B systems. In Mikroskopie 2012, Duben 17-18, Kongresové censtrum SÚZA, Bratislava, SK. - 2012, p. 66.

19. ŠVEC, Peter - ŠVEC, Peter Jr. - MAŤKO, Igor - HOŠKO, Ivan – **ŠKORVÁNEK, Ivan** - JANIČKOVIČ, Dušan. Recent developments in preparation and applications of amorphous alloys. In Workshop INNOVMAT ACADEMY - Progressive methods and technologies of preparation, processing and diagnostics of materials, May 10, 2012, MTF STU Bratislava.

20. ŠVEC, Peter - ŠVEC, Peter Jr. - MAŤKO, Igor - JANIČKOVIČ, Dušan - HOŠKO - **KOVÁČ, Jozef – ŠKORVÁNEK, Ivan**. Formation, structure and properties of mono, bi and tri-layered rapidly quenched ribbons. In Progress in Applied Surface, Interface and Thin Film Science 2012 (SURFINT-SREN III), May 14-18, 2012, Florence, Italy : Extended Abstract Book of Conference. - Bratislava : Comenius University, 2012, p. 184. ISBN 978-80-223-3212-5.

21. **VARGA, Marek - MARCIN, Jozef - CAPIK, Marek - KOVÁČ, Jozef** - ŠVEC, Peter - **ŠKORVÁNEK, Ivan**. Field-annealed Fe-Ni-B amorphous and nanocrystalline alloys for magnetic sensor applications. In ICM 2012 : 19th International Conference on Magnetism, July 8 - 13, 2012, Busan, Korea, abstract IB01, p, 91.

22. **SEDLÁK, Marián.** Mesoscopic properties of solutions and liquid mixtures as revealed by light scattering techniques. In 18th Symposium on Thermophysical Properties, Boulder, Colorado, USA, June 24 - 29, 2012, invited talk.

2013

1. **ANTOŠ, Jaroslav.** ttbar production mechanism. In CZ-SK ATLAS Physics Workshop, 27 - 28 May 2013, Prague, invited talk.

2. **ANTOŠ, Jaroslav.** Higgs searches at LHC (a critical look). In CZ-SK ATLAS Physics Workshop, 27 - 28 May 2013, Prague, invited talk.

3. **BOBÍK, Pavol** - BOELLA, G. - BOSCHINI, M.J. - CONSOLANDI, C. - GERVASI, M. - GRANDI, D. - **KUDELA, Karel** - NOVENTA, S. - PENSOTTI, S. - PUTIŠ, Marián - RANCOITA, Pier Giorgio - ROZZA, Davide - DELLA TORRE, Stefano - TACCONI, M. Heliospheric modulation of Cosmic rays. In TeV Particle Astrophysics 2013, August 26 - 29, 2013, Irvine, California, USA, invited talk.

4. **KOPČANSKÝ, Peter - TOMAŠOVIČOVÁ, Natália - TIMKO, Milan - ZÁVIŠOVÁ, Vlasta - KONERACKÁ, Martina - MITRÓOVÁ, Zuzana - HASHIM, Anežka - RAJŇÁK, Michal - HNATIČ, Michal** - ÉBER, Nándor - TÓTH-KATONA, Tibor - FODOR-CSORBA, Katalin - VAJDA, Anikó - JADZYN, Jan - HONKONEN, Juha - BEAUGNON, Eric - CHAUD, Xavier. Magnetic nanoparticles can help to increase the sensitivity of liquid crystals to an applied external magnetic field. In ICMF 13 : 13th International Conference on Magnetic Fluids, Januar 7-11, 2013, New Delhi, India, invited talk.

5. **KUDELA, Karel.** Low energy cosmic ray variability: A couple of remarks. In 22nd Annual Student Conference Week of Doctoral Students 2013, June 4-7, 2013, Prague, invited talk.

6. **SKYBA, Peter.** Spin Wave analogue of event horizon in superfluid 3He-B. In Microkelvin 2013 : Microkelvin Workshop 2013, 9 - 13 September 2013, Porvoo, Finland, invited talk.

7. **SZABÓ, Pavol.** The low temperature STM in Košice. In VIII. Hungarian SPM Konference, 18 October 2013, Debrecen, Hungaria, invited talk.

8. **ŠKORVÁNEK, Ivan - MARCIN, Jozef - CAPIK, Marek - KOVÁČ, Jozef** - JANIČKOVIČ, Dušan - ŠVEC, Peter Jr. Magnetic processing of amorphous and nanocrystalline alloys. In NANOVED 2013 & NANO INFO DAY : 6th International Conference on Nanosciences, Nanotechnologies, Nanomaterials and NANO INFO DAY of the Nanoforce Project. - Brno : TRIBUN EU, 2013, o-13. ISBN 978-80-263-0511-8.

9. **ŠKORVÁNEK, Ivan - MARCIN,** Jozef - IDZIKOWSKI, Bogdan - GEBARA, P. - PAWLIK, Piotr. LaFeCoSi- and GdFeAl-Based Composites with Enhanced Refrigerant Capacity and Table-Like Magnetocaloric Effect. In TMS 2013 : 142nd Annual Meeting and Exhibition, March 3-7, 2013, San Antonio, Texas, invited talk.

10. **ŠKORVÁNEK, Ivan.** Soft magnetic composites with tunable magnetocaloric properties. In SMM 21 : 21st International Conference on Soft Magnetic Materials, 1 - 4 September, 2013, Budapest, Hungary, invited talk.

11. **ŠKORVÁNEK, Ivan - CAPIK, Marek - MARCIN, Jozef** - JANIČKOVIČ, Dušan - ŠVEC, Peter. Soft magnetic amorphous and nanocrystalline bilayer ribbons. In ANMM 2013 : 6th International Workshop on Amorphous and Nanostructured Magnetic Materials, September 30 - October 3, 2013, Sendai, Japan, invited talk.

12. **ŠKORVÁNEK, Ivan - MARCIN, Jozef** - ŠVEC, Peter - LUPU, Nicoleta - CHIRIAC, Horia. Tuning of soft magnetic properties in FeCo-and FeNi-based amorphous and nanocrystalline alloys by thermal processing in external magnetic field. In THERMEC 2013 : International conference on processing and manufacturing of advanced materials. Book of abstracts. Las Vegas, USA, 2.-6.12.2013. - B.V., 2013, invited talk.

13. **TIMKO, Milan - MOLČAN, Matúš - RAJŇÁK, Michal - KOVÁČ, Jozef - KOPČANSKÝ, Peter** - SKUMIEL, Andrzej - JÓZEFCZAK, Arkadiusz. Heating Characteristic of Magnetic Fluids based on various carrier liquid. In 9th Workshop on Molecular Acoustics, Relaxation and Calorimetric Methods, February 25 - March 1, 2013, Szczyrk, Poland, invited talk.

14. **TOMAŠOVIČOVÁ, Natália**. Structural Phase transition in ferronematics - nematic liquid crystals doped with magnetic nanoparticles. In ESF Exploratory Workshop on Defect-Assembled Soft Matter for Nanoscience and Biotechnology, Rogaška Slatina, Slovenia, 13 - 16 September 2013, invited talk.

15. SANTAGELO, Andrea - **BOBÍK, Pavol - KUDELA, Karel - PASTIRČÁK, Blahoslav.** The JEM-EUSO mission: Context and status. In EPJ Web of Conferences, 2013, vol. 53, art. no. 09001. (2013 - SCOPUS). ISSN 2100-014X.

16. **VAVRA, Martin - HRABČÁK, Pavol - ZENTKOVÁ, Mária - MIHALIK, Marián - MIHÁLIK, Matúš - CSACH, Kornel**. The Effect of Presuure on Magnetic Properties of KMnCr(CN)6. In EPJ Web of Conferences, 2013, vol. 40, art. no. 14001. (2013 - SCOPUS). ISSN 2100-014X.

17. **GAŽOVÁ, Zuzana.** Self-assembly amyloid systems of proteins. In 2013 NCTS November Workshop on Critical Phenomena and Complexes Systems, 11, November 2013, Taipei, Taiwan, invited talk.

18. **KOPČANSKÝ, Peter - ŠIPOŠOVÁ, Katarína - BEDNÁRIKOVÁ, Zuzana - ANTOŠOVÁ, Andrea - KONERACKÁ, Martina - ZÁVIŠOVÁ, Vlasta - KUBOVČÍKOVÁ, Martina - TIMKO, Milan - GAŽOVÁ, Zuzana.** Can magnetic fluids help in the treatment of amyloid associated diseases? In PIM 2013 : International conference on Processes in Isotopes and Molecules, September 25-27, 2013, Cluj-Napoca, Romania, invited talk.

19. **KOPČANSKÝ, Peter**. Magnetic response of liquid crystals (LC) including bioLC doped by magnetic nanoparticles. In 2013 NCTS November Workshop on Critical Phenomena and Complexes Systems, 11, November 2013, Taipei, Taiwan, invited talk.

20. **KOŽÁR, Tibor.** From "bio" to "nano" - Computational Models and Strategies. In 2013 NCTS November Workshop on Critical Phenomena and Complexes Systems, 11, November 2013, Taipei, Taiwan, invited talk.

21. **SZABÓ, Pavol** - NEILINGER, P. - TRGALA, M. - GRAJCAR, M. - **SAMUELY, Peter**. Superconductivity near transition to insulating state in molybdenum carbide. In VORTEX VIII : Eight International Conference in School Format on Vortex Matter in Nanostructured Superconductors, 21-26 September, 2013, Rhodes, Greece, invited talk Mon12, p. 63.

22. **SZABÓ, Pavol** - GRAJCAR, M. - **SAMUELY, Peter**. Scanning tuneneling microscopy and spectroscopy of superconducting molybdene carbide ultra thin films. In XVI KKN : XVI National Conference on Superconductivity, October 7-12, 2013, Zakopane, Poland, invited talk.

23. **SAMUELY, Peter**. High temperature superconductors. In SAS - IVF - JST Workshop, 9 - 11 July 2013, Smolenice, Slovakia, invited talk.

2014

1. **KOPČANSKÝ, Peter**. How to induce high sensitivity of liquid crystal to external magnetic field? In PM 2014 : European Conference Physics of Magnetism, June 23 - 27, 2014, Poznaň, Poland, invited talk.

2. **KOPČANSKÝ, Peter**. Feronematics. In 18th Conference of Czech and Slovak Physicists, September 16-19, 2014, Olomouc, Czech Republic, invited lecture.

3. **KOPČANSKÝ, Peter**. Interaction of magnetic fluids with amyloid sstructures. In PLMMP 2014: 6th International Conference Physics of Liquid Matter: Modern Problems, May 23th-27th, 2014, Kyiv, Ukraine, invited lecture.

4. **KOPČANSKÝ, Peter**. The effects of amyloid structure disaggregation in the presence of magnetic fluids and magnetic fields. In 43rd Winter School on Wave Acoustics and 10th Winter Workshop on Molecular Acoustics, Relaxation and Calorimetric Methods, 4.3. - 7.3. 2014, Szczyrk, Poland, invited talk.

5. **KUDELA, Karel**. Quasi-periodic variations of low energy cosmic rays. In STP 13: 13th Solar terrestrial Physics symposium, October 12 - 18, 2014, Xian, China, invited talk.

6. **KUDELA, Karel**. On quasi-periodic variations of low energy cosmic rays observed near Earth. In ICHLNRRA 2014 : 8th International Conference on High Levels of Natural Radiation and Radon Areas, September 1 - 5, 2014, Prague, Czech Republic, invited talk.

7. **SAMUELY, Peter**. MoC ultrathin superconducting films on verge to the insulating state. In S-HY-NE-D 2014 : Physics and Applications of Superconducting Hybrid Nano-Engineered Devices, August 31 - September 4, 2014, Castellabate, Italy, invited lecture.

8. **SZABÓ, Pavol**. Superconductivity near the superconductor-insulator transition in MoC thin films Nanoscale superconductivity. In Advances in Nanostructured Superconductors: Materials, Properties and Theory, 4th to 7th May, 2014, Madrid, Spain, invited lecture.

9. **ŠKORVÁNEK, Ivan - MARCIN, Jozef - CAPIK, Marek - VARGA, Marek** - JANOTOVÁ, Irena - ŠVEC, Peter. Field-annealed amorphous and nanocrystalline bilayer ribbons with tailorable soft magnetic properties. In MAP6 : 6th International

Workshop on Materials Analysis and Processing in Magnetic Fields, 8 - 11 July, 2014, Okinawa, Japan, invited lecture, p. 2-3.

10. **ŠKORVÁNEK, Ivan - MARCIN, Jozef** - **VARGA, Marek** - MAŤKO, Igor - ŠVEC, Peter. Rapidly Quenched Amorphous and Nanocrystalline Bilayer Ribbons for Energy and Sensor Applications. In EMN 2014 : 8th International conference on energy, materials and nanotechnology, 22 - 25 November 2014, Orlando, Florida, invited talk SS-06, p. 100.
11. **ŠKORVÁNEK, Ivan - MARCIN, Jozef - CAPIK, Marek** - JANIČKOVIČ, Dušan - ŠVEC, Peter. Amorphous and nanocrystalline bilayer ribbons with tailorable soft magnetic properties. In ICSM 2014 : 4th International Conference on Superconductivity and Magnetism, 27 April 2014 - 2 May 2014, Antalya, Turkey, invited talk.

12. **ŠKORVÁNEK, Ivan.** Field-annealed Soft Magnetic Amorphous and Nanocrystalline Ribbons with Improved Energy Performance. In CIMTEC 2014 : 6th Forum on New Materials, June 15-19, 2014, Montecatini Terme, Italy, invited lecture.

13. **TIMKO, Milan.** The hyperthermic effect in bacterial nanoparticles. In 43rd Winter School on Wave Acoustics and 10th Winter Workshop on Molecular Acoustics, Relaxation and Calorimetric Methods, 4.3. - 7.3. 2014, Szczyrk, Poland, invited talk.

14. **FLACHBART, Karol**. Nature of electrical conductivity in topological insulatol SmB6 at low temperatures. In ISBB 2014 : 18th International Symposium on Boron, Borides and Related Materials, August 31 - September 5, 2014, Honolulu, Hawaii, USA, invited talk.

15. **STRÍŽENEC, Pavol**. Performance of the ATLAS Liquid Argon Calorimeter after three years of LHC operation and plans for a future upgrade, ATLAS-COM-LARG-2014-001, International conference: Instrumentation for Colliding Beam Physics, INSTR 14, 24 February to 1 March 2014, Novosibirsk, Russian Federation, JINST 9 (2014)

2015

1. **KAČMARČÍK, Jozef - PRIBULOVÁ, Zuzana** - SAMUELY, Tomáš - **SZABÓ, Pavol** - SUDEROW, Herman - KIM, Timur K. - **SAMUELY, Peter**. Bi2Pd , the multiband superconductor. Thermodynamic and STM studies of the superconducting energy gap. In Advances in Studies of Superconducting Hybrids: Theory and Modeling vs Experiment , May 16 - 19, 2015, Arcachon, France : Workshop, invited talk, p. 29.

2. **KOPČANSKÝ, Peter**. Magnetoferritin. In ISMAP 2015 : Ilmenau Symposium on Medical Application of Magnetic Nanoparticles and Ferrofluids, Ilmenau, Germany, September 1-3, 2015, invited talk.

3. **SAMUELY, Peter**. Superconductor insulator transition in MoC ultrathin Films: Transport, StM and microwave studies. In Localization, Interactions and Superconductivity, Chernogolovka, Russia, June 29 - July 3, 2015 : International Workshop, invited talk.

4. **SAMUELY, Peter - KAČMARČÍK, Jozef** - SAMUELY, Tomáš - **SZABÓ, Pavol** - ŽEMLIČKA, M. - NEILINGER, P. - TRGALA, M. - REHÁK, M. - MANCA, Daniel - GRAJCAR, M. Supression of Superconductivity in Strongly Disordered Thin MoC Films. In VORTEX IX : Vortex Matter in Nanostructured Superconductors, Rhodes, Greece, September 12 - September 17, 2015, invited talk, p. 66.

5. **SEDLÁK, Marián**. Aqueous solutions and mixtures: mesoscale phenomena. In 10th Annual Water Conference on the Physics, Chemistry and Biology of Water, Bulgaria, October 1st - 4th 2015, invited talk.

6. STREČKA, Jozef - **ČENČARIKOVÁ, Hana** - LYRA, M.L. Phase diagrams and thermodynamics of a coupled spin-electron model on doubly decorated planar lattices. In XXXVIII ENFMC Brazilian Physical Society Meeting, May 24-28, 2015, Parana, Brazil : Condensed Matter, Optics, Atomic and Molecular, Biological and Medical Physics, invited talk.

7. **ŠKORVÁNEK, Ivan - MARCIN, Jozef** - **GONZÁLEZ-LEGARETTA, L. - ANDREJKA, František - VARGA, Marek** - MAŤKO, Igor - ŠVEC, Peter. Amorphous and Nanocrystalline Bilayer Ribbons for Magnetic Sensors. In ANMM 2015 : 7th International Workshop on Amorphous and Nanostructured Magnetic Materials, 21-24 September 2015, Iasi, Romania Programme and Abstracts., invited talk, p. 45.

8. **ŠKORVÁNEK, Ivan - MARCIN, Jozef - ANDREJKA, František - VARGA, Marek** - MAŤKO, Igor - ŠVEC, Peter. Rapidly quenched amorphous and nanocrystalline bilayer ribbons with tailorable magnetic prooperties. In FiMPART 2015 : Frontiers in Materials Processing, Application, Research and Technology, Hyderabad, India, June 12 - 15, 2015, invited talk.

9. **ŠKORVÁNEK, Ivan**. Magnetic multiphase composites with tunable magnetocaloric properties. In Phase transitions in Magnetic Materials : from fundamentals to Applications, August 16-20, 2015, Cancun, Mexico, invited talk.

10. **ŠKORVÁNEK, Ivan**. Amorphous and Nanocrystalline Fe-based Bilayer Ribbons with Tailorable Magnetic Properties. In DINEMN 2015 : Donostia international Workshop on Energy Materials Nanotechnology, 1 - 4 September 2015, San Sebastián, Spain, invited talk.

11. **TIMKO, Milan**. Hyperthermic effect in magnetosome. In ISMAP 2015 : Ilmenau Symposium on Medical Application of Magnetic Nanoparticles and Ferrofluids, Ilmenau, Germany, September 1-3, 2015, invited talk.

12. **TIMKO, Milan**. The hyperthermic effect in oil based magnetic fluids. In 11th Workshop on Molecular Acoustics, Relaxation and Calorimetric Methods, 3. - 6.3. 2015, Szczyrk, Poland, invited talk.

13. **TOMAŠOVIČOVÁ, Natália**. Structural transitions in ferronematics - nematic liquid crystals doped with magnetic nanoparticles. In Mini-workshop on Critical Phenomena and Complex Systems, 24 September 2015, Hsinchu, Taiwan, invited talk.

14. **GABÁNI, Slavomír - PRISTÁŠ, Gabriel** - GLUSHKOV, V. - SLUCHANKO, N.E. - SIEMENSMEYER, K. - SHITSEVALOVA, N.Yu. - **FLACHBART, Karol**. Nature of electrical conductivity in Kondo - insulator SmB6 at very low temperatures. In Strongly Correlated Topological Insulators: SmB6 and Beyond, June 2-5, 2015, University of Michigan, invited talk

2.3.12. List of researchers who served as members of the organising and/or programme committees

M. Hnatič - chairman

International Conference Small Triangle Meeting on Theoretical Physics, 2012

P. Kopčanský – chairman, member of the advisory committee

International Conference - NANOFLUID, Nov 5-7, 2012, Stara Lesna, Slovakia

M. Hnatič - chairman

International Conference “Small Triangle Meeting on Theoretical Physics” (STM 2013),

Oct 27-30, 2013, Stara Lesna, Slovakia

P. Kopčanský – chairman

International Workshop on Structural aspects of biocompatible ferrocolloids (BIOFC 2013), Aug 26-28, 2013, IEF SAV, Košice

P. Kopčanský – chairman

International Conference NANOFLUID 2013, Oct. 28-30, 2013, Stara Lesna, Slovakia

M. Hnatič – member of the organising committee

International Workshop on Precision Physics and Fundamental Physical Constants, Oct 7-11, 2013, St. Petersburg, Russia

M. Hnatič – members of the advisory committee

International Conference "Mathematical Modeling and Computational Physics" (MMCP 2013), July 8-12, 2013, Dubna, Russia

P. Kopčanský – members of the advisory committee

International Conference "Mathematical Modeling and Computational Physics" (MMCP 2013), July 8-12, 2013, Dubna, Russia

M. Hnatič - chairman

International Conference, 16th Small Triangle Meeting on Theoretical Physics (STM 2014),

Oct 5-8, 2014, Humenne, Slovakia

M. Hnatič – member of the organizing committee

Workshop on Precision Physics and Fundamental Physical Constants, Dec 1-5, 2014, JINR Dubna, Russia

M. Hnatič – member of the organizing committee

The International School on Advanced Methods of Modern Theoretical Physics: Integrable and Stochastic Systems, Aug 3-8, 2014, JINR Dubna, Russia;

M. Hnatič – member of the program committee

The XVIII International Scientific Conference of Young Scientists and Specialists (AYSS-2014), Feb 24-28, 2014, JINR Dubna, Russia

M. Hnatič – members of the organizing committee

International Conference, 17th Small Triangle Meeting on Theoretical Physics (STM 2015),

Sep 7-11, 2015, Sveta Nedelja, Hvar, Croatia

P. Kopčanský – members of the organizing committee

International Conference, 17th Small Triangle Meeting on Theoretical Physics (STM 2015),

Sep 7-11, 2015, Sveta Nedelja, Hvar, Croatia

M. Hnatič – member of the organizing committee

International Conference on Precision Physics and Fundamental Physical Constants,

Oct 12-16, 2015, Budapest, Hungary

M. Hnatič – member of the organizing committee

International Conference ''Hadron Structure 2015'' (HS 2015), June 29 - July 3, 2015, Horny Smokovec, Slovakia

M. Hnatič – member of the advisory committee

V International Conference ''Models in Quantum Field Theory'' (MQFT 2015), Sept 21-25, 2015, St Petersburg, Russia

M. Hnatič – chairman

International Conference "Mathematical Modeling and Computational Physics" (MMCP 2015), July 13-17, 2015, Stara Lesna, Slovakia

P. Kopčanský – member of the organizing committee

International Conference "Mathematical Modeling and Computational Physics" (MMCP 2015), July 13-17, 2015, Stara Lesna, Slovakia

M Timko - member of organising committe

CSMAG Converence 2013, Košice

M. Timko - member of programme committee

Conference of Czech and Slovak Physicists 2014

M. Sedlák - member of the management committee

COST meeting at ECIS 2014, Limassol, September 7-12, 2014

K. Kudela - member of international advisory committee
(IAC) of ECRS 2012, Moscow, Russia;

K. Kudela - member of international advisory committee
ECRS 2014, Kiel Germany

K. Kudela - member of international advisory committee
TEPA-2013, TEPA-2014, TEPA-2015, Nor Amberd, Armenia

K. Kudela - member of international advisory committee
ICSPS-2015, Vivekanand, India

D. Bruncko - member of international advisory committee
Physics in Collision, 2012 – 2015

D. Bruncko - member of organizing committee
Hadron Structure and QCD: from LOW to HIGH energies, Gatchina, Russia, July 4 – July 8, 2012

D. Bruncko - member of organizing committee
XX International Workshop on Deep-Inelastic Scattering and Related Subjects, 26-30 March 2012, University of Bonn, Germany

D. Bruncko - member of organizing committee
Hadron Structure '13, 30 June - 4 July, 2013, Tatranské Matliare, Slovakia

D. Bruncko - chairman
Physics in Collision, 12-15 September, 2012, Štrbské Pleso, Slovakia

P. Stríženec - member of organizing committee
Physics in Collision, 12-15 September, 2012, Štrbské Pleso, Slovakia

M. Straka - member of organizing committee
Physics in Collision, 12-15 September, 2012, Štrbské Pleso, Slovakia

Kuľková I. - member of organizing committee
Physics in Collision, 12-15 September, 2012, Štrbské Pleso, Slovakia

J. Urbán - member of organizing committee
Physics in Collision, 12-15 September, 2012, Štrbské Pleso, Slovakia

E. Kladiva - member of organizing committee
Physics in Collision, 12-15 September, 2012, Štrbské Pleso, Slovakia

M. Stehlík - member of organizing committee
Physics in Collision, 12-15 September, 2012, Štrbské Pleso, Slovakia

J. Antoš - member of organizing committee
Physics in Collision, 12-15 September, 2012, Štrbské Pleso, Slovakia

P. Stríženec - member of organizing committee
ATLAS Hadronic Calibration Workshop, 14. – 18. September, 2015, Bratislava, Slovakia

D. Bruncko - member of organizing committee
ATLAS Hadronic Calibration Workshop, 14. – 18. September, 2015, Bratislava, Slovakia

M. Straka - member of organizing committee
ATLAS Hadronic Calibration Workshop, 14. – 18. September, 2015, Bratislava, Slovakia

Kuľková I. - member of organizing committee
ATLAS Hadronic Calibration Workshop, 14. – 18. September, 2015, Bratislava, Slovakia

J. Urbán - member of organizing committee
ATLAS Hadronic Calibration Workshop, 14. – 18. September, 2015, Bratislava, Slovakia

L. Šándor - member of international advisory committee
Strangeness in Quark Matter SQM 2013, 22 - 27 July 2013, Birmingham, UK

L. Šándor - member of international advisory committee
Board of elders of XLII International Symposium on Multiparticle Dynamics ISMD 2012, 4 - 9 October 2012, Wildbad Kreuth, Germany

L. Šándor - member of international advisory committee
Board of elders of XLIII International Symposium on Multiparticle Dynamics ISMD 2013, 15 - 20 September 2013, Chicago IL, USA

L. Šándor - member of international advisory committee
Board of elders of XLIV International Symposium on Multiparticle Dynamics ISMD 2014, 8 - 12 September 2014, Bologna, Italy

Z. Gažová, M. Antalík, J. Bágeľová, D. Fedunová, A. Musatov, Z. Tomori - scientific committee of the Structure and Stability of Biomacromolecules (SSB) conferences 2013, 2015, organized in Košice

Z. Bednáriková, E. Demjén, I. Hrmo, S. Poniková, M. Reiffers, D. Sedláková, K. Šipošová, D. Švarcbergerová - organizing committee of the Structure and Stability of Biomacromolecules (SSB) conferences 2013, 2015, organized in Košice

I. Škorvánek, co-organizer of syposium
141st Annual Meeting and Exhibition TMS 2012, Symposium: „Processing to Control Morphology and Texture in Magnetic Materials“ Orlando, Florida , USA, March. 11-15, 2012

I. Škorvánek, chairman
15th Czech and Slovak conference on magnetism, CSMAG`13, Košice, 17.-21.6.2013

I. Škorvánek, member of International Advisory Committee, organizer of session
Donostia International Conference on Nanoscale Magnetism and Applications, DICNMA 2013, Session: Nanocrystalline materials, San Sebastian, Spain, Sept. 9-13, 2013

I. Škorvánek, member of International Organizing Committee
21st International Conference on Soft Magnetic Materials, Budapest, Hungary, 1 - 4 September, 2013

I. Škorvánek, member of Program Committee
6th International Workshop on Amorphous and Nanostructured Magnetic Materials, Sendai, Japan, September 30 - October 3, 2013

I. Škorvánek, member of Organizing Committee
6th International Conference on Nanosciences, Nanotechnologies and Nanomaterials, Svit, Slovakia, Oct. 21 – 24, 2013

I. Škorvánek, member of Scientific Committee
9th Pamir International Conference, “Fundamental and applied MHD, Thermo Acoustics and Space Technologies”, Riga, Latvia, June 16 - 20, 2014

I. Škorvánek, member of Advisory Committee
The European Conference, PHYSICS OF MAGNETISM 2014 (PM'14), Poznań, POLAND, June 23-27, 2014

I. Škorvánek, member of International Organizing Committee
22st International Conference on Soft Magnetic Materials, Sao Paulo, Brazil, 13 - 16 September, 2015

I. Škorvánek, member of International Advisory Committee
Donostia International Workshop on Energy, Materials and Nanotechnology, San Sebastian-Donostia, Spain, September 1-4, 2015

I. Škorvánek, member of Program Committee
7th International Workshop on Amorphous and Nanostructured Magnetic Materials, Iasi, Romania, 21-24 September 2015

J. Marcin, program chairman
15th Czech and Slovak conference on magnetism, CSMAG`13, Košice, 17.-21.6.2013

J. Marcin, member of Organizing Committee
Magnetic Measurements, MM-2015, Košice, Slovakia, 25th - 28th August 2015

J. Kováč, publication chairman
15th Czech and Slovak conference on magnetism, CSMAG`13, Košice, 17.-21.6.2013

M. Varga, member of Organizing Committee
Magnetic Measurements, MM-2015, Košice, Slovakia, 25th - 28th August 2015

P. Skyba, chairmen of MICROKELVIN 2012 conference, Smolenice, Slovakia, 19th - 24th March 2012

P. Skyba, member of program committee of ULT 2014 conference, Bariloche, Argentina, 15th - 18th August 2014

P. Skyba, member of program committee of QFS 2013 conference, Matsue, Japan, 1th - 6th August 2013

P. Skyba, member of program committee of QFS 2012 conference, Lancaster, Great Britain, 15th - 21th August 2012

- **Position of individual researchers in a national context**

2.3.13. List of invited/keynote presentations at national conferences, as documented by programme or invitation letter

2012
1.**K. Kudela,** Objav kozmického žiarenia pred 100 rokmi: impulz (nielen) pre kozmofyzikálny výskum (The discovery of cosmic ray 100 years ago), 19. konferencia slovenských fyzikov, 3.-6. 9. 2012, na stránke http://sfs.sav.sk/19konfsl.html

2013
1 **MIHALIK, Marián.** Štruktúra a magnetické vlastnosti progresívnych materiálov na báze oxidov mangánu (The structure and magnetic properties of progressive materials on the base of MnO). In *Progresívne magnetické materiály : Zborník abstraktov. Košice, 25.10.2013*. - Košice: Ústav materiálového výskumu SAV, 2013, s. 12, invited talk. ISBN 978-80-970964-6-5.

2 ZELEŇÁKOVÁ, Adriana - **KOVÁČ, Jozef** - ZELEŇÁK, Vladimír. Komplexná ac susceptibilita v nanokompozitných ateriáloch na báze železa (The complex ac susceptibility of Fe-based nanocomposites). In *Progresívne magnetické materiály : Zborník abstraktov. Košice, 25.10.2013*. - Košice : Ústav materiálového výskumu SAV, 2013, s. 10, invited talk. ISBN 978-80-970964-6-5.

3 **ZENTKOVÁ, Mária**. Multifunkčné materiály na báze molekulárnych magnetov (Multifunctional materials on the base of molecular magnets). In *Progresívne magnetické materiály: Zborník abstraktov. Košice, 25.10.2013*. - Košice : Ústav materiálového výskumu SAV, 2013, s. 11, invited talk. ISBN 978-80-970964-6-5.

4 **SKYBA, Peter**. Analógie horizontov udalostí čiernych dier v supratekutých fázach hélia-3 (The analogs of event horizon of black holes in superfluid helium-3). In *20. konferencia slovenských fyzikov, 2.-5.september 2013, Bratislava : Zborník*. - Bratislava : SFS, 2013.

1.3.14. List of researchers who served as members of organising and programme committees of national conferences

Timko Milan: Chair of Programme committee Conference of Slovak Physicists 2015, 2013, 2012

- **Supplementary information and/or comments documenting the international and national status of the Institute**

Pavol Szabó

Prize „Arany János díj“ of the Hungarian Academy of Sciences – for excellent research and scientific popularization, 2012

Peter Samuely – member of the Advisory board of Physica C - since 2012

- A medal on the 60th Anniversary of the Slovak Academy of Sciences for leading a top research team - 2013

Šándor Ladislav

- Silver medal of the Faculty of Science, P. J. Šafárik University, Košice on the 50th anniversary of the foundation of the Faculty - 2013

- Honourable mention of the Minister of Education, Science, Research and Sport of the Slovak republic on 20th anniversary of the Slovak membership at CERN - 2013

Bruncko Dušan

- Honourable mention of the Minister of Education, Science, Research and Sport of the Slovak republic on 20th anniversary of the Slovak membership at CERN - 2013

- A medal on the 60th Anniversary of the Slovak Academy of Sciences for leading a top research team - 2013

Králik Ivan

- A medal on the 60th Anniversary of the Slovak Academy of Sciences for leading a top research team - 2013

Bán Jaroslav, Bruncko Dušan, Kladiva Eduard, Seman Michal, Stríženec Pavol

Slovak Academy of Sciences Award for results of the scientific collaboration with CERN leading to the discovery and measurement of properties of a particle consistent with the Higgs boson – 2014

Andrea Antošová, Zuzana Gažová, Martina Koneracká, Peter Kopčanský, Katarína Šipošová, Vlasta Závišová - Slovak Academy of Sciences Award 2014 – Study of the magnetic nanoparticles as therapeutics of amyloid-related diseases.

The scientists of IEP SAS are:

- experts of the national government and the SAS in different fields of research

- referees of the most reputable scientific journals, like Science, Phys. Rev. Letters, Phys. Review B, Phys. Review E, Biomacromolecules, etc.

- referees, raporteurs and panelists of FP7 and H2020 projects, foreign grant agencies, etc.

2.4. Tables of project structure, research grants and other funding resources

- **International projects and funding**

2.4.1. Major projects within the European Research Area – Framework Programmes of the EU, ERA-NET, European Science Foundation, NATO, COST, INTAS, etc. (here and in items below please specify: type of project, title, grant number, duration, total funding and funding for the institute, responsible person in the institute and his/her status in the project, e.g. coordinator, work package leader, investigator),

Year	Project title	Type/ Project number	Duration in months	Funding for the Institute (EUR)	Role of the Institute/ Responsible person
2012	European Microkelvin Collaboration	228464	04/2009-09/2013 (12)	11311	WPL / Skyba
	JEM-EUSO, Extreme Universe Space Observatory Onboard Japan Experiment Module	MVTS JEM-EUSO	01/2010-01/2017 (12)	20000	WPL / Kudela
	Engineering in Superconductivity	ERANET ESO	01/2010-12/2012 (12)	49905	C / Samuely
	Small energy harvester based on magnetostrictive amorphous and nanocrystalline materials	ERANET STREAM	01/2012-12/2014 (12)	44328	C / Škorvánek
	Developing space weather products and services in Europe	COST ES 0803	08/2008-11/2012 (11)	3600	CL / Kudela
	Colloidal Aspects of Nanoscience for Innovative Processes and Materials	COST CM 1101	01/2012-12/2016 (12)	4000	C / Sedlák
	Nanoscience and Engineering in Superconductivity	ESF Research Networking Programme	06/2006-05/2012 (5)	1667	C / Samuely
	Computational approaches to study structure, folding and interactions of biopolymers	NSC Taiwan	01/2011-12/2013 (12)	21995	C / Kožár
	Nanoscale Superconductivity: Novel Functionalities through Optimized Confinement of Condensate and Fields	COST MP1201	10/2012-10/2016 (3)	0	C / Samuely
	ATLAS experiment on LHC in CERN: deep-inelastic events and new physics at TeV energies	CERN ATLAS 0777/2011	01/2011-12/2015 (12)	48752	WPL / Bruncko
	ALICE experiment at the CERN LHC: a study of strong interacting matter properties at high energy densities	CERN ALICE 0778/2011	01/2011-12/2015 (12)	57365	WPL / Šándor
2013	European Microkelvin Collaboration	228464	04/2009-09/2013 (9)	24746	WPL / Skyba

	JEM-EUSO, Extreme Universe Space Observatory Onboard Japan Experiment Module	MVTS JEM-EUSO	01/2010-01/2017 (12)	20000	WPL / Kudela
	Small energy harvester based on magnetostrictive amorphous and nanocrystalline materials	ERANET STREAM	01/2012-12/2014 (12)	46981	C / Škorvánek
	Colloidal Aspects of Nanoscience for Innovative Processes and Materials	COST CM 1101	01/2012-12/2016 (12)	4000	C / Sedlák
	Computational approaches to study structure, folding and interactions of biopolymers	NSC Taiwan	01/2011-12/2013 (12)	22000	C / Kožár
	Nanoscale Superconductivity: Novel Functionalities through Optimized Confinement of Condensate and Fields	COST MP1201	10/2012-10/2016 (12)	5000	C / Samuely
	Magnetically active anisotropic composite systems	ERANET MACOSYS	09/2013-08/2016 (4)	8300	C / Kopčanský
	ATLAS experiment on LHC in CERN: deep-inelastic events and new physics at TeV energies	CERN ATLAS 0777/2011	01/2011-12/2015 (12)	54344	C / Bruncko
	ALICE experiment at the CERN LHC: a study of strong interacting matter properties at high energy densities	CERN ALICE 0778/2011	01/2011-12/2015 (12)	55344	C / Šándor
2014	JEM-EUSO, Extreme Universe Space Observatory Onboard Japan Experiment Module	MVTS JEM-EUSO	01/2010-01/2017 (12)	18000	C / Kudela
	Small energy harvester based on magnetostrictive amorphous and nanocrystalline materials	ERANET STREAM	01/2012-12/2014 (12)	40012	C / Škorvánek
	Colloidal Aspects of Nanoscience for Innovative Processes and Materials	COST CM 1101	01/2012-12/2016 (12)	3600	C / Sedlák
	Nanoscale Superconductivity: Novel Functionalities through Optimized Confinement of Condensate and Fields	COST MP1201	10/2012-10/2016 (12)	3600	C / Samuely
	Magnetically active anisotropic composite systems	ERANET MACOSYS	09/2013-08/2016 (12)	23140	C / Kopčanský
	Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy	COST 054/14 TD1402	11/2014-11/2018 (2)	0	C / Kopčanský
	ATLAS experiment on LHC in CERN: deep-inelastic events and new physics at TeV energies	CERN ATLAS 0777/2011	01/2011-12/2015 (12)	114027	C / Bruncko
	ALICE experiment at the CERN LHC: a study of strong interacting matter properties at high energy densities	CERN ALICE 0778/2011	01/2011-12/2015 (12)	111027	C / Králik

2015	**JEM-EUSO, Extreme Universe Space Observatory Onboard Japan Experiment Module**	**MVTS JEM-EUSO**	**01/2010-01/2017 (12)**	**20000**	**WPL / Bobík**
	Colloidal Aspects of Nanoscience for Innovative Processes and Materials	**COST CM 1101**	**01/2012-12/2016 (12)**	**4000**	**C / Sedlák**
	Nanoscale Superconductivity: Novel Functionalities through Optimized Confinement of Condensate and Fields	**COST MP1201**	**10/2012-10/2016 (12)**	**4000**	**C / Samuely**
	Magnetically active anisotropic composite systems	**ERANET MACOSYS**	**09/2013-08/2016 (12)**	**25000**	**C / Kopčanský**
	Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy	**COST 054/14 TD1402**	**11/2014-11/2018 (12)**	**4667**	**C / Kopčanský**
	Non-globular proteins - from sequence to structure, function and application in molecular physiopathology	**COST BM1405**	**08/2015-05/2019 (5)**	**1650**	**C / Gažová**
	ATLAS experiment on LHC in CERN: deep-inelastic events and new physics at TeV energies	**CERN ATLAS 0777/2011**	**01/2011-12/2015 (12)**	**60000**	**C / Bruncko**
	ALICE experiment at the CERN LHC: a study of strong interacting matter properties at high energy densities	**CERN ALICE 0778/2011**	**01/2011-12/2015 (12)**	**50000**	**C / Králik**

2.4.2. Other international projects, incl. total funding and funding for the institute

SK-RO-0012-10

Investigation of the lysozyme amyloid aggregtiion using in vitro assays and analysing its effects on cell viability and proliferation

Duration: 3.1.2011 / 31.12.2012

C / Gažová

2012: Total funding / funding for the institute: 2580 / 1837,91

SK-FR-0035-11

FePt@Pyrex hard magnetic microvires

Duration: 1.1.2012 / 31.12.2013

C / Kováč

2012: Total funding / funding for the institute: 2650 / 1936,86

2013: Total funding / funding for the institute: 2650 / 2253,46

SK-RO-0027-10

Multifunctional nanostructured magnetic materials for sensor applications

Duration: 1.1.2011 / 31.12.2012

C / Ivan Škorvánek

2012: Total funding / funding for the institute: 2600 / 2444

SK-FR-0012-11
Magneto-optic properties of polymer thin films
Duration: 1.1.2012 / 31.12.2013
C / Milan Timko
2012: Total funding / funding for the institute: 2650 / 1932,20
2013: Total funding / funding for the institute: 2650 / 846,80

SK-SRB-0054-11
Manganese Oxides Based Multiferroics
Duration: 1.1.2012 / 31.12.2013
C / Marián Mihálik
2012: Total funding / funding for the institute: 2430 / 2332,46
2013: Total funding / funding for the institute: 2430 / 2400

SK-RO-0016-12
Investigation of the amyloidogenic proteins in relationship with their cytotoxic effect
Duration: 1.1.2013 / 31.12.2014
C / Gažová
2013: Total funding / funding for the institute: 2500 / 1799,56
2014: Total funding / funding for the institute: 2500 / 1545,03

SK-GR-0023-11
Development & calibration of space instruments for the new space mission SPEKTR-R and RESONANCE - first data analysis 3-11
Duration: 1.1.2013 / 31.12.2014
C / Kudela
2013: Total funding / funding for the institute: 2520 / 0
2014: Total funding / funding for the institute: 2500 / 0

SK-PT-0026-12
Magneto-electric effect and spin-phonon coupling in transition metal oxides
Duration: 1.1.2013 / 31.12.2014
C / Marián Mihalik
2013: Total funding / funding for the institute: 2700 / 1838,46
2014: Total funding / funding for the institute: 2700 / 2149,60

SK-FR-2013-0025
Bulk Superconductors with optimesed pinning
Duration: 1.1.2014 / 31.12.2015
C / Diko
2014: Total funding / funding for the institute: 2650 / 1279,80
2015: Total funding / funding for the institute: 2650 / 1084,20

SK-HU-2013-0039

Elaboration and characterization of graphene layers with controlled nanoscale rippling

Duration: 1.1.2015 / 31.12.2016

C / Szabó

2015: Total funding / funding for the institute: 1500 / 1089,86

SK-CZ-2013-0109

Uranium intermetallics and their hydrides

Duration: 1.1.2014 / 31.12.2015

C / Marián Mihalik

2015: Total funding / funding for the institute: 4000 / 1916,06

SK-CZ-2013-0083

Magnetic and magnetooptical properties of selected manganites

Duration: 1.1.2015 / 31.12.2015

C / Matúš Mihalik

2015: Total funding / funding for the institute: 4000 / 1281,31

SK-HU-2013-0009

Magnetic properties of anisotropic composite nanosystems

Duration: 1.1.2015 / 31.12.2015

C / Tomašovičová

2015: Total funding / funding for the institute: 1500 / 1252,76

SK-SRB-2013-0050

Magnetic nanocomposites for biomedical application

Duration: 1.1.2015 / 31.12.2016

C / Zentková

2015: Total funding / funding for the institute: 2430 / 2104,10

SK-UA-2013-0028

Relaxation and photoinduced effects in chalcogenide glasses of Ge-As-S (Se) system

Duration: 01.01.2014 / 31.12.2015

C / Flachbart

2015: Total funding / funding for the institute: 1550 / 92,30

SK-UA-2013-0027

Physical Mechanisms of the Low Temperature Plastic Deromation and Failure of New High Strength Multicomponent Amorphous and High-Entropy Alloys

Duration: 01.09.2015 / 31.12.2016

C / Csach

2015: Total funding / funding for the institute: 1930 / 0

2.4.3. Other important projects and collaborations without direct funding (max. 10 projects)

- **National projects and their funding**

2.4.4. Projects supported by the Slovak Research and Development Agency (APVV)

	Project title	Typ / Project number	Duration in months	Funding for the Institute (EUR)	Role of the Institute / Responsible person
2012	Novel quantum states in nanoscopic magnetic systems	APVV 0132-11	07/2012-12/2015 (6)	4282	WPL / Gabáni
	Structuralization phenomena in systems with nanoparticles	APVV 0171-10	05/2011-10/2014 (12)	71600	C / Kopčanský
	High strength electrotechnical composite steels	APVV 0147-11	07/2012-12/2015 (6)	7014	WPL / Škorvánek
	Quantum electrodynamics of artificial nanostructures	APVV 0515-10	05/2011-10/2014 (12)	21475	WPL / Kupka
	Advanced polymer technologies in biomedicine: Polymer microcapsules for immunoprotection of transplanted pancreatic islets in diabetes treatment	APVV 0486-10	05/2011-10/2014 (12)	14215	WPL / Sedlák
	Interactive activities to make physics attractive for basic school, their teachers and general public	APVV LPP-0124-09	09/2009-12/2012 (12)	3558	WPL / Marián Mihálik
	Strongly interacting matter under extreme conditions	APVV 0050-11	07/2012-12/2015 (6)	3607	WPL / Nemčík
	The effect of aliskiren loaded nanoparticles in experimental hypertension	APVV 0742-10	05/2011-10/2014 (12)	12979	WPL / Koneracká
	Progressive materials with competing order parameters	APVV 0036-11	07/2012-12/2015 (6)	34741	C / Samuely
	Sensors based on magnetic microwires	APVV 0266-10	05/2011-12/2014 (12)	23337	WPL / Škorvánek
	Nanocrystalline and quasicrystalline metallic systems with tailored structure and morfology	APVV 0492-11	07/2012-12/2015 (6)	10816	WPL / Škorvánek

	Interactive methods of image acquisition and processing in microscopy using natural user interface	**APVV 0526-11**	**07/2012-12/2015 (6)**	**19165**	**C / Tomori**
	Preparation of nanostructured interfaces, their integration with biolelements and subsequent use	**APVV 0282-11**	**07/2012-12/2013 (6)**	**2100**	**WPL / Kožár**
	Enviromental nano-aplications closely to students	**APVV LPP 0093-09**	**09/2009-08/2012 (8)**	**910**	**WPL / Zentková**
	Scicence - user friendly	**APVV LPP - 0270-09**	**09/2009-08/2012 (8)**	**19369**	**C / Zentková**
2013	**Novel quantum states in nanoscopic magnetic systems**	**APVV 0132-11**	**07/2012-12/2015 (12)**	**13868**	**WPL / Gabáni**
	Structuralization phenomena in systems with nanoparticles	**APVV 0171-10**	**05/2011-10/2014 (12)**	**81250**	**C / Kopčanský**
	High strength electrotechnical composite steels	**APVV 0147-11**	**07/2012-12/2015 (12)**	**15595**	**WPL / Škorvánek**
	Quantum electrodynamics of artificial nanostructures	**APVV 0515-10**	**05/2011-10/2014 (12)**	**21475**	**WPL / Kupka**
	Advanced polymer technologies in biomedicine: Polymer microcapsules for immunoprotection of transplanted pancreatic islets in diabetes treatment	**APVV 0486-10**	**05/2011-10/2014 (12)**	**14215**	**WPL / Sedlák**
	Strongly interacting matter under extreme conditions	**APVV 0050-11**	**07/2012-12/2015 (12)**	**6085**	**WPL / Nemčík**
	The effect of aliskiren loaded nanoparticles in experimental hypertension	**APVV 0742-10**	**05/2011-10/2014 (12)**	**11179**	**WPL / Koneracká**
	Progressive materials with competing order parameters	**APVV 0036-11**	**07/2012-12/2015 (12)**	**73273**	**C / Samuely**
	Sensors based on magnetic microwires	**APVV 0266-10**	**05/2011-12/2014 (12)**	**14111**	**WPL / Škorvánek**
	Nanocrystalline and quasicrystalline metallic systems with tailored structure and morfology	**APVV 0492-11**	**07/2012-12/2015 (12)**	**24531**	**WPL / Škorvánek**
	Interactive methods of image acquisition and processing in microscopy using natural user interface	**APVV 0526-11**	**07/2012-12/2015 (12)**	**46670**	**C / Tomori**
	Preparation of nanostructured interfaces, their integration with biolelements and subsequent use	**APVV 0282-11**	**07/2012-12/2013 (12)**	**4100**	**WPL / Kožár**

	Bulk Superconductors	**APVV 0330-12**	**10/2013-09/2017 (3)**	**8872**	**C / Diko**
	Collective phenomena in coupled electron and spin systems	**APVV 0097-12**	**10/2013-12/2017 (3)**	**5559**	**C / Farkašovský**
2014	**Novel quantum states in nanoscopic magnetic systems**	**APVV 0132-11**	**07/2012-12/2015 (12)**	**12342**	**WPL / Gabáni**
	Structuralization phenomena in systems with nanoparticles	**APVV 0171-10**	**05/2011-10/2014 (10)**	**54450**	**C / Kopčanský**
	High strength electrotechnical composite steels	**APVV 0147-11**	**07/2012-12/2015 (12)**	**24304**	**WPL / Škorvánek**
	Quantum electrodynamics of artificial nanostructures	**APVV 0515-10**	**05/2011-10/2014 (10)**	**21475**	**WPL / Kupka**
	Advanced polymer technologies in biomedicine: Polymer microcapsules for immunoprotection of transplanted pancreatic islets in diabetes treatment	**APVV 0486-10**	**05/2011-10/2014 (10)**	**11200**	**WPL / Sedlák**
	Strongly interacting matter under extreme conditions	**APVV 0050-11**	**07/2012-12/2015 (12)**	**3747**	**WPL / Nemčík**
	The effect of aliskiren loaded nanoparticles in experimental hypertension	**APVV 0742-10**	**05/2011-10/2014 (10)**	**1936**	**WPL / Koneracká**
	Progressive materials with competing order parameters	**APVV 0036-11**	**07/2012-12/2015 (12)**	**63156,5**	**C / Samuely**
	Sensors based on magnetic microwires	**APVV 0266-10**	**05/2011-12/2014 (12)**	**9305**	**WPL / Škorvánek**
	Nanocrystalline and quasicrystalline metallic systems with tailored structure and morfology	**APVV 0492-11**	**07/2012-12/2015 (12)**	**30234,19**	**WPL / Škorvánek**
	Interactive methods of image acquisition and processing in microscopy using natural user interface	**APVV 0526-11**	**07/2012-12/2015 (12)**	**42340**	**C / Tomori**
	Bulk Superconductors	**APVV 0330-12**	**10/2013-09/2017 (12)**	**73157,46**	**C / Diko**
	Collective phenomena in coupled electron and spin systems	**APVV 0097-12**	**10/2013-12/2017 (12)**	**38494,5**	**C / Farkašovský**
2015	**Novel quantum states in nanoscopic magnetic systems**	**APVV 0132-11**	**07/2012-12/2015 (12)**	**13936**	**WPL / Gabáni**

High strength electrotechnical composite steels	**APVV 0147-11**	**07/2012-12/2015 (12)**	**26078**	**WPL / Škorvánek**
Strongly interacting matter under extreme conditions	**APVV 0050-11**	**07/2012-12/2015 (12)**	**4298**	**WPL / Nemčík**
Progressive materials with competing order parameters	**APVV 0036-11**	**07/2012-12/2015 (12)**	**46477,5**	**C / Samuely**
Nanocrystalline and quasicrystalline metallic systems with tailored structure and morfology	**APVV 0492-11**	**07/2012-12/2015 (12)**	**33301,81**	**WPL / Škorvánek**
Interactive methods of image acquisition and processing in microscopy using natural user interface	**APVV 0526-11**	**07/2012-12/2015 (12)**	**49108**	**C / Tomori**
Bulk Superconductors	**APVV 0330-12**	**10/2013-09/2017 (12)**	**71018**	**C / Diko**
Collective phenomena in coupled electron and spin systems	**APVV 0097-12**	**10/2013-12/2017 (12)**	**41979,5**	**C / Farkašovský**
Graphene-based nanoplatform for detection of cancer	**APVV 14-0120**	**07/2015-06/2019 (6)**	**5029**	**WPL / Koneracká**
Effects of nanoencapsulated simvastatin on cardiovascular system in experimental metabolic syndrome	**APVV 14-0932**	**07/2015-06/2019 (6)**	**4024**	**WPL / Závišová**
Superconductor - insulator transition	**APVV 14-0605**	**07/2015-06/2019 (6)**	**31249**	**C / Szabó**

2.4.5. Projects supported by the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA) for each year, and their funding

VEGA	2012	2013	2014	2015
Number	25	27	28	28
Funding in the year (EUR)	174245	191015	179817	196917

- **Summary of funding from external resources**

2.4.6. List of projects supported by EU Structural Funds

- The Slovak Infrastructure for High Performance Computing (SIVVP)
  ITMS 26210120002
  Duration: 1/10 - 12/15
  WPL / Kožár

- New materials and technologies for energetics
  ITMS 26220220061
  Duration: 5/10 - 10/13
  C / Diko

- Research and Development of the Second Generation of YBCO Bulk Superconductors
  ITMS 26220220041
  Duration: 9/09 - 4/14
  C / Diko

- Infrastructure Improving of Centre of Excellence of Advanced Materials with Nano- and Submicron- Structure
  ITMS 26220120035
  Duration: 5/10 - 4/13
  WPL / Škorvánek

- Centre for cooperative phenomena and phase transitions in nanosystems with perspective utilization in nano- and biotechnology II
  ITMS 26220120033
  Duration: 4/10 - 9/13
  C / Kopčanský

- Development of technological processes of magnetic fluids for biomedical applications
  ITMS 26220220005
  Duration: 1/10 - 6/12
  C / Kopčanský

- Center of Excellence for Research on Physiology of the Digestive Tract
  ITMS 26220120043
  Duration: 3/10 - 2/13
  WPL / Antalík

- Technology of the fabrication of electrical steels for the electric motors with higher efficiency
  ITMS 26220220037
  Duration: 1/10 - 6/12
  WPL / Škorvánek

- Center of Space Research: influence of space weather - I.
  ITMS 26220120009
  Duration: 5/09 - 10/12
  WPL / Kudela

- Extrem II - Center of advanced physical studies for materials in extreme conditions
  ITMS 26220120047
  Duration: 08/11 - 1/14
  WPL / Skyba

- Center of Space Research: influence of space weather - II.
  ITMS 26220120029
  Duration: 3/10 - 8/14
  WPL / Kudela

- Center of excellence for power electronics and their material components II
  ITMS 26220120046
  Duration: 10/10 - 10/13
  I / Timko

- Educational physical centre IEP SAS
  ITMS 26110230034
  Duration: 9/10 - 8/13
  C / Zentková

- Infrastructure improving for research of nanosystems with perspective utilization in technical and medical applications
  ITMS 26210120012
  Duration: 1/12 - 6/15
  C / Kopčanský

- Educational centre for Research and Development of complex nanosystems („ECVV - NANOKOP“)
  ITMS 26110230061
  Duration: 1/12 - 12/13
  C / Kopčanský

- International virtual laboratory of progressive material physics – PhysNet
  ITMS 26110230097
  Duration: 9/13 - 10/15
  C / Juríková

- Research Center of advanced materials and technologies for current and future applications "PROMATECH"
  ITMS 26220220186
  Duration: 7/13 - 12/15
  WPL / Samuely

2.4.7. Summary of external resources of the EU Structural Funds (ERDF/ESF)

Year	Project title	Type/ Project number	Duration in months	Funding for the Institute (EUR)	Role of the Institute/ Responsible person
2012	**The Slovak Infrastructure for High Performance Computing**	**SIVVP ITMS 26210120002**	**01/2010-09/2015 (12)**	**0**	**WPL / Kožár**
	New materials and technologies for energetics	**ITMS 26220220061**	**05/2010-10/2013 (12)**	**1675949**	**C / Diko**
	Research and Development of the Second Generation of YBCO Bulk Superconductors	**ITMS 26220220041**	**09/2009-04/2014 (12)**	**39066**	**C / Diko**
	Infrastructure Improving of Centre of Excellence of Advanced Materials with Nano- and Submicron- Structure	**ITMS 26220120035**	**05/2010-04/2013 (12)**	**279306**	**WPL / Škorvánek**
	Centre for cooperative phenomena and phase transitions in nanosystems with perspective utilization in nano- and biotechnology II	**ITMS 26220120033**	**04/2010-09/2013 (12)**	**639093**	**C / Kopčanský**

	Development of technological processes of magnetic fluids for biomedical applications	ITMS 26220220005	01/2010-06/2012 (6)	64252	C / Kopčanský
	Center of Excellence for Research on Physiology of the Digestive Tract	ITMS 26220120043	03/2010-02/2013 (12)	0	WPL / Antalík
	Technology of the fabrication of electrical steels for the electric motors with higher efficiency	ITMS 26220220037	01/2010-06/2012 (6)	71986	WPL / Škorvánek
	Center of Space Research: influence of space weather - I.	ITMS 26220120009	05/2009-10/2012 (10)	119987	WPL / Kudela
	Extrem II - Center of advanced physical studies for materials in extreme conditions	ITMS 26220120047	08/2011-01/2014 (12)	255249	WPL / Skyba
	Center of Space Research: influence of space weather - II.	ITMS 26220120029	03/2010-08/2014 (12)	148328	WPL / Kudela
	Center of excellence for power electronics and their material components II	ITMS 26220120046	10/2010-10/2013 (12)	16952	WPL / Timko
	Educational physical centre IEP SAS	ITMS 26110230034	09/2010-08/2013 (12)	74740	C / Zentková
	Infrastructure improving for research of nanosystems with perspective utilization in technical and medical applications	ITMS 26210120012	01/2012-06/2015 (12)	0	C / Kopčanský
	Educational centre for Research and Development of complex nanosystems („ECVV - NANOKOP“)	ITMS 26110230061	01/2012-12/2013 (12)	201477	C / Kopčanský
2013	The Slovak Infrastructure for High Performance Computing	SIVVP ITMS 26210120002	01/2010-09/2015 (12)	4122	WPL / Kožár
	New materials and technologies for energetics	ITMS 262220220061	05/2010-10/2013 (10)	625412	C / Diko
	Research and Development of the Second Generation of YBCO Bulk Superconductors	ITMS 26220220041	09/2009-04/2014 (12)	163847	C / Diko
	Infrastructure Improving of Centre of Excellence of Advanced Materials with Nano- and Submicron- Structure	ITMS 26220120035	05/2010-04/2013 (4)	28356	WPL / Škorvánek
	Centre for cooperative phenomena and phase transitions in nanosystems with perspective utilization in nano- and biotechnology II	ITMS 26220220033	04/2010-09/2013 (9)	513235	C / Kopčanský
	Center of Excellence for Research on Physiology of the Digestive Tract	ITMS 26220120043	03/2010-02/2013 (2)	0	WPL / Antalík

	Extrem II - Center of advanced physical studies for materials in extreme conditions	**ITMS 26220120047**	**08/2011-01/2014 (12)**	**87787**	**WPL / Skyba**
	Center of Space Research: influence of space weather - II.	**ITMS 26220120029**	**03/2010-08/2014 (12)**	**39488**	**WPL / Kudela**
	Center of excellence for power electronics and their material components II	**ITMS 26220120046**	**10/2010-10/2013 (10)**	**14760**	**WPL / Timko**
	Educational physical centre IEP SAS	**ITMS 26110230034**	**09/2010-08/2013 (8)**	**91667**	**C / Zentková**
	Infrastructure improving for research of nanosystems with perspective utilization in technical and medical applications	**ITMS 26210120012**	**01/2012-06/2015 (12)**	**1025407**	**C / Kopčanský**
	Educational centre for Research and Development of complex nanosystems („ECVV - NANOKOP“)	**ITMS 26110230061**	**01/2012-12/2013 (12)**	**352678**	**C / Kopčanský**
	International virtual laboratory of progressive material physics - PhysNet	**ITMS 26110230097**	**09/2013-10/2015 (4)**	**38879**	**C / Juríková**
	Výskumné centrum progresívnych materiálov a technológií pre súčasné a budúce aplikácie - PROMATECH	**ITMS 26220220186**	**07/2013-12/2015 (6)**	**0**	**WPL/Samuely**
2014	**The Slovak Infrastructure for High Performance Computing**	**SIVVP ITMS 26210120002**	**01/2010-09/2015 (12)**	**5546**	**WPL / Kočan**
	Research and Development of the Second Generation of YBCO Bulk Superconductors	**ITMS 26220220041**	**09/2009-04/2014 (4)**	**325**	**C / Diko**
	Extrem II - Center of advanced physical studies for materials in extreme conditions	**ITMS 26220120047**	**08/2011-01/2014 (1)**	**27901**	**WPL / Skyba**
	Center of Space Research: influence of space weather - II.	**ITMS 26220120029**	**03/2010-08/2014 (8)**	**227218**	**WPL / Kudela**
	Infrastructure improving for research of nanosystems with perspective utilization in technical and medical applications	**ITMS 26210120012**	**01/2012-06/2015 (12)**	**1748993**	**C / Kopčanský**
	International virtual laboratory of progressive material physics - PhysNet	**ITMS 26110230097**	**09/2013-10/2015 (12)**	**716325**	**C / Juríková**
	Research Center of advanced materials and technologies for current and future applications "PROMATECH"	**ITMS 26220220186**	**07/2013-12/2015 (12)**	**21967**	**WPL/Samuly**
2015	**The Slovak Infrastructure for High Performance Computing**	**SIVVP ITMS 26210120002**	**01/2010-12/2015 (12)**	**200462**	**WPL / Kočan**

Infrastructure improving for research of nanosystems with perspective utilization in technical and medical applications	**ITMS 26210120012**	**01/2012-06/2015 (6)**	**121840**	**C / Kopčanský**
International virtual laboratory of progressive material physics - PhysNet	**ITMS 26110230097**	**09/2013-10/2015 (10)**	**634808**	**C / Juríková**
Research Center of advanced materials and technologies for current and future applications "PROMATECH"	**ITMS 26220220186**	**07/2013-12/2015 (12)**	**102383**	**WPL/Samuly**

External resources	2012	2013	2014	2015	total	average
External resources (milions of EUR)	1,894	0,604	0,684	0,678	**3,861**	**0,965**
External resources transfered to coooperating research institute (milions of EUR)	0,021	0,042	0,052	0,064	**0,178**	**0,044**

- **Supplementary information and/or comments on research projects and funding sources**

2.5. PhD studies and educational activities

2.5.1. List of accredited programmes of doctoral studies, period of validity

2.4.1 General physics and mathematical physics – with Faculty of Sciences, Pavol Jozef Safarik University, Košice (FS UPJŠ) - since 2004

4.1.3 Physics of condensed matter and acoustics - with FS UPJS since 2004

4.1.5 Nuclear and subnuclear physics – with FS UPJS since 2004

5.2.26 Materials – with Faculty of Metallurgy, Technical University, Košice - since 2009

2.5.2. Summary table on doctoral studies (number of internal/external PhD students; number of foreign PhD students, number of students who successfully completed their thesis, number of PhD students who quit the programme*)*

PhD study	31.12.2012			31.12.2013			31.12.2014			31.12.2015		
Number of potential PhD supervisors	51			49			51			49		
PhD students	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted
Internal	16,0	5,0	1,0	22,0	6,0	3,0	20,0	1,0	4,0	16,0	7,0	5,0
External	3,0	0,0	0,0	0,0	0,0	3,0	1,0	0,0	0,0	1,0	0,0	0,0
Other supervised by the research employees of the institute	12,0	2,0	1,0	8,0	1,0	0,0	9,0	2,0	0,0	10,0	2,0	0,0

Foreign PhD student: Dmytro Rak, Ukraina – supervisor: Marian Sedlák

Long term stays of foreign PhD students visiting IEP:

Paula Lampen, University of South Florida, Physics Department, Tampa, FL, USA, from March 17th to April 15th, 2014

Evgenyia Mikhalitsyna, Ural Federal University, Yekaterinburg, Russia, from May 31st to June 30th, 2015

Tatiana Eggers, University of South Florida, Physics Department, Tampa, FL, USA, from Sept. 28th to October 29th, 2015

When Zhao, University of Cambridge, , Cambridge, Depertment ofEngineering, UK, from October 18th to December 3th, 2015.

2.5.3. Summary table on educational activities

Teaching	2012	2013	2014	2015
Lectures (hours/year)[3]	213	235	111	346
Practicum courses (hours/year)[3]	78	248	308	113
Supervised bachelor thesis (in total)	12	10	20	13
Supervised diploma thesis (in total)	17	17	25	15
Supervised PhD thesis (in total)	4	6	16	6
Members in PhD committees (in total)	7	8	7	7
Members in DrSc. committees (in total)	0	2	1	1
Members in university/faculty councils (in total)	8	8	9	9
Members in habilitation/inauguration committees (in total)	2	3	5	4

1.5.4. List of published university textbooks

2.5.5. Number of published academic course books

Magnetizmus (Magnetismus) , kol. autorov ,UEF SAV Košice, EQUILIBRIA, 2012, ISBN 978-80-970779-6-9

P. Farkašovský, H.Čenčariková, Analytické a numerické metódy v teórii silne korelovaných elektrónových systémov (Analytical and numerical methods in strongly correlated electron systems) , UEF SAV Košice, EQUILIBRIA, 2013, ISBN 978-80-89656-03-5

Peter Markoš, Fotonické kryštály a metamateriály (Photon crystals and metamaterials), UEF SAV Košice, EQUILIBRIA, 2013, ISBN 978-80-89656-04-2

Vysoké tlaky vo fyzike kondenzovaných látok (High pressures in condensed mater physics), kol.autorov, UEF SAV Košice, EQUILIBRIA, 2013, ISBN 978-80-89656-02-8

Viktor Kavečanský, Úvod do štúdia kryštálovej štruktúry metódami rontgenovej práškovej difraktometrie (Introduction to the study of crystal lattice studies RTG methods),doplnkový učebný text, Ústav experimentálnej fyziky SAV 2013,36 strán, ISBN 978-80-89656-06-6

Informatické pracovné listy s bádateľskými aktivitami (Informative worksheets with research activities), UEF SAV, Equilibria , 2012, ISBN 978-80-970779-7-6

Mária Zentková, Danka Janková,Marián Mihalik: Pastelková fyzika-zásobník pokusov (Pastel physics – the reservoir of experiments), Ústav Experimentálnej fyziky SAV, Počet strán: 80, 2012, ISBN-978-80-970779-8-3

2.5.6. List of joint research laboratories/facilities with universities

1. *Laboratory of magnetism* - Department of magnetism with the Faculty of Science, P. J. Šafárik University, Košice. This long term collaboration is focused on the study of microstructure and magnetic properties of nanostructured and composite soft magnetic materials as well as various systems of magnetic nanoparticles

2. *Center of Low Temperature Physics (CLTP)* – Centre of Excellence - joint low temperature laboratories of the Department of Low Temperature Physics and Faculty of Science, P. J. Šafárik University form the CLTP. The Centre uses common low temperature infrastructure (including 4He liqufier) and common experimental equipments. The Centre organizes periodical seminars of low temperature physics.

3. *Faculty of Metallurgy TU KE - joint laboratory-* The collaboration is focused on the pedagogical area and exploitation of experimental facilities.

4. *Faculty of Electrotechnics, University of Žilina - joint laboratory.* The joint research laboratories develop the cooperation in area the study of acoustic, magnetic and dielectric properties of magnetic fluids and ferronematics (complex system of liquid crystal and magnetic nanoparticles).

5. *Faculty of Aeronautics TU KE - joint laboratory.* This agreement between our Institutions is devoted to the cooperation in pedagogical and research areas mainly in study of dielectric and hyperthermic properties of systems containing the magnetic nanoparticles.

6. *PROMATECH* - the aims of the project is creation and operation of Slovak research centre at the highest level as an integrated and interdisciplinary center, which will conduct research materials and technologies for current and future applications, generating scientific research results with high innovation potential and short application time to industrial practice.The main project partner is the Slovak Academy of Sciences, other partners are the Institute of Materials Research SAS, Institute of Experimental Physics SAS, Institute of Geotechnics SAS, Institute of Materials and Machine Mechanics SAS, University of Pavol Jozef Šafárik in Košice and Technical University in Košice .

- **Supplementary information and/or comments on doctoral studies and educational activities**

During the evaluation period, the Institute was involved in <u>three projects to increase of the level of scientific education</u> covered by the EU Structural Funds. Projects Edufyce 2011-2012 (22 secondments, innovation of PhD study in Codensed Matter Physics, new textbooks for PhD, total budget 0.2 mill. Euros), Physnet 2013-15 (62 secondments + 78 recruitments, total budget 1.2 mill. Euros) and Nanokop 2012-2013 (30 secondments + 30 recruitments, total budget 0.56 mills. Euros) provided new PhD and Post-doc positions, and allowed placements of PhD students, young scientists and researchers in EU laboratories. Leading EU scientist and experts have been invited and thus provide invaluable expertise to the training of resident young researchers. These projects were important milestones at the internationalization of the PhD studies at the Institute.

<u>Defence of doctoral degree (DrSc.):</u>

Pavol Farkašovský 2013

Peter Skyba 2015

Andrej Musatov 2015

2.6. Social impact

2.6.1. List of the most important results of applied research projects. Max. 10 items

In the frame of FP 7 MNT-ERANET II STREAM Small energy harvester based on magnetostrictive amorphous and nanocrystalline materials, 2012–201 (collaboration with 2 foreign partners) we have developed an electromagnetic energy harvesting device able to sustain wireless sensors monitoring systems by converting the mechanical energy from vibrations into electric energy. The constructed prototype of such device consisted of an arrangement of two NdFeB permanent magnets, bound to a nonmagnetic cantilever beam that oscillate in the proximity of a coil having a multilayer core that is achieved by gluing together pieces of ultra-soft magnetic nanocrystalline FeCuNbSiB-based ribbons in a sandwich type structure. The maximum output power delivered by the energy harvesting device was around 30 mW for an acceleration of 1 g (g = 9.8m/s^2). Project responsible at IEP SAS: Ivan Škorvánek

The cooperation with EVPU a.s. Nova Dubnica in frame of previous MNT Era Net MAFINCO (MAgnetic Fluid-new INsulated and COoling medium for power transformers) project was devoted to the preparation of transformer oil magnetic fluids with sufficient dielectric and magnetic properties, in construction power transformer filled by magnetic fluid with better operational condition against this one filled by pure transformer oil. The inhibited transformer oil as insulation fluid in power transformers performs two main functions–insulating, i.e. preventing the flow of electric current between conductive components,and cooling, i.e. transfer the heat out of active transformer components. Our inductrial partner EVPU has abiding interest to continue in collaboration in the framework of new projects.

2.6.2. List of the most important studies commissioned for the decision-making authorities, the government and NGOs, international and foreign organisations

Dušan Bruncko

- evaluation reports for various projects (25) in Czech republic
- annual evaluation reports for the Ministry of Education, Youth and Sports of the Czech Republic in 2012 – 2015. A project of the Czech cooperation with CERN.

Ladislav Šándor

- Annual evaluation reports for the Ministry of Education, Youth and Sports of the Czech Republic in 2012 – 2013. A project of the Czech cooperation with CERN.

Karel Kudela

- Activities for COPUOS (The Committee on the Peaceful Uses of Outer Space) as a delegate of Ministry of Education in COPUOS UN.
- Biennal reports "Space Research in Slovakia" as Coeditor of biennal reports for COSPAR (The Committee on Space Research) available at http://nccospar.saske.sk)
- Evaluation reports for various projects in Slovakia and in abroad (~20)
- Reviewer of papers in various journals; awarded as one of top reviewers of Advances in Space Research 2014, 2015 (http://media.journals.elsevier.com/content/files/asr-bestreviewers2014-04053657.pdf)
- Reviewer of 2 PhD theses, 1 habilitation, member of 1 inauguration commission for profesorship (all in abroad)

Peter Samuely

- participated in the work of the Commission of the Ministry of Education, Science, Research and Sport for a novelization of the Slovak Act No. 172 on organization of science in Slovakia.
- as a member of the Commission of the Ministry of Education, Science, Research and Sport to judge if the publications issued in universities were properly classified as the scientific monographs - checked some 500 books
- as a member of the Commission of the Ministry of Education, Science, Research and Sport for acreditation of the all Slovak research performing organizations - evaluation of more than 300 private, NGO, public and state organizations.
- as a chairman of the Council of Natural Sciences at the Slovak Agency for Research and Development (APVV) - reported on some 100 projects.

Pavol Szabo

- reporter and member of a PhD commission at Université Grenoble Alpes, France 2015

Peter Skyba

- reporter and member of a PhD commission at Aalto University, Finland, 2015
- as a member of the selection panel of the Council of Natural Sciences at the Slovak Agency for Research and Development (APVV)– reported on some 50 projects
- member of IUPAP C5 commision
- as a member of the General Assembly and Selection Panel of 7. FP EU MICROKELVIN project – reported on some 30 projects

Michal Hnatich

- as a member of the selection panel of the Council of Natural Sciences at the Slovak Agency for Research and Development (APVV)– reported on some 30 projects

Peter Kopčanský

- as a member of scientific committee Magnetic structures at ILL (Institute of Laue Langevin) Grenoble France – reported on some 40 projects
- member of expert committee on Soft Matter and Nanomaterials at JINR Dubna Russia, selection of 30 proposals
- member of Slovak scientific committee for JINR Dubna Russia, for Ministry of Education, Science, Research and Sport of Slovak Republic – selection of proposals

2.6.3. List of contracts and research projects with industrial and other commercial partners, incl. revenues

The biomechanical measurements research at the Dept. of Biophysics resulted into cooperation with several institutions including the industrial partner "VSL Software, Kosice". This industrial partner has proposed a RIS3 project "Design and development of an adaptive virtual reality environment with integrated sensoric system for biomedical and industrial applications" with participation of our institute.

2.6.4. List of licences sold abroad and in Slovakia, incl. revenues

2.6.5. List of most important social discourses under the leadership or with significant participation of the institute (max. 10 items)

2.6.6. Summary of relevant activities, max. 300 words

2.7. Popularisation of Science (outreach activities)

2.7.1. List of the most important popularisation activities, max. 20 items

Steel Park – the entertainment and technical center of Košice was officially opened in 2013 as one of the main activities of the Košice – European Capital of Culture 2013 project. It is a result of cooperation between the city, the steelmaking company U. S. Steel Košice and three academic institutions – the Technical University of Košice, Pavol Jozef Šafárik University and Slovak Academy of Sciences. The creative team of IEP SAS had a leading role in preparing and realization of the scientific program of the center. Ten interactive showpieces have been developed and prepared in the laboratories of IEP SAS. Steel Park reveals a big success in the field of popularization of sciences. It has more, then 12 000 visitors during one year. The creative team of IEP SAS (RNDr. Mária Zentková, CSc., RNDr. Matuš Mihalik, PhD.Ing. Emil Gažo, RNDr. Milan Timko, CSc.Doc. Ing. Zoltán Tomori,CSC.Mgr. Pavol Szabó,CSc., RNDr. Marián Mihalik, CSc., RNDr. Jozef Kováč, CSc., Bc. Katarína Paulovičová) has been awarded with the Prize of SAS for Scientific Popularization in 2014.
Our creative team organizes the Day of IEP SAS at Steel Park yearly. These days, the scientist are presenting directly the scientific showpieces of the center and different popularization activities are organized (300 visitors/day).

Institute of Experimental Physics SAS took an active part in mediating science as an attractive form of leisure activities in the frame of periodical events called **Vedecká kaviareň** (Science café) for adults and **Vedecký brloh** (Science nest) for kids in 2012-2015. Scientists from the whole scope of research topics in our institute gave popular lectures about their work for the broad audience of Science café .

Science nest (since 2013) for kids is directly supervised by our institute and as it is specifically focused to kids its philosophy is based exclusively on hands on experiments and in general education mediated interactively with fun and adventure. Science nest is visited by the whole families with kids , school kids with teachers and by groups of homeschooled children, gifted kids as well as kids with some kind of disorder, namely kids with Asperger syndrome. On site activities are accompanied by blogs where the kids could find digest with description of realized experiments. The coordinator of the project Mária Zentková has been awarded with the Prize of SAS for Scientific Popularization in 2016.

Researchers night – is the biggest scientific popularization action in EU and Slovakia since 2006. The main coordinator of the scientific program of the Košice action is Pavol Szabó, the scientific secretary of IEP SAS. Our institution presents 5 – 10 scientific/show experiments and 2-3 popularization talks yearly. The festival in Košice is organized in a Shopping Centre Optima, where the average number of visitors is above 15 000.

EU scientific festivals – Z. Tomori and M. Zentková are regularly taking part at the scientific festivals Piknik Naukowy, Varšava, Poland and an interactive exponate of Z. Tomori has been presented at the EU Researchers Night 2015 in Bruxelles.

Films – two 20 min popularization films: Mrazivý magnet (Freezing magnet) and Vidieť neviditeľné (See the invisible) for the serial Spectrum vedy (Spectrum of science) have been prepared in the laboratories of IEP SAS. In collaboration with the TV channel TA3 a short film about the Centre of Low Temperature Physics has been prepared.

During the evaluation period **Ján Baláž** (Department of Speve Physics) was one of the most frequently presenting scientist in Slovak medias. He was active particularly in popular science at the field of astronautics and space science and technology. His activities involved his own popular articles in press and web media, lectures and public discussions at "café scientifique", children's scientific patisserie, TEDx conference and various Radio and TV popular discussion forums. Among most popular in Slovakia it was TV series "Under the lamp", "Guardian angels", Crystal wings", and radio series "Ours and worldwide", "Morning show of Fun Radio", "Christmas dialogues", etc... There was also plenty of his short inputs in TV news of all major Slovak TV stations. His activities has been awarded with the Prize of the SAS for General Scientific Popularization in 2016.

Slovakia at CERN

- A travelling exhibition “Slovenká cesta do mikrokozmu” (“Slovak journey to microcosm”) installed in several Slovak towns: Novohrad Museum and Gallery Lučenec (6 February 2014), Rožňava (2 June 2014), Slovak Technical Museum Košice (9 September 2014), Astronomical Observatory Prešov (8 October 2014), Humenné (18 November 2014), Astronomical Observatory Partizánske (29 April 2015). The exhibition was dedicated to Slovak high energy physics activities, and Slovak contribution to building two CERN experiments at the LHC accelerator: ALICE and ATLAS. At these installations 5 popularization lectures aimed at the general public were delivered.
- In cooperation with P. J. Šafárik University Košice, Technical University Košice and CERN a two part educational activity “Okná CERN-u dokorán” (Windows to CERN Wide Open) and “Okná CERN-u dokorán II” (Windows to CERN Wide Open II) were organized on 28 May 2015 and 19 November 2015, respectively. The former was aimed at the students of secondary schools from the Košice region, the latter at graduate and post graduate students. The lectures were delivered by Slovak physicists working at CERN and researchers from the Institute of Experimental Physics in Košice (8 lectures) participating at the experiments at CERN. The aim of the action was to demonstrate that universities and scientific institutes in Slovakia provide education and PhD programs at levels comparable with other European institutions.
- 2014: 60-th Anniversary of CERN. 3 lectures were delivered within the Masterclasses outreach activity, and 6 public lectures were given at the dedicated event organized at the Prešov University in Prešov (11 - 12 November 2014).
- 2013: 20 years of Slovakia at CERN. Several outreach activities related to the 20-th anniversary of the Slovak presence at CERN, including 3 lectures for the members of the Association of Slovak Scientific and Technological Societies delivered at CERN, several lectures for the secondary school students, and our participation at the official celebrations in the Centre of Scientific and Technological Information of Slovak Republic on 25 June 2013 where public lectures aimed at the industrial sphere were delivered.

2.7.2. Table of outreach activities according to institute annual reports

Outreach activities	2012	2013	2014	2015	total
Articles in press media/internet popularising results of science, in particular those achieved by the Organization	15	10	7	7	39
Appearances in telecommunication media popularising results of science, in particular those achieved by the Organization	15	10	17	13	55
Public popularisation lectures	25	40	31	22	118

- **Supplementary information and/or comments on popularization activities, max. 300 words**

  The Open Days of IEP SAS has been temporarily stopped in the period 2013 – 2015 due to reconstructions of the laboratories.

2.8. Background and management. Human resources and implementation of recommendations from previous assessment

2.8.1. Summary table of personnel

Personnel	2012	2013	2014	2015
All personnel	147.0	144.0	147.0	127.0
Research employees from Tab. Research staff	118.0	132.0	135.0	134.0
FTE from Tab. Research staff	91.860	93.940	98.310	99.900
Average age of research employees with university degree	45.1	44.8	45.4	46.4

2.8.1.1. Professional qualification structure (as of 31.12. 2015) FEMALE

FEMALE	AGE								
Number of	< 30	31 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	> 65
DrSc. / prof. [5]	0	0	0	0	0	0	0	0	0
II.a / Assoc. prof. [6]	0	0	1	1	5	2	1	0	0
Other researchers PhD./CSc.	1	5	6	0	2	0	0	0	0
doc. / Assoc. prof.	0	0	0	0	0	0	0	0	0

2.8.1.2. Professional qualification structure (as of 31.12. 2015) MALE

MALE	AGE								
Number of	< 30	31 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	> 65
DrSc. / prof. [5]	0	0	0	0	0	2	2	4	2
II.a / Assoc. prof. [6]	0	0	1	5	1	4	5	5	2
Other researchers PhD./CSc.	0	7	5	1	1	1	3	6	1
doc. / Assoc. prof.	0	0	0	0	0	0	2	3	0

2.8.2. Postdoctoral and mobility scheme

2.8.2.1. Postdoctoral positions supported by national and international resources

During the evaluation period, the Institute was involved in three projects to increase of the level of scientific education covered by the EU Structural Funds. Projects Edufyce 2011-2012 (22 secondments, innovation of PhD study in Codensed Matter Physics, new textbooks for PhD, total budget 0.2 mill. Euros), Physnet 2013-15 (62 secondments + 78 recruitments, total budget 1.2 mill. Euros) and Nanokop 2012-2013 (30 secondments + 30 recruitments, total budget 0.56 mills. Euros) provided new PhD and Post-doc positions, and allowed placements of young scientists and researchers in EU laboratories. Leading EU scientist and experts have been invited and thus provide invaluable expertise to the training of resident young researchers.

The project Physnet allowed **one year post-doc position** for a young leading researcher **Dr. Prasanna Kulkarni** from UAM Madrid at IEP SAS in the period 2012-2013.

The following positions for young Slovak researchers have been supported from EU Structural Funds and APVV projects:

2012: Antal Vitaliy Laboratory of Material Physics
2013: Varga Marek Laboratory of Nanomaterials and Applied Magnetism
Gál Peter Department of Biophysics
Jurečková Jana Department of Theoretical Physics

2014:	Varga Marek	Laboratory of Nanomaterials and Applied Magnetism
	Gargalík Radoslav	Department of Biophysics
	Antal Iryna	Department of Magnetism
	Jurečková Jana	Department of Theoretical Physics
2015:	Jurečková Jana	Department of Theoretical Physics
	Varga Marek	Laboratory of Nanomaterials and Applied Magnetism

New post-doc positions have been supported by the Slovak Academic Information Agency (SAIA) and Videgrad Fund:

Iana Kokriashkina (Uzhorod National University, Uzhorod, Ukraine), Department of Subnuclear Physics, 1 September 2013 till 31 August 2014, supervisor Ivan Králik

Iana Kokriashkina (Uzhorod National University, Uzhorod, Ukraine), Department of Subnuclear Physics, 1 September 2015 till 30 June 2016, project of the International Visegrad Fund, supervisor Ivan Králik

Lorena González-Legarreta (Spain), Laboratory of Nanomaterials and Applied Magnetism, **10 months stay at 2015**, supervisor I. Škorvánek .

2.8.2.2. Postdoctoral positions supported external funding

Andrzej Musial (Poland), Laboratory of Nanomaterials and Applied Magnetism **6 months stay in 2015** supported by Polish National Centre for Research and Development within the project No. POKL.04.03.00-00-015/12.

2.8.2.3. SAS stipends and SASPRO stipends

2.8.2.4. Internal funding - the Slovak Academy of Sciences Supporting Fund of Stefan Schwarz

Marianna Baťková	1.5.2008 - 30.4.2012	Department of Magnetism
Martina Šefčíková	1.5.2008 - 30.4.2012	Laboratory of Material Physics
Roman Lysák	1.2.2009 - unfinished	Department of Subnuclear Physics
Marcel Človečko	1.1.2010 - 31.12.2014	Department of Low Temperature Physics
Vlasta Závišová	1.1.2010 - 31.12.2014	Department of Magnetism
Anežko Hashim	1.5.2011 - 30.4.2016	Department of Magnetism
Gabriel Pristáš	1.5.2011 - 30.4.2015	Department of Low Temperature Physics
Vitaliy Antal	1.1.2011 - 31.12.2014	Laboratory of Material Physics
Matúš Mihálik	1.1.2012 - 31.12.2015	Department of Magnetism
Marián Putiš	1.1.2013 - 31.12.2016	Department of Space Physics
Peter Kaliňák	1.5.2013 - 30.4.2017	Department of Subnuclear Physics
Daniela Volochová	1.5.2013 - 30.4.2017	Daboratory of Material Physics
Katarína Šipošova	1.1.2014 - 31.12.2017	Department of Biophysics
Matúš Molčan	1.5.2015 - 30.4.2019	Department of Magnetism
Martina Kubovčíková	1.1.2015 - 31.12.2018	Department of Magnetism

2.8.3. Important research infrastructure *(max. 2 pages)*

The **Department of Low Temperature Physics** covers all basic physical measurements of transport, magnetic and thermal properties of condensed matter starting from microkelvin temperatures to ambient, or to even higher temperatures (400 K), in magnetic fields up to 10 Tesla and under pressure up to 140 kbar. The Centre accommodates numerous excellent commercial devices, like Physical Properties Measuring System for measurement of basic physical properties down to 300 mK and two Magnetic Properties Measuring System with SQUID magnetometer, several ^{3}He-^{4}He, ^{3}He and ^{4}He refrigerators equiped with standard low temperature techniques. We have developed and mastered several unique techniques as the subkelvin STM, ac calorimetry down to 0.5 K and field up to 10 T, high pressure measurements with different pressure cells up to 150 kbars immersed in the home made dilution fridge working down to 50 mK and fields up to 8 Tesla. The Department has its own cryogenic base – helium liquefier with the production on the order of 40 000 liters per year. The Department has been running the semiclean room with a thin film technology based on magnetron sputtering, optical and electron beam lithography and atomic force microscope working at ambiente conditions. Thus the laboratory represent a complex infrastructure for preparation and characterization of nanostructures and nanocomponents. Recently, a major Ultra-high Vacuum LT STM microscope developed for us by the Specs company has enabled STM measurements down to 1K in magnetic field up to 3 T. The sample preparing chamber allows for preparation of thin films using 4 evaporator guns. The chemical and structural characterization can be done by RHEED, XPS, UPS, AES, ISS, LEIS and the mass spectrometer. The in-house developed Hall probed magnetometer is recently supplemented by the Scanning Hall Probe Microscop from Attocube. It is working down to 1.6 K and in fields up to 7 T. The crygen-free dilution refrigerator Triton200 working down to 10 mK and in magnetic fields up to 8 T is devoted for studies of mechanical micro- and nano-resonators and detectors in quantum limit.

Laboratory of Materials Physics is well equipped for preparation of progressive ceramic materials and for structural and microstructural characterisation of materials. Unique equipment recently acquired includes two chamber furnaces with all side heating and excellent homogeneity of temperature field installed for batch growth of bulk REBCO crystals, and upgraded systems for comprehensive thermal (TG, DTA, DSC) and gaseous products (mass spectrometer) analyses. The X-ray diffraction system allows X-ray powder diffraction analyses from 77K to 1,473K and is equipped with X-ray micro-focussed beam and diffractometer for thin film analyses. A new laboratory analysis of materials by scanning electron microscopy and microanalysis techniques (EDX, EBSD) was resently established in collaboration with the Institute of Geotechniques os SAS. The Laboratory of thermal analysis at **Department of Metal Physics** is equipped with apparatus for complex thermomechanical analysis (Q800, Q400EM TA Instruments) with static and dynamic load control in wide range of loads and temperatures (up to 18 N and 1000 °C) and thermal analysis (DSC 8000 Perkin Elmer and DTA with TG - SETSYS16 Setaram) from -50°C to 1550 °C. Scanning electron microscope (VEGA3 LMU + EDX analyser) utilized for morphologic observations and chemical analysis.

The experimental facilities in **Laboratory of Nanomaterials and Applied Magnetism** allow to obtain information about wide range of functional properties of magnetic materials . They includ two VSM magnetometers: i) temperature range 4.2 -300 K and 100 –1200 K, fields up to 6 T, ii) hysteresis loop tracer for soft magnetic materials based on flux-gate sensors, temperature range 300 – 800 K, Magnetoopic Kerr Microscope, which allows study of domain structure and surface hysteresis loops of soft magnetic materials in temperature range 77 – 900 K, AC-hysteresigraph allowing measurements of AC- magnetic characteristics including losses in frequency range 10-2000 Hz, setup for measurements of frequency dependencies of complex magnetic permeability and GMI in frequency range 100 Hz – 110 MHz, unique Cryo-free“14 T magnetic system with warm 75 mm bore equipped with a special furnace for thermomagnetic processing of materials in strong magnetic fields (temperature range 300 – 1200 K), magnetic shielded room for implementation of sensitive magnetic and electromagnetic experiments with available experimental space 2,5 m x 2,5 x 2,3 m.

The laboratories in **Department of Magnetism** are equipped to prepare magnetic nanoparticles and measure physical properties of magnetic materials such as magnetic fluids, ferronematics, biologically active substances obtaining magnetic materials, oxides and intermetallic compounds in the form of single crystals, polycrystalline materials and nano-sized powders. The Centre of Nanofluid are equipped to prepare and characterize nanoparticle, for example by dynamic light

scattering on Zetasizer NanoZS and by differential centrifugal sedimentation (DC24000 UHR disk centrifuge). Quantitative and qualitative analysis are carried out by UV/VIS SPECORD 40 and ICP-AES spectrometers and Low Voltage Electron Microscope LVEM5. Cryogen-free technology enables measurements of magnetic, electric and thermal properties of liquid, solid, powder and nanostructured materials in magnetic field up to 18T and temperature range from 1.6 - 320K. The laboratory also operates ultra-high precision capacitance bridge AH2700A operational in a frequency range from 50Hz– 20kHz, Trek–DC and AC high voltage power amplifier with a fixed gain of 4,000V/V, PD-4, Presco AG partial discharge measuring system with PD range from 10 up to 100,000 pC, and a modular compact rheometer Anton Paar MCR 502 equipped with electro and magnetorheological cells. Magnetic Hyperthermia Laboratory tests hyperthermia effect in AC field. The single crystals are prepared by floating zone or travelling solvent floating zone methods in the four mirrors optical furnace. The intermetallic compounds can be prepared in mono-arc furnace on water cooled copper crucible, which enable casting of rods for crystal growth. Laboratory of Infrared and Raman spectroscopy is equipped with BRUKER vacuum FTIR spectrometer VERTEX80v, Raman spectrometer RAMANOSCOPE, Raman microscope RAMII and IR microscope HYPERION. FTIR spectrometer VERTEX80v is equipped with ATR sample technic for broad spectral range. Infrared microscope functional in reflex and transmission mode. Laboratory of electrical transport measurements of electrical transport properties of solids in varying temperature range. Electrical resistance measurements of materials or structures are possible in the range from nano-Ohm to giga-Ohms. Laboratory of Atomic Force Microscopy offers characterization of material and biomaterial surfaces at ambient temperature in air by various measurement modes, such as contact, tapping, MFM, EFM and KFM.

The experimental facilities at **Biophysics department** allow detailed investigation and characterization of the structure, stability and conformational transitions of biomacromolecules and supramolecular biocomplexes. Examples of infrastructures include UV-Vis spectrophotometer (Jasco), spectrofluoroluminometer FluoStar Optima, absorption and fluorescence multireader (Synergy MX), CD spectrometer (Jasco) and infrared spectrometer FTLA 2000 equipped for FT Raman spectroscopy, differential scanning calorimeter (Microcal), surface plasmon resonance and isothermal titration calorimeter (Microcal), stopped-flow spectrometer (Applied Photopysics), high-performance liquid chromatography, ultracentrifuge and atomic force microscopy (Veeco). We developed morphometric analysis of images obtained by atomic force microscopy (Veeco) and transmission electron microscopy by adaptation of the Genuine software Ellipse 2.0. Mathematical modeling using non-linear regression is important for statistical analysis of parameters characterizing supramolecular complexes (high, length, diameter). Optical tweezers allow manipulation and study of the single molecules by interacting with a bead attached to that molecule. The department has established designated cell culture area for investigation of cytotoxicity.

Laboratory of Experimental Chemical Physics is focusing on methods for the characterization of nanoparticle and macromolecular systems, predominantly based on laser optical methods (static, dynamic, electrophoretic laser light scattering, optical microscopy in the laser beam with nanoparticle diffusion tracking, light scattering coupled with separation based on asymmetrical flow field-flow fractionation and centrifugal separation). Obtained structural information in soft matter systems ranges from 1nm to tens of microns while dynamical information ranges from tens of nanoseconds to seconds. Structural and dynamic data are complemented by interaction parameters obtained by various experimental methods. The obtained infrastructure significantly contributed to research outputs, for instance mesoscale clusters in ternary systems were for the first time visualized just in our laboratory - due to newly acquired infrastructure.

The technical infrastructure of the **Department of Space Physics** is oriented mainly at the development of scientific instruments operating on board of space satellites and probes. The infrastructure involves Electronic laboratory for development and testing of analog and digital systems, Clean Room for final integration of space-borne devices and environmental testing facilities including Laboratories for vibration-acceleration, thermal-vacuum and electromagnetic compatibility testing. High altitude laboratory at Lomnický štít (2634 m) has maintains infrastructure for continual observations of cosmic rays and other physical parameters. Infrastructure was upgraded and new instruments were installed including, but not limited to neutron monitor, muon detection system SEVAN, dosimeters and detectors of the type medipix.

Most of the **Department of Subnuclear Physics** infrastructure is located at international research centres, such as CERN, Geneva, Switzerland. We have contributed to the building of the ALICE and ATLAS experiments at LHC. An integral part of large experiments is a GRID farm for massive data processing that is upgraded and enlarged on the regular basis. In 2012 the GRID farm has 304 CPU cores and 230 TB disk space. These resources were upgraded to 726 CPU cores and 938 TB disk space at the end of 2015. The computing resources are exploited 24 hours a day, 7 days a week, with very few maintenance interruptions. The GRID computing infrastructure is integrated into the SlovakGrid national facility and is used by two large multinational collaborations.

The majority of the unique experimental apparatus of the Institute is available to researchers and graduate students from the Safarik University and other research institutes in Košice.

2.8.4 Description of how the results and suggestions of the previous assessment were taken into account

The suggestions of the previous assessment can be summarized as follows:

The following recommendations may require the involvement of the Presidium of the SAS and the cooperation of larger number of institutes of SAS.

1) To perform by the forces of SAS or by assistance of an external organization a comprehensive audit of the situation of PhD studies at SAS institutes, including analysis of a) legislation, b) practical forms of cooperation of institutes of SAS and faculties of universities, c) financial aspects, d) numbers of PhD students at universities and institutes of SAS, and e) recommendations to solve the present problems. In a „normal" situation the best PhD students should be supervised by the best researchers. But as shown by ARRA this is not the case at present in Slovakia and the number of PhD students at a faculty has only a small correlation, if any, with its research output.

PhD studies under the supervision of 19 scientists were completed during the assessment period. Subjects of the PhD thesis included solid state physics and acoustic, general physics, nuclear and sub-nuclear physics and materials. In accordance with the Presidium of SAS rules, the number of graduate students is limited to 4-5 PhD students/year. Due to the availability of project Physnet, 4 additional PhD student positions were supported by external sources between 2012-2014. This allow to increase the number of PhD students to an average of 16.8 students/year during the assessment period. As external supervisors, Institute's employed scientists trained 9.8 PhD students/year through the Technical University and UPJS University in Košice. In addition, the institute was involved in three projects Edufyce (total budget 0.2 mill. Euros), Nanokop (total budget 0.56 mill. Euros) and Physnet (total budget 1.2 mill. Euros) targeted to increase of the level of science and development of IEP SAS and supported by EU Structural Funds. These projects allowed for new PhD positions, long-term scientific secondments for PhD students and their supervisors into leading EU laboratories. Leading EU scientists have been invited to deliver specialized lecturers for PhD courses (for example from CNRS Paris, CNRS Grenoble, CEA Grenoble, UAM MADRID, IFW Dresden, University Oviedo, JNIR Dubna, *etc.*). New courses for PhD studies at IEP SAS have been accredited (as of 2016) for Physical Engineering of Progressive Materials (with TU Košice) and Biophysics (with UPJŠ Košice).

2) Enhancement of mutual cooperation with universities (well-structured and well-defined joint appointments according to proven and successful international practices).

The collaboration of IEP SAS and the university laboratories in Košice have traditionally been and remain at outstanding quality. We have 8 well working laboratories (see chapter 2.5.6) and 5 common programs for PhD studies. Our open access large-scale facilities, such as the Laboratory of Magnetism and The Centre of Low Temperature Physics are run as core laboratories with the Faculty of Natural Sciences, UPJŠ. During the assessed period and in the framework of the EU

Structural Fund projects we have invested over 10 mil. Euros for shared infrastructure. The number of collaboration projects and scientific outputs is steadily increasing.

3) Most of directors, including the one of IEF SAS defined their vision of the perspective of their institutes as "continuation of present successful activities". This is too modest. In our opinion, the directors should be asked to formulate their visions and the objectives to be reached by their institutes in a much more detailed way. The Presidium of SAS could organize a series of seminars for groups of similarly oriented institutes with the presentation of visions of the future of these institutes. At present the institutes reaching the average world level of indicators like citations per publication were considered as excellent. In the future, such a level could be increased to, say, 120% instead of the present 100%.

- The long term strategy of the IEP is described in Chapter 3.

- the average indicators citations/publications of the institution have been increased from 7.84 (period 2007-2011) to 14.33 (period 2012-2015) - see the Table below.

Scientific outputs	CC publications WoS+Scopus	Citations SCI WoS+Scopus	cit/publ
2012-2015	959	13745	14.33
2007-2011	751	5890	7.84
2012-2015 / 2007-2011	1.27	2.33	1.82

Tab 2.8.4 compares the total scientific outputs of IEP SAS for the recent and the previous evaluation period.

4) The Presidium could form groups consisting of 1 or 2 members of individual institutes to formulate a strategy of outreach, including the attempts to increase the number of young people interested to study STEM subjects at universities.

Outreach activities of IEP

The Institute is actively involved in the field of outreach/popularization activities. We do not only organize different popularization activities for children of all age classes (see chapter 2.7), but also popularize science to the general public. In Slovakia, the IEP SAS is well known. During the assessed period the institute obtained 3 Prizes from SAS for Scientific Popularization:

2014 – The creative popularization team of IEP SAS: Emil Gažo, Mária Zentková, Matuš Mihalik, Milan Timko, Zoltán Tomori, Marián Mihalik, Jozef Kováč, Katarína Paulovičová and Pavol Szabó were awarded the Prize of SAS for Scientific Popularization in 2014 for the development and building of the scientific exhibits in STEEL PARK, entertainment and technical center in Košice.

2016 (for activities of previous years): Mária Zentková was awarded the Prize of SAS for Scientific Popularization

2016 (for activities of previous years): Ján Baláž won the Prize of SAS for General Scientific Popularization

5) The data of ARRA give numbers of papers of an institute in the 0.1 percentile, 1 percentile and 1 decile of most cited papers. It is recommended to give special financial awards to the authors (or research groups) of these publications. Papers in the fields of particle physics should be evaluated separately.

The outstanding scientific achievements are presented yearly at the Annual Evaluation Seminar upon rating by members of the Scientific Committee, and the winners are awarded within the financial limits of the institution.

- **Supplementary information and/or comments on management, research infrastructure, and trends in personnel development**

CITKE is a specialized workplace in the SAS Košice, whose objective is the construction, management and development of territorial computer network of the SAS in Košice. The main objective of CITKE is to secure and manage all connections of the institutions situated in Košice with the Internet, monitor the network security, oversee maintenance and development of optical and other networks and collaborate with SANET (TU Košice and UPJŠ). This center also fulfills other objectives, such as management, maintenance and upgrades of the central network server (DNS, mail – approx. 700 accounts, web).

3. Research strategy and future development of the institute for the next five years (2016-2020) (Recommended 3 pages, max. 5 pages)

3.1. Present state of the art in both the national and the international contexts

The significance (quality) of the IEP SAS on the national level can be documented by results of annual evaluation of Slovak Academy of Sciences (SAS) institutes, being organized yearly by the Presidium of SAS. According to these evaluation criteria our Institute appears usually to be among the best three within the Section I of Non-living Nature. The significance on international scale can be documented / underlined by the fact that the majority of research activities was / is carried out in international collaboration with established scientific institutes and research centres in Europe, USA and all over the world, by published papers, and by many bi-lateral agreements between the Institute and foreign institutes. All scientific results achieved by the Institute and mentioned in the "Summary of R&D activity..." were obtained predominantly in a vivid international collaboration, many of them with funding from international resources. As the future research of the Institute will mostly maintain this tendency, the ongoing research in related (above-mentioned) directions will present the current state of knowledge from both the international and national perspective also in next four years.

3.2. Research strategy of the institute in the national and the international contexts, objectives and methods

The Institute of Experimental Physics (IEP) of Slovak Academy of Sciences (SAS) in Košice is one of the leading centers for physic-related research in Slovakia. This institute is a home-base for researchers who are nationally and internationally recognized for their contributions to scientific community. The institute's future vision is to further enhance its scientific impact and become one of the leading Central European centers for physics research. The list below highlights some of the improvements that will be implemented in order to further enhance the quality of the research at IEP:

- support of the research activities under the European flagship projects; IEP will motivate and support researchers involved in the areas of the flagship projects in order to strengthen the potential of the Institute and to further integrate within the European Research Areas;
- support of international collaborations; IEP will establish new and permanently maintain existing collaborations in all physics related areas, thus affirming and improving the Institute's quality and international recognition through collaborations with the world-renewed scientists at the level of individual and group research projects as well as in institutional partnerships;
- support of inter- and multidisciplinary research teams/projects, thus bridging physics with nano-, bio-, micro-/macro- and other "state-of-the-art" areas;

- expand the expertise of the research personnel; this will be accomplished by recruitment of young and enthusiastic scientists (both domestic and international), who have demonstrated exceptional research qualities and have obtained international experiences either at doctoral or postdoctoral level; the new young scientist hires will be accommodated with best available support (such as start-ups) to place the Institute competitively for place of employment for the young aspiring and best-in-the field researchers;
- support the education of diverse student body with goals to raise excellent scientists; the current scientific community at the Institute is actively involved in co-supervision and training of intra- and interdisciplinary physics related projects for students at the undergraduate, graduate as well as post-graduate level; organization of research meetings ranging small departmental symposia to conferences with international attendance and invited key note speakers of the highest calibre; as well as establishing and maintaining opportunities with twin universities and research institutes for student exchange and/or degree programs to provide students with the expertise to become leaders in science;
- support research activities that have a potential of rapid transfer of knowledge from basic research into innovative products and technologies; create and protect intellectual property of the Institute and intensify cooperation with the business sector aiming at the commercialization of the results of high quality research, as physics is a discipline where the leading edge fundamental research can go hand-in-hand with patent protected application outputs;
- open the majority of the Institute's scientific infrastructure to all academic and research entities in Slovakia, as this will support collaborations and input of new ideas;
- restructure the departments in order to motivate formation of new dynamic research teams/units; this reorganization will facilitate complex and interdisciplinary research groups with high level of autonomy and responsibility administered by group leaders and coordinated by departments and unit chairs;
- improve the administrative support for research programs by developing a clear and effective computerized system for administrative procedures;
- support of scientific popularization at the regional and national level, by raising awareness of the importance of knowledge and scientific research for the development of the entire society.

Research strategies of the scientific departments:

Department of Low Temperature Physics (DLTP) has become a core partner of the European Microkelvin Platform (EMP) http://emplatform.eu/. While in the previous period we participated in the project of 7th FP as a smaller partner, in the recent project applied to H2020 we are supposed to be one from seven open access low temperature infrastructures of EU, as well as one of the key players in the planned common research activities. Research at the frontier near absolute zero has for long been a powerhouse of ideas in physics and beyond. The principal objective of EMP is the opening up of the milli- and microkelvin temperature regime to nanoscience, condensed matter physics, cosmology and instrumentation. DLTP has proceeded significantly from "standard" low temperature physics subjects as magnetism and superconductivity in bulk materials and superfluidity in helium-3 to nanoscience and nanotechnology. If we compare our future plans with for example the Top ten research fronts in physics as formulated by Thomson Reuters IP&Science, we find a significant overlap in the low dimensional materials as 2D systems: graphene but also 2D transition metal dichalcogenides, iron based superconductors and topological Mott insulators. Our focus will be on ultrathin down to single molecular superconducting films, on strongly disordered superconducting films near the superconductor-insulator transition the mechanism of which is still a strong challenge (concept of Bose insulator, BKT transition). 1D and 0D objects will be studied as well. For example, we have made first successful trials in studies of the superconducting vortex spatial and symmetry confinement. Two principal probes, low temperature (LT) scanning tunneling microscope (STM) sensitive to the coherence length and LT scanning Hall probe microscope (SHPM) sensitive to penetration depth have been mastered in the lab recently. We have in disposal also modern thin film technology and nanolithography. At ultralow temperatures in our nuclear demagnetization fridge and cryo-gen free dilution refrigerator various piezo-resonators, micro- and nanoresonators, will be studied in quantum limit. Quantum critical materials as topological insulators (SmB_6), but also superconductors with competing orders will be studied under extreme conditions at low temperature, high magnetic fields and high pressures up to 14 GPa. Magnetic ordering of rich variety can be found in rare earth borides. We plan to study them

not only by conventional probes but also on the mesoscopic and nanoscopic scale via the spin polarized STM and SHPM. Moreover, the behavior of geometrically frustrated magnetic systems under extreme conditions will be studied to look for new states of matter which could be observed near the expected quantum critical points. Our long term subject, the supefluid helium-3 will be used as a model system for exploration of Majorana particles, topological insulator (topological superfluids), spin-wave analogue of the event horizon, dissipation processes at zero temperature limit, etc. In addition, application possibilities of magnetic and superconducting materials and devices, which could be used as sensors, units of quantum information in quantum computing etc., will be investigated.

Laboratory of Materials Physics will mainly focus on following activities in the field of bulk superconductors, new superconductors, and magnetocaloric materials. The main activity will be concentrated on REBCO bulk single-grain superconductors, as there is still a large area for improvement of pinning of REBCO bulk magnetic flux lines compared to REBCO thin films. We will continue studies focussed on chemical pinning by substitutions in the RE123 lattice and redistribution of substituents by post growth thermo-chemical treatments. Activities in this field will be coordinated with our collaborative groups (mainly University of Cambridge, SIT Tokyo, University of Caen, JTU Shanghai, CAERI Daejeon) as agreed upon during "Bulk Superconductivity Road Mapping Workshop", organised by the Engineering Department and The Institute for Manufacturing, University of Cambridge, on Jun 7, 2016. In addition to REBCO, we will study the influence of preparation parameters on the structure and microstructure of other bulk superconductors (MgB2 and FeSe) prepared in collaborating laboratories. We will also concentrate our efforts on preparation and characterization of new superconductors (sulfides, pnictides, etc.). Alongside magnetocaloric manganites, which were our focus during last accreditation period, we will study the structure and microstructure of magnetocaloric Heusler alloys, prepared by melt spinning at the UPJS Košice (collaboration project). New progressive technology will be applied to study of spark plasma sintering for preparation of magnetocaloric manganites and their influence on transition temperature and magnetocaloric effect.

Department of Metal Physics The research will be focused to the study of homogeneous and inhomogeneous deformation of metallic glasses and nanocrystalline alloys. In cooperation with the Institute of Low Temperature physics (Kharkov) we will focuse to the study of failure processes of nanocrystalline alloys (prepared by intensive plastic deformation) and a new class of metallic alloys (high entropy alloys). The thermal analysis will be enhanced by measuring of thermal conductivity of low conductive substances using dynamic DSC methods.

The research activities of the **Laboratory of Nanomaterials and Applied Magnetism** will focus on development of novel magnetic materials for energy conversion and sensors. Various amorphous and nanocrystalline magnetic alloys prepared by rapid quenching from the melt in the form of single layer and bilayer ribbons are of particular interest as their desired. properties can be achieved by targeted technological, compositional, structural and shape modifications and by choice of optimal physical treatments, mainly thermal processing in external magnetic fields or under mechanical stress. We will study new alloy systems based on rare earths and/or 3-d transition metals as well as new multi-component high entropy alloys that display large magnetocaloric effect for their potential application in magnetic cooling. For these studies we plan to employ composites of two or more magnetic phases with suitable magnetic entropy characteristics and different Curie temperatures in order to enhance their refrigeration capacity. We also plan to develop new soft magnetic materials, in the form of ribbons and wires, with optimized magnetoimpedance characteristics and/or tailorable magnetoelastic properties for near-future application and materials innovation in highly sensitive magnetic sensors.

Department of Magnetism – The Centre of Nanofluids will continue research in the areas of functionalization and encapsulation magnetic nanoparticles in magnetic labeled polymer nanospheres under the support of active two APVV projects ("Graphene-based nanoplatform for detection of cancer" and "Effects of nanoencapsulated simvastatin on cardiovascular system in experimental metabolic syndrome"). Concurrently, scientific explorations in the field of biocompatible magnetic nanoparticles preparation for hyperthermia treatment and in radiotherapy will be carried out under the umbrella of the COST project action TD1402 entitled "Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy" (RADIOMAG) (2014-2018) (http://www.cost.eu/COST_Actions/tdp/TD1402). More specifically, these studies involve magnetosome prepared by biomineralization process. Furthermore, we will continue on our study

of structural properties and biomedical application of magnetoferritin, employing SANS/SAXS methods at large scale facilities (XFEL Hamburg, PSI Villigen, ILL Grenoble, BNC Budapest and JINR Dubna) in addition to other, more commonly used analytical technologies. We will pursue research endeavors into a new area by study of complex anisotropic systems based on thermotropic as well as biological liquid crystals doped with magnetic nanoparticles, recently supported by APVV for 2016-2019 funding period, with the main premise to increase the sensitivity of these anisotropic systems to external magnetic fields. We expect to gain better understanding of the physics of the colloid systems based on liquid crystals, a first necessary step for liquid crystalline materials design with improved magnetic properties and also helps to establish the knowledge necessary to utilize related future technologies. In the field of oil-based magnetic fluids we will concentrate our efforts on cooling and insulating effectiveness of liquid media used in electrical power equipment. We propose to develop new types of insulating and cooling magnetic fluids by doping them with progressive carbon nanostructures like graphene, fullerene and nanotubes; with all of developed and tested magnetic fluids recommended for application in real power transformers produced by industrial company, for example EVPU Nová Dubnica. This R & D is supported by participation to COST entitled „Overcoming Barriers to Nanofluid Market Uptake CA15519“ (http://www.cost.eu/COST_Actions/ca/CA15119). In the field of electrical transport and tunnelling phenomena our attention will be focused on the class of valence fluctuating semiconductors. Our research will be directed with an aim to understand the nature of electronic transport in SmB_6 and similar systems. We plan to prepare SmB_6 thin films and evaluate the role of surface states in their electrical conduction, with special attention to evaluate the applicability of the scenario of Kondo topological insulator and the recently proposed model of valence-fluctuation induced transport, to describe the electrical conduction of SmB_6 thin films. conduction of SmB_6 thin films. Despite the fact that multiferroics are attractive candidates for use in in electrically controllable microwave elements, magnetic field sensors and also in spintronics , the main problem preventing possible application is the fact that electric polarization controlled by magnetic field was proven only in the region of low temperatures, while the possibility of applications demand occurrence of a magneto-electric effect at room temperature. We will focus to improvement of sample preparation technology and to the tuning of application friendly properties by means of doping and using applied pressure as external tuning parameter.

Department of Biophysics – the research focus within this department will continue to elucidate the relationship between formation of non-native protein conformers and their propensity to form morphologically different amyloid aggregates as the pathology and mechanism of protein amyloid aggregation, present in many amyloid-related diseases, remains elusive and current treatments are not effective. Based on the fact that inhibition of amyloid aggregates could be used as potential therapeutic approach in case of amyloid-related diseases, we will identify new amyloid inhibitors. Further systematic studies of the effect of nanoparticles on poly/peptides in order to correlate among the well-defined physico-chemical properties of nanoparticles and propensity of poly/pepties to form amyloid aggregates. Simultaneously, we will perform experimental explorations to identify substances that initiate or accelerate the process of amyloid aggregation. In addition, we will elucidate the mechanisms by which oxidative stress damages individual components of the electron-transfer complexes and verify individual participation of these complexes in antioxidant defence. Furthermore we will continue on studies for the association of mitochondrial dysfunction with age-related diseases. Our research focus will continue in areas of conformational change studies of biomacromolecules due to presence of various stimuli, for example nanoparticles, molecular magnets or other nanoobjects responsible and involved in conformational stability of macromolecules. Different area of our research will involve our contribution to the creation of highly efficient photovoltaic electronic elements. We have abilities and equipment to characterize optical properties of these novel supramolecular complexes in addition to be able to visualized them using polarized light microscope equipped with optical tweezers designed for fluorescence or Raman spectroscopy. Members of our research team are interested in image analysis, which can be transformed into more advanced forms like computer vision, virtual reality, artificial intelligence, *etc.* Individual directions follow same philosophy, which mean the transformation from micromanipulation to microrobotics (nanorobotics) and from contact biomechanical measurements to contactless ones, where the algorithms known from robotics can be applied to plan the trajectory of moving particles (*e.g.* creating a microhand, smart sorting and automated measurements). In order to achieve the above mentioned goals we will continue to conduct research in experimental and theoretical areas.

The research strategy in the **Laboratory of Experimental Chemical Physics** will follow up on the successful strategy from recent years based on focusing on the investigation of some important and interesting, yet poorly understood physical phenomena in chemical systems. Solving of some puzzles of current chemical physics resulted in both important basic research outputs and hand-in-hand with this also in applied research outputs and patents. The transfer of ideas from basic research to applied research was thus practically immediate, the traditional time scheme being to patent first, and then to publish. We plan to work during next five years in parallel in two areas: (1) implementation of our patents in real life and (2) continuation of our basic research with a potential of further patent applications. Particularly we will focus on spontaneously occurring and induced target-oriented self-assembly of polymeric and nonpolymeric materials in liquid state, phase transitions, and cooperative phenomena in these systems. We will focus on mesoscale phenomena and structures, i.e. those at the scale larger than atomic or molecular and smaller than macroscopic. These themes fully correspond to our experimental infrastructure and methodological expertise focusing on structural and dynamical characterization of soft matter on nano- and submicron scales, mainly based on advanced laser optical techniques in our lab complemented by experiments on large-scale european facilties (synchrotron SAXS, SANS, neutron spin echo, etc.). As done in the past, we would like also to contribute to creative development of experimental methods, especially laser light scattering methods, and methodical work in this field.

Department of Theoretical Physics - further theoretical studies in the area of condensed matter physics will be focused on a description of coexisting cooperative phenomena in strongly correlated electron systems with different order parameters. In particular, we plan to study the coexistence of charge and spin ordering, ferroelectric and ferromagnetic state, and finally, charge/spin ordering and superconductivity. We will concentrate on the huge correlation between theory and experiment through the application of ab initio method, namely the DFT technique and on the study of electronic properties of correlated systems. We would like to describe models for free electrons that move along curved nanostructure and interact with these induced spins, their spins will be reversed with the respect to neighboring free electrons and absorbed by them. We expect that one wormhole is emerging between two sheets and graphene is transformed to a superconductor. We are going to investigate also the superfluid phases of helium 3 and excitations existing within them as a model system for the quantum field theory in curved spacetime and the corresponding phenomena predicted by that theory. Within the area of non-linear stochastic dynamics we will study the influence of the breaking of various symmetries of the turbulent environments on the behavior of structure and correlation functions passively advected (scalar, vector & magnetic) fields in the framework of simplified (Kraichnan, Kazantsev-Kraichnan, etc.) models as well as in the framework of the Navier-Stokes turbulence and the turbulent magnetohydrodynamics. Exactly solvable antiferromagnetic models of the classical statistical mechanics on the geometrically frustrated lattices will be also investigated. Within the phenomenology of elementary particle we will investigate theoretically the onset of various effects (effects of the quantum coherence, color transparency, gluon shadowing, Cronin effects, vacuum and medium induced energy loss and effective energy loss caused by multiple initial state interactions of a parton before a hard scattering) occuring in various processes on nuclear targets (iclusive production of light hadrons, production of heavy mesons, Drell-Yan process, DIS (Deep Inelastic Scattering) on nuclei, coherent and incoherent production of vector mesons, etc.), in various kinematical regions corresponding to RHIC and LHC.

The space physics department's focus is research on the particles of low and medium energy and participation in the JEM-EUSO experiment. The future directions include, but are not limited to analysis of quasi-periodic and irregular cosmic rays (CR), variations and comparison with parameters of interplanetary space, Earth's magnetosphere, state of atmosphere; relations of fluxes of low energy CR to space weather (SW) effects; changes of magnetospheric transmissivity for CR; CR modulation in heliosphere according to experimental data; development of new devices or their parts for satellite/space probe observations of suprathermal particles in magnetosphere, in interplanetary space and in other space plasma populations; analysis of satelite/space probe data with the aim to further the understanding of sources, acceleration mechanisms, transport, losses in magnetosphere and role of the particles in SW effects; updates on measurements at Lomnicky Stit (observatory) including SEVAN (Space Environmental Viewing and Analysis Network), dosimetric observations and study of CR relations to atmospheric electricity. In the future, we will also measure UV radiation by own network of ground detectors and develop models for the

physical description based on recorded data, as part of a feasibility study implemented within the 1. PECS ESA call in Slovakia. The future directions within the JEM-EUSO collaborations include participation on JEM-EUSO experiment preparation, which also includes involvement in data analysis from precursor experiments SPB EUSO, Mini-EUSO and K-EUSO. SPB NASA balloon launch is planned for April 2017, while Mini-EUSO detector will be placed on the International Space Station in December 2017. K-EUSO experiments will start around 2020.

The future of the **Department of Subnuclear Physics** in the next 5 years will be mainly determined by the experimental programmes of CERN. Our main emphases are going to be ALICE and ATLAS experiments. Although the assembly of these experiments is completed, works on detector upgrades will continue in future. The ALICE collaboration already started a major upgrade programme to increase the detector parameters to levels able to facilitate increased luminosity planned for the LHC accelerator. The cluster of institutions in Košice (IEP SAS, UPJŠ Košice and TU Košice) are responsible for the development of detector control system for the new Inner Tracking System. The major upgrades for the ATLAS experiment are planned at a later stage. In the near future, our team is going to be involved in the development of the ADC chip. As the amount of the data collected by both, ALICE and ATLAS experiments, steadily increases, our large scale computing facilities must accordingly adapt to support growing demands, therefore leading to continuous modernization of the LHC Grid computing. In addition to our involvement in the maintenance and improvements of the experimental infrastructure of LHC, such as on-line control and monitoring for ALICE and calorimetry and radiation measurements for ATLAS, we will simultaneously perform elaborative and extensive physics analyses on LHC data.

Project proposals submited to 7RP or H2020	2012	2013	2014	2015
Institute as coordinator	0	0	0	0
Institute as participant	0	0	4	5

1. Other information relevant for the assessment

In addition to the achievements described in this evaluation report, our institute was able to significantly enhance and improve its infrastructure. During the assessment period, EU structural funds invested more than 10 million Euros into our institute's infrastructure, which allowed reconstruction of majority of present laboratories and their equipment with new instruments. Three research units within the institute: the Department of Magnetism, the Laboratory of Nanomaterials and Applied Magnetism and the Laboratory of Materials Physics moved to a new building with newly equipped laboratories. In addition, new laboratories were built in the departments of Low Temperature physics and Biophysics.

Unfortunately, the provider (ASFEU, Bratislava) implemented bureaucracy involved in the administration of these EU Structural Funds had a negative effect on the research productivity of principal investigators in addition to inconveniences (such as noise, dirt and dust) which are always associated with undergoing reconstructions. We are aware that these constructions caused interruptions in research activities are necessary in order to build an Institute equipped with first class research infrastructure.

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director of IEP SAS