Ústav experimentálnej fyziky SAV

Správa o činnosti organizácie SAV za rok 2012

Košice
január 2013

Obsah osnovy Správy o činnosti organizácie SAV za rok 2012

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1. Základné údaje o organizácii

1.1. Kontaktné údaje

Názov: Ústav experimentálnej fyziky SAV
Riaditeľ: Doc. RNDr. Karol Flachbart, DrSc.
Zástupca riaditeľa: RNDr. Alena Juríková, CSc.
Vedecký tajomník: Mgr. Pavol Szabó, CSc.
Predseda vedeckej rady: RNDr. Zuzana Gažová, CSc.
Člen snemu SAV: RNDr. Zuzana Gažová, CSc.
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Názvy a adresy detašovaných pracovísk:

- **Laboratórium kozmickej fyziky na Lomnickom štíte**
  059 60 Tatranská Lomnica, tel.: 052/467 071

Vedúci detašovaných pracovísk:

- **Laboratórium kozmickej fyziky na Lomnickom štíte**
  Prof. Ing. Karel Kudela, DrSc.

Typ organizácie: Rozpočtová od roku 1969

1.2. Údaje o zamestnancoch

Tabuľka 1a Počet a štruktúra zamestnancov

Štruktúra zamestnancov	K	K		K do 35 rokov		F	P	T
		M	Ž	M	Ž			
Celkový počet zamestnancov	147	94	53	20	9	138	108,26	76,88
Vedeckí pracovníci	80	59	21	9	5	74	63,86	61,86
Odborní pracovníci VŠ	34	20	14	8	4	31	22,11	11,62
Odborní pracovníci ÚS	20	8	12	2	0	20	13,07	3,4
Ostatní pracovníci	13	7	6	1	0	13	9,22	0

K – kmeňový stav zamestnancov v pracovnom pomere k 31.12.2012 (uvádzať zamestnancov v pracovnom pomere, vrátane riadnej materskej dovolenky, zamestnancov pôsobiacich v zahraničí, v štátnych funkciách, členov Predsedníctva SAV, zamestnancov pôsobiacich v zastupiteľských zboroch)
F – fyzický stav zamestnancov k 31.12.2012 (bez riadnej materskej dovolenky, zamestnancov pôsobiacich v zahraničí v štátnych funkciách, členov Predsedníctva SAV, zamestnancov pôsobiacich v zastupiteľských zboroch)

P – celoročný priemerný prepočítaný počet zamestnancov
T – celoročný priemerný prepočítaný počet riešiteľov projektov
M, Ž – muži, ženy

Tabuľka 1b Štruktúra vedeckých pracovníkov (kmeňový stav k 31.12.2012)

Rodová skladba	**Pracovníci s hodnosťou**				**Vedeckí pracovníci v stupňoch**		
	DrSc.	**CSc./PhD.**	**prof.**	**doc.**	**I.**	**IIa.**	**IIb.**
Muži	11	49	5	6	22	25	12
Ženy	0	20	0	0	1	9	11

Tabuľka 1c Štruktúra pracovníkov podľa veku a rodu, ktorí sú riešiteľmi projektov

Veková štruktúra (roky)	**< 31**	**31-35**	**36-40**	**41-45**	**46-50**	**51-55**	**56-60**	**61-65**	**> 65**
Muži	3	4	5	3	8	9	19	7	3
Ženy	3	5	5	6	3	3	2	1	0

Tabuľka 1d Priemerný vek zamestnancov organizácie k 31.12.2012

	Kmeňoví zamestnanci	**Vedeckí pracovníci**	**Riešitelia projektov**
Muži	49,6	51,0	51,7
Ženy	44,3	42,3	42,0
Spolu	47,7	48,8	48,6

1.3. Iné dôležité informácie k základným údajom o organizácii a zmeny za posledné obdobie (v zameraní, v organizačnej štruktúre a pod.)

2. Vedecká činnosť

2.1. Domáce projekty

Tabuľka 2a Zoznam domácich projektov riešených v roku 2012

ŠTRUKTÚRA PROJEKTOV	Počet projektov		Čerpané financie za rok 2012 (v €)		
	A	B	A		B
			spolu	pre organi-záciu	
1. Vedecké projekty, ktoré boli r. 2012 financované VEGA	24	1	177 651	177 651	
2. Projekty, ktoré boli r. 2012 financované APVV	4	11	249 168	214 525	34 643
3. Projekty OP ŠF	6	12	4 326 032	4 258 499	67 533
4. Projekty centier excelentnosti SAV	2	0	55 400	55 400	-
5. Iné projekty (FM EHP, ŠPVV, Vedecko-technické projekty, ESF, na objednávku rezortov a pod.)	1	0	9 555	9 555	-

A - organizácia je nositeľom projektu
B - organizácia sa zmluvne podieľa na riešení projektu

Tabuľka 2b Zoznam domácich projektov podaných v roku 2012

Štruktúra projektov	Miesto podania	Organizácia je nositeľom projektu	Organizácia sa zmluvne podieľa na riešení projektu
1. Účasť na nových výzvach APVV r. 2012	-	4	5
2. Projekty výziev OP ŠF podané r. 2012	Bratislava		
	Regióny	1	1
3. Projekty výziev FM EHP podané r. 2012	-		

2.2. Medzinárodné projekty

2.2.1. Medzinárodné projekty riešené v roku 2012

Tabuľka 2c Zoznam medzinárodných projektov riešených v roku 2012

ŠTRUKTÚRA PROJEKTOV	Počet projektov		Čerpané financie za rok 2012 (v €)		
			A		
	A	B	spolu	pre organi-záciu	B
1. Projekty 6. a 7. rámcového programu EÚ	0	1	7 311	7 311	-
2. Multilaterálne projekty v rámci vedeckých programov COST, INTAS, EUREKA, ESPIRIT, PHARE, NATO, UNESCO, CERN, IAEA, ESF (European Science Foundation) a iné	0	8	106 118	106 118	-
3. Projekty v rámci medzivládnych dohôd o vedecko-technickej spolupráci	0	0	-	-	-
4. Bilaterálne projekty	0	1	-	-	-
5. Podpora medzinárodnej spolupráce z národných zdrojov (MVTS, APVV)	5	8	150 750	160 750	
6. Iné projekty financované alebo spolufinancované zo zahraničných zdrojov	0	0	-	-	-

A - organizácia je nositeľom projektu
B - organizácia sa zmluvne podieľa na riešení projektu

2.2.2. Medzinárodné projekty v 7. RP EÚ podané v roku 2012

Tabuľka 2d Podané projekty 7. RP EÚ v roku 2012

	A	B
Počet podaných projektov v 7. RP EÚ	0	0

A - organizácia je nositeľom projektu
B - organizácia sa zmluvne podieľa na riešení projektu

Údaje k domácim a medzinárodným projektom sú uvedené v Prílohe B.

2.2.3. Zámery na čerpanie štrukturálnych fondov EÚ v ďalších výzvach

ÚEF sa sústreďuje v nových výzvach ASFEÚ:
- na stavbu nového Vedecko-výskumného pavilónu PROMATECH - nových laboratórií v rámci spoločného centra s ÚMV, ÚGt a ÚMMS a partnermi z UPJŠ a TUKE v areáli SAV na Watsonovej ulici
- stavebnú rekonštrukciu existujúcich laboratórií v areáli SAV na Watsonovej ulici a v Parku Angelinum
- dobudovanie existujúcej experimentálnej infraštruktúry
- na využitie LPP projektov na posilnenie výskumných tímov mladými doktorandmi a postdoktorandmi

2.3. Najvýznamnejšie výsledky vedeckej práce

2.3.1. Základný výskum

I. miesto
Boseho-Einsteinova kondenzácia magnónov a polia narušujúce ich symetriu
Projekty: Microkelvin - projekt 7 RP EÚ, APVV-0515-10, VEGA 0128, CFNT MVEP, ŠF EÚ 26220120005.
Riešitelia: M. Kupka, P. Skyba (Oddelenie teoretickej fyziky, Oddelenie fyziky nízkych teplôt)

Stavy s koherentnou precesiou magnetizácie (spinov) v supratekutom 3He-B (homogénne a perzistentne precesujúce domény) sú považované za jednu z makroskopických foriem Boseho-Einsteinových kondenzátov magnónov. Keď magnóny vytvoria jeden z týchto mnohomagnónových koherentných stavov, možno ho opísať jednou „jedno-magnónovou vlnovou funkciou". Aplikáciou vhodnej vonkajšej poruchy možno generovať oscilácie celého kondenzátu okolo stavu s koherentnou precesiou, čo je prejavom jeho kolektívnej „tuhosti“, odolnosti voči rozptylu individuálnych magnónov z tohto stavu. V prípade voľne homogénne precesujúcej domény je stav koherentnej precesie degenerovaný, keďže uhlová frekvencia precesie je nezávislá od fázy precesie. Frekvencia malých oscilácií magnetizácie okolo homogénne precesujúcej domény preto v dlhovlnnej limite spojite klesá k nule. Takéto tzv. bezmedzerové alebo bezhmotnostné módy sú nazývané Goldstoneovými módmi. V práci [1] sme teoreticky i experimentálne ukázali, že prítomnosť vysokofrekvenčného (vf) poľa fixuje fázu precesie, čím sníma degeneráciu stavu s koherentnou precesiou spinov. Ináč povedané, vf pole narúša U(1) symetriu kondenzátu magnónov. Toto narušenie symetrie je spojené so vznikom medzery v spektre frekvencií oscilácii kondenzátu magnónov. Inými slovami, príslušné módy prestávajú byť Goldstoneovými, získavajú „hmotnosť“. V práci [2] boli v širokom intervale teplôt experimentálne študované vlastnosti stavov s koherentnou precesiou spinov zvaných perzistentne precesujúca doména. Výsledky boli porovnané s teoretickými modelmi pre spinové vlny a pre procesy disipacie energie boli navrhnuté rôzne

mechanizmy, pričom sme ukázali, že pri ultranízkych teplotách za istých podmienok dominuje disipačný proces spojený s povrchom.

BEC of magnons in superfluid 3He-B and symmetry breaking fields.

States with a coherent precession of magnetization (spin) in superfluid 3He-B (homogeneously and persistent precessing domains) are considered as some of macroscopic forms of the Bose-Einstein condensates of magnons. Once the magnons form one of these states, this many-magnon coherent state is described by a „single-magnon wave function“. A suitable external perturbation may cause the condensate to oscillate around the state with coherent precession, which demonstrates a collective rigidity of the condensate against scattering a single magnon out of it. The states corresponding to a free coherent spin precession are degenerate in the phase of precession, so the oscillations around such states possess a gapless dispersion relation and are known as the Goldstone modes. In work [1] we showed both theoretically and experimentally that the presence of high frequency field lifts the degeneracy of the precessing state with respect to the phase of the precession, that is, it violates the symmetry of the magnon condensate, and former Goldstone modes become non-Goldstone ones, as they acquire the energy gap (“mass”) in their spectrum. In work [2], over a broad temperature range, the states with coherent spin precession known as persistent precessing domains were studied experimentally. The results were compared with theoretical predictions for the spin waves models and for processes of the energy dissipation various mechanisms were suggested and discussed. However, we showed that at ultra low temperatures and at certain conditions, a dissipation mechanism associated with the surface dominates.

[1] M. Kupka, P. Skyba: BEC of magnons in superfluid 3He-B and symmetry breaking fields, Physical Review B **85**, 184529 (2012).
[2] S.N. Fisher, G. R. Pickett, P. Skyba, N. Suramlishvili: Decay of persistent precessing domains in 3He-B at very low temperatures, Physical Review B **86**, 024506 (2012).

II.miesto
Štúdium kritických vlastností modelov stochastickej dynamiky a štatistickej mechaniky.
Projekty: VEGA: 0173, ŠF: 26220120029.
Riešitelia: E. Jurčišinová, M. Jurčišin, R. Remecký, P. Zalom (Oddelenie teoretickej fyziky)

Je známe, že experimentálne, numerické, ako aj teoretické výsledky ukazujú existenciu odchýlok od záverov klasickej fenomenologickej Kolmogorovej-Obukhovovej teórie. Teda, jednou z hlavných otázok v teórii rozvinutej turbulencie je otázka platnosti základných princípov klasickej fenomenologickej Kolmogorovej-Obukhovovej teórie, ako aj analýza a vysvetlenie možných odklonov od záverov tejto teórie v rámci mikroskopických modelov.
V tejto súvislosti sme metódami kvantovej teórie poľa študovali vplyv existencie dodatočných ultrafialových divergencií v dvojrozmernom turbulentnom prostredí na anomálne škálovanie štruktúrnych funkcií pasívne advektovaného skalárneho poľa v trojrozmernom turbulentnom prostredí. Ukázali sme, že tieto efekty sa neobjavujú na úrovni priblíženia prvého rádu poruchovej teórie. Študovali sme tiež vplyv vnútornej (tenzorovej) štruktúry advektovaného poľa na vlastnosti anomálneho škálovania korelačných funkcií advektovaného poľa v turbulentnom prostredí. Ukázali sme, že anomálne škálovanie, teda odklon od klasického Kolmogorovho škálovania, je podstatne väčší v prípade vektorových polí ako v prípade skalárnych polí.Okrem toho sme sa zaoberali aj kritickými vlastnosťami niektorých presne riešiteľných modelov štatistickej mechaniky. Sústredili sme sa na globálnu analýzu v modeloch na tzv. rekurzívnych mriežkach, ktoré sa v ostatnom období intenzívne využívajú na štúdium celého spektra nielen fyzikálnych javov. V tejto súvislosti bol nájdený aproximačný vzťah medzi kritickými bodmi Isingovho modelu na Betheho mriežkach s ľubovoľnými hodnotami spinu. Okrem toho bola nájdená všeobecná rovnica pre určenie kritických

teplôt Isingovho modelu so spinom ½ na všetkých tzv. čistých Husimiho mriežkach. Dosiahnuté výsledky, na jednej strane, predstavujú východiskový bod pre hlbšie štúdium a pochopenie vlastností anomálneho škálovania korelačných funkcií v symetrických ako aj nesymetrických turbulentných prostrediach na mikroskopickej úrovni. Na druhej strane, dosiahnuté výsledky predstavujú tiež východiskový bod pre globálnu teoretickú analýzu a všeobecné riešenia klasických štatisticko-mechanických modelov na rekurzívnych mriežkach.

Study of critical properties in models of stochastic dynamics and statistical mechanics.

It is well-known that experimental, numerical, as well as theoretical results show the existence of deviations from the conclusions of the classical phenomenological Kolmogorov-Obukhov theory. Thus, one of the main questions in the theory of fully developed turbulence is the validation of the basic principles of the classical phenomenological Kolmogorov-Obukhov theory, as well as the investigation and explanation of possible deviations from its conclusions in the framework of microscopic models. In this respect, using the field-theoretic methods we have studied the influence of the existence of additional ultraviolet divergences in two-dimensional turbulent environment on the anomalous scaling of the structure functions of passively advected scalar field in three dimensions. It was shown that these effects do not appear at the first order level of approximation within the perturbative theory. Besides, we have also studied the influence of the internal (tensor) structure of an advected field on the properties of anomalous scaling of correlation functions of the advected field in the turbulent environment. It is shown that the anomalous scaling, i.e., the deviation from classical Kolmogorov scaling, is much more pronounced in the case of vector fields than in the case of scalar fields. In addition, we have also investigated the critical properties of some exactly solvable models in the statistical mechanics. We have focused on a global analysis of models on recursive lattices that are used for study of wide spectrum of problems. In this respect, an approximate formula for determining of positions of the critical temperatures for arbitrary high values of the spin variable was found. Besides, a general equation for determining of the critical temperatures of the Ising spin ½ model on all the so-called pure Husimi lattices was derived.
Achieved results, on one hand, represent a starting point for further deeper study and understanding at microscopic level of properties of the anomalous scaling of various correlations functions in symmetric, as well as asymmetric turbulent environments. On the other hand, achieved results also represent a starting point for global theoretical analysis and general solutions of various classical models in statistical mechanics on various recursive lattices.

[1] A.V. Gladyshev, E. Jurčišinová, M. Jurčišin, R. Remecký, and P. Zalom: Anomalous scaling of a passive scalar field near two dimensions, Phys. Rev. E 86 (2012) 036302 (12pp);
[2] E. Jurčišinová and M. Jurčišin: Anomalous scaling of the magnetic field in the Kazantsev–Kraichnan model, J. Phys. A: Math. Theor. 45(2012) 485501 (26pp);
[3] E. Jurčišinová and M. Jurčišin: Critical temperatures of the Ising model on the Bethe lattice for arbitrary values of spin, Int. J. Mod. Phys. B 26 (2012) 1250003 (31pp);
[4] E. Jurčišinová and M. Jurčišin: The Ising Model on Pure Husimi Lattices: A General Formulation and the Critical Temperatures, J. Stat. Phys. 147 (2012) 1077-1093 (17pp).

2.3.2. Aplikačný typ

I. miesto
Spôsob prípravy polymérnych nanočastíc na báze homopolyméru poly(etylakrylovej kyseliny)
Projekty: VEGA 0215, APVV 048610, COST CM-1101, Centrum excelencie pre progresívne materiály s nano- a submikrónovou štruktúrou. ITMS kód projektu 26220120019.
Riešitelia: M. Sedlák

Vytvorenie väzby medzi základným a aplikovaným výskumom. Tento cieľ bol veľmi úspešne

naplnený udelením patentu „Spôsob prípravy polymérnych nanočastíc na báze homopolyméru poly(etylakrylovej kyseliny)“. Polymérne nanočastice vo všeobecnosti sú tvorené buď chemickými reakciami (kovalentné väzby) alebo niekoľkými typmi asociácií polymérov (fyzikálne väzby): asociácia kopolymérov (jedna zložka dobre, druhá slabo rozpustná), asociácia opačne nabitých iónových homopolymérov v dôsledku elektrostatickej príťažlivej interakcie, asociácia dvoch prípadne viacerých typov homopolymérov pomocou vodíkových väzieb, asociácia (ko)polymérov pomocou surfaktantov alebo kombináciou vyššie uvedených typov. Náš vynález predstavuje principiálne nový typ polymérnych nanočastíc pripraviteľných asociáciou homopolymérov jediného jedného typu pomocou nového objaveného mechanizmu. Polymérne nanočastice boli pripravené na báze homopolyméru poly(etylakrylovej kyseliny). Mechanizmus ich vzniku spočíva v tom, že sa zahrieva roztok homopolyméru poly(etylakrylovej kyseliny) (PEA) pri zahrievaní ktorého sa výrazne znižuje kvalita rozpúšťadla so zvyšujúcou sa teplotou a reťazce sú nútené asociovať (preferujú kontakt polymér-polymér pred kontaktom s rozpúšťadlom). Pri priblížení reťazcov dochádza ku vzniku vodíkových väzieb medzi reťazcami (prostredníctvom väzieb medzi karboxylovými skupinami na reťazcoch, ktoré sú zároveň donorom i akceptorom vodíkových väzieb). Takýmto spôsobom vzniká polymérny komplex (nanočastica). Pri následnom znížení teploty späť na laboratórnu teplotu sa kvalita rozpúšťadla opäť zvyšuje, asociáty by sa v princípe mohli rozpadnúť, ale so znižujúcou sa teplotou sa zároveň zvyšuje tiež intenzita vodíkových väzieb, čo stabilizuje častice.

Preparation method of polymeric nanoparticles on the basis of poly(ethylacrylic acid) homopolymers.

Interconnection between basic and applied research. This goal was achieved by a patent award „Preparation method of polymeric nanoparticles on the basis of poly(ethylacrylic acid) homopolymers.“ Polymeric nanoparticles in general are prepared either by chemical reactions (covalent bonds) or by various types of self-assembly (physical bonds). The self-assembly by physical forces is based on the whole variety of mechanisms, e. g. copolymer self-assembly in selective solvents (hydrophobic interaction of less soluble blocks), association of ionic homopolymers with opposite charges due to electrostatic attraction, association of two or more types of homopolymers due to intermolecular hydrogen bonding, association of (co)polymers triggered by surfactants, termination of the homopolymer phase separation by surfactants which stabilize the system in a dispersed state, etc. A new approach to polymer self-assembly is presented where stable polymeric nanoparticles are formed from homopolymers of one type only and without any assembly-triggering additives. The mechanism of the self-assembly is based on the following idea. A thermosensitive polymer, aqueous solution of partially ionized poly(ethylacrylic acid) is heated, the solvent quality gradually worsen upon heating and polymer-polymer contacts are preferred over polymer-solvent contacts, which leads to the formation of polymer assemblies. Upon subsequent cooling to laboratory temperature, the assemblies should eventually dissolve, however, this is not the case due to the fact that polymer chains brought to a close proximity at elevated temperatures become hydrogen-bonded. In addition, hydrogen bonds strengthen upon cooling. As a result, stable nanoparticles are obtained.

[1]M. Sedlák, Č. Koňák: Spôsob prípravy polymérnych nanočastíc na báze homopolyméru poly(etylakrylovej kyseliny), ÚPV SR, číslo prihlášky: PP5007-2008. Patent č. 287951. Udelený 27.4.2012.

II. miesto

Vyhľadávanie nových materiálov pre aplikácie v memristívnych súčiastkach využitím atómového silového mikroskopu

Projekty: VEGA 2-0133-09, ŠF ITMS 26220120005 a ITMS 26220120047.
Riešitelia: I. Baťko, M. Baťková (Oddelenie fyziky magnetických javov)

Využitím atómového silového mikroskopu boli metódou lokálnej anodickej oxidácie tenkých titánových filmov pripravené testovacie Ti/TiO_x/Ti štruktúry vykazujúce memristívne správanie. Elektrické merania takýchto Ti/TiO_x/Ti štruktúr potvrdili ich memristívnu povahu a naznačili prítomnosť procesov iónovej/nábojovej difúzie v TiO_x bariére. Následné štúdie pomocou Kelvinovej silovej mikroskopie poskytli dôkaz o prítomnosti týchto difúznych procesov, ako aj o očakávaných procesoch napätím indukovanej redistribúcie iónov/nábojov v oxidickej bariére. Na základe časového vývoja povrchového potenciálu bolo odhadnuté, že „doba zapamätania stavu" takýchto štruktúr je limitovaná difúznymi procesmi v TiO_x bariére a je (prinajmenšom) rádovo v minútovej škále. Práca prezentuje široko využiteľný prístup na vyhľadávanie nových oxidických materiálov pre perspektívne memristívne aplikácie, ako aj technologickú alternatívu výroby memristívnych (nano)súčiastok v geometrii výhodnej pre štúdie pomocou pokrokových techník rastrovacej sondovej mikroskopie.

AFM-utilizing approach to search for new oxide materials for applications in memristive devices

We managed to prepare test structures of Ti/TiO_x/Ti devices exhibiting memristive behaviour by use of (AFM-) tip induced oxidation of titanium thin films. Electrical measurements of such structures confirmed their memristive behaviour and inferred presence of diffusion processes in the TiO_xbarrier. Consequent Kelvin probe force microscopy studies provided evidence for the diffusion processes as well as for expected electric field induced ionic/charge redistribution in the oxide barrier. Time evolution of the surface potential due to the diffusion processes in the TiO_xbarrier revealed minute-scale (at least) retention times of the devices. The work presents a widely utilizable approach to search for novel oxide materials for perspective memristive applications as well as alternative technology for fabrication of memristive (nano)devices in geometry favouring advantageous scanning probe microscopy studies of their in-barrier processes.

[1] I. Batko and M. Batkova, AFM-utilizing approach to search for new oxide materials for perspective applications in memristive devices, The European Physical Journal Applied Physics, 2012, vol. 58, 20102-p1 – 20102-p7.

II. miesto

Vývoj a vybudovanie nízkoteplotného rastrovacieho tunelového mikroskopu
Projekty: VEGA 2/0148/10, APVV-0036-11, ŠF ITMS 26220120047, ESO MNT ERA.Net, ESF NES
Riešitelia: P. Szabó, P. Samuely (Oddelenie fyziky nízkych teplôt)

Nízkoteplotný rastrovací tunelový mikroskop (LT STM) pracujúci v teplotnom intervale T = 0,3 K – 300 K a v magnetických poliach H = 0 – 8 Tesla bol vybudovaný na Oddelení fyziky nízkych teplôt (OFNT). Hlava STM mikroskopu bola vyvinutá v spolupráci s prof. J. Rodrigom z UAM v Madride. Vďaka špeciálneho dizajnu piezomotorov systém umožňuje skenovanie povrchov s atomárnym rozlíšením na veľkých vzdialenostiach (cca. 10 mm v smere Y) a na viacerých vzorkách. Hlava STM mikroskopu bola prispôsobená ku ^{3}He refrigerátoru Janis. Elektronika na ovládanie STM mikroskopu spoločnosti Nanotec bola modifikovaná na merania I-V charakteristík s

vysokým rozlíšením. Unikátne parametre tohto systému zaradili OFNT do elitnej skupiny európskych laboratórií, schopných študovať vlastnosti materiálov pri subkelvinových teplotách a vysokých magnetických poliach s atomárnym rozlíšením. Prvé výsledky, dosiahnuté na tomto zariadení boli publikované v roku 2012.

Development and estabilishment of a Low Temperature Scanning Tunnelling Microscope

A Low Temperature Scanning Tunnelling Microscope (LT STM) working in the temperature range T = 0.3 K – 300 K and magnetic fields H = 0 – 8 Tesla has been estabilished at the Department of Low Temperature Physics (DLTP). The STM head has been developed in collaboration with prof. J. Rodrigo from UAM in Madrid. Due to the special design of piezo-motors the system enables surface scanning in a large areas (cca. 10 mm in Y direction) with atomic resolution. The STM head has been adapted to the Janis ^{3}He refrigerator. The STM contoler purchased from Nanotec has been modified for high resolution I-V characteristics measurements. The unique parameters of this equipment rank DLTP to the elite group of European laboratories, capable for the study of materials at subkelvin temperatures and high magnetic fields with atomic resolution. First results, obtained on this equipment have been published in 2012 (see literature below).

[1] T. K. Kim, A. N. Yaresko, V. B. Zabolotnyy, A. A. Kordyuk, D. V. Evtushinsky, N. H. Sung, B. K. Cho, T. Samuely, P. Szabó, J. G. Rodrigo, J. T. Park, D. S. Inosov, P. Samuely, B. Büchner, and S. V. Borisenko:*Conventional superconductivity in $SrPd_2Ge_2$*, Phys. Rev. B **85** 014520 (2012).
[2] T. Samuely, P. Szabó, Z. Pribulová, N. H. Sung, B. K. Cho, T. Klein, V. Cambel, J. G. Rodrigo and P. Samuely: *Type II superconductivity in $SrPd_2Ge_2$*, Supercon. Sci. Technol. **26** 015010 (2013)
[3] T. Samuely, P. Szabó, J. G. Rodrigo and P. Samuely: *Superconducting density of states and vortex studies on $SrPd_2Ge_2$*, Physica C **479** 95 (2012)

2.3.3. Medzinárodné vedecké projekty

I. miesto
Šírenie kozmického žiarenia heliosférou
Projekty: VEGA 2/0081/10, spolupráca s INFN Miláno, Taliansko
Riešitelia: P. Bobik, K. Kudela (Oddelenie kozmickej fyziky)

Toky galaktického kozmického žiarenia (GKŽ) a ich energetická distribúcia boli v posledných desaťročiach pozorované v rôznych fázach slnečného cyklu meraniami na balónoch a v kozme. Získané údaje umožňujú pokusy o lepšie pochopenie procesov spojených s transportom GKŽ v heliosfére.
Model šírenia protónovej zložky GKŽ heliosférou pomenovaný HelMod (Heliospheric modulation Model) sme vyvinuli s použitím dvoj-dimenzionálneho Monte Carlo prístupu k určeniu diferenciálnych intenzít protónov počas 23. slnečného cyklu. HelMod zahŕňa efekty spojené s variáciou slnečnej aktivity počas šírenia kozmického žiarenia z heliopauzy cez vonkajšiu a vnútornú heliosféru k Zemskej orbite. Je založený na Parkerovej rovnici, ktorá zahŕňa difúziu, konvekciu, drift častíc a energetické straty. Sledujúc vývoj slnečnej aktivity určujúcej vstupné parametre modelu, dokážeme popísať moduláciu lokálneho medzihviezdneho spektra (LMS) v heliosfére až k Zemi, predpokladajúc že LMS je za terminačnou rázovou vlnou heliosféry izotrópne. Spektra simulované pre 23 slnečný cyklus sú v dobrej zhode so spektrami publikovanými kolaboráciami experimentov BESS, AMS a PAMELA. Navyše, simulované modulované spektra určené modelom pre roky 1995 a 2007 ukazujú šírkový gradient objavený sondou Ulysses počas takzvaných rýchlych skenov v rokoch 1995 a 2007. Aplikácia modelu na podiel pozitrónov v kozmickom žiarní pre energie nižšie ako 10 GeV, ukazuje možné vysvetlenie rozdielných výsledkov získaných experimentmi AMS-01 a PAMELA. Model tiež umožňuje predikciu podielu pozitrónov pre

expriment AMS-02. HelMod je vyvíjaný v spolupráci s INFN, Miláno.

Propagation of cosmic rays in the heliosphere

During the last decades, using balloon flights and spaceborne missions, the fluxes of galactic cosmic rays (GCRs) and their energy distributions were observed in different phases of solar activity. These data allow one to attempt a better understanding of processes related to the transport of GCRs through the heliosphere.

A propagation model of galactic cosmic protons through the heliosphere was developed using a two-dimensional Monte Carlo approach to determine the differential intensities of protons during solar cycle 23. The model includes the effects due to the variation of solar activity during the propagation of cosmic rays from the boundary of the heliopause down to Earth's position. The model is based on the Parker's transport equation which contains diffusion, convection, particle drift and energy loss. Following the evolution in time of the solar activity, we are able to modulate a local interstellar spectrum (LIS), that we assumed isotropic beyond the termination shock, down to the Earth position inside the heliosphere. The simulated spectra during solar cycle 23 were found to be in agreement with those obtained from experimental observations carried out by the BESS, AMS, and PAMELA collaborations. In addition, the modulated spectra determined with HelMod for the year 1995 and 2007 exhibits the latitudinal gradient found by the Ulysses fast scans in years 1995 and 2007. The model application to the cosmic ray positron fraction at energy below 10 GeV, showing how the particle drift processes could explain different results for AMS-01 and PAMELA. Model also alow possibility of the cosmic ray positron fraction prediction for the AMS-02 experiment. HelMod is developed in collaboration with INFN, Milano.

[1] Bobik P., Boella G., Consolandi C., Della Torre S., Gervasi M., Grandi D., Kudela K., Pensotti S., Rancoita P.G., Tacconi M., Systematic investigation of solar modulation of galactic protons for solar cycle 23 using a Monte Carlo approach with particle drift effects and latitudinal dependence. Astrophysical J. vol. 745, no.2., art.no. 132, 2012
[2] Bobik P., Boschini, M.J., Consolandi C., Della Torre S., Gervasi M., Grandi D., Kudela K., Pensotti S., Rancoita P.G., Antiproton modulation in the Heliosphere and AMS-02 antiproton over proton ratio prediction, Astrophys. Space Sci. Trans., Volume 7, Issue 3, 245, 2011
[3] Bobik P., Kudela K., Boschini M., Grandi, D., Gervasi, M., Rancoita, P. G., Solar modulation model with reentrant particles, Adv. Space Res., Volume 41, Issue 2, p. 339-342, 2008
[4] Della Torre S., Bobik P., Boschini M.J., Consolandi C., Gervasi M., Grandi D., Kudela K., Pensotti S., Rancoita P.G., Tacconi M. Effects of solar modulation on the cosmic ray positron fraction. Adv. Space Research, vol.49, p.1587-1592, 2012

II.miesto

Magnetické špongie –príklad multifunkčných molekulárnych magnetov

Projekty: VEGA, 0057, Medziakademická dohoda s Henryk Niewodniaczanski Institute, Polish Academy of Sciences

Riešitelia: M. Mihalik, M.Zentková (Oddelenie fyziky magnetických javov)

Magnetické špongie patria medzi multifunkčné molekulárne magnetické materiály, u ktorých v závislosti od teploty dochádza k reverzibilnému uvoľňovaniu molekúl vody a to v dvoch stupňoch. V prípade nami skúmanej $\{[Mn^{II}(pydz)(H_2O)_2][Mn^{II}(H_2O)_2][Nb^{IV}(CN)_8]3H_2O\}_n$ zlúčeniny je tento proces sprevádzaný lokálnymi zmenami štruktúry v okolí magnetických iónov a následnou zmenou magnetických vlastností. Za účelom lepšieho pochopenia magnetických interakcii sme študovaný systém podrobili systematickému štúdiu magnetických vlastností, ktoré zahrňovalo štúdium magnetických fázových prechodov pri atmosférickom tlaku a vysokom hydrostatickom tlaku, kritických exponentov a magnetokalorického javu . Podarilo sa nám ukázať, že charakter

dehydratovaním vyvolaných zmien je rovnaký ako v prípade zmien vyvolaných aplikáciou vonkajšieho hydrostatického tlaku.

Magnetic sponges- example of multifunctional molecular magnets

Magnetic sponges belong to the family of multifunctional molecular magnets, where reversible dehydration in two steps depending on temperature is observed.

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 structure followed by the change of magnetic properties. In order to understand magnetic interactions in the system for both as prepared and dehydrated compound we studied magnetic properties, including magnetic phase transitions at atmospheric and high hydrostatic pressures, critical exponents and magnetocaloric effect. We have shown, that by dehydration induced change in magnetic properties is of the same character as the one induced by applying external pressure.

[1] FITTA, Magdalena - BALANDA, Maria - MIHALIK, Marián - PELKA, Robert - PINKOWICZ, Dawid - SIEKLUCKA, Barbara - ZENTKOVÁ, Mária: Magnetocaloric effect in M–pyrazole-[Nb(CN)8] (M = Ni, Mn) molecular compounds. In Journal of Physics: Condensed Matter, 2012, vol. 24, no. 50, art. no. 506002.

[2] FITTA, Magdalena - PELKA, Robert - BALANDA, Maria - CZAPLA, Mariusz - MIHALIK, Marián - PINKOWICZ, Dawid - 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] PINKOWICZ, David - KRUPIEWSKA, Katarzyna - LEWINSKI, Krysztof - BALANDA, Maria - MIHALIK, Marián - ZENTKOVÁ, Mária - SIEKLUCKA, Barbara. High-pressure single-crystal XRD and magnetic study of a octacyanoniobate octacyanoniobate-based magnetic sponge. In CrystEngComm, 2012, vol. 14, no. 16, p. 5224-5229.

[4] PELKA, R. - CZAPLA, Mariusz - ZIELINSKI, P.M. - FITTA, M. - BALANDA, Maria - PINKOWICZ, David - PRATT, F.L. - MIHALIK, Marián - PRZEWOZNIK, J. - AMATO, A. - SIEKLUCKA, Barbara - WASIUTYNSKI, T. Critical behavior of the Mn2[Nb(CN)8] molecular magnet. In Physical Review B, 2012, vol. 85, no. 22, art. no. 224427.

2.4. Publikačná činnosť (úplný zoznam je uvedený v Prílohe C)

Tabuľka 2e Štatistika vybraných kategórií publikácií

PUBLIKAČNÁ A EDIČNÁ ČINNOSŤ	A Počet v r. 2012/ doplnky z r. 2011	B Počet v r. 2012/ doplnky z r. 2011	C Počet v r. 2012/ doplnky z r. 2011
1. Vedecké monografie vydané v domácich vydavateľstvách (AAB, ABB, CAB)	**0 / 0**	**0 / 0**	**0 / 0**
2. Vedecké monografie vydané v zahraničných vydavateľstvách (AAA, ABA, CAA)	**0 / 0**	**0 / 0**	**0 / 0**
3. Odborné monografie, vysokoškolské učebnice a učebné texty vydané v domácich vydavateľstvách (BAB, ACB)	**0 / 0**	**0 / 0**	**0 / 0**
4. Odborné monografie a vysokoškolské učebnice a učebné texty vydané v zahraničných vydavateľstvách (BAA, ACA)	**0 / 0**	**0 / 0**	**0 / 0**
5. Kapitoly vo vedeckých monografiách vydaných v domácich vydavateľstvách (ABD, ACD)	**0 / 0**	**0 / 0**	**0 / 0**
6. Kapitoly vo vedeckých monografiách vydaných v zahraničných vydavateľstvách (ABC, ACC)	**2 / 0**	**0 / 0**	**0 / 0**
7. Kapitoly v odborných monografiách, vysokoškolských učebniciach a učebných textoch vydaných v domácich vydavateľstvách (BBB, ACD)	**0 / 0**	**0 / 0**	**0 / 0**
8. Kapitoly v odborných monografiách, vysokoškolských učebniciach a učebných textoch vydaných v zahraničných vydavateľstvách (BBA, ACC)	**0 / 0**	**0 / 0**	**0 / 0**
9. Vedecké a odborné práce v časopisoch evidovaných v Current Contents (ADC, ADCA, ADCB, ADD, ADDA, ADDB, CDC, CDCA, CDCB, CDD, CDDA, CDDB, BDC, BDCA, BDCB, BDD, BDDA, BDDB)	**200 / 9**	**0 / 0**	**0 / 0**
10. Vedecké a odborné práce v nekarentovaných časopisoch (ADE, ADEA, ADEB, ADF, ADFA, ADFB, CDE, CDEA, CDEB, CDF, CDFA, CDFB, BDE, BDEA, BDEB, BDF, BDFA, BDFB)	**14 / 0**	**0 / 0**	**0 / 0**
11. Vedecké a odborné práce v zborníkoch (konferenčných aj nekonferenčných, vydaných tlačou alebo na CD)			
a/ recenzovaných, editované (AEC, AED, AFA, AFB, AFBA, AFBB, BEC, BED, CEC, CED)	**22 / 0**	**0 / 0**	**0 / 0**
b/ nerecenzovaných (AEE, AEF, AFC, AFD, AFDA, AFDB, BEE, BEF)	**33 / 0**	**0 / 0**	**0 / 0**

12. Vydané periodiká evidované v Current Contents	**0**	**0**	**0**
13. Ostatné vydané periodiká	**0**	**0**	**0**
14. Vydané alebo editované zborníky z vedeckých podujatí (FAI)	**3/0**	**0/0**	**0/0**
15. Vedecké práce uverejnené na internete (GHG)	**0 / 0**	**0 / 0**	**0 / 0**
16. Preklady vedeckých a odborných textov (EAJ)	**0 / 0**	**0 / 0**	**0 / 0**

A - pracovisko SAV je uvedené ako pracovisko (adresa) autora, alebo je súčasťou kolaborácie alebo iného združenia, ktoré je uvedené ako pracovisko (adresa) autora
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C - pracovisko SAV je uvedené ako materské pracovisko autora odlišné od pracoviska, na ktorom práca vznikla (napr. „on leave...“, „permanent address...“, „present address...“)

Tabuľka 2f

OHLASY	A Počet v r. 2011/ doplnky z r. 2010	B Počet v r. 2011/ doplnky z r. 2010
Citácie vo WOS (1.1, 2.1)	781 / 7	30 / 0
Citácie v SCOPUS (1.2, 2.2)	75 /2	1 / 0
Citácie v iných citačných indexoch a databázach (9, 10)	2 / 0	0 / 0
Citácie v publikáciách neregistrovaných v citačných indexoch (3, 4)	29/0	0 / 0
Recenzie na práce autorov z organizácie (5, 6, 7, 8)	1 / 0	0 / 0

Počet citácií: 928, bez veľkých kolaborácií

Celkový počet citácií s veľkými kolaboráciami ATLAS, ALICE a CDF na základe výstupov z WOS je cca. 2500

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2.5. Aktívna účasť na vedeckých podujatiach

Tabuľka 2g Vedecké podujatia

Prednášky a vývesky na medzinárodných vedeckých podujatiach	300
Prednášky a vývesky na domácich vedeckých podujatiach	25

2.6. Vyžiadané prednášky

2.6.1. Vyžiadané prednášky na medzinárodných vedeckých podujatiach

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 ,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, Jozef - KOVÁČ, Ivan- ŠKORVÁNEK,. 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.

2.6.2. Vyžiadané prednášky na domácich vedeckých podujatiach

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

2.6.3. Vyžiadané prednášky na významných vedeckých inštitúciách

Ak boli príspevky publikované, sú súčasťou Prílohy C, kategória (AFC, AFD, AFE, AFF, AFG, AFH)

2.7. Patentová a licenčná činnosť na Slovensku a v zahraničí v roku 2012

2.7.1. Vynálezy, na ktoré bol udelený patent

Na Slovensku - počet patentov: 1

Číslo PV: 287951
Mená autorov: Sedlák Marián, Koňák Čestmír, RNDr., DrSc., Praha, CZ
Názov vynálezu: Spôsob prípravy polymérnych nanočastíc na báze homopolyméru (polyetylakrylovej kyseliny)
Majiteľ / spolumajiteľ: Ústav experimentálnej fyziky SAV, Košice

2.7.2. Prihlásené vynálezy

2.7.3. Predané licencie

2.7.4. Realizované patenty

Finančný prínos pre organizáciu SAV v roku 2012 a súčet za predošlé roky sa neuvádzajú, ak je zverejnenie v rozpore so zmluvou súvisiacou s realizáciou patentu.

2.8. Iné informácie k vedeckej činnosti.

V priebehu roka 2012 prebehla akreditácia ÚEF za obdobie 2007-2011. Akreditačná komisia SAV zaradila ústav do kategórie **A**.

3. Doktorandské štúdium, iná pedagogická činnosť a budovanie ľudských zdrojov pre vedu a techniku

3.1. Údaje o doktorandskom štúdiu

Tabuľka 3a Počet doktorandov v roku 2012

Forma	Počet k 31.12.2012				Počet ukončených doktorantúr v r. 2012					
	Doktorandi				Ukončenie z dôvodov					
	celkový počet		z toho novoprijatí		ukončenie úspešnou obhajobou		predčasné ukončenie		neúspešné ukončenie	
	M	Ž	M	Ž	M	Ž	M	Ž	M	Ž
Interná zo zdrojov SAV	8	8	0	2	1	0	1	0	0	0
Interná z iných zdrojov	0	0	0	0	0	0	0	0	0	0
Externá	2	1	0	0	0	0	0	0	0	0
Spolu	10	9	0	2	1	0	1	0	0	0

3.2. Zmena formy doktorandského štúdia

Tabuľka 3b Počty preradení

Z formy	**Interná z prostriedkov SAV**	**Interná z prostriedkov SAV**	**Interná z iných zdrojov**	**Interná z iných zdrojov**	**Externá**	**Externá**
Do formy	**Interná z iných zdrojov**	**Externá**	**Interná z prostriedkov SAV**	**Externá**	**Interná z prostriedkov SAV**	**Interná z iných zdrojov**
Počet	0	0	0	0	0	0

3.3. Zoznam doktorandov, ktorí ukončili doktorandské štúdium úspešnou obhajobou

Tabuľka 3c Menný zoznam ukončených doktorandov v roku 2012 úspešnou obhajobou

Meno doktoranda	**Forma DŠ**	**Mesiac, rok nástupu na DŠ**	**Mesiac, rok obhajoby**	**Číslo a názov študijného odboru**	**Meno a organizácia školiteľa**	**Fakulta udeľujúca vedeckú hodnosť**
Peter Kaliňák	interné štúdium hradené z prostriedkov SAV	10 / 2008	9 / 2012	4.1.5 jadrová a subjadrová fyzika	RNDr. Ladislav Šándor CSc., Ústav experimentálnej fyziky SAV	Prírodovedecká fakulta UPJŠ

Zoznam interných a externých doktorandov je uvedený v Prílohe A.

3.4. Zoznam akreditovaných študijných odborov s uvedením VŠ

Tabuľka 3d Zoznam akreditovaných študijných odborov s uvedením univerzity/vysokej školy a fakulty, kde sa doktorandský študijný program uskutočňuje

Názov študijného odboru (ŠO)	**Číslo ŠO**	**Doktorandské štúdium uskutočňované na:** (univerzita/vysoká škola a fakulta)
všeobecná fyzika a matematická fyzika	4.1.2	Prírodovedecká fakulta UPJŠ
fyzika kondenzovaných látok a akustika	4.1.3	Prírodovedecká fakulta UPJŠ
jadrová a subjadrová fyzika	4.1.5	Prírodovedecká fakulta UPJŠ
Materiály	5.2.26	Hutnícka fakulta TUKE

Tabuľka 3e Účasť na pedagogickom procese

Menný prehľad pracovníkov, ktorí boli menovaní do odborových komisií študijných programov doktorandského štúdia	**Menný prehľad pracovníkov, ktorí pôsobili ako členovia vedeckých rád univerzít, správnych rád univerzít a fakúlt**	**Menný prehľad pracovníkov, ktorí získali vyššiu vedeckú, pedagogickú hodnosť alebo vyšší kvalifikačný stupeň**
Prof. Ing. Marián Antalík, DrSc. (biochémia)	Prof. Ing. Marián Antalík, DrSc. (Prírodovedecká fakulta UPJŠ)	RNDr. Hana Čenčariková, PhD (IIa)
Doc. RNDr. Dušan Bruncko, CSc. (jadrová a subjadrová fyzika)	Prof. Ing. Marián Antalík, DrSc. (Fakulta chemickej a potravinárskej technológie STU)	RNDr. Pavol Farkašovský, CSc. (I)
Ing. Pavel Diko, DrSc. (fyzika kondenzovaných látok a akustika)	Doc. RNDr. Karol Flachbart, DrSc. (Prírodovedecká fakulta UPJŠ)	Ing. Vlasta Závišová, PhD. (IIa)
Ing. Pavel Diko, DrSc. (materiály)	Prof. RNDr. Marián Reiffers, DrSc. (Prešovská univerzita v Prešove)	
RNDr. Pavol Farkašovský, CSc. (všeobecná fyzika a matematická fyzika)	Prof. RNDr. Marián Reiffers, DrSc. (Fakulta humanitných a prírodných vied PU)	
Doc. RNDr. Michal Hnatič, DrSc. (jadrová a subjadrová fyzika)	Prof. RNDr. Peter Samuely, DrSc. (Univerzita Pavla Jozefa Šafárika v Košiciach)	
Doc. RNDr. Michal Hnatič, DrSc. (všeobecná fyzika a matematická fyzika)	Prof. RNDr. Peter Samuely, DrSc. (Fakulta matematiky, fyziky a informatiky UK)	
Doc. RNDr. Peter Kopčanský, CSc. (fyzika kondenzovaných látok a akustika)	Prof. RNDr. Peter Samuely, DrSc. (Technická univerzita v Košiciach)	
Doc. RNDr. Peter Kopčanský, CSc. (všeobecná fyzika a matematická fyzika)		
Prof. Ing. Karel Kudela, DrSc. (jadrová a subjadrová fyzika)		
Prof. RNDr. Marián Reiffers, DrSc. (všeobecná fyzika a matematická fyzika)		
Prof. RNDr. Peter Samuely,		

DrSc. (fyzika kondenzovaných látok a akustika)		
RNDr. Marián Sedlák, DrSc. (mineralurgia)		
RNDr. Marián Slivka, CSc. (jadrová a subjadrová fyzika)		
RNDr. Milan Stehlík, DrSc. (jadrová a subjadrová fyzika)		
RNDr. Ladislav Šándor, CSc. (jadrová a subjadrová fyzika)		
RNDr. Ivan Škorvánek, CSc. (fyzika kondenzovaných látok a akustika)		
Doc. Ing. Zoltán Tomori, CSc. (kybernetika)		

3.5. Údaje o pedagogickej činnosti

Tabuľka 3f Prednášky a cvičenia vedené v roku 2012

PEDAGOGICKÁ ČINNOSŤ	**Prednášky**		**Cvičenia a semináre**	
	doma	**v zahraničí**	**doma**	**v zahraničí**
Počet prednášateľov alebo vedúcich cvičení	9	0	1	0
Celkový počet hodín v r. 2012	213	0	78	0

Prehľad prednášateľov predmetov a vedúcich cvičení, s uvedením názvu predmetu, úväzku, katedry, fakulty, univerzity/vysokej školy je uvedený v Prílohe D.

Tabuľka 3g Aktivity pracovníkov na VŠ

1.	**Počet pracovníkov, ktorí pôsobili ako vedúci alebo konzultanti diplomových a bakalárskych prác**	13
2.	**Počet vedených alebo konzultovaných diplomových a bakalárskych prác**	17
3.	**Počet pracovníkov, ktorí pôsobili ako školitelia doktorandov (PhD.)**	11
4.	**Počet školených doktorandov (aj pre iné inštitúcie)**	18
5.	**Počet oponovaných dizertačných a habilitačných prác**	4
6.	**Počet pracovníkov, ktorí oponovali dizertačné a habilitačné práce**	4
7.	**Počet pracovníkov, ktorí pôsobili ako členovia komisií pre obhajoby DrSc. prác**	0
8.	**Počet pracovníkov, ktorí pôsobili ako členovia komisií pre obhajoby PhD. prác**	7
9.	**Počet pracovníkov, ktorí pôsobili ako členovia komisií, resp. oponenti v inauguračnom alebo habilitačnom konaní na vysokých školách**	2

3.6. Iné dôležité informácie k pedagogickej činnosti
3.6.1. Vedenie doktorandských prác na iných pracoviskách

1. Školiteľ: prof. Ing. Marián Antalík, DrSc.
Pracovisko: PF UPJŠ
Študijný program: Odbor biochémia, interná forma
Meno a priezvisko doktoranda: Mgr. Jozef Parnica
Názov dizertačnej práce: Iónové kvapaliny a ich vplyv na vlastnosti protínov

2. Školiteľ: prof. Ing. Marián Antalík, DrSc.
Pracovisko: PF UPJŠ
Študijný program: Odbor biochémia, interná forma
Meno a priezvisko doktoranda: Ing. Peter Keša
Názov dizertačnej práce: Interakcie biomolekúl s kvapalnými kryštálmi

3. Školiteľ: prof. Ing. Marián Antalík, DrSc.
Pracovisko: PF UPJŠ
Študijný program: Odbor biochémia, interná forma
Meno a priezvisko doktoranda: Mgr. Júlia Kudláčová
Názov dizertačnej práce: Supramolekulárne komplexy biomakromolekúl

4. Školiteľ: prof. Ing. Marián Antalík, DrSc.
Pracovisko: PF UPJŠ
Študijný program: Odbor biochémia, interná forma
Meno a priezvisko doktoranda: Mgr.Lucia Cibuľová
Názov dizertačnej práce: Konformačná stabilita proteínov

5. Školiteľ: doc. Ing. Zoltán Tomori, CSc.
Pracovisko: Univerzita P.J.Šafárika, PF, Ústav informatiky
Študijný program: Informatika, interná
Meno a priezvisko doktoranda: Ing. Radoslav Gargalík
Názov dizertačnej práce: Segmentácia 3D obrazov

6. Školiteľ: prof. Ing. Karel Kudela, DrSc.
Pracovisko: ÚFV Prírodovedecká fakulta UPJŠ
Študijný program: 4.1.5 Jadrová a subjadrová fyzika (III. St., interná forma)
Meno a priezvisko doktoranda: Mgr. Igor Parnahaj
Názov dizertačnej práce: Kvázi-periodické variácie kozmického žiarenia.

7. Školiteľ: prof. Ing. Karel Kudela, DrSc.
Pracovisko: ÚFV Prírodovedecká fakulta UPJŠ
Študijný program: 4.1.5 Jadrová a subjadrová fyzika (III. St. externá forma)
Meno a priezvisko doktoranda: Mgr. Mária Kancírová
Názov dizertačnej práce: Kozmické žiarenie: možné vplyvy na stav atmosféry.

8. Školiteľ: RNDr. Pavol Bobík, PhD.
Pracovisko: Katedra jadrovej fyziky a subjadrovej fyziky PF UPJŠ
Študijný program: Jednoodborové štúdium, doktorandské III. st., denná forma, od: 03.09.2012
Meno a priezvisko doktoranda: Ing. Lukáš Gombár
Názov dizertačnej práce: Štúdium kozmického žiarenia ultravysokých energií – JEM-EUSO experiment.

9. Školiteľ: RNDr. Zuzana Gažová, CSc.
Pracovisko: PF UPJŠ
Študijný program: Biochémia - interná
Meno a priezvisko doktoranda: Zuzana Bednáriková
Názov dizertačnej práce: Inhibítory amyloidnej agregácie proteínov

10. Školiteľ: RNDr. Zuzana Gažová, CSc.
Pracovisko: PF UPJŠ
Študijný program: Biochémia - interná
Meno a priezvisko doktoranda: Katarína Šipošová
Názov dizertačnej práce: Amyloidná agregácia proteínov

11. Školiteľ: RNDr. Ján Nemčík, CSc.
Pracovisko: KF FJFI ČVUT, Praha
Študijný program: Jadrová a subjadrová fyzika
Meno a priezvisko doktoranda: Ing. Ján Čepila
Názov dizertačnej práce: Kvantové koherenční efekty v proton (deuteron)-jaderných srážkách

12. Školiteľ: RNDr. Ján Nemčík, CSc.
Pracovisko: KF FJFI ČVUT, Praha
Študijný program: Jadrová a subjadrová fyzika
Meno a priezvisko doktoranda: Ing. Michal Křelina
Názov dizertačnej práce: Studium produkce hadronů s velkým pT v interakcích na nukleonových a jaderných terčících.

4. Medzinárodná vedecká spolupráca

4.1. Medzinárodné vedecké podujatia

4.1.1. Medzinárodné vedecké podujatia, ktoré organizácia SAV organizovala v roku 2012 alebo sa na ich organizácii podieľala, s vyhodnotením vedeckého a spoločenského prínosu podujatia

Microkelvin 2012, Kongresové centrum SAV Smolenice, 90 účastníkov, 19.03.-24.03.2012
Microkelvin 2012 - 19.3.2012- 24.3.2012 bola vedecká konferencia spojená s hodnotiacim seminárom za účasti projektovej manažerky EK Marie Douka, ako aj dvoch externých posudzovateľov. Cieľom konferencie bola prezentácia vedeckých výsledkov a vedecký odpočet plánovaných cieľov projektu Microklevin celým konzorciom projektu.

Rozhovory o aktuálnych otázkach röntgenovej a neutrónovej štruktúrnej analýzy, Košice, 25 účastníkov, 29.03.-29.03.2012
Medzinárodný seminár sa konal 29. 3. 2012 v Košiciach a zúčastnilo sa ho viac ako 25 odborníkov z oblasti štúdia kryštálovej štruktúry difrakčnými metódami z viacerých európskych krajín . V rámci seminára odznelo 12 prednášok na ktorých účastníci prezentovali prehľad aktuálneho stavu vo viacerých vedných oblastiach využívajúcich difrakčné metódy, ako aj niektoré najnovšie poznatky z oblasti základného výskumu a ich aplikácie v praxi .

HADRON STRUCTURE '12, Tatranské Matliare, Tatranské Matliare, 40 účastníkov, 30.06.-04.07.2012
Medzinárodná konferencia bola organizovaná slovenskými vedeckými inštitútmi (ÚEF SAV, FÚ SAV, UK Bratislava, UPJŠ) v spolupráci s Ruskou akadémiou vied.

Precision Physics and Fundamental Physical Constants , Stará Lesná, hotel ACADEMIA, 40 účastníkov, 10.09.-14.09.2012
Tradičná konferencia, prvýkrát organizovaná na Slovensku, ktorá sa zaoberá presnosťou dosiahnutou v súčasnosti pri experimetálnom meraní a teoretických vypočtoch základných fyzikálnych konštánt.

Physics in Collision 2012, hotel Patria, Štrbské Pleso, Slovensko, 110 účastníkov, 12.09.-15.09.2012
Jedná sa o jednu zo svetových medzinárodných konferencií z fyziky vysokých energií. Typické pre túto konferenciu je to, že je hneď po letných HEP
konferenciách, pokytuje obvykle review prednášky,
dáva však aj priestor pre prezentáciu mladých fyzikov vo forme posterov.

Fyzika materiálov, TUKE Košice, 60 účastníkov, 17.10.-19.10.2012
Pravidelná konferencia zameraná na fyzikálny výskum tradičných a nových materiálov.Členovia org. výboru z ÚEF SAV: K. Flachbart, P. Kopčanský, P. Samuely

4.1.2. Medzinárodné vedecké podujatia, ktoré usporiada organizácia SAV v roku 2013 (anglický a slovenský názov podujatia, miesto a termín konania, meno, telefónne číslo a e-mail zodpovedného pracovníka)

Czech and Slovak Conference on Magnetism/CSMAG 13, Česká a slovenská konferencia o magnetizme, Košice, 17.06.-21.06.2013, (Ivan Škorvánek, 055/7922235, skorvi@saske.sk)
Cieľom pravidelnej v poradí už 15. konferencie bude ponúknuť príležitosť pre slovenských a českých vedeckých pracovníkov a hostí z mnohých ďalších krajín, ktorí pracujú v oblasti

základného a aplikovaného magnetizmu, prezentovať svoje posledné výsledky a vymieňať si idey a technické informácie.

STM2013 - Small Triangle meeting on Theoretical Physics , Stará Lesná/STM2013 - Small Triangle meeting on Theoretical Physics , Stará Lesná, Stará Lesná, 09.09.-12.09.2013, (Michal Hnatič, 055/7922226, hnatic@saske.sk)
Od 1998 roku organizuje ÚEF. Prednášky orientované na problematiku z oblasti atomóvej fyziky, komplexných systémov, nano-fyziky, fyziky vysokých energií.

Štruktúra a stabilita biomakromolekúl SSB 2013, Košice, 09.09.-13.09.2013 (Zuzana Gažová, 055/7204135, gazova@saske.sk)
Medzinárodná konferencia SSB je pravidelná konferencia, usporiadaná ÚEF SAV a PF UPJŠ v Košiciach. Tematické okruhy konferencie: štruktúra, stabilita a agregácia biomakromolekúl, viazanie ligandov a identifikácia rôznych liečiv, matematické modelovanie optických a fyzikálno-chemických metód pri štúdiu a aplikácii biomakromolekúl v biomedicíne a v bio-nanotechnológiách.

4.1.3. Počet pracovníkov v programových a organizačných výboroch medzinárodných konferencií

Tabuľka 4a Programové a organizačné výbory medzinárodných konferencií

Typ výboru	Programový	Organizačný	Programový i organizačný
Počet členstiev	4	4	2

4.2. Členstvo a funkcie v medzinárodných orgánoch

4.2.1. Členstvo a funkcie v medzinárodných vedeckých spoločnostiach, úniách a národných komitétoch SR

Doc. RNDr. Dušan Bruncko, CSc.

Člen Rady Centra časticové fyziky, Praha (funkcia: člen)
Kolaboračná rada experimentu ATLAS v CERN (funkcia: člen)

Doc. RNDr. Karol Flachbart, DrSc.

Americká fyzikálna spoločnosť (funkcia: člen)
Nemecká fyzikálna spoločnosť (funkcia: člen)

RNDr. Viktor Kavečanský, CSc.

Kryštalografická spločnosť (funkcia: člen)

Prof. Ing. Karel Kudela, DrSc.

COSPAR (funkcia: predseda NK)
International Academy of Astronautics (funkcia: člen zvolený)
URSI (funkcia: člen NK)

RNDr. Ján Nemčík, CSc.

Centrum pre fyziku relativistických jadrových zrážok (CFRJS) FJFI ČVUT Praha (funkcia:

vedecký garant)

Prof. RNDr. Marián Reiffers, DrSc.

„Fellow“ – Institute of physics (funkcia: člen panelov pre prijímanie nových „fellow“)
Európska fyzikálna spoločnosť (funkcia: individuálny člen)
Rada Európskej fyzikálnej spoločnosti (funkcia: člen)

Prof. RNDr. Peter Samuely, DrSc.

Academia Europaea Scientiarum et Artium, Salzburg (funkcia: riadny člen)
APS (funkcia: člen)

RNDr. Marián Sedlák, DrSc.

American Chemical Society (funkcia: člen)
American Physical Society (funkcia: člen)

RNDr. Marián Slivka, CSc.

SCOSTEP (funkcia: člen NK)

RNDr. Ladislav Šándor, CSc.

Kolaboračná rada experimentu ALICE v CERNe (funkcia: člen)

RNDr. Ivan Škorvánek, CSc.

American Assoc. for Advancement of Science (funkcia: člen)
Humboldtov klub v SR (funkcia: podpredseda)
International Advisory Committee for Soft Magnetic Materials (funkcia: člen)
Magnetism Committee TMS Society USA (funkcia: člen)

Doc. Ing. Zoltán Tomori, CSc.

IEEE - Computer Society (funkcia: affiliat.)

4.3. Účasť expertov na hodnotení medzinárodných projektov (EÚ RP, ESF a iných)

Tabuľka 4b Experti hodnotiaci medzinárodné projekty

Meno pracovníka	Typ programu/projektu/výzvy	Počet hodnotených projektov
Bruncko Dušan	projekt INGO LA08047 a INGO LG12006, oponent	2
	Projekt LA08032, oponent	1
	Projekt LA08047, zaverecna oponentura, oponent	1
	Projekt LC527 MŠMT. oponent, člen Rady centra částicové fyziky LC527	1
	Projekt LG12006, oponent	1
	Projekt LG13009, oponent	1
	Projekt LG13031, oponent	1
	Projekt LG13043, oponent	1
	Projekt MŠMT Spolupráce ČR s CERN, INGO, člen oponentnej rady	1
	Záverečná oponentúra projektu LC527, člen Oponentnej komisie	1
Gažová Zuzana	Vietnam National University's Information Technology	1
Kudela Karel	ESF project	1
Šándor Ladislav	Program spolupráce ČR s CERN (projekt INGO)	1

4.4. Najvýznamnejšie prínosy MVTS ústavu vyplývajúce z mobility a riešenia medzinárodných projektov a iné informácie k medzinárodnej vedeckej spolupráci

Ústav experimentálnej fyziky SAV v Košiciach participuje v značnom počte významných medzinárodných vedecko-výskumných kolaborácií, či už sa jedná o odbor jadrovej a subjadrovej fyziky, kozmickej fyziky alebo široké spektrum odborov fyziky pevných látok až po biofyziku. Ako príklad je možné uviesť:

- v oblasti pevných látok spoluprácu s laboratóriami CNRS v Grenobli, University of Lancaster, UAM Madrid, s ústavmi Poľskej akedémie vied, Českej akadémie vied a Maďarskej akadémie vied
- v jadrovej a subjadrovej fyzike príspevok do experimentov ATLAS a ALICE na urýchľovači LHC v CERNe
- v kozmickej fyzike kolaboráciu JEM-EUSO
- v biofyzike spoluprácu s Health Science Center, San Antonio v USA a CNR v Bologni v Taliansku.

Prehľad údajov o medzinárodnej mobilite pracovníkov organizácie je uvedený v Prílohe E.
Prehľad a údaje o medzinárodných projektoch sú uvedené v kapitole 2 a Prílohe B.

5. Vedná politika

Ústav experimentálnej fyziky SAV v Košiciach patrí medzi najúspešnejšie ústavy v získavaní prostriedkov zo Štrukturálnych fondov EÚ v rámci SAV. Štrukturálne fondy EÚ predstavujú síce veľmi významný, ale časovo limitovaný zdroj prostriedkov významného skvalitnenia prístrojovej základne, a už vôbec neposkytujú prostriedky na ich prevádzku, údržbu a ďalší rozvoj. Z tohto dôvodu je nevyhnutné aby Agentúra na podporu výskumu a vývoja pravidelne a v dostatočnom objeme prostriedkov plnila svoju funkciu hlavného zdroja financovania trvalého a udržateľného rozvoja vedy a výskumu na Slovensku. Súčasne by bolo dobré, keby sa zvýšili možnosti zamestnávania post-docov cez podporný fond Štefana Schwarza.

6. Spolupráca s univerzitami/vysokými školami, štátnymi a neziskovými inštitúciami okrem aktivít uvedených v kap. 2, 3, 4

6.1. Spolupráca s univerzitami/VŠ (fakultami)

Názov univerzity/vysokej školy a fakulty: Prírodovedecká fakulta UPJŠ
Druh spolupráce (spoločné pracovisko alebo iné): Centrum excelentnosti SAV - Centrum fyziky veľmi nízkych teplôt a materiálového výskumu v extrémnych podmienkach
Začiatok spolupráce: 2011
Zameranie: materiálový výskum pri externých podmienkach
Zhodnotenie: Spoločné výskumné centrum excelentnosti SAV spolu s PF UPJŠ, ÚMV SAV a ÚGt SAV

Názov univerzity/vysokej školy a fakulty: Prírodovedecká fakulta UPJŠ
Druh spolupráce (spoločné pracovisko alebo iné): Spoločné pracovisko
Začiatok spolupráce: 1969
Zameranie: Fyzika veľmi nízkych teplôt
Zhodnotenie: Centrum fyziky veľmi nízkych teplôt Košice je spoločné pracovisko ÚEF SAV a UPJŠ, ktoré je tiež Centrom excelentnosti SAV a UPJŠ, ktoré umožňuje spoločné využívanie experimentálnej techniky.

Názov univerzity/vysokej školy a fakulty: Prírodovedecká fakulta UPJŠ
Druh spolupráce (spoločné pracovisko alebo iné): Spoločné projekty a využívanie experimentálnej techniky
Začiatok spolupráce: 1999
Zameranie: Fyzika tuhých látok
Zhodnotenie: Dlhodobá spolupráca v oblasti štúdia mikroštruktúry a magnetických vlastností nanokryštalických kompozitných materiálov a systémov magnetických nanočastíc.

Názov univerzity/vysokej školy a fakulty: Fakulta elektrotechniky a informatiky TUKE
Druh spolupráce (spoločné pracovisko alebo iné): Spoločné využívanie experimentálnej aparatúry
Začiatok spolupráce: 2008
Zameranie: analýza obrazu
Zhodnotenie: Spoločný projekt APVV - Fakulta elektrotechniky a informatiky TUKE a Prírodovedecká fakulta UPJŠ sú spoluriešitelia.

Názov univerzity/vysokej školy a fakulty: Hutnícka fakulta TUKE
Druh spolupráce (spoločné pracovisko alebo iné): Spoločné využívanie experimentálnej techniky
Začiatok spolupráce: 1969
Zameranie: Materiálová fyzika
Zhodnotenie: Spolu s Ústavom materiálového výskumu SAV v Košiciach spoločné využívanie experimentálnej techniky.

6.2. Významné aplikácie výsledkov výskumu v spoločenskej praxi alebo vyriešenie problému pre štátnu alebo neziskovú inštitúciu

Zadávateľ, odberateľ, zmluvný partner: EDIS v.v.d.
Názov aplikácie/objekt výskumu: Výskum a vývoj magnetických senzorových systémov vyhľadávania a indikácie feromagnetických a vodivých telies a bezkontaktných snímačov vnútorných pnutí v kompozitných materiáloch.
Začiatok spolupráce: 2010
Stručný opis aplikácie/výsledku: V rámci projektov aplikovaného výskumu APVV-0454-07 „Výskum a vývoj magnetických senzorových systémov vyhľadávania a indikácie feromagnetických a vodivých telies“ (hlavnný riešiteľ Letecká fakulta TUKE, spoluriešiteľ ÚEF SAV, doba riešenia 09/2008 – 12/2010) a APVV –0266–10 „Senzory na báze magnetických mikrodrôtov – SEMAMID“ (hlavnný riešiteľ Letecká fakulta TUKE, spoluriešiteia ÚEF SAV a PF UPJŠ, doba riešenia 07/2011 – 06/2014) bola vyvinutá nová generácia priemyselných senzorových systémov na vyhľadávanie nežiadúcich feromagnetických telies na pásových dopravníkoch kolesových rýpadiel pre povrchovú ťažbu uhlia ako i bezkontaktných snímačov vnútorných pnutí v kompozitných materiáloch. Košická firma EDIS v.v.d. (zmluvný odberateľ výsledkov výskumu) realizoje transfer získaných poznatkov do priemyselnej praxe.
Zhodnotenie (uviesť i finančný efekt z aplikácie v € pre organizáciu SAV):

6.3. Iná činnosť využiteľná pre potreby spoločenskej praxe

7. Spolupráca s aplikačnou a hospodárskou sférou okrem aktivít uvedených v kap. 2, 3, 4

7.1. Spoločné pracoviská s aplikačnou sférou

7.2. Kontraktový – zmluvný výskum (vrátane zahraničných kontraktov)

7.3. Iná činnosť využiteľná pre potreby hospodárskej praxe

8. Aktivity pre Národnú radu SR, vládu SR, ústredné orgány štátnej správy SR a iné organizácie

8.1. Členstvo v poradných zboroch vlády SR, Národnej rady SR, ministerstiev SR, orgánoch EÚ, EP, NATO a pod.

Tabuľka 8a Členstvo v poradných zboroch Národnej rady SR, vlády SR, ministerstiev SR, orgánoch EÚ, EP, NATO a pod.

Meno pracovníka	Názov orgánu	Funkcia
Doc. RNDr. Dušan Bruncko, CSc.	Výbor pre spoluprácu s CERN	člen
Doc. RNDr. Michal Hnatič, DrSc.	Výbor pre spoluprácu SR s SÚJV Dubna	člen
RNDr. Ivan Králik, CSc.	Výbor pre spoluprácu s CERN	člen
Prof. Ing. Karel Kudela, DrSc.	Výbor OSN COPUOS (COmmission for Peaceful Use of Outer Space)	Zástupca SR
	High Level Space Policy GRoup	alternujúci člen
Prof. RNDr. Marián Reiffers, DrSc.	Vedecká rada ILL, Grenoble, Francúzsko	člen
	Komisia pre spoluprácu s XFEL pri MŠ SR	člen
Prof. RNDr. Peter Samuely, DrSc.	Komisia Ministerstva školstva, vedy, výskumu a športu SR pre novelizáciu zákona 172 Zz	člen
	Komisia Ministerstva školstva, vedy, výskumu a športu SR pre spoločné hodnotenie výskumu na vysokých školách a v SAV	člen
	Hodnotiteľská komisia MŠVVaŠ pre zaraďovanie publikácií	člen
	Hodnotiaca komisia pre hodnotenie činnosti organizácií vykonávajúcich výskum a vývoj pri Ministerstve školstva, vedy, výskum a športu SR	člen
RNDr. Ladislav Šándor, CSc.	Výbor pre spoluprácu SR s CERN	podpredseda
	Pracovná skupina Rady CERN pre európsku stratégiu vo fyzike vysokých energií (European Strategy Group)	zástupca SR

8.2. Expertízna činnosť a iné služby pre štátnu správu a samosprávy

8.3. Členstvo v radách štátnych programov a podprogramov ŠPVV a ŠO

Tabuľka 8b Členstvo v radách štátnych programov a podprogramov ŠPVV a ŠO

Meno pracovníka	Názov orgánu	Funkcia
Doc. RNDr. Michal Hnatič, DrSc.	Pracovná skupina APVV pre matematiku, fyziku a informatiku	člen
RNDr. Peter Skyba, CSc.	Pracovná skupina APVV pre matematiku, fyziku a informatiku	člen
RNDr. Ladislav Šándor, CSc.	Rada pre prírodné vedy APVV	člen, podpredseda pracovnej skupiny pre matematiku, fyziku a informatiku

8.4. Prehľad aktuálnych spoločenských problémov, ktoré riešilo pracovisko v spolupráci s Kanceláriou prezidenta SR, s vládnymi a parlamentnými orgánmi alebo pre ich potrebu

9. Vedecko-organizačné a popularizačné aktivity

9.1.Vedecko-popularizačná činnosť

9.1.1. Najvýznamnejšia vedecko-popularizačná činnosť pracovníkov organizácie SAV

Tabuľka 9a Vedecko-popularizačná činnosť pracovníkov organizácie SAV

Meno	Spoluautori	Typ[1]	Názov	Miesto zverejnenia	Dátum alebo počet za rok
Ing. Ján Baláž, PhD.		PB	Kam letí vesmírna sonda ROSETTA ?	Seminár Kozmonautika a raketová technika, Hvezdáreň Valašské Meziříčí	24.11.2012
Ing. Ján Baláž, PhD.		PB	Kvalifikačné environmentálne testy a námety na vedecké experimenty na palube skCUBE	Centrum Vedecko-Technických Informácií SR, Bratislava	11.5.2012
Ing. Ján Baláž, PhD.		PB	Prednáška "Košické výpravy do vesmíru"	Hvezdáreň Medzev	14.11.2012
Ing. Ján Baláž, PhD.	Vladimír Jancura	TL	Interview pre Pravdu: Rosette sa v kozme darí, tvrdí jej košický spolutvorca	Denník Pravda - príloha Víkend, http://dennik.pravda.sk/Pravda.aspx?datum=8.12.2012#32	8.12.2012
Ing. Ján Baláž, PhD.	Vladimír Jancura	IN	Interview pre Pravdu: Rosette sa v kozme darí, tvrdí jej košický spolutvorca	Denník Pravda - webové vydanie, http://spravy.pravda.sk/domace/clanok/252353-rosette-sa-v-kozme-dari-tvrdi-jej-kosicky-spolutvorca/	17.12.2012
Doc. RNDr. Dušan Bruncko, CSc.	-	iné	Konzultant v ramci CASCADE projektu - http://fyzika.uniza.sk/cascade	mal som na starosti dve skupiny stredoskolskych studentov	3.4.2012
Doc. RNDr. Dušan Bruncko, CSc.	-	TL	Prečo má hmota navrch	SME, 8.1.2012	8.1.2012
Doc. RNDr. Dušan Bruncko, CSc.	-	TL	Topky.sk - interview	http://www.topky.sk/cl/10/1315911/Slovensky-vedec-z-CERNu-prezradil--Hladame-nove-dimenzie-	6.7.2012
Doc. RNDr. Dušan Bruncko, CSc.	-	TL	Topky.sk - interview	http://www.topky.sk/cl/11/1316098/Slovaci-prispeli-k-vedeckemu-uspechu--Sme-blizsie-k-pochopeniu-vesmiru	5.7.2012
Doc. RNDr. Dušan Bruncko, CSc.	J. Antos	TL	http://vat.pravda.sk/zem/clanok/63376-uz-sa-pripravuje-fabrika-na-vyrobu-higgsov/	dennik Pravda	6.7.2012
Doc. RNDr. Dušan Bruncko, CSc.	J. Antos, E. Kladiva	iné	http://www.sav.sk/index.php?lang=sk&charse	Aktuality SAV	5.7.2012

			t=&doc=services-news&source_no=20&news_no=454		
RNDr. Slavomír Gabáni, PhD.		EX	Deň otvorených dverí	ÚEF SAV	8.11.2012
RNDr. Slavomír Gabáni, PhD.		PB	Fyzika nízkych teplôt, supravodivosť.	Plejsy	13.7.2012
RNDr. Slavomír Gabáni, PhD.		iné	Fyzika vákua	Optima Košice	28.9.2012
RNDr. Slavomír Gabáni, PhD.		PB	Fyzika vákua	ZŠ v Spišskom Podhradí	24.2.2012
Ing. Emil Gažo		iné	Festival vedy - Noc výskumníkov 2012	OC Optima Košice	28.9.2012
RNDr. Zuzana Gažová, CSc.		iné	Noc výskumníka	www.nocvyskumnika.sk	28.9.2012
RNDr. Jozef Kačmarčík, PhD		PB	E ako Experiment - experimenty pri nízkych teplotách	Liečebno-výchovné sanatórium, Košice-Barca	23.10.2012
RNDr. Jozef Kačmarčík, PhD		PB	Noc výskumníkov	OC Optima, Košice	18.9.2012
RNDr. Jozef Kačmarčík, PhD		PB	Popularizačná prednáška "Supravodivosť"	Cirkevné gymnázium sv. Miluláša, Stará Ľubovňa	27.1.2012
RNDr. Jozef Kačmarčík, PhD		PB	Popularizačná prednáška "Supravodivosť"	Gymnázium Terézie Vansovej, Stará Ľubovňa	27.1.2012
RNDr. Jozef Kačmarčík, PhD		PB	Popularizačná prednáška na tému "Fantastický svet vákua"	Cirkevná stredná odborná škola sv. Jozafáta, Trebišov	29.10.2012
RNDr. Eduard Kladiva, CSc.		IN	Článok na blogu: „Slovenský prezident v špičkovom výskumnom centre“	http://kladiva.blog.sme.sk/c/307848/Slovensky-prezident-v-spickovom-vyskumnom-centre.html	12.9.2012
RNDr. Eduard Kladiva, CSc.		IN	Článok na blogu: Objavili v CERNe Higgsov bozón alebo neobjavili?	http://kladiva.blog.sme.sk/c/302732/Objavili-v-CERNe-Higgsov-bozon-alebo-neobjavili.html	4.7.2012
RNDr. Eduard Kladiva, CSc.		IN	Mikrokozmos na Facebook, informácie z jadrovej a subjadrovej fyziky	http://www.facebook.com/Mikrokozmos	1.1.2012
RNDr. Eduard Kladiva, CSc.	A. Dirner, I. Kimák	iné	výstava „Slovenská cesta do mikrokozmu“ v zmenšenej verzii, marec – november 2012	Prírodovedecká fakulta UPJŠ, Košice	15.3.2012
RNDr. Eduard Kladiva, CSc.	A. Dirner, I. Kimák	iné	výstava „Slovenská cesta do mikrokozmu“, december 2012	Gymnázium Poprad	1.12.2012
RNDr. Eduard Kladiva, CSc.	J. Antoš	TL	2 články v Správy SAV: : "Krok do novej subjadrovej fyziky"	Správy SAV č. 8/2012 a č. 9/2012	31.8.2012
RNDr. Eduard	J. Antoš	IN	článok v Aktuality		16.9.2012

Kladiva, CSc.			SAV „Physics in Collision 2012“	http://www.sav.sk/index.php?lang=sk&charset=&doc=services-news&source_no=20&news_no=4603, Správy SAV 9/2012	
RNDr. Eduard Kladiva, CSc.	J. Antoš	IN	Článok v Aktuality SAV, Slovenskí fyzici prispievajú k najnovším vedeckým výsledkom	http://www.sav.sk/index.php?lang=sk&charset=&doc=services-news&source_no=20&news_no=4545	4.7.2012
RNDr. Ivan Králik, CSc.		PB	LHC 2008-2012: Urýchľovače, detektory, Štandardný Model	Regional Masterclasses, Gymnázium P.J. Šafárika, Rožňava	24.10.2012
RNDr. Ivan Králik, CSc.		PB	Našli, alebo nenašli? 15 minút slávy	Masterclasses, PF UPJŠ Košice	15.3.2012
RNDr. Ivan Králik, CSc.	Matúš Veselý	TL	Naučil ľudí kontrolovať rádioaktivitu	QUARK, 9/2012, str. 16	1.9.2012
Prof. Ing. Karel Kudela, DrSc.		PB	Storočnica objavu kozmického žiarenia a aktivity v Tatrách a v Košiciach (angl), pozvaná prednáška na podujatí UTU – Unlocking the Universe,	Hurbanovo	4.10.2012
Prof. Ing. Karel Kudela, DrSc.		PB	Storočnica objavu kozmického žiarenia a aktivity v Tatrách a v Košiciach, pozvaná prednáška	UMB Banská Bystrica	9.11.2012
Prof. Ing. Karel Kudela, DrSc.	Ronald Langer	iné	Akcie ku 30. výročiu meraní na Lomnickom štíte neutronovým monitorom, napr. tlačová beseda 7.3.2012 na L. štíte, spolu s Ronaldom Langerom	stv, ta3, korzar a iné	7.3.2012
Ing. Zuzana Mitróová, PhD		iné	Festival vedy - Noc výskumníkov 2012	OC Optima Košice	28.9.2012
RNDr. Zuzana Pribulová, PhD		iné	Noc výskumníka 2012	OC Optima Košice	28.9.2012
RNDr. Zuzana Pribulová, PhD	Slavomír Gabáni	PB	Popularizačná prednáška pre žiakov základnej školy v Spišskom Podhradí	Spišské Podhradie	24.2.2012
Prof. RNDr. Peter Samuely, DrSc.		RO	Hosť Panorámy, univerzita 3. veku	radio Regina KE SRo	6.10.2012
Prof. RNDr. Peter Samuely, DrSc.		RO	Leto vedca - fyzik, prof. Peter Samuely	radio Regina KE SRo	28.8.2012
Prof. RNDr. Peter Samuely, DrSc.		PB	Noc výskumníka	Optima Košice, otvorenie podujatia	28.9.2012
Prof. RNDr. Peter Samuely, DrSc.	J. Dusza, P. Baláž, P. Diko	DO	Nanoveda a nanotechnológie	STV Spektrum vedy	13.11.2012
Prof. RNDr. Peter	P. Szabó, J.	DO	Portret vedcov	STV	30.12.2012

Samuely, DrSc.	Kačmarčík, Z. Pribulová, M. Trusík				
RNDr. Pavol Stríženec, CSc.	prof. Branislav Sitar CSc	RO	Ziva beseda v SRO vysielani "Nocna pyramida" o objave Higgsovho bozonu	SRO 1	8.7.2012
RNDr. Pavol Stríženec, CSc.	RNDr. Tibor Zenis PhD	TV	Ziva beseda vo vysielani TA3 o objave Higgsovho bozonu	Televizia TA3	4.7.2012
Mgr. Pavol Szabó, CSc.		iné	Člen realizačného tímu Steel Park - Creative Factory, koordinátor za SAV	Steel Park - Creative Factory, Košice	2012
Mgr. Pavol Szabó, CSc.		PB	Deň vedy na ZŠ Š. Máraiho - zábavné experimenty z fyziky	ZŠ Š. Máraiaho	24.6.2012
Mgr. Pavol Szabó, CSc.		PB	Fyzika v blízkosti absolútnej nuly	Letná škola učiteľov, SOŠ internáty, Grešákova 1	24.7.2012
Mgr. Pavol Szabó, CSc.		iné	Hlavný koordinátor Noci výskumníkov v Košiciach	OC Optima, Košice	28.9.2012
Mgr. Pavol Szabó, CSc.		iné	Hodiny vedy v Cinemaxe - organizátor 10 vedecko-popularizačných prednášok v rámci Noci výskumníkov v Košiciach	Cinemax, OC Optima, Košice	28.9.2012
Mgr. Pavol Szabó, CSc.		iné	Koordinátor Dňa otvorených dverí na ÚEF SAV	ÚEF SAV	8.11.2012
Mgr. Pavol Szabó, CSc.		RO	Noc výskumníkov v Košiciach - rozhovor pre Rádio Pátria	Rádio Pátria	30.9.2012
Mgr. Pavol Szabó, CSc.		TV	Noc výskumníkov v Košiciach - rozhovor pre TV Region	TV Region	28.9.2012
Mgr. Pavol Szabó, CSc.		TL	Rozhovor pre magazín Kassai Kaleidoskóp: A tudomány muvészete (Umenie vedy)	Kassai Kaleidoszkóp	2012
Mgr. Pavol Szabó, CSc.		TL	Rozhovor pre MTI (Maďarská tlačová agentúra) o cene Maďarskej akadémie vied (MTA): Arany János díj	Rôzne internetové portály v Maďarsku a na Slovensku, denník Új Szó	2012
Mgr. Pavol Szabó, CSc.		TV	Rozhovor pre Národnostný magazín STV o cene Maďarskej akadémie vied (MTA): Arany János díj	STV, hirek.sk	2012
Mgr. Pavol Szabó, CSc.		RO	Rozhovor pre rádio Lánchíd (Budapest, Maďarsko) o vede na Slovensku (20 min.)	Lánchíd rádió, Budapest, Maďarsko	2012

Mgr. Pavol Szabó, CSc.		RO	Rozhovor pre rádio Pátria (program Kaleidoskop) o cene Maďarskej akadémie vied (MTA): Arany János díj	Rádio Pátria	2012
Mgr. Pavol Szabó, CSc.		TV	Vidieť neviditeľné - účastník dokumentárneho filmu v rámci cyklu Spektrum vedy	STV 2, Spektrum vedy	2012
Mgr. Pavol Szabó, CSc.		TV	Živý rozhovor pre TV Naša: Deň otvorených dverí na ÚEF SAV	TV Naša	6.11.2012
Mgr. Pavol Szabó, CSc.		TV	Živý rozhovor pre TV Naša: Noc výskumníkov v Košiciach	TV Naša	25.9.2012
RNDr. Ladislav Šándor, CSc.		RO	Beseda o fyzike v CERN a letnom relaxe	Magazín rádia Regina Košice	19.7.2012
RNDr. Ladislav Šándor, CSc.		PB	prednáška - Česi a Slováci v CERN	Československý spolek "Domov", Basel, Švajčiarsko	12.10.2012
Doc. Ing. Zoltán Tomori, CSc.	Ing. Erna Demjén, PhD	PB	Noc výskumníka	OC Optima	28.9.2012
RNDr. Mária Zentková, CSc.		iné	Workshop k vydaniu knihy Bádateľské aktivity vo vyučovaní informatiky	PF UPJŠ Košice	7.12.2012
RNDr. Mária Zentková, CSc.		iné	Workshop pre učiteľov 1.stupňa ZŠ ku knihe Zásobník pokusov z Pastelkovej fyziky	ZŠ Trebišovská 10 Košice	8.12.2012
RNDr. Mária Zentková, CSc.	Marian Mihalik, Martin Vavra, Marek Antoňák, Janka Lazurová	iné	Študentská vedecká konferencia - Rozlúčka so SUSY	Košice	18.12.2012
RNDr. Mária Zentková, CSc.	Marian Mihalik, Slavomír Gabani	PB	SUSY na Letnom futbalovom kempe	Plejsy	12.7.2012
RNDr. Pavol Bobík, PhD		iné	Den otvorených dverí ÚEF SAV	Košice - Watsonova	8.11.2012
RNDr. Pavol Bobík, PhD		iné	Noc výskumníka 2012	Kosice - Optima	25.9.2012
RNDr. Blahoslav Pastirčák, CSc.		iné	Den otvorenych dveri	Kosice UEF SAV Watsonova 47	8.11.2012
RNDr. Blahoslav Pastirčák, CSc.		iné	Noc vyskumnika	Kosice Optima	25.9.2012
RNDr. Marián Putiš, PhD.		iné	Deň otvorených dverí UEF SAV	Košice Watsonova 47	8.11.2012
RNDr. Mária Zentková, CSc.	Matúš Mihalik, Janka Lazurova, Marian Mihalik	iné	Creative factory- konštrukcia exponátov z magnetizmu	Košice	2012

[1] *PB - prednáška/beseda, TL - tlač, TV - televízia, RO - rozhlas, IN - internet, EX - exkurzia, PU - publikácia, MM - multimédiá, DO - dokumentárny film*

9.1.2. Súhrnné počty vedecko-popularizačných činností organizácie SAV

Tabuľka 9b Súhrnné počty vedecko-popularizačných činností organizácie SAV

Typ	Počet	Typ	Počet	Typ	Počet
prednášky/besedy	21	tlač	9	TV	6
Rozhlas	7	internet	6	exkurzie	4
Publikácie	0	multimediálne nosiče	0	dokumentárne filmy	2
Iné	17				

9.2. Vedecko-organizačná činnosť

Tabuľka 9c Vedecko-organizačná činnosť

Názov podujatia	Domáca/ medzinárodná	Miesto	Dátum konania	Počet účastníkov
19. konferencia slovenských fyzikov	domáca	Fakulta humanitných a prírodných vied, Prešovská Univerzita, Prešov	03.09.-06.09.2012	80
STM2012 - Small Triangle meeting on Theoretical Physics , Stará Lesná	domáca	Stará Lesná	09.09.-12.09.2012	25
Microkelvin 2012	medzinárodná	Kongresové centrum SAV Smolenice	19.03.-24.03.2012	90
Rozhovory o aktuálnych otázkach röntgenovej a neutrónovej štruktúrnej analýzy	medzinárodná	Košice	29.03.-29.03.2012	25
HADRON STRUCTURE '12, Tatranské Matliare	medzinárodná	Tatranské Matliare	30.06.-04.07.2012	40
Precision Physics and Fundamental Physical Constants	medzinárodná	Stará Lesná, hotel ACADEMIA	10.09.-14.09.2012	40
Physics in Collision 2012	medzinárodná	hotel Patria, Štrbské Pleso, Slovensko	12.09.-15.09.2012	110
Fyzika materiálov	medzinárodná	TUKE Košice	17.10.-19.10.2012	60

9.3. Účasť na výstavách

9.4. Účasť v programových a organizačných výboroch národných konferencií

Tabuľka 9d Programové a organizačné výbory národných konferencií

Typ výboru	Programový	Organizačný	Programový i organizačný
Počet členstiev	1	1	0

9.5. Členstvo v redakčných radách časopisov

Prof. Ing. Marián Antalík, DrSc.

Chemical papers (funkcia: člen)

Ing. Pavel Diko, DrSc.

ISRN Condensed Matter Physics (funkcia: Editorial board)

Doc. RNDr. Karol Flachbart, DrSc.

Acta Electrotechnica et Informatica (funkcia: člen redakčnej rady)

Prof. Ing. Karel Kudela, DrSc.

Advances in Astronomy, Special Issue „Cosmic Ray Variability: Century of Its Observations“ (funkcia: Lead Guest Editor of Special Issue)
Acta Electrotechnica et Informatica (funkcia: člen redakčnej rady)
Acta Universitatis Carolinae (funkcia: člen redakčnej rady)
Dataset Papers in Geosciences, Geophysics (funkcia: člen Editorial Board)
Indian Journal of Radio and Space Physics (funkcia: člen redakčnej rady)
The Open Aerospace Enginnering Journal (funkcia: člen Editorial Advisory Board)
The Scientific World Journal, Geophysics (funkcia: člen Editorial Board)

Prof. RNDr. Peter Samuely, DrSc.

Physica C (funkcia: člen Advisory board)

RNDr. Peter Skyba, CSc.

Acta Physica Slovaca (funkcia: člen)

RNDr. Ivan Škorvánek, CSc.

ISRN Nanotechnology (funkcia: člen editorial board)

9.6. Činnosť v domácich vedeckých spoločnostiach

Prof. Ing. Marián Antalík, DrSc.

Slovenská biofyzikálna spoločnosť (funkcia: člen)
Slovenská spoločnosť pre biochémiu a molekulárnu biológiu (funkcia: člen)

RNDr. Diana Fedunová, PhD.

Slovenská biofyzikálna spoločnosť (funkcia: člen)
Slovenská spoločnosť pre biochémiu a molekulárnu biológiu (funkcia: člen)

RNDr. Slavomír Gabáni, PhD.

Slovenská fyzikálna spoločnosť (funkcia: člen)

RNDr. Zuzana Gažová, CSc.

Slovenská biofyzikálna spoločnosť (funkcia: člen)
Slovenská spoločnosť pre biochémiu a molekulárnu biológiu (funkcia: člen)

Prof. Ing. Karel Kudela, DrSc.

Vedecká rada Astronomického ústavu SAV (funkcia: člen)

RNDr. Jozef Marek, PhD.

Slovenská biofyzikálna spoločnosť (funkcia: člen)

Prof. RNDr. Marián Reiffers, DrSc.

Národný komitét IUPAP (funkcia: člen)
Slovenská fyzikálna spoločnosť (funkcia: predseda)

Prof. RNDr. Peter Samuely, DrSc.

Vedecká rada ÚMV SAV (funkcia: člen)
Vedecká rada Ústavu experimentálnej fyziky SAV (funkcia: člen)

RNDr. Peter Skyba, CSc.

Slovenská fyzikálna spoločnosť (funkcia: člen)

RNDr. Marián Slivka, CSc.

JSMF (funkcia: člen)

RNDr. Ivan Škorvánek, CSc.

Odborná skupina Magnetizmu pri Slovenskej Fyzikálnej Spoločnosti (funkcia: Vedúci)

9.7. Iné dôležité informácie o vedecko-organizačných a popularizačných aktivitách

Deň otvorených dverí ÚEF SAV
V rámci Týždňa vedy a techniky EÚ na Slovensku sa 8. novembra 2012 uskutočnil Deň otvorených dverí Ústavu experimentálnej fyziky SAV s celkovým počtom návštevníkov okolo 400 (dominantne študentov gymnázií a stredných škôl z Košíc a okolia). O akcii informovali aj lokálne médiá.

Noc výskumníkov 2012
V rámci najväčšieho popularizačného podujatia zameraného na vedu a výskum na Slovensku Noc výskumníkov pracovníci ÚEF SAV v Košiciach zorganizovali a koordinovali vedeckú show košických ústavov SAV a miestnych univerzít. Akcia sa uskutočnila dňa 28. septembra 2012 v Obchodnom centre Optima v Košiciach. V rámci Noci výskumníkov v spolupráci so spoločnosťou Cofilm sa realizoval i kolotoč 10 vedecko-popularizačných prednášok v kinosále (pre 80 ľudí) multikina Cinemax.

Projekt interaktívneho vedecko-technologického múzea „Creative factory“
Pokračovali sme v spolupráci s marketingovou divíziou US Steel Košice, s r.o. pri realizácii projektu interaktívneho vedecko-technologického múzea Steel park - Creative Factory. Kreatívny tím ÚEF SAV v spolupráci s popularizátormi vedy z košických akademických pracovísk NbÚ SAV, PF UPJŠ, TU, predstaviteľov USS Košice a EHMK2013 už začal pracovať na realizácii vedeckých exponátov a vedeckých hračiek múzea. Košická veda a najmodernejšie technológie používané v slovenskom priemysle a v spoločnosti US Steel Košice budú prezentované interaktívnou formou v rekonštruovaných priestoroch Kultúrparku. Steel park - Creative Factory, sponzorovaný spoločnosťou US Steel Košice, s.r.o. a mestom Košice bude slávnostne otvorený koncom roku 2013 v rámci akcií Košice - Európske hlavné mesto kultúry 2013.

10. Činnosť knižnično-informačného pracoviska

10.1. Knižničný fond

Tabuľka 10a Knižničný fond

Knižničné jednotky spolu		3090
z toho	knihy a zviazané periodiká	3063
	audiovizuálne dokumenty	0
	elektronické dokumenty (vrátane digitálnych)	5
	mikroformy	0
	iné špeciálne dokumenty - dizertácie, výskumné správy	22
Počet titulov dochádzajúcich periodík		4
z toho zahraničné periodiká		3
Ročný prírastok knižničných jednotiek		40
v tom	kúpou	35
	darom	5
	výmenou	0
	bezodplatným prevodom	0
Úbytky knižničných jednotiek		0
Knižničné jednotky spracované automatizovane		40

10.2. Výpožičky a služby

Tabuľka 10b Výpožičky a služby

Výpožičky spolu		1200
z toho	odborná literatúra pre dospelých	1100
	výpožičky periodík	50
	prezenčné výpožičky	50
MVS iným knižniciam		15
MVS z iných knižníc		80
MMVS iným knižniciam		0
MMVS z iných knižníc		0
Počet vypracovaných bibliografií		0
Počet vypracovaných rešerší		0

10.3. Používatelia

Tabuľka 10c Užívatelia

Registrovaní používatelia	120
Návštevníci knižnice spolu (bez návštevníkov podujatí)	450

10.4. Iné údaje

Tabuľka 10d Iné údaje

On-line katalóg knižnice na internete (1=áno, 0=nie)	2.151,21 €
Náklady na nákup knižničného fondu v €	

10.5. Iné informácie o knižničnej činnosti

11. Aktivity v orgánoch SAV

11.1. Členstvo vo Výbore Snemu SAV

11.2. Členstvo v Predsedníctve SAV a vo Vedeckej rade SAV

Prof. RNDr. Peter Samuely, DrSc.

- člen Predsedníctva
- člen Vedeckej rady SAV

11.3. Členstvo vo vedeckých kolégiách SAV

Prof. Ing. Marián Antalík, DrSc.

- VK SAV pre chemické vedy (Podpredseda kolégia SAV)

Ing. Pavel Diko, DrSc.

- VK SAV pre elektroniku, materiálový výskum a technológie (člen kolégia)

RNDr. Jozef Ferencei, CSc.

- VK SAV pre matematiku, fyziku a informatiku (člen)

Doc. RNDr. Karol Flachbart, DrSc.

- VK SAV pre matematiku, fyziku a informatiku (člen komisie)

RNDr. Zuzana Gažová, CSc.

- VK SAV pre matematiku, fyziku a informatiku (člen)

Doc. RNDr. Peter Kopčanský, CSc.

- VK SAV pre matematiku, fyziku a informatiku (podpredseda kolégia)

Prof. Ing. Karel Kudela, DrSc.

- VK SAV pre vedy o Zemi a vesmíre (člen kolégia)

11.4. Členstvo v komisiách SAV

Doc. RNDr. Karol Flachbart, DrSc.

- Komisia SAV pre zahraničné styky (člen komisie)

Ing. Viktor Kočan

- Komisia SAV pre informačné a komunikačné technológie (člen)

Prof. Ing. Karel Kudela, DrSc.

- Komisia SAV pre vesmírne aktivity (podpredseda)

Prof. RNDr. Peter Samuely, DrSc.

- Akreditačná komisia SAV (predseda komisie)

RNDr. Peter Skyba, CSc.

Mgr. Pavol Szabó, CSc.

- Komisia SAV pre propagáciu a médiá (člen komisie)

RNDr. Ivan Škorvánek, CSc.

- Komisia SAV pre vyhodnocovanie medzinárodných projektov (člen)

11.5. Členstvo v orgánoch VEGA

RNDr. Kornel Csach, CSc.

- Komisia VEGA č. 7 pre strojárstvo a príbuzné odbory informačných a komunikačných technológií a materiálové inžinierstvo (člen komisie)

Ing. Pavel Diko, DrSc.

- Komisia VEGA č. 7. pre strojárstvo a materiálové inžinierstvo (člen)

RNDr. Marián Jurčišin, PhD.

- Komisia VEGA č.1 (člen)

Doc. RNDr. Peter Kopčanský, CSc.

- Komisia VEGA č. 1 pre matematické vedy, počítačové a informatické vedy a fyzikálne vedy (člen)

RNDr. Pavol Stríženec, CSc.

- Komisia VEGA č. 1 pre matematické vedy, počítačové a informatické vedy a fyzikálne vedy (člen)

RNDr. Ivan Škorvánek, CSc.

- Komisia VEGA č. 7 (člen komisie)

12. Hospodárenie organizácie

12.1. Výdavky RO SAV

Tabuľka 12a Výdavky RO SAV (v €)

Kategória	Posledný upravený rozpočet r. 2012	Čerpanie k 31.12.2012 celkom	z toho:	
			z rozpočtu	z mimoroz. zdrojov
Výdavky spolu	**5 027 557**	**6 920 045**	**5 026 442**	**1 893 603**
z toho:				
- kapitálové výdavky	**2 364 170**	**3 765 018**	**2 363 399**	**1 401 620**
- bežné výdavky	**2 663 387**	**3 155 027**	**2 663 043**	**491 983**
- mzdové výdavky	1 238 845	1 408 657	1 238 845	169 812
odvody do poisťovní a NÚP	428 587	480 769	428 587	52 182
- tovary a ďalšie služby	995 955	1 265 601	995 611	269 990
z toho:				
výdavky na projekty (VEGA, APVV, ŠPVV, MVTP, ESF)	706 172	976 163	706 172	269 990
výdavky na periodickú tlač	130	130	130	
transfery na vedeckú výchovu	115 465	115 124	115 124	

12.2. Príjmy RO SAV

Tabuľka 12b Príjmy RO SAV (v €)

Kategória	Posledný upravený rozpočet r. 2012	Plnenie k 31.12.2012
Príjmy spolu:	**1 917 784**	**1 917 784**
z toho:		
rozpočtované príjmy (účet 19)	**23 669**	**23 669**
z toho:		
- príjmy za nájomné	**0**	**0**
mimorozpočtové príjmy (účet 780)	**1 894 115**	**1 894 115**

12.1. Náklady PO SAV

Tabuľka 12a Náklady PO SAV (v €)

Kategória	**Plán na rok 2012 (posl. uprav.)**	**Skutočnosť k 31.12.2012 celkom**	**z toho:**	
			z príspevku	**z vlastných zdrojov**
Kapitálové výdavky				
Náklady spolu:				
z toho:				
- mzdové náklady (účet 521)				
- odvody do poisťovní a NÚP (účet 524-525)				
- vedecká výchova				
- náklady na projekty (VEGA, APVT, APVV, ŠPVV, MVTP, ESF a i.)				
- náklady na vydávanie periodickej tlače				

12.2. Tržby PO SAV

Tabuľka 12b Tržby PO SAV (v €)

Kategória	**Plán na rok 2012**	**Plnenie k 31.12.2012**
Výnosy spolu:		
z toho:		
- príspevok na prevádzku (účet 691)		
- vlastné tržby spolu:		
z toho:		
- tržby za nájomné		
- tržby za riešenie projektov (tuzemských + zahraničných, z účtu 64)		

13. Nadácie a fondy pri organizácii SAV

14. Iné významné činnosti organizácie SAV

15. Vyznamenania, ocenenia a ceny udelené pracovníkom organizácie v roku 2012

15.1. Domáce ocenenia

15.1.1. Ocenenia SAV

Čenčariková Hana
1. miesto v Súťaži mladých vedeckých pracovníkov SAV
Oceňovateľ: Predsedníctvo SAV

Diko Pavel
Riadny člen Učenej spoločnosti SAV
Oceňovateľ: Učená spoločnost SAV
Opis: Od 19.6.2012 riadny člen Učenej spoločnosti SAV.

Kudela Karel
Riadny člen Učenej spoločnosti SAV
Oceňovateľ: Učená spoločnost SAV
Opis: Od 19.6.2012 riadny člen Učenej spoločnosti SAV.

15.1.2. Iné domáce ocenenia

Pribulová Zuzana, Kačmarčík Jozef, Szabó Pavol a Samuely Peter
Vedecko-technický tím roka
Oceňovateľ: Minister školstva, vedy, výskumu a športu SR
Opis: Cena za významný prínos v oblasti štúdia nových supravodičov

15.2. Medzinárodné ocenenia

Szabó Pavol
Cena Maďarskej akadémie vied (MTA): Arany János díj
Oceňovateľ: Maďarská akadémia vied
Opis: cena za medzinárodne uznávaný vedecký výskum a popularizáciu vedy

16. Poskytovanie informácií v súlade so zákonom č. 211/2000 Z. z. o slobodnom prístupe k informáciám v znení neskorších predpisov (Zákon o slobode informácií)

17. Problémy a podnety pre činnosť SAV

Správu o činnosti organizácie SAV spracoval(i):

Doc. RNDr. Karol Flachbart, DrSc., 055/7922200
Mgr. Pavol Szabó, CSc., 055/ 7922306, 7922310

Vedecký tajomník ÚEF SAV:

.....
Mgr. Pavol Szabó, CSc.

Riaditeľ organizácie SAV:

.....
Doc. RNDr. Karol Flachbart, DrSc.

Prílohy

Príloha A

Zoznam zamestnancov a doktorandov organizácie k 31.12.2012

Zoznam zamestnancov podľa štruktúry (nadväzne na údaje v Tabuľke 1a)

	Meno s titulmi	Úväzok (v %)	Ročný prepočítaný úväzok
Vedúci vedeckí pracovníci DrSc.			
1.	Prof. Ing. Marián Antalík, DrSc.	50	0.50
2.	Ing. Pavel Diko, DrSc.	100	1.00
3.	Doc. RNDr. Karol Flachbart, DrSc.	100	1.00
4.	Doc. RNDr. Michal Hnatič, DrSc.	50	0.50
5.	Prof. Ing. Karel Kudela, DrSc.	100	1.00
6.	Prof. RNDr. Marián Reiffers, DrSc.	40	0.40
7.	RNDr. Milan Rybanský, DrSc.	33	0.33
8.	Prof. RNDr. Peter Samuely, DrSc.	90	0.90
9.	RNDr. Marián Sedlák, DrSc.	100	1.00
Vedúci vedeckí pracovníci CSc., PhD.			
1.	RNDr. Jaroslav Antoš, CSc.	100	1.00
2.	Doc. RNDr. Dušan Bruncko, CSc.	100	1.00
3.	RNDr. Kornel Csach, CSc.	100	1.00
4.	RNDr. Pavol Farkašovský, CSc.	100	1.00
5.	RNDr. Jozef Ferencei, CSc.	100	0.50
6.	Doc. RNDr. Peter Kopčanský, CSc.	100	1.00
7.	RNDr. Jozef Kováč, CSc.	100	1.00
8.	RNDr. Ivan Králik, CSc.	100	1.00
9.	RNDr. Marián Mihalik, CSc.	100	1.00
10.	RNDr. Peter Skyba, CSc.	100	1.00
11.	RNDr. Ladislav Šándor, CSc.	50	0.50
12.	RNDr. Ivan Škorvánek, CSc.	100	1.00
13.	RNDr. Milan Timko, CSc.	100	1.00
14.	RNDr. Jozef Urban	1	0.00
Samostatní vedeckí pracovníci			
1.	Ing. Jaroslava Bágeľová, CSc.	60	0.60
2.	Ing. Ján Baláž, PhD.	100	1.00
3.	Ing. Jaroslav Bán, CSc.	51	0.51
4.	RNDr. Ivan Baťko, CSc.	100	1.00
5.	RNDr. Pavol Bobík, PhD	100	1.00

6.	RNDr. Hana Čenčariková, PhD	100	1.00
7.	RNDr. Alexander Dirner, CSc.	50	0.50
8.	RNDr. Slavomír Gabáni, PhD.	100	1.00
9.	RNDr. Zuzana Gažová, CSc.	100	1.00
10.	RNDr. Marián Jurčišin, PhD.	100	1.00
11.	RNDr. Alena Juríková, CSc.	100	1.00
12.	RNDr. Jozef Kačmarčík, PhD	100	1.00
13.	RNDr. Viktor Kavečanský, CSc.	100	1.00
14.	Ing. Martina Koneracká, CSc.	100	1.00
15.	RNDr. Tibor Kožár, CSc.	100	1.00
16.	RNDr. Martin Kupka, CSc.	100	1.00
17.	Prof. RNDr. Vladimír Lisý, DrSc.	30	0.30
18.	RNDr. Jozef Marcin, PhD	100	1.00
19.	Ing. Jozef Miškuf, CSc.	100	1.00
20.	MUDr. Andrey Musatov, CSc.	100	0.50
21.	RNDr. Ján Nemčík, CSc.	100	1.00
22.	RNDr. Blahoslav Pastirčák, CSc.	100	1.00
23.	RNDr. Richard Pinčák, PhD.	100	1.00
24.	RNDr. Zuzana Pribulová, PhD	100	1.00
25.	RNDr. Michal Pudlák, CSc.	100	1.00
26.	RNDr. Marián Slivka, CSc.	100	1.00
27.	RNDr. Milan Stehlík, DrSc.	100	1.00
28.	RNDr. Pavol Stríženec, CSc.	100	1.00
29.	Mgr. Pavol Szabó, CSc.	100	1.00
30.	RNDr. Natália Tomašovičová, CSc.	100	1.00
31.	Doc. RNDr. Ladislav Tomčo, PhD.	20	0.20
32.	Doc. Ing. Zoltán Tomori, CSc.	100	1.00
33.	Ing. Vlasta Závišová, PhD.	100	1.00
34.	RNDr. Mária Zentková, CSc.	100	1.00
Vedeckí pracovníci			
1.	Mgr. Iryna Antal, PhD.	100	0.50
2.	Mgr. Vitaliy Antal, PhD.	100	1.00
3.	RNDr. Andrea Antošová, PhD.	100	0.00
4.	RNDr. Marianna Baťková, PhD.	100	1.00
5.	RNDr. Marcel Človečko, PhD.	100	0.00

6.	Ing. Erna Demjén, PhD.	100	1.00
7.	RNDr. Ján Fedorišin, PhD.	5	0.00
8.	RNDr. Diana Fedunová, PhD.	100	1.00
9.	RNDr. Anežka Hashim, PhD.	100	1.00
10.	RNDr. Eduard Kladiva, CSc.	100	1.00
11.	Ing. Marián Krivda, PhD.	5	0.00
12.	RNDr. Jozef Marek, PhD.	100	1.00
13.	RNDr. Matúš Mihálik, PhD.	100	0.75
14.	Ing. Zuzana Mitróová, PhD	100	1.00
15.	RNDr. Gabriel Pristáš, PhD.	100	0.67
16.	RNDr. Marián Putiš, PhD.	100	0.25
17.	RNDr. Richard Remecký, PhD.	5	0.00
18.	Ing. Martina Šefčíková, PhD	100	1.00
19.	RNDr. Jana Tóthová, PhD.	20	0.20
20.	RNDr. Eva Valušová, PhD.	100	1.00
21.	RNDr. Marek Varga, PhD.	100	1.00
22.	RNDr. Martin Vavra, PhD.	25	0.25
23.	Ing. Katarína Zmorayová, PhD	100	1.00
Odborní pracovníci s VŠ vzdelaním			
1.	Ing. Richard Bílek	100	1.00
2.	Ing. Pavel Binko, CSc.	5	0.00
3.	Ing. Jozef Borovský	100	0.50
4.	Ing. Marcela Brasová	100	1.00
5.	Ing. Anna Ciffrová	0	0.00
6.	PhDr. Eva Fedáková	5	0.05
7.	Ing. Emil Gažo	100	1.00
8.	Mgr. Radka Geciková	20	0.20
9.	Ing. Igor Hrmo	100	1.00
10.	Mgr. Eva Jurčišinová	100	1.00
11.	Mgr. Mária Kancírová	1	0.00
12.	Ing. Viktor Kočan	100	1.00
13.	Ing. Valéria Kočanová	100	0.33
14.	Mgr. Peter Kulík	100	1.00
15.	Ing. Ingrid Kuľková	100	1.00
16.	Mgr. Ronald Langer	100	1.00

17.	Ing. Ľudmila Lapšanská	15	0.15
18.	Mgr. Angela Lencsesová	100	1.00
19.	RNDr. Tomáš Lučivjanský	20	0.20
20.	Ing. Marcela Medeová	100	1.00
21.	Ing. Maxim Mizov	100	0.75
22.	Mgr. Igor Parnahaj	1	0.01
23.	RNDr. Jozef Parnica	1	0.00
24.	Ing. Vladimír Pavlík	100	1.00
25.	Ing. Judita Pribišová	100	0.75
26.	Mgr. Dmytro Rak	100	0.60
27.	Ing. Miloslav Straka	100	1.00
28.	Ing. Igor Strhárský	100	1.00
29.	Ing. Michal Šenkovič	25	0.25
30.	RNDr. Katarína Šipošová	25	0.13
31.	Ing. Jozef Špalek	100	1.00
32.	Mgr. Jana Štetiarová	100	1.00
33.	RNDr. Stanislav Uličiansky	100	1.00
34.	Mgr. Martin Vaľa	5	0.00
Odborní pracovníci ÚSV			
1.	Martin Baláž	25	0.25
2.	Štefan Bicák	100	1.00
3.	Rudolf Drozda	100	1.00
4.	Jana Gažiová	0	0.00
5.	Anna Ivanišová	100	1.00
6.	Ivan Jurčo	100	1.00
7.	Jozef Kolcún	100	1.00
8.	Róbert Koppel	0	0.00
9.	Gabriela Kozáková	100	1.00
10.	Monika Lengová	10	0.10
11.	Katarína Paulovičová	100	1.00
12.	Anna Pokrivňáková	15	0.15
13.	Gabriel Pristáš	100	1.00
14.	Mária Sabadková	75	0.75
15.	Dagmar Sedláková	100	0.42
16.	Mária Šemšáková	15	0.15

17.	Samuel Štefánik	100	1.00
18.	Viera Štrbinová	100	1.00
19.	Dana Švarcbergerová	100	1.00
20.	Anna Tomičová	25	0.25
Ostatní pracovníci			
1.	Monika Baloghová	76	0.63
2.	Mária Belková	76	0.76
3.	Juraj Drozda	100	1.00
4.	Štefan Fink	100	1.00
5.	Peter Jurko	100	1.00
6.	Ing. Stanislav Kaliský	100	1.00
7.	Kamila Kondášová	100	0.60
8.	Juraj Koribanič	50	0.50
9.	Ing. Samuel Piovarči	1	0.00
10.	Mária Pirošová	27	0.27
11.	Ľudmila Ristvejová	50	0.50
12.	Božena Soroková	76	0.76
13.	Ján Timko	100	1.00

Zoznam zamestnancov, ktorí odišli v priebehu roka

	Meno s titulmi	**Dátum odchodu**	**Ročný prepočítaný úväzok**
Vedúci vedeckí pracovníci DrSc.			
1.	RNDr. Milan Rybanský, DrSc.	31.12.2012	-
Samostatní vedeckí pracovníci			
1.	RNDr. Slavomír Maťaš, CSc.	14.8.2012	0.00
Vedeckí pracovníci			
1.	RNDr. Radoslav Bučík, PhD	30.12.2012	0.00
2.	RNDr. Jana Turčanová, PhD.	30.12.2012	0.00
Odborní pracovníci s VŠ vzdelaním			
1.	Ing. Ľubica Kreibiková	17.8.2012	0.25
2.	Ing. Miriam Lipčeiová	30.12.2012	0.25
3.	Ing. Eva Lojdová	12.3.2012	0.09
4.	Mgr. Mykhaylo Rushchak	8.8.2012	0.60
5.	RNDr. Michaela Šimšíková	30.12.2012	0.00
Odborní pracovníci ÚSV			

1.	Jana Gažiová	31.12.2012	-
Ostatní pracovníci			
1.	Regína Kmecová	12.3.2012	0.20

Zoznam doktorandov

	Meno s titulmi	Škola/fakulta	Študijný odbor
Interní doktorandi hradení z prostriedkov SAV			
1.	Mgr. Marek Antoňák	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
2.	Mgr. Marek Capik	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
3.	Mgr. Ivan Čurlík	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
4.	Mgr. Michal Dančo	Prírodovedecká fakulta UPJŠ	4.1.2 všeobecná fyzika a matematická fyzika
5.	Ing. Mária Huráková	Technická univerzita v Košiciach	5.2.26 materiály
6.	Mgr. Martina Kubovčíková	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
7.	Ing. Jana Lazúrová	Hutnícka fakulta TUKE	5.2.26 materiály
8.	Mgr. Jozefína Majorošová	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
9.	Mgr. Lucia Melníková	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
10.	Ing. Matúš Molčan	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
11.	Ing. Samuel Piovarči	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
12.	Ing. Monika Radušovská	Hutnícka fakulta TUKE	5.2.26 materiály
13.	Mgr. Michal Rajňák	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
14.	Ing. Iveta Takáčová	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
15.	Mgr. Peter Zalom	Prírodovedecká fakulta UPJŠ	4.1.2 všeobecná fyzika a matematická fyzika
16.	Mgr. Marianna Zapotoková	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
Interní doktorandi hradení z iných zdrojov			
organizácia nemá interných doktorandov hradených z iných zdrojov			
Externí doktorandi			
1.	Ing. Emil Gažo	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
2.	Ing. Pavol Hrabčák	Prírodovedecká fakulta UPJŠ	4.1.3 fyzika kondenzovaných látok a akustika
3.	Mgr. Štefánia Máťošová	Prírodovedecká fakulta UPJŠ	4.1.2 všeobecná fyzika a matematická fyzika

Príloha B
Projekty riešené v organizácii

Medzinárodné projekty

Programy: Medziakademická dohoda (MAD)

1.) Mechanické vlastnosti objemných nanokryštalických a amorfných materiálov pri kryogénnych teplotách *(Mechanical properties of bulk nanocrystalline and amorphous materials at cryogenic temperatures.)*

Zodpovedný riešiteľ:	Kornel Csach
Trvanie projektu:	1.1.2011 / 31.12.2013
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	1 - Ukrajina: 1

Dosiahnuté výsledky:
Boli študované prejavy lokálnej plasticity a porušenia nanokryštalickej zliatiny Ni-Fe pri nízkych teplotách. Boli pozorované analógie v morfológii tvárneho porušenia v prípade mnanozrnných a amorfných zliatin. Dosiahnuté výskledky boli prezentované v 4 konferenčných príspevkoch 1 CC publikácii.

2.) Vlastnosti nových magnetických materiálov *(Properties of new magnetic materials)*

Zodpovedný riešiteľ:	Marián Mihalik
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	3 - Poľsko: 3

Dosiahnuté výsledky:
Magnetické špongie –príklad multifunkčných molekulárnych magnetov

Projekty: VEGA, 0057, Medziakademická dohoda s Henryk Niewodniaczanski Institute, Polish Academy of Sciences
Riešitelia: M. Mihalik, M.Zentková (Oddelenie fyziky magnetických javov)

Magnetické špongie patria medzi multifunkčné molekulárne magnetické materiály, u ktorých v závislosti od teploty dochádza k reverzibilnému uvoľňovaniu molekúl vody a to v dvoch stupňoch. V prípade nami skúmanej {[MnII(pydz)(H2O)2][MnII(H2O)2][NbIV(CN)8]3H2O}n zlúčeniny je tento proces sprevádzaný lokálnymi zmenami štruktúry v okolí magnetických iónov a následnou zmenou magnetických vlastností. Za účelom lepšieho pochopenia magnetických interakcii sme študovaný systém podrobili systematickému štúdiu magnetických vlastností, ktoré zahrňovalo štúdium magnetických fázových prechodov pri atmosférickom tlaku a vysokom hydrostatickom

tlaku, kritických exponentov a magnetokalorického javu . Podarilo sa nám ukázať, že charakter dehydratovaním vyvolaných zmien je rovnaký ako v prípade zmien vyvolaných aplikáciou vonkajšieho hydrostatického tlaku.

[1] FITTA, Magdalena - BALANDA, Maria - MIHALIK, Marián - PELKA, Robert - PINKOWICZ, Dawid - SIEKLUCKA, Barbara - ZENTKOVÁ, Mária: Magnetocaloric effect in M–pyrazole-[Nb(CN)8] (M = Ni, Mn) molecular compounds. In Journal of Physics: Condensed Matter, 2012, vol. 24, no. 50, art. no. 506002.
[2] FITTA, Magdalena - PELKA, Robert - BALANDA, Maria - CZAPLA, Mariusz - MIHALIK, Marián - PINKOWICZ, Dawid - 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] PINKOWICZ, David - KRUPIEWSKA, Katarzyna - LEWINSKI, Krysztof - BALANDA, Maria - MIHALIK, Marián - ZENTKOVÁ, Mária - SIEKLUCKA, Barbara. High-pressure single-crystal XRD and magnetic study of a octacyanoniobate octacyanoniobate-based magnetic sponge. In CrystEngComm, 2012, vol. 14, no. 16, p. 5224-5229.
[4] PELKA, R. - CZAPLA, Mariusz - ZIELINSKI, P.M. - FITTA, M. - BALANDA, Maria - PINKOWICZ, David - PRATT, F.L. - MIHALIK, Marián - PRZEWOZNIK, J. - AMATO, A. - SIEKLUCKA, Barbara - WASIUTYNSKI, T. Critical behavior of the Mn2[Nb(CN)8] molecular magnet. In Physical Review B, 2012, vol. 85, no. 22, art. no. 224427.

3.) Anizotrópne magnetické kvapaliny *(Anisotropic magnetic fluids)*

Zodpovedný riešiteľ:	Natália Tomašovičová
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	3 - Maďarsko: 3

Dosiahnuté výsledky:
Boli pripravené feronematické vzorky na báze kvapalného kryštálu 6CHBT dopovaného jednostennými uhlíkovými nanorurkami (SWCNT), SWCNT – COOH a SWCNT funkcionalizované Fe3O4 a sférickymi magnetickými časticami. Ďalej boli pripravené a študované feronematické vzorky dispergované v polymernej matrici (PDLC). Štúdium štruktúrnych nestabilít vo feronematikách pri nízkych poliach (do 0,2T) ukázalo zvýšenú citlivosť týchto materiálov na slabé magnetické polia, čo poukazuje na možné aplikácie týchto materiálov ako senzorov magnetického poľa. Dosiahnuté výsledky počas trvania projektu boli publikované v 1 kapitole v knihe, 8 CC časopisoch a 12 príspevkov bolo prezentovaných na medzinárodných konferenciach z toho 2 prednášky boli pozvané.

Programy: Medziústavná dohoda

4.) Štúdium amyloidnej agregácie in vitro a v mozgomiešnom moku *(Study of the amyloid aggregation in vitro and in cerebrospinal fluid)*

Zodpovedný riešiteľ:	Zuzana Gažová
Trvanie projektu:	1.10.2010 / 31.12.2014
Evidenčné číslo projektu:	
Organizácia je	áno

koordinátorom projektu:	
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
V rámci spolupráce sme sledovali vplyv magnetickej kvapaliny na amyloidné agregáty poly/peptidov vytvorených in vivo v likvore ľudí trpiacich na Alzheimeru chorobu v porovnaní s účinkom na likvor ľudí trpiacich na iné neurodegeneratívne ochorenia. Údaje boli korelované s biochemickými údajmi.

5.) Prenos energetických častíc v turbulentnej heliosfére *(Energetic particle transport in the turbulent heliosphere)*

Zodpovedný riešiteľ:	Milan Stehlík
Trvanie projektu:	1.1.2010 / 31.12.2014
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	2 - Ukrajina: 2

Dosiahnuté výsledky:
Analyzovaný bol problém štatistického urýchľovania s následnou difúziou nabitých EČ v homogénnom i ohraničenom priestore. Analyzovali sa procesy - Fermiho štatistické urýchľovanie a urýchľovanie indukovaným elektrickom poli v gyrotropnej heliosfére (tzv. alpha-mechanizmus). Získané boli energetické spektrá častíc a analytické riešenia transportných rovníc v oblasti urýchľovania i mimo nej [Fedorov Yu.I., Shakhov B.A., Stehlik M.: Statistical acceleration of energetic particles and their diffusion in the turbulent magnetic fields. Journal of Physics B. 45, 2012, 165702-1-14; Fedorov Yu.I., Shakhov B.A., Stehlik M.: Statistical acceleration and spatial diffusion of cosmic rays in the turbulent medium. Kinem. Fiz. Nebes. Tel. 28(6), 2012, 1-25.]. Zdokonalený bol model anizotropného magnetohydrodynamického dynama kozmických telies, v ktorom bol vypočítaný smer generovaného spontánneho magnetického poľa korelujúceho s osovou asymetriou anizotropného systému [Shakhov B.A., JurcisinM., Jurcisinova E., Stehlik M.: The spontaneous magnetic field direction in an anisotropic MHD dynamo. Kinematics and Physics of Celestial Bodies 28(5), 2012, 225–231.].

Programy: COST

6.) Vývoj produktov a služieb pre kozmické počasie v Európe *(Developing space weather products and services in Europe)*

Zodpovedný riešiteľ:	Karel Kudela
Trvanie projektu:	1.8.2008 / 30.11.2012
Evidenčné číslo projektu:	COST ES 0803
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Univ. Atény, Dr. Anna Belehaki
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Meranie intenzity kozmického žiarenia neutronovým monitorom na Lomnickom štíte v spojitom režime a dostupnosťou v reálnom čase na http://neutronmonitor.ta3.sk, resp. na nmdb.eu, pokračovalo.
Boli pripravené publikácie (1. vyšla po korekciách, 2. zaslaná):

1. Kudela, K., Variability of Low Energy Cosmic Rays Near Earth, in Exploring the Solar Wind, ISBN 979-953-307-380-3, Book edited by: Dr. Marian Lazar, Ruhr-Universitat, Bochum, Germany, 2012

2. P.I.Y. Velinov , S. Asenovski , L. Dorman , K. Kudela , J. Lastovicka , L. Mateev , A. Mishev and P. Tonev, Impact of cosmic rays and solar energetic particles on the Earth's environment, zasl. do časopisu J. Space Weather and Space Climate, 2012.

PhD študent riešiteľa Mgr. I. Parnahaj (PF UPJŠ) sa zúčastnil školy o kozmickej plazme EU School on Space Weather fundamental plasma processes,
v júni 2012, s podporou projektu pridelenou zo zahraničia:
http://www.df.unipi.it/~califano/SWIFF_School/EU_School_on_Space_Weather_
fun
damental_plasma_processes.html

7.) Koloidné aspekty nanovedy pre inovatívne procesy a materiály *(Colloidal Aspects of Nanoscience for Innovative Processes and Materials)*

Zodpovedný riešiteľ:	Marián Sedlák
Trvanie projektu:	19.1.2012 / 18.1.2016
Evidenčné číslo projektu:	CM 1101
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	
	Podpora medzinárodnej spolupráce z národných zdrojov: 4000 €

Dosiahnuté výsledky:
V priebehu roku sme sa venovali skúmaniu roztokov nízkomolekulárnych hydrofilných a amfifilných látok ktorých spontánne samousporiadanie v roztokoch dosiaľ nie je pochopené. Jednou z interpretácií existencie mezoskopických nanoštruktúr ktorá sa objavila v literatúre je to, že molekuly rozpusteného vzduchu (atmosférických plynov) segregujú do nanobublín, ktoré by z fyzikálneho hľadiska nemali existovať (veľmi vysoký tlak), ale môžu byť stabilizované vrstvou rozpustenej látky na rozhraní voda/vzduch. Problematika nanobublín je v súčasnosti dosť aktuálna nedávnym objavom nanobublín na hydrofóbnych povrchoch /rozhraniach ale aj výskumom zameraným na použitie nanobublín v roztokoch ako kontrastnej látky pri USG zobrazovaní v medicíne a dokonca pri terapií nádorov. Táto hypotéza bola preverovaná experimentmi rozptylu svetla, odplyňovaním a použitím centrifugácie na sledovanie vplyvu silného gravitačného poľa na prítomné mezoskopické nanoštruktúry [1,2]. Experimenty ukázali že sa nejedná o nanobubliny, čím sa potvrdil pôvodný predpoklad že ide o supramolekulárne štruktúry.

[1] M. Sedlák, D. Rak: Large-scale Inhomogeneities in Solutions of Low Molar Mass Compounds

and Mixtures of Liquids: Supramolecular Structures or Nanobubbles?, Journal of Physical Chemistry B, submitted

[2] Pozvaná prednáška: M. Sedlák: Mesoscopic properties of solutions and liquid mixtures as revealed by light scattering techniques, 18th Symposium on Thermophysical Properties, Boulder, Colorado, USA, 24. 6. – 29. 6. 2012.

Programy: European Science Foundation (ESF)

8.) Nanoveda a technika v supravodivosti *(Nanoscience and Engineering in Superconductivity)*

Zodpovedný riešiteľ:	Peter Samuely
Trvanie projektu:	1.1.2007 / 31.12.2012
Evidenčné číslo projektu:	ESF Research Networking Programme
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Katolícka univerzita Leuven
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Projekt NES bol po 5 rokoch činnosti formálne ukončený v 1. polroku. Účastníci projektu sa v r. 2012 zorganizovali workshop On Nanoscale Superconductivity and Fluxonics, On the occasion of the 60th birthday of Prof. Dr. Victor V. Moshchalkov
June 12, 2012 v Leuvene, v Belgicku. Veľká časť účastníkov projektu NES, vrátane slovenskej časti, sa úspepešne uchádzalo o projekt NanoSC COST, ktorý sa začal v októbri 2012 a bude pokračovať 4 roky. P. Samuely je člen Riadiacej skupiny.

Programy: CERN/MŠ

9.) Experiment ATLAS na LHC v CERN: hlboko-nepružné javy a nová fyzika pri TeV energiách *(ATLAS experiment on LHC in CERN: deep-inelastic events and new physics at TeV energies)*

Zodpovedný riešiteľ:	Dušan Bruncko
Trvanie projektu:	1.1.2011 / 31.12.2015
Evidenčné číslo projektu:	0777/2011
Organizácia je koordinátorom projektu:	nie
Koordinátor:	CERN, ATLAS kolaborácia
Počet spoluriešiteľských inštitúcií:	312 - Argentína: 3, Arménsko: 2, Austrália: 4, Azerbajdžan: 3, Bielorusko: 3, Kanada: 5, Česko: 9, Nemecko: 27, Dánsko: 3, Španielsko: 3, Francúzsko: 18, Veľká Británia: 29, Gruzínsko: 1, Grécko: 3, Švajčiarsko: 7, Čile: 3, Čína: 4, Izrael: 5, Taliansko: 15, Japonsko: 23, Maroko: 5, Holandsko: 3, Nórsko: 3, Poľsko: 5, Portugalsko: 7, Rumunsko: 2, Rusko: 9, Srbsko: 0, Slovensko: 1, Slovinsko: 3, Švédsko: 4, Turecko: 5, Taiwan: 2, USA: 93

Dosiahnuté výsledky:

Liquid argon calorimeter performance at high rates
A. Glattea, ..., D. Bruncko, E. Kladiva, J. Ferencei, P. Strizenec, J. Spalek,...
NIM A669 (2012), pp. 47-66

Performance of Missing Transverse Momentum Reconstruction in Proton-Proton Collisions at 7 TeV with ATLAS
The ATLAS collaboration (G. Aad et al.).
European Physics Journal C72 (2012), 1844

Performance of the ATLAS Trigger System in 2010
The ATLAS collaboration (G. Aad et al.).
European Physics Journal C72 (2012), 1849

Search for anomalous production of prompt like-sign muon pairs and constraints on physics beyond the Standard Model with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1201.1091
Submitted to Physical Review D

Study of jets produced in association with a W boson in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1201.1076
Submitted to Physical Review D

Kshort and Lambda production in pp interactions at sqrt(s) = 0.9 and 7 TeV measured with the ATLAS detector at the LHC
The ATLAS collaboration (G. Aad et al.).
Physical Review D85 (2012),012001

Measurement of the top quark pair production cross-section with ATLAS in the single lepton channel
The ATLAS collaboration (G. Aad et al.).
Physics Letter B711 (2012), 244-263

Measurement of the pseudorapidity and transverse momentum dependence of the elliptic flow of charged particles in lead-lead collisions at sqrt(s_NN) = 2.76 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Phys.Lett.B707 (2012), 330-348

Measurement of the isolated di-photon cross-section in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Phys. Rev. D85 (2012), 012003

Rapidity gap cross sections measured with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1201.2808
Submitted to Eur. Phys. J. C

Search for excited leptons in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1201.3293
Physical Review D85 (2012), 072003

Search for supersymmetry in final states with jets, missing transverse momentum and one isolated lepton in sqrt{s} = 7 TeV pp collisions using 1 fb-1 of ATLAS data
The ATLAS collaboration (G. Aad et al.).
Physical Review D85 (2012), 012006

Measurement of the Transverse Momentum Distribution of W Bosons in pp Collisions at sqrt(s) = 7 TeV with the ATLAS Detector
The ATLAS collaboration (G. Aad et al.).
Phys.Rev.D85 (2012), 012005

Measurement of the cross section for the production of a W boson in association with b-jets in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Phys.Lett.B 707 (2012) 418-437

Measurements of the electron and muon inclusive cross-sections in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Phys.Lett.B707 (2012), 438-458

Measurement of the top quark pair production cross section in pp collisions at sqrt(s) = 7 TeV in dilepton final states with ATLAS
The ATLAS collaboration (G. Aad et al.).
Phys.Lett.B707 (2012), 459-477

Search for displaced vertices arising from decays of new heavy particles in 7 TeV pp collisions at ATLAS
The ATLAS collaboration (G. Aad et al.).
Phys.Lett.B707 (2012), 478-496

Measurement of the ZZ production cross section and limits on anomalous neutral triple gauge couplings in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physical Review Letters108 (2012), 041804

Search for New Phenomena in ttbar Events with Large Missing Transverse Momentum in Proton-Proton Collisions at s=7 TeV with the ATLAS Detector
G. Aad et al. (ATLAS Collaboration)
Phys.Rev.Lett.108 (2012), 041805

Search for decays of stopped, long-lived particles from 7 TeV pp collisions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Submitted to Eur. Phys. J. C

Search for excited leptons in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector

The ATLAS collaboration (G. Aad et al.).
arXiv:1201.3293
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Search for New Physics in the Dijet Mass Distribution using 1 fb-1 of pp Collision Data at sqrt(s) = 7 TeV collected by the ATLAS Detector
The ATLAS collaboration (G. Aad et al.).
Phys.Lett.B708 (2012), 37-54

Combined search for the Standard Model Higgs boson using up to 4.9 fb-1 of pp collision data at sqrt(s) = 7 TeV with the ATLAS detector at the LHC
G. Aad et al. (ATLAS Collaboration)
Physics Letters B710 (2012), 49-66

Search for the Standard Model Higgs boson in the diphoton decay channel with 4.9 fb-1 of pp collisions at sqrt(s)=7 TeV with ATLAS
G. Aad et al. (ATLAS Collaboration)
arXiv:1202.1414
Submitted to Physics Letters B

Search for the Standard Model Higgs boson in the decay channel H->ZZ(*)->4l with 4.8 fb-1 of pp collisions at sqrt(s)=7 TeV with ATLAS
G. Aad et al. (ATLAS Collaboration)
arXiv:1202.1415
Physics Letters B710 (2012), 383-402

A measurement of the ratio of the W and Z cross sections with exactly one associated jet in pp collisions at sqrt(s) = 7 TeV with ATLAS
The ATLAS collaboration (G. Aad et al.).
Phys.Lett.B708 (2012), 221-240

Search for pair production of a heavy quark decaying to a W boson and a b quark in the lepton+jets channel with the ATLAS detector
arXiv:1202.3076
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A measurement of the material in the ATLAS inner detector using secondary hadronic interactions
The ATLAS collaboration (G. Aad et al.).
JINST 7 (2012), P01013

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The ATLAS collaboration (G. Aad et al.).
arXiv:1202.3389
Physical Review D86 (2012), 012007

Search for anomalous production of prompt like-sign muon pairs and constraints on physics beyond the Standard Model with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physical Review D85 (2012), 032004

Search for anomaly-mediated supersymmetry breaking with the ATLAS detector based on a

disappearing-track signature in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1202.4847
Submitted to Eur. Phys. J. C

Measurement of the cross section for top-quark pair production in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector using final states with two high-pt leptons
The ATLAS collaboration (G. Aad et al.).
arXiv:1202.4892
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Search for same-sign top-quark production and fourth-generation down-type quarks in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Measurement of the production cross section for Z/gamma* in association with jets in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physical Review D85 (2012), 032009

Search for down-type fourth generation quarks with the ATLAS detector in events with one lepton and high transverse momentum hadronically decaying W bosons in sqrt(s) = 7 TeV pp collisions
The ATLAS collaboration (G. Aad et al.).
arXiv:1202.6540
Physical Review Letters 109 (2012), 032001

Searches for supersymmetry with the ATLAS detector using final states with two leptons and missing transverse momentum in sqrt{s} = 7 TeV proton-proton collisions
The ATLAS collaboration (G. Aad et al.).
Physics Letters B709 (2012), 137-157

Search for first generation scalar leptoquarks in pp collisions at sqrt{s}=7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Phys. Lett. B709 (2012), 158-176, Errata: Phys. Lett. B711 (2012), 442-455

Measurement of the azimuthal ordering of charged hadrons with the ATLAS detector ATLAS Collaboration
The ATLAS collaboration (G. Aad et al.).
arXiv:1203.0419
Physical Review D86 (2012), 052005

Search for FCNC single top-quark production at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physics Letters B712 (2012), 351-369

Search for new particles decaying to ZZ using final states with leptons and jets with the ATLAS detector in sqrt(s) = 7 Tev proton-proton collisions
The ATLAS collaboration (G. Aad et al.).
Physics Letters B712 (2012), 331-350

Search for strong gravity signatures in same-sign dimuon final states using the ATLAS detector at the LHC
The ATLAS collaboration (G. Aad et al.).
Physics Letters B709 (2012), 322-340

Measurement of the WZ production cross section and limits on anomalous triple gauge couplings in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Single hadron response measurement and calorimeter jet energy scale uncertainty with the ATLAS detector at the LHC
The ATLAS collaboration (G. Aad et al.).
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Submitted to European Physical Journal C

Search for a light Higgs boson decaying to long-lived weakly-interacting particles in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1203.1303
Physical Review Letters 108 (2012), 251801

Electron performance measurements with the ATLAS detector using the 2010 LHC proton-proton collision data
The ATLAS collaboration (G. Aad et al.).
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Measurement of the polarisation of W bosons produced with large transverse momentum in pp collisions at sqrt(s) = 7 TeV with the ATLAS experiment
The ATLAS collaboration (G. Aad et al.).
European Journal of Physics C72 (2012), 2001

Search for the Higgs boson in the H->WW(*)->lvlv decay channel in pp collisions at sqrt{s} = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Rapidity gap cross sections measured with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
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Search for the Standard Model Higgs boson in the diphoton decay channel with 4.9 fb-1 of pp collisions at sqrt(s)=7 TeV with ATLAS
G. Aad et al. (ATLAS Collaboration)
Phys.Rev.Lett. 108 (2012), 111803

Measurement of the azimuthal anisotropy for charged particle production in sqrt(s_NN) = 2.76 TeV lead-lead collisions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1203.3087
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Forward-backward correlations and charged-particle azimuthal distributions in pp interactions using the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Measurement of the production cross section of an isolated photon associated with jets in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1203.3161
Physical Review D85 (2012), 092014

Search for second generation scalar leptoquarks in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1203.3172
European Journal of Physics C72 (2012), 2151

Measurement of inclusive two-particle angular correlations in pp collisions with the ATLAS detector at the LHC
The ATLAS collaboration (G. Aad et al.).
arXiv:1203.3549
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Determination of the strange quark density of the proton from ATLAS measurements of the W->l nu and Z->ll cross sections ATLAS Collaboration
The ATLAS collaboration (G. Aad et al.).
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Observation of spin correlation in ttbar events from pp collisions at sqrt(s) = 7 TeV using the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physical Review Letters 108 (2012), 212001

Measurement of the charge asymmetry in top quark pair production in pp collisions at sqrt(s) = 7 TeV using the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
ARxIV:1203.4211
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Measurement of D*+/- meson production in jets from pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Jet mass and substructure of inclusive jets in sqrt(s) = 7 TeV pp collisions with the ATLAS experiment
The ATLAS collaboration (G. Aad et al.).
ARxIV:1203.4606
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Measurement of the centrality dependence of the charged particle pseudorapidity distribution in lead-lead collisions at sqrt(s_NN) = 2.76 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1108.6027
Phys.Lett.B710 (2012), 363-382

Search for heavy neutrinos and right-handed W bosons in events with two leptons and jets in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
ARxIV:1203.5420
European Physical Journal C72 (2012), 2056

Measurement of the top quark mass with the template method in the top antitop -> lepton + jets channel using ATLAS data
The ATLAS collaboration (G. Aad et al.).
ARxIV:1203.5755
European Physical Journal C72 (2012), 2046

Search for gluinos in events with two same-sign leptons, jets and missing transverse momentum with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
ARxIV:1203.5763
Physical Review Letters 108 (2012), 241802

Search for supersymmetry in pp collisions at sqrt(s) = 7 TeV in final states with missing transverse momentum and b-jets with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
ARxIV:1203.6193
Physical Review D85 (2012), 112006

Measurement of the WW cross section in sqrt(s) = 7 TeV pp collisions with the ATLAS detector and limits on anomalous gauge couplings
The ATLAS collaboration (G. Aad et al.).
Physics Letters B712 (2012), 289-308

Search for events with large missing transverse momentum, jets, and at least two tau leptons in 7 TeV proton-proton collision data with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Search for the decay Bs0 -> mu mu with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Search for Extra Dimensions using diphoton events in 7 TeV proton-proton collisions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Search for Diphoton Events with Large Missing Transverse Momentum in 1 fb^-1 of 7 TeV Proton-

Proton Collision Data with the ATLAS Detector
The ATLAS collaboration (G. Aad et al.).
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Search for pair production of a new quark that decays to a Z boson and a bottom quark with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Physical Review Letters 109 (2012), 071801

Search for resonant WZ production in the WZ to l nu l' l' channel in sqrt(s) = 7 TeV pp collisions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1204.1648
Physical Review D85 (2012), 112012

Observation of a new chi_b state in radiative transitions to Upsilon(1S) and Upsilon(2S) at ATLAS
The ATLAS collaboration (G. Aad et al.).
Physical Review Letters 108 (2012), 152001

Search for charged Higgs bosons decaying via H+ -> tau nu in top quark pair events using pp collision data at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1204.2760
JHEP06 (2012), 039

Search for supersymmetry with jets, missing transverse momentum and at least one hadronically decaying tau lepton in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1204.3852
Physics Letters B714 (2012), 197-214

Search for TeV-scale gravity signatures in final states with leptons and jets with the ATLAS detector at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1204.4646
Physics Letters B716 (2012), 122-141

Measurement of the inclusive W+- and Z/gamma cross sections in the electron and muon decay channels in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physical Review D85 (2012), 072004

Search for supersymmetry in events with three leptons and missing transverse momentum in sqrt(s) = 7 TeV pp collisions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1204.5638
Physics Review Letters 108 (2012), 261804

Search for squarks and gluinos using final states with jets and missing transverse momentum with the ATLAS detector in sqrt(s) = 7 TeV proton-proton collisions
The ATLAS collaboration (G. Aad et al.).

Physics Letters B710 (2012), 67-85

Search for anomaly-mediated supersymmetry breaking with the ATLAS detector based on a disappearing-track signature in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
Eur. Phys. J. C72 (2012), 1993

Search for decays of stopped, long-lived particles from 7 TeV pp collisions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Eur. Phys. J. C72 (2012), 1965

Search for excited leptons in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Measurement of tau polarization in W->taunu decays with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1204.6720
Eur. Phys. J. C72 (2012), 2062

Search for scalar top quark pair production in natural gauge mediated supersymmetry models with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1204.6736
Physics Letters B715 (2012), 44-60

Search for scalar bottom pair production with the ATLAS detector in pp Collisions at sqrt{s} = 7 TeV.
The ATLAS collaboration (G. Aad et al.).
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Study of jets produced in association with a W boson in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Search for a fermiophobic Higgs boson in the diphoton decay channel with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Search for lepton flavour violation in the emu continuum with the ATLAS detector in sqrt(s) = 7 TeV pp collisions at the LHC
The ATLAS collaboration (G. Aad et al.).
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Search for tb resonances in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1205.1016

Physical Review Letters 109 (2012), 081801

Measurement of the top quark pair cross section with ATLAS in pp collisions at sqrt(s) = 7 TeV using final states with an electron or a muon and a hadronically decaying tau lepton
The ATLAS collaboration (G. Aad et al.).
arXiv:1205.2067
Physics Letters B717 (2012), 89-108

Search for contact interactions in dilepton events from pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physics Letters B712 (2012), 40-58

Search for heavy vector-like quarks coupling to light quarks in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physics Letters B712 (2012), 22-39

Measurement of the W boson polarization in top quark decays with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
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Submitted to JHEP

Measurement of W gamma and Z gamma production cross sections in pp collisions at sqrt(s) = 7 TeV and limits on anomalous triple gauge couplings with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1205.2531
Physics Letters B717 (2012), 49-69

Measurement of the t-channel single top-quark production cross section in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1205.3130
Physics Letters B717 (2012), 330-350

Search for production of resonant states in the photon-jet mass distribution using pp collisions at sqrt(s) = 7 TeV collected by the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physical Review Letters Phys. 108 (2012), 211802

A search for ttbar resonances with the ATLAS detector in 2.05 fb^-1 of proton-proton collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1205.5371
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Evidence for the associated production of a W boson and a top quark in ATLAS at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1205.5764
Physics Letters B716 (2012), 142-159

Search for a Standard Model Higgs boson in the H -> ZZ -> llnunu decay channel using 4.7 fb-1 of

sqrt(s) = 7 TeV data with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1205.6744
Physics Letters B717 (2012), 29-48

A search for flavour changing neutral currents in top-quark decays in pp collision data collected with the ATLAS detector at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1206.0257
Submitted to JHEP

Search for the Standard Model Higgs boson in the H -> WW(*) -> l nu l nu decay mode with 4.7 /fb of ATLAS data at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1206.0756
Physics Letters B716 (2012), 62-81

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The ATLAS collaboration (G. Aad et al.).
arXiv:1206.1760
JHEP 07 (2012), 167

Measurement of event shapes at large momentum transfer with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1206.2135
European Physical Journal C72 (2012), 2211

Search for a Standard Model Higgs boson in the mass range 200-600 GeV in the H->ZZ->llqq decay channel
The ATLAS collaboration (G. Aad et al.).
arXiv:1206.2443
Physics Letters B717 (2012), 70-88

Measurement of the b-hadron production cross section using decays to D*muX final states in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1206.3122
Nuclear Physics B864 (2012), 341-381

Measurement of t anti-t production with a veto on additional central jet activity in pp collisions at sqrt(s) = 7 TeV using the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1203.5015
Eur. Phys. J. C72 (2012), 2043

ATLAS measurements of the properties of jets for boosted particle searches
The ATLAS collaboration (G. Aad et al.).
arXiv:1206.5369
Physical Review D 86 (2012), 072006

earch for the Standard Model Higgs boson in the H to tau+ tau- decay mode in sqrt(s) = 7 TeV pp collisions with ATLAS
The ATLAS collaboration (G. Aad et al.).
arXiv:1206.5971
Journal of High Energy Physics 09 (2012), 070

Search for the Higgs boson in the H->WW->lnujj decay channel at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1206.6074
Physics Letters B718 (2012), 391-410

Search for the Standard Model Higgs boson produced in association with a vector boson and decaying to a b-quark pair with the ATLAS detector ATLAS Collaboration
The ATLAS collaboration (G. Aad et al.).
arXiv:1207.0210
Physics Letters B718 (2012), 369-390

Combined search for the Standard Model Higgs boson in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1207.0319
Physical Review D86 (2012), 032003

Measurement of the Lambda_b lifetime and mass in the ATLAS experiment
The ATLAS collaboration (G. Aad et al.).
arXiv:1207.2284
Submitted to Physical Review D

A search for ttbar resonances in lepton+jets events with highly boosted top quarks collected in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1207.2409
Journal of High Energy Physics 09 (2012), 41

Search for top and bottom squarks from gluino pair production in final states with missing transverse energy and at least three b-jets with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1207.4686
European Physical Journal C72 (2012), 2174

Measurements of top quark pair relative differential cross-sections with ATLAS in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1207.5644
Submitted to European Physical Journal C

Search for magnetic monopoles in sqrt(s) = 7 TeV pp collisions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1207.6411
Physical Review Letters 109 (2012), 261803

Measurement of inclusive jet and dijet production in pp collisions at sqrt(s) = 7 TeV using the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
Physical Review D86 (2012),014022

Measurement of charged-particle event shape variables in sqrt(s) = 7 TeV proton-proton interactions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1207.6915
Submitted to Physical Review D

Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC
The ATLAS collaboration (G. Aad et al.).
arXiv:1207.7214
Physics Letters B716 (2012), 1-29

Underlying event characteristics and their dependence on jet size of charged-particle jet events in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.0563
Physical Review D86 (2012), 072004

Time-dependent angular analysis of the decay Bs -> J/psi phi and extraction of Delta Gamma_s and the CP-violating weak phase phi_s by ATLAS
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.0572
Submitted to Journal of High Energy Physics

Search for squarks and gluinos with the ATLAS detector in final states with jets and missing transverse momentum using 4.7 fb^-1 of sqrt(s) = 7 TeV proton-proton collision data
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.0949
Submitted to Physical Review D

Measurement of WZ production in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.1390
European Physical Journal C72 (2012), 2173

Search for a supersymmetric partner to the top quark in final states with jets and missing transverse momentum at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.1447
Physical Review Letters 109 (2012), 211802

Jet size dependence of single jet suppression in lead-lead collisions at sqrt(s(NN)) = 2.76 TeV with the ATLAS detector at the LHC
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.1967
Submitted to Physics Letters B

Search for direct top squark pair production in final states with one isolated lepton, jets, and missing transverse momentum in sqrt(s) = 7 TeV pp collisions using 4.7 fb-1 of ATLAS data
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.2590
Physical Review Letters 109 (2012), 211803

Search for new phenomena in the WW to l nu l' nu' final state in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.2880

Search for direct slepton and gaugino production in final states with two leptons and missing transverse momentum with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.2884

Evaluation of the local hadronic calibration with combined beam-test data for the endcap and forward calorimeters of ATLAS in the pseudorapidity region 2.5<|\eta |<4.0
J. Pinfold, J. Soukup, J.P. Archambault, C. Cojocaru, M. Khakzad, G. Oakham, M. Schram, M.G. Vincter, V. Datskov, V. Drobin, A. Fedorov, S. Golubykh, N. Javadov, V. Kalinnikov, S. Kakurin, M. Kazarinov, V. Kukhtin, E. Ladygin, A. Lazarev, A. Neganov, L. Petrova, I. Pisarev, N. Rousakovitch, E. Serochkin, S. Shilov, A. Shalyugin, Yu. Usov, M. Pecsy, P. Stavina, P. Strizenec, F. Barreiro, C. Gabaldon, F. Labarga, E. Nebot, C. Oliver, S. Rodier, J. del Peso, A. Belkin, M. Heldmann, L. Koepke, R. Othegraven, T. Schliephake, D. Schroff, H. Secker, J. Thomas, C. Benchouk, F. Djama, F. Hubaut, E. Monnier, V. Niess, P. Pralavorio, M. Raymond, B. Resende, D. Sauvage, C. Serfon, S. Tisserant, J. Toth, G. Azuelos, P. Delsart, C. Leroy, R. Mehdiyev, A. Akimov, M. Blagov, A. Komar, A. Snesarev, M. Speransky, V. Sulin, M. Yakimenko, V. Epshtein, V. Khovansky, P. Shatalov, T. Barillari, J. Erdmann, A. Kiryunin, L. Kurchaninov, S. Menke, M. Nagel, H. Oberlack, G. Pospelov, D. Salihagic, P. Schacht, T. Chen, J. Ping, M. Qi, A. Maslennikov, A. Soukharev, A. Talyshev, Yu. Tikhonov, P. Cavalleri, P. Schwemling, S. Chekulaev, S. Denisov, V. Evdokimov, M. Levitsky, A. Minaenko, G. Mitrofanov, A. Moiseev, A. Pleskatch, D. Stoyanova, L. Zakamsky, M. Bieri, J. Rani, D. Schouten, M. Vetterli, P. Loch, J. Rutherfoord, A. Savin, L. Shaver, M. Shupe, C. Galt, P. Gorbounov, N. Knecht, P. Krieger, L. Ma, R. Mazini, R. Orr, M. Losty, C.J. Oram, M. Fincke-Keeler, T. Hughes, N. Kanaya, R.K. Keeler, R. Langstaff, M. Lefebvre, R. McPherson, W. Shaw, M. Wielers, H.M. Braun, J. Thadome, Ch. Zeitnitz, ATLAS Liquid Argon Endcap Collaboration
NIM A693 (2012), 74-97

Search for direct production of charginos and neutralinos in events with three leptons and missing transverse momentum in sqrt(s) = 7 TeV pp collisions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.3144

Search for light scalar top quark pair production in final states with two leptons with the ATLAS detector in sqrt(s) = 7 TeV proton-proton collisions
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.4305
European Physical Journal C72 (2012), 2237

Further search for supersymmetry at sqrt(s) = 7 TeV in final states with jets, missing transverse momentum and isolated leptons with the ATLAS detector

The ATLAS collaboration (G. Aad et al.).
arXiv:1208.4688
Physical Review D86 (2012), 092002

Measurements of the pseudorapidity dependence of the total transverse energy in proton-proton collisions at sqrt(s) = 7 TeV with ATLAS
The ATLAS collaboration (G. Aad et al.).
arXiv:1208.6256
Journal of High Energy Physics 11 (2012), 033

Search for diphoton events with large missing transverse momentum in 7 TeV proton-proton collision data with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1209.0753
Physics Letters B718 (2012), 411-430

Search for light top squark pair production in final states with leptons and b-jets with the ATLAS detector in sqrt(s) = 7 TeV proton-proton collisions
The ATLAS collaboration (G. Aad et al.).
arXiv:1209.2102
Submitted to Physics Letters B

Search for high-mass resonances decaying to dilepton final states in pp collisions at a center-of-mass energy of 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1209.2535
Submitted to Journal of High Energy Physics

Search for a heavy top-quark partner in final states with two leptons with the ATLAS detector at the LHC
The ATLAS collaboration (G. Aad et al.).
arXiv:1209.4186
Journal of High Energy Physics 11 (2012), 094

ATLAS search for a heavy gauge boson decaying to a charged lepton and a neutrino in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1209.4446
Eur. Phys. J. C72 (2012), 2241

Search for dark matter candidates and large extra dimensions in events with a photon and missing transverse momentum in pp collision data at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1209.4625
Submitted to Physical Review Letters

Search for resonant top plus jet production in ttbar + jets events with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1209.6593
Physical Review D86 (2012), 091103

Search for displaced muonic lepton jets from light Higgs boson decay in proton-proton collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.0435
Submitted to Physics Letters B

Measurement of the flavour composition of dijet events in pp collisions at sqrt{s}=7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.0441
Submitted to European Physical Journal C

Search for Supersymmetry in Events with Large Missing Transverse Momentum, Jets, and at Least One Tau Lepton in 7 TeV Proton-Proton Collision Data with the ATLAS Detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.1314
European Physical Journal C72 (2012), 2215

ATLAS search for new phenomena in dijet mass and angular distributions using pp collisions at sqrt(s)=7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.1718
Submitted to Journal of High Energy Physics

Search for direct chargino production in anomaly-mediated supersymmetry breaking models based on a disappearing-track signature in pp collisions at sqrt(s)=7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.2852
Submitted to Journal of High Energy Physics

Measurement of W^+W^- production in pp collisions at sqrt{s}=7 TeV with the ATLAS detector and limits on anomalous WWZ and WWgamma couplings
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.2979
Submitted to Phys. Rev. D

Search for R-parity-violating supersymmetry in events with four or more leptons in sqrt(s) = 7 TeV pp collisions with the ATLAS detector ATLAS Collaboration
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.4457
Journal of High Energy Physics 12 (2012), 124

Search for dark matter candidates and large extra dimensions in events with a jet and missing transverse momentum with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.4491
Submitted to Journal of High Energy Physics

Search for anomalous production of prompt like-sign lepton pairs at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.4538

Submitted to Journal of High Energy Physics

Search for pair production of massive particles decaying into three quarks with the ATLAS detector in sqrt(s) = 7 TeV pp collisions at the LHC ATLAS Collaboration
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.4813
Submitted to Journal of High Energy Physics

Search for pair-produced massive coloured scalars in four-jet final states with the ATLAS detector in proton-proton collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.4826
Submitted to European Journal of Physics C

Search for doubly-charged Higgs bosons in like-sign dilepton final states at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.5070
European Journal of Physics C72 (2012), 2244

Search for pair production of heavy top-like quarks decaying to a high-pT W boson and a b quark in the lepton plus jets final state at sqrt(s)=7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.5468
Submitted to Physics Letters B

Jet energy resolution in proton-proton collisions at sqrt(s) = 7 TeV recorded in 2010 with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.6210
Submitted to European Physical Journal C

Measurement of Z boson Production in Pb+Pb Collisions at sqrt(s_NN)=2.76 TeV with the ATLAS Detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.6486
Submitted to Phys. Rev. Letters

A search for high-mass resonances decaying to tau+tau- in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.6604
Submitted to Physics Letters B

Search for long-lived, heavy particles in final states with a muon and multi-track displaced vertex in proton-proton collisions at sqrt(s)=7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1210.7451
Submitted to Physics Letters B

Search for Extra Dimensions in diphoton events using proton-proton collisions recorded at sqrt(s) = 7 TeV with the ATLAS detector at the LHC

The ATLAS collaboration (G. Aad et al.).
arXiv:1210.8389
Submitted to Physics Letters B

Search for contact interactions and large extra dimensions in dilepton events from pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.1150
Submitted to Phys.Rev.D

Search for supersymmetry in events with photons, bottom quarks, and missing transverse momentum in proton-proton collisions at a centre-of-mass energy of 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.1167
Submitted to Physics Letters B

Searches for heavy long-lived sleptons and R-Hadrons with the ATLAS detector in pp collisions at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.1597
Submitted to Physics Letters B

Measurement of isolated-photon pair production in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.1913
Submitted to Journal of High Energy Physics

Search for resonances decaying into top-quark pairs using fully hadronic decays in pp collisions with ATLAS at sqrt(s) = 7 TeV
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.2202
Submitted to Journal of High Energy Physics

Measurement of ZZ production in pp collisions at sqrt(s)=7 TeV and limits on anomalous ZZZ and ZZgamma couplings with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.6096
Submitted to Journal of High Energy Physics

Search for new phenomena in events with three charged leptons at a center-of-mass energy of 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.6312
Submitted to Physical Review D

Measurement of angular correlations in Drell-Yan lepton pairs to probe Z/gamma* boson transverse momentum at sqrt(s)=7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.6899
Submitted to Physics Letters B

Search for the neutral Higgs bosons of the Minimal Supersymmetric Standard Model in pp collisions at sqrt(s)=7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.6956
Submitted to Journal of High Energy Physics

Measurement of the ttbar production cross section in the tau+jets channel using the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.7205
Submitted to Journal of High Energy Physics

Measurement of Upsilon production in 7 TeV pp collisions at ATLAS
The ATLAS collaboration (G. Aad et al.).
arXiv:1211.7255
Submitted to Phys. Rev. D

Search for a heavy narrow resonance decaying to e mu, e tau, or mu tau with the ATLAS detector in sqrt(s) = 7 TeV pp collisions at the LHC
The ATLAS collaboration (G. Aad et al.).
arXiv:1212.1272
Submitted to Physics Letters B

Search for charged Higgs bosons through the violation of lepton universality in ttbar events using pp collision data at sqrt(s) = 7 TeV with the ATLAS experiment
The ATLAS collaboration (G. Aad et al.).
arXiv:1212.3572
Submitted to JHEP

Observation of Associated Near-side and Away-side Long-range Correlations in sqrt(s_NN)=5.02 TeV Proton-lead Collisions with the ATLAS Detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1212.5198
Submitted to Physical Review Letter

A Particle Consistent with the Higgs Boson Observed with the ATLAS Detector at the Large Hadron Collider
The ATLAS collaboration (G. Aad et al.).
Science, 21 December 2012, 1576-1582

A search for prompt lepton-jets in pp collisions at sqrt(s) = 7 TeV with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1212.5409
Submitted to Physical Letter B

Multi-channel search for squarks and gluinos in sqrt(s)=7 TeV pp collisions with the ATLAS detector
The ATLAS collaboration (G. Aad et al.).
arXiv:1212.6149
Submitted to Eur. Phys. J. C

10.) Experiment ALICE na LHC v CERN: štúdium vlastností silne interagujúcej hmoty pri extrémnych hustotách energie *(ALICE experiment at the CERN LHC: a study of strong interacting matter properties at high energy densities.)*

Zodpovedný riešiteľ:	Ladislav Šándor
Trvanie projektu:	1.1.1998 / 31.12.2015
Evidenčné číslo projektu:	CERN/MŠ ALICE KE, zmluva o financovaní 778/2011
Organizácia je koordinátorom projektu:	nie
Koordinátor:	CERN - European organization for nuclear research, Geneva
Počet spoluriešiteľských inštitúcií:	102 - Arménsko: 1, Brazília: 0, Kuba: 1, Česko: 3, Nemecko: 7, Dánsko: 1, Španielsko: 2, Fínsko: 1, Francúzsko: 8, Veľká Británia: 1, Grécko: 1, Chorvátsko: 2, Maďarsko: 1, Švajčiarsko: 1, Čína: 2, India: 8, Taliansko: 13, Japonsko: 3, Kórejská republika: 4, Mexiko: 4, Holandsko: 2, Nórsko: 3, Peru: 1, Poľsko: 3, Portugalsko: 0, Rumunsko: 2, Rusko: 10, Slovensko: 2, Švédsko: 1, Ukrajina: 1, USA: 12, JAR: 1
Čerpané financie:	MŠVVaŠ SR: 60000 €

Dosiahnuté výsledky:

V roku 2012 urýchľovací komplex LHC i experiment ALICE fungovali spoľahlivo a objem nových získaných údajov značne prekročil očakávania.

Vo fyzikálnej analýze sme v minulom roku pokračovali v štúdiu produkcie podivných častíc i krátkožijúcich častíc (rezonancií) obsahujúcich podivný kvark s v p-p i Pb-Pb zrážkach. Výťažky a spektrá neutrálnych kaónov a hyperónov Lambda, ako aj údaje o závislosti pomeru ich výťažkov na priečnej hybnosti častíc boli pripravené na opublikovanie. Prispeli sme aj k príprave viacerých ďalších fyzikálnych publikácií. V roku 2012 bola ukončená a úspešne obhájená dizertačná práca RNDr. Petra Kaliňáka (školiteľ L. Šándor).

Najzaujímavejší výsledok ALICE v roku 2012 bol získaný pri analýze pilotného súboru údajov o p-Pb zrážkach pri energii 5.02 TeV (2 mil. prípadov interakcie). Pri štúdiu rozloženia priečnej hybnosti a jadrového modifikačného faktoru R(pPb) nabitých častíc bolo zistené, že kolektívne efekty, pozorované v centrálnych Pb-Pb zrážkach, nesúvisia s počiatočným stavom zrážajúcich sa jadier, ale sú "odtlačkom" horúcej excitovanej hmoty vytvorenej v zrážkach ťažkých iónov (pozri preprint arXiv: 1210.4520 [nucl-ex]. Preto so značným záujmom očakávame získanie veľkého objemu nových údajov o p-Pb zrážkach plánované na január-február 2013 a pripravujeme sa na analýzu produkcie podivných častíc v p-Pb interakciách. Zber týchto údajov úspešne začal 20.januára 2013.

K spracovaniu experimentálnych údajov i k potrebným náročným fyzikálnym simuláciám prispela aj dobre fungujúca počítačová farma na ÚEF SAV, ktoré je integrálnou súčasťou celosvetového gridového systému LCG (LHC Computing Grid). Na našej farme, ktorá bola rozšírená o ďalšie výpočtové i diskové komponenty, bolo v minulom roku spočítaných viac ako 760000 náročných úloh pre experiment ALICE. Úspešne pokračoval i rozvoj a prevádzka interaktívneho výpočtového klastra SKAF, pracujúceho v režime PROOF pre flexibilnú analýzu veľkých objemov údajov.

Bol realizovaný i značný objem metodických prác. Členovia skupiny ALICE ÚEF SAV pracovali v smenách pri zabezpečení prevádzky experimentu v CERN. Zabezpečovali sme prevádzku a modernizáciu elektroniky pre kremíkový pixelový detektor (SPD) a centrálny triggrovací procesor (CTP). Aktívne sme sa zúčastnili aj na príprave projektu modernizácie (upgrade) vnútorného dráhového systému (ITS) ALICE. Rozbehli sme potrebné prípravné vývojové práce, zamerané najmä na radiačné testy prototypov novej digitálnej elektroniky. Kontinuálne sme zabezpečovali on-line monitorovanie luminozity v interakčnom bode ALICE na LHC, ktoré je plne integrované do

kontrolného systému experimentu. Od novembra 2012 je naša skupina zodpovedná za vyhodnocovanie meraní normalizačného účinného prierezu (tzv. VdM scans).

V roku 2012 sme v rámci projektu ALICE publikovali 21 prác v špičkových karentovaných časopisoch (viď zoznam publikácií vo výročnej správe ÚEF SAV - práce, kde prvým autorom je K. Aamodt alebo B. Abelev), ako aj 14 elektronických publikácií - preprintov, zaslaných do časopisov. Výsledky našej analýzy údajov o Pb-Pb zrážkach sme v apríli 2012 prezentovali na ALICE Physics Week vo Frascati (Taliansko).

Programy: 7RP

11.) Európska mikrokelvinová spolupráca *(European Microkelvin Collaboration)*

Zodpovedný riešiteľ:	Peter Skyba
Trvanie projektu:	1.4.2009 / 31.3.2013
Evidenčné číslo projektu:	228464
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Prof. Mikko Paalanen
Počet spoluriešiteľských inštitúcií:	12 - Nemecko: 3, Fínsko: 2, Francúzsko: 1, Veľká Británia: 2, Švajčiarsko: 1, Taliansko: 1, Holandsko: 2

Dosiahnuté výsledky:
V marci 2012 sme v KC SAV Smolenice zorganizovali hodnotiacu konferenciu projektu Microkelvin, konferenciu Microkelvin 2012. Na konferencii sa zúčastnilo vyše 80 účastníkov, za účasti p. Marie Douka - projektovej manažerky projektu Microkelvin. Na konferencii boli prezentované výsledky kolaborácie a vytýčená stratégia na záverečné obdobie projektu.

Publikované práce:

S.N. Fisher, G.R. Pickett, P. Skyba, N. Suramlishvili, Decay of persistent precessing domains in3He-B at very low temperatures, Phys. Rev. B 86, 024506 (2012), DOI:10.1103/PhysRevB.86.024506

M. Kupka, P. Skyba, BEC of magnons in superfluid 3He-B and symmetry breaking fields, Phys. Rev. B 85, 184529 (2012), DOI: 10.1103/PhysRevB.85.184529

S. Holt and P. Skyba, Electrometric direct I/V converter with wide bandwidth, Rev. Sci. Instruments 83, 064703 (2012)

Programy: Multilaterálne - iné

12.) JEM-EUSO, Kozmické Observatórium Extrémneho Vesmíru na palube Japonského Experimentálneho Modulu *(JEM-EUSO, Extreme Universe Space Observatory Onboard Japan Experiment Module)*

Zodpovedný riešiteľ:	Karel Kudela
Trvanie projektu:	1.1.2010 / 31.1.2015
Evidenčné číslo projektu:	MVTS JEM-EUSO
Organizácia je koordinátorom projektu:	nie

Koordinátor:	Univ. Tuebingen
Počet spoluriešiteľských inštitúcií:	24 - Bulharsko: 1, Nemecko: 2, Španielsko: 2, Francúzsko: 2, Švajčiarsko: 2, Taliansko: 2, Japonsko: 2, Kórejská republika: 2, Mexiko: 2, Poľsko: 2, Rusko: 2, Slovensko: 1, USA: 2

Dosiahnuté výsledky:
Boli upresňované výpočty rôznych pozaďových efektov v atmosfére, ktoré môžu ovplyvniť korektnosť interpretácie detekovaných spŕšok od kozmického žiarenia a tvoriť limity pre dobu pozorovania z ISS.

S poďakovaním podpore SAV pri integrovaní sa SR do ESA vyšla publikácia 1 a v recenznom konaní je práca 2. Práca 3 je prijatá. Pokračujúca účasť ÚEF SAV v projekte s podporou SAV je uvedená v "STATUS OF THE ACTIVITIES OF THE
JEM-EUSO CONSORTIUM, 13 November 2012" pripravenej 12.11. RIKENom, Japonsko.

1. P. Bobik, K. Kudela, B. Pastircak , A. Santangelo , M. Bertaina , K. Shinozaki , F. Fenu , J. Szabelski , J. Urbar, Distribution of secondary particles intensities over Earth's surface: Effect of the geomagnetic field, Advances in Space Research 50 (2012) 986–996

2. ADAMS JR.,J.H. – AHMAD, S. - ... – BOBIK, P. - ... – KUDELA, K. ... PASTIRCAK, B....-SHARAKIN, S. An evaluation of the exposure in nadir observation of the JEM-EUSO mission., submitted to Astroparticle Phys., 2012

3. BLAHOSLAV PASTIRČÁK, PAVOL BOBÍK AND KAREL KUDELA
FOR THE JEM-EUSO COLLABORATION: JEM-EUSO EXPERIMENT FOR EXTREME ENERGY COSMIC RAY OBSERVATION, Proceedings of the PIC 2012 (Physics in Collision), _Štrbské Pleso, Slovakia, na arXiv:1212.6520v1 [astro-ph.IM] 28 Dec 2012.

Členovia kolektívu pripravili viaceré reporty a prezentácie interného charakteru, príspevkov na medzinárodných konferenciách ako aj popularizačných aktivít v súvislosti s JEM-EUSO (uvedení sú len prví autori):

B. Pastirčák: Fake trigger background simulation, JEM-EUSO Simulation meeting, Madrid Spain, 26 - 30 March 2012

P. Bobík: Background distribution at FS, JEM-EUSO Simulation meeting, Madrid Spain, 26 - 30 March 2012

B. Pastirčák: Status of fake trigger background simulations, The 11th International JEM-EUSO Meeting, Moscow, Russia, May 2012

B. Pastirčák: JEM-EUSO experiment for extreme energy cosmic rays observation, poster na PIC 2012, Štrbské pleso, 12. - 15. september 2012, vybraný medzi postermi aj pre ústnu prezentáciu, príspevok do knihy-zborníka PIC 2012 pripravený, prijatý (Blahoslav Pastirčák, Pavol Bobík, Karel Kudela for the JEM-EUSO collaboration, arXiv:1212.6520v1 , 28.12.2012)

B. Pastirčák: Status of fake trigger events analysis, JEM-EUSO simulation meeting, Geneva, 17. - 19. october 2012

P. Bobík: JEM-EUSO duty cycle estimation Influence of auroral lights, JEM-EUSO simulation meeting, Geneva, 17. - 19. october 2012

P. Bobík: JEM-EUSO duty cycle estimation Influence of auroral lights and South Atlantic Anomaly, JEM-EUSO general meeting, Wako, JP, 3. - 7. december 2012

M. Putiš: Status of ray trace background, JEM-EUSO general meeting, Wako, JP, 3. - 7. december 2012

Vyše uvedené výsledky sú na internej stránke projektu.

K. Kudela pripravil 2 krátke reporty o stave riešenia projektu v SR pre koordinátora ESA v tomto projekte, analzyoval možný vplyv geomagnetickej aktivity na pozadie.

Programy: Bilaterálne - iné

13.) Štúdium amyloidnej agregácie lyzozýmu in vitro a analýza vplyvu agregácie na prežívanie buniek *(Investigation of the lysozyme amyloid aggregtiion using in vitro assays and analysing its effects on cell viability and proliferation)*

Zodpovedný riešiteľ:	Zuzana Gažová
Trvanie projektu:	3.1.2011 / 31.12.2012
Evidenčné číslo projektu:	SK-RO-0012-10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	
	Podpora medzinárodnej spolupráce z národných zdrojov: 1500 €

Dosiahnuté výsledky:
V rámci projektu sme sledovali účinok amyloidných agregátov na prežívanie a proliferáciu buniek, študovali sme najmä cytotoxicitu amyloidných agregátov v korelácii s bunkovým cyklom a apoptickými procesmi [Siposova et al. Magnetic fluid reverses inhibition of cell growing caused by protein amyloid fibrils, 9th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Minneapolis, Minnesota, U.S.A., 22-26 May 2012; Mocanu et al., Protective role of nanoparticles against cytotoxic effect induced by amyloid fibrils, XXIII Biochemical Meeting, Brno, Check Republic, 26-29 August 2012].

Programy: ERANET

14.) Inžiniering supravodivosti *(Inžiniering supravodivosti)*

Zodpovedný riešiteľ:	Peter Samuely
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	1 - Česko: 1

Dosiahnuté výsledky:
Pracovný balík 1. Masívne monokryštalické REBCO supravodiče (skrátene REBCO MMS)

Výsledky dosiahnuté v roku 2012 sa dotýkajú rastu masívnych monokryštalických supravodičov, vývoja ich mikroštruktúry a defektov v procese rastu a tvorby nanorozmerových piningových centier substitúciami v mriežke supravodiča.

1. Rast YBa2Cu3Ox masívnych monokryštálov
Na základe experimentálneho sledovania rastu masívnych YBa2Cu3Ox (Y123) kryštálov so zachytenými Y2BaCuO5 (Y123)v časticami v systéme s nominálnym zložením Y1.5Ba2Cu3Ox (zmes YBa2Cu3Ox a Y2O3 fáz) a prídavkom 1 hm. % CeO2 sme optimalizovali parametre rastu kvalitných masívnych YBa2Cu3Ox kryštálov a popísali fázové a štruktúrne zmeny v systéme počas kryštalizácie [1]. Ukázali sme, že Y123 monokryštál rastie v tomto systéme v oblasti teplôt 988 až 1003 ?C, pričom pri teplote izotermického rastu 996 ?C a vyššej sa netvoria na kryštalizačnom fronte stupne a následne defekty v podobe tzv. a/a-subzrn (Fig. 1). Meranie rýchlosti rastu Y123 kryštálu v závislosti na teplote izotermického rastu dovolilo porovnať tento parameter s dátami publikovanými pre YBCO systém (Fig. 2.) a ukázať na príčiny rozdielov, ktoré spočívajú najmä v rozdielnom nominálnom zložení ale aj v jave tlačenia tuhýchY211 častíc rastúcim Y123 kryštálom [2].
Orginálnym výsledkon tohoto štúdia je nájdenie príčin zastavenia rastu pri izotermickej výdrži. Tento jav sme dali do súvisu s prítomnosťou nadbytku oxidu medi v systéme, ktorý vzniká pri reakcii východzích zložiek (Y123+Y2O3 + CeO2) [3]. Počast rastu Y123 kryštálu sa koncentrácia CuO v zostávajúcej tavenine zvyšuje, klesá peritektická teplota, čo sme demonštrovali termickou analýzou, až sa rast zastaví. Ďalší rast môže pokračovať pri dodatočnom podchladení systému. Aplikovaním pomalého ochladzovania z teploty izotermického rastu sme pripravili kvalitnú masívne Y123 kryštály. Okrem toho sme analýzou štruktúry v jednotlivých štádiách kryštalizácie v skúmanom systéme popísali sferoidnú kryštalizáciu Y123 fázy [4], vývoj subzrnnej štruktúry pri rýchlom ochladzovaní ako aj podmienky a mechanizmus kryštalizácie BaCu2O2 fázy v tomto systéme [3].

2. Vývoj mikroštruktúry, zjemnenie Y211 častíc.
V systéme Y1.5Ba2Cu3Ox (zmes YBa2Cu3Ox a Y2O3 fáz) a prídavkom 1 hm. % CeO2 sme študovali vývoj mikrostruktúry v jednotlivých štádiách prípravy masívnych monokryštalických supravodičov [5]. Ukázali sme na možné mechanizmy zjemnenia Y211 častíc prídavkom zlúčeniny obsahujúcej cér. Prvým z možných postupov je lokálne zvýšenie koncentrácie pridaného Y2O3 a následné vytvorenie skeletonu s vysokou hustotou Y211 častíc, ktoré nemôžu rásť počas sintrovania vzorky (Fig. 3 (a) a (c)). Takýto stavu sa dosiahne ak v zlisovanej vzorke budú prítonmné veľké a malé častice Y123 fázy. Druhou možnosťou je prídavok BaCeO3 zlúčeniny so submikrónovým rozmerom častíc namiesto CeO2. Táto zlúčenina neprispieva k tvorbe CuO v systéme, následnej tvorbe taveniny pri sintrovaní a rastu Y211 častíc (Fig 3 (c)) [6].

3. Tvorba nanorozmerových piningových centier substitúciami
Študovali sme tvorbu nanorozmerových centier uchytávania magnetických tokočiar kryštálovej mriežke Y123 fázy (tzv. chemický pining) substitúciami Y resp. Ba nízkymi koncentráciami Sm, Gd a Yb [7,8]. Substitúcie týchto katiónov v mriežke Y123 samáriom, gadolíniom a yterbiom viedli k zmenám v teplote prechodu do supravodivého stavu a objaveniu pík efektu v závislosti kritickej prúdovej hustoty na magnetickom poli (Fig 4 (a) a (b)|[7]. Vo vzorkách so súčasným dopovaním atómami Yb a Sm resp. Gd kritická teplota stúpa so zvyšujúcou sa koncentráciou substituentu pri konštatntnej koncentrácii Yb (Fig. 4 (c)). Tento jav je pomerne prekvapujúci a zaslúži si ďalšie podrobnejšie štúdium [8].

4. Masívne supravodiče na báze pniktidov

Okrem REBCO masívnych monokryštalických supravodičov sme sa venovali aj masívnym supravodičonm na báze pniktidov. Študovali sme vzorky masívneho supravodiča FeSe pripraveného kryštalizáciou taveniny na NCK University Tainan, Taiwan [9].

Mikroskopická a termická analýza vzoriek ukázala, že v systéme prebieha atermická fázová transformácia martenzitického typu. Toto vedie k vysokým mechanickým pnutiam v systéme, ktoré môžu byť príčinou potlačenie prechodovej teploty. Táto môže byť zvýšená dodatočným tepelným spracovaním.

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Pracovný balík 2. Nanoštrukturované supravodiče

1.Systém s intrinzickými Jospehsonovými spojmi - (LaSe)(NbSe2) a nanofyzika pomocou subkelvinového STM.

Pomocou skenovacieho tunelového mikroskopu vyvinutého v laboratóriu sme pokračovali v meraniach na nových monokryštáloch (LaSe)1.14(NbSe2), ktoré pripravil Dr. Cario z univerzity v Nantes vo Francúzsku. Prvé výsledky podporujúce hypotézu vnútorných josephsonovských spojov v systéme boli publikované v Ref.[K1].
Pomocou subkelvinového STM mikroskopu s využitím CITS módu (Current Imaging Tunneling Spectroscopy) sme študovali charakteristiky supravodiča SrPd2Ge2, ktorý je izoštruktúrny so systémami železných pniktidov na báze „122“ . V prácach Refs.[1-4] sme pomocou metód ARPES a STM/STS ukázali, že na rozdiel od pniktidov ide o konvenčný supravodič. Intrinzicky patrí ku typu-I supravodivosti, ale vďaka tzv. špinavej limite existuje ako typ-II s abrikosovskou mriežkou supravodivých vírov, ktorú sme zobrazili pomocou STS CITS. Zmenou technologických parametrov príprav bude možné uskutočniť prechod od typu-II ku typu-I, čo otvára veľmi zaujímavé možnosti štúdia fyzikálnych vlastností systém na rozhraní dvoch typov.

2.Príprava a charakterizácia tenkých vrstiev a nanoštruktúr supravodivých, kovových, magnetických a hybridných

Tenké filmy nióbu v hrúbkach do 100 nm boli pripravené magnetrónovým naprašovaním. Filmy boli charakterizované AFM (povrchová štruktúra) a XRD (mriežkové konštanty). Študovali sme závislosť kritickej teploty supravodivého prechodu Tc a horného kritického poľa Hc2 na štruktúre filmov a tiež závislosť od vonkajšieho tlaku do 30 kbarov. Ukazuje sa, že pomocou vonkajšieho tlaku možno zvýšiť Tc filmov s nanokryštalickými zrnami až na hodnoty blízke masívnemu nióbu. Ide pravdepodobne o homogenizáciu a usporiadanie pôvodne vysoko neusporiadaných štruktúr. Horné kritické magnetické pole tenkých filmov je až desaťkrát väčšie ako u masívneho nióbu. Výsledky sú pripravené na publikovanie v Ref.[7].
V tomto roku sme uskutočnili spoločný experiment košického a pražského pracoviska zameraný na charakterizáciu tenkých supravodivých filmov NbN komplementárnymi technikami. V Prahe boli filmy študované v kolmom poli do 7 Tesla film in pomocou terahertzovej spektroskopie (Time Domain Terahertz Spectroscopy (TD TS)), zatiaľ čo v Kosiciach pomocou rastrovacej tunelovej mikroskopie a spektroskopie STM/STS. TD TS spriemeruje optické vlastnosti cez celú meranú vzorku, na druhej strane STM/STS odráža lokálne vlastnosti na nanoškále. Získané charakteristiky umožňujú porovnať vysokofrekvenčnú vodivosť s teoretickými modelmi bez ďalších fitovacích parametrov. Komplexná vodivosť v nulovom magnetickom poli je dobre popísaná Zimmermanovým modelom. V magnetickom poli je dynamika supravodivých vírov popísaná modifikovanou Londonovou rovnicou (selfkonzistentné riešenie Coffeyho a Clema). Taktiež sme použili časovo rozlíšenú teóriu Ginzburga a Landaua. Výsledky budú publikované v Ref. [6].
Pomocou magnetrónového naprašovania sme pripravili hybridné štruktúry supravodič/normálny kov. Supravodivý film z nióbu hrúbky niekoľkých desiatok nanometrov bol následne pokrytý vrstvou zlatého filmu hrúbky niekoľkých nanometrov. Takéto pokrytie študovaného materiálu, napr. supravodiča vrstvou chemicky stáleho kovu s hrúbkou menšou ako je koherenčná hĺbka supravodiča slúži ako pasivátor inak chemicky aktívneho povrchunapr, resp. na zlepšenie korugácie povrchu. To umožní následné merania povrchov, mriežok/skla supravodivých vírov, resp. spektier rastrovacím tunelovým mikroskopom. Podobným spôsobom sme pasivovali aj povrchy monokryštálov supravodivých pniktidov, ktoré inak nemožno pomocou STM vôbec merať.
V rámci spoločného projektu 7.RP EÚ Microkelvin s pracovníkmi Aalto University v Helsinkach a spoločnosťou Micronova v Helsinkách bol realizovaný transfer technologických poznatkov a

procesov potrebných pre výrobu nanomostíkov na košické pracovisko. Nanomostíky majú šírku 100nm a dĺžku 200µm.
V minulom roku sme uviedli v Košiciach do prevádzky zariadenie na optickú litografiu a nanolitografiu elektrónovým lúčom, kde sme mohli uplatniť získané skúsenosti z Helsínk. V súčasnosti prebieha optimalizácia prevádzky zariadenia, ale boli v našom laboratóriu úspešne pripravené prvé nanoštruktúry. Možno konštatovať, že košické pracovisko má zvládnutú technológiu výroby týchto nanomostíkov.
Ako doplnok k nanomostíkom sme vyrobili aj mechanické rezonátory na báze cínových ihiel/whiskerov. Vzhľadom na to, že ide o monokryštály cínu, ktorý pod teplotou 3K bude supravodičom, očakávame, že pôjde o rezonátory s vysokým Q faktorom, ktoré budú zaujímavé nie len z pohľadu fyziky samotného rezonátora, ale najmä jeho aplikácií pri štúdiu takých javov v supratekutých fázach hélia, akými sú generovanie a detekcia kvantovej turbulencie, povrchových stavov v supratekutých fázach hélia-3, ako nízkoteplotné teplomery a pod.
Na košickom pracovisku bol nainštalovaný a do prevádzky uvedený tzv. suchý rozpúšťací refrigerátor Triton 200 od Oxford Instruments (refrigerátor bez kryogénnych kvapalín) spolu so supravodivým magnetom generujúcim pole do 8Tesla. Refrigerátor bol zakúpený z prostriedkov projektu EXTREM, projektu ŠF EÚ. Pre inštaláciu refrigerátora bol navrhnutý a zrealizovaný závesný rám s antivibračným systémom a bol navrhnutý a nainštalovaný chladiaci okruh refrigerátora. Následne bolo inštalovaný samotný refrigerátor. Pri testovacích meraniach v Košiciach refrigerátor dosiahol teplotu 6.7 mK a garantovanú hodnotu magnetického poľa 8 Tesla. Meranie základnej teploty t.j. najnižšie dosiahnutej teploty bolo uskutočnené pomocou jadrového orientačného teplomera, ktorý je primárnym teplomerom. Inštalovaný refrigerátor je kľúčovým fyzikálnym zariadením pre fyzikálne merania samotných nanomostíkov, ako aj iných fyzikálnych systémov.
Bolo navrhnuté a vyrobené tepelné kotvenie so striebornou experimentálnou platňou, ktorá je umiestnená v centre magnetického poľa 8T supravodivého magnetu. V súčasnosti na refrigerátore prebieha inštalácia meracích vodičov a meracej elektroniky, ktorá je nutná k meraniu nielen samotných nanomostíkov, ale aj pre ďalšie fyzikálne merania.
V súčasnosti prebiehajú charakterizácia rezonátorov na báze nanomostíkov a cínových whiskerov vo vákuu a pri teplotách do 10 milikelvinov v poli do 8 Tesla.
Príprava matíc nanoostrovčekov. Matice boli pripravené elektrónovou litografiou na uhlíkovom a kremíkovom substráte. Ako príklad uvádzame maticu, kde je vzdialenosť medzi platinovými nanoostrovčekmi na uhlíkovom substráte 500 nm a veľkosť nanoostrovčeka je 100 nm. Rozmer celej matice bol 2x2 mm2 a celkový počet nanoostrovčekov niekoľko miliónov. Touto technológiou sa pripravujú magnetické supravodivé, kovové aj dielektrické nanoostrovčeky, resp. ich matice. Matice z platiny po vyžíhaní (v ochrannej atmosfére Ar pri niekoľkých 100 stupňoch) vytvoria sústavy orientovaných nanokryštálov s orientáciou (111). Tieto budú slúžiť ako modelové systémy pre štúdium katalytických reakcií, napr. vo vodíkových palivových článkoch. Pripravené hybridné štruktúry tenký nióbový film s magnetickými nanoostrovčekmi (permaloy) budú v projekte nanoSC COST slúžiť na štúdium magnetickým poľom generovanej supravodivosti.

3.Príprava systémov s koherentným kvantovým prekĺzavaním supravodivej fázy
Ani 100 rokov po objave supravodivosti nebol ešte experimentálne detegovaný fundamentálny jav koherentného kvantového prekĺzavania supravodivej fázy (coherent quantum phase slip - CQPS). Ide o jav komplementárny ku Josephsonovmu javu: zatiaľ čo pri Josephsonovom jave dochádza ku koherentnému prenosu Cooperových párov medzi supravodivými kontaktami, pri CQPS by mali ísť o koherentný transport supravodivých vírov cez supravodivý drôt. Pozorovanie tohto fundamentálneho javu je pravdepodobnejšie v silne neusporiadaných supravodičoch v blízkosti prechodu supravodič – izolátor. Systém s CQPS bude mať podobne ako Josephsonove spoje uplatnenie v metrológií (prúdový štandard), rsp. Pri realizácii supravodivých qubitov bez Josephsonovho spoja. Pokúšame sa pripraviť zariadenie s CQPS na súčiastke z karbidu molybdénu. Pripravili sme ultratenké supravodivé filmy z karbidu molybdénu (MoC) v rôznych hrúbkach od 5

do 10 nm. Kritická supravodivá teplota škáluje s hrúbkou filmu. Zmerali sme exponenciálnu teplotnú závislosť doby života v tomto supravodiči s vysokým stupňom neusporiadanosti a to pomocou dvoch experimentov. Jeden bol urobený pomocou mikrovlnových meraní na rezonátore z MoC pri teplotách nad 300 mK. Druhý experiment boli STM merania pri teplotách nad 280 mK. Oba experimenty analyzované pomocou modelu Mattisa a Bardeena indikujú, že doba života kvázičastíc síce exponenciálne rastie so znižovaním teploty, ale má tendenciu saturovať ku konečnej hodnote (Ref.[5]). To by mohlo mať nepriaznivé dôsledky na dekoherenciu v qubitoch na báze CQPS. Boli pripravené štruktúry pre možnú realizáciu qubitu na báze CQPS z karbidu molibdénu. V súčasnostu prebieha ich charakterizácia na zmiešavacom refrigerátore Triton 200.
4.Spriahnuté perzistentne precesujúce domény v supratekutom héliu-3 ako analóg qubitu
Bola navrhnutá a zrealizovaná experimentálna komôrka pre štúdium interakcie medzi dvomi perzistentne precesujúcim doménami (PPD). Každá z domén je charakterizovaná vlastným kvantovým stavom (amplitúda magnetizácie, frekvencia a fáza precesie), nastaveným vonkajším magnetickým poľom. Naša konfigurácia umožňuje pomocou prídavného magnetického poľa nastaviť veľkosti energetickej bariéry medzi doménami. Takáto konfigurácia reprezentuje v princípe qubit, keďže vhodným nastavením veľkosti bariéry dôjde ku kvantovej interferencií medzi dvomi kvantovými stavmi domén. Qubity na báze perzistentne precesujúcich domén neumožnia praktickú technickú realizáciu kvantového počítania, ale vzhľadom na veľmi dlhú dobu života pri ultranízkych teplotách (pri teplote stoviek mikrokelvinov je to rádove 1000 s), umožňujú štúdium javov dekoherencie. V práci Ref. [8] sme určili závislosť doby života PPD na teplote pre rôzne polohy PPD z pohľadu horizontálnej steny experimentálnej komôrky. V súčasnosti prebieha experiment s dvomi navzájom interagujúcimi PPD.

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[K3] SAMUELY, Tomáš - SZABÓ, Pavol - RODRIGO, J.G. - SAMUELY, Peter. Superconducting density of states and vortex studies on SrPd2Ge2. In Seventh International Conference on Vortex Matter in Nanostructured Superconductors, Rhodes, Greece, 10-17 September, 2011, invited lecture (P. Samuely).
[K4] SAMUELY, Tomáš - SZABÓ, Pavol - RODRIGO, J.G. - INOSOV, D.S. - PARK, J.T. - SUNG, N.H. - CHO, B.K. - SAMUELY, Peter. Scanning Tunneling Spectroscopy of Superconducting Energy Gap in SrPd2Ge2 Single Crystal, Isostructural with 122 Iron Pnictides. In International Workshop on Mesoscopic Superconductivity and Vortex Imaging, Bath, U.K., 3-7 May, 2011, invited lecture (P. Samuely).
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[K8] P. Szabó, T. Samuely, J. Kačmarčík, P. Samuely, J. G .Rodrigo, L. Cario, STM studies on the intrinsic Josephson junction behavior of the low temperature (LaSe)1.14(NbSe2) superconductor, International Conference on Phase Separation and Superstripes in High Temperature Superconductors and Related Materials. SUPERSTRIPES (2012), Erice, Sicily, from July 11 to 17, 2012 at the Ettore Majorana Foundation and Centre for Scientific Culture, abstract book, p.114, invited lecture (P. Szabó).
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[K10] P. Szabó, J. Kačmarčík, Z. Pribulová, J. Girovský, S. Gabáni, G. Pristáš, I. Takáčová, K. Flachbart, T. Mori, and P. Samuely, Strong-coupling superconductivity of YB6, International conference on MATERIALS & MECHANISMS OF SUPERCONDUCTIVITY - M2S 2012, Washington, D.C., USA July 29 - August 3, 2012. Book of abstracts P3-07.
[K11] Z. Pribulová, J. Kačmarčík, P. Samuely, P. Barančeková and G. Karapetrov, Systematic study of CuxTiSe2 by ac-calorimetry, International conference on MATERIALS & MECHANISMS OF SUPERCONDUCTIVITY - M2S 2012, Washington, D.C., USA July 29 - August 3, 2012. Book of abstracts P1-114.
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[K13] J. Kačmarčík, Z. Pribulová, P. Szabó, S. Gabáni, T. Mori, P. Samuely, YB6- superconductor with an Einstein lattice, Proceedings of International Conference on Physics of Materials, 17 – 19 October 2012, Košice, pp. 55 – 58.

15.) Malé zariadenie na získavanie energie na báze magnetostrikčných amorfných a nanokryštalických materiálov *(Small energy harvester based on magnetostrictive amorphous and*

nanocrystalline materials)

Zodpovedný riešiteľ:	Ivan Škorvánek
Trvanie projektu:	1.1.2012 / 31.12.2014
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	nie
Koordinátor:	National Institute of Research and Development for Technical Physics
Počet spoluriešiteľských inštitúcií:	2 - Rumunsko: 2

Dosiahnuté výsledky:
Naše výskumné aktivity v prvom roku riešenia projektu boli orientované na návrh a vývoj vhodných magnetostrikčných amorfných a nanokryštalických zliatin na báze železa v tvare tenkých pások a na cielenú optimalizáciu ich magnetických a magnetoelastických vlastností. Hlavným cieľom bolo dosiahnuť koexistenciu vysokej hodnoty nasýtenej magnetickej polarizácie s dostatočne vysokými hodnotami magnetostrikčnej konštanty a magnetomechanického koeficientu. Jednou zo základných metodík, ktoré sme za týmto účelom využili(okrem modifikácie kompozičného zloženia) bolo tepelné spracovanie materiálu za súčasného pôsobenia externého magnetického poľa. Ako jeden z perspektívnych kandidátov na získanie vhodných magnetických a magnetoelastických charakteristík pre účely tohoto projektu bol vytipovaný systém zliatin s vysokou magnetostrikciou na báze FeGa. Naše výsledky ukázali, že tepelné spracovanie v aplikovanom magnetickom poli ovplyvňuje pozitívne hodnoty magnetostrikcie a magnetomechanického koeficientu. Magnetomechanický koeficient narástol z hodnôt 0.13 - 0.35 pre "as-quenched" vzorky na hodnotu 0.75 pre vzorky po optimálnom tepelnom spracovaní. Žíhanie v poli viedlo tiež k zmene tvaru ich hystereznej slučky. Ďalšia časť našich aktivít bola venovaná štúdiu efektov spracovania v externom magnetickom poli na magnetické a magnetoelastické vlastnosti amorfných a nanokryštalických zliatin na báze železa. Sľubné výsledky v tomto smere boli získané pre materiál typu FINEMET, ktorý bol následne pripravený v požadovanom objemovom množstve pre rumunského partnera na prvé skúšky v stavanom prototype zariadenia na získavanie energie z vibrácií v okolitom prostredí.

LUPU, Nicoleta - ŠKORVÁNEK, Ivan – GRIGORAS, M. – TIBU, Mihai - MARCIN, Jozef - CHIRIAC, Horia. The effect of magnetic field annealing on polycrystalline Fe-Ga melt-spun ribbons. In INTERMAG 2012: IEEE International Magnetics Conference, May 7th - 11th, 2012, Vancouver,Canada, Program Book p.44, talk BF-06

ŠKORVÁNEK, Ivan - MARCIN, Jozef - VARGA, Marek - CAPIK, Marek - KOVÁČ, Jozef - ŠVEC, Peter. FeNi- and FeCo-based amorphous and nanocrystalline alloys for magnetic sensors: the effect of field annealing. In MAP 5 : Proceedings of 5th International Workshop on Materials Analysis and Processing in Magnetic Fields, May 13-17, 2012, Autrans, France, talk, p.54-56.

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Ivan ŠKORVÁNEK, Jozef MARCIN, Marek CAPIK, Marek VARGA, Jozef KOVÁČ, Irena JANOTOVA, Peter ŠVEC, Bogdan IDZIKOWSKI, Soft Magnetic Melt-Spun Ribbons for Energy and Sensor Applications. In Acta electrotechnica et informatica, 2013, ISSN 1335-8243, (pozvaná prednáška na PM-2012 konferencii), prijate do tlače

Projekty národných agentúr

Programy: VEGA

1.) Supramolekulárne komplexy proteínov *(Supramolecular proteincomplexes)*

Zodpovedný riešiteľ:	Marián Antalík
Trvanie projektu:	1.1.2012 / 31.12.2015
Evidenčné číslo projektu:	VEGA2/0025/12
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	UEF SAV: 5401 €

Dosiahnuté výsledky:
V predchádzajúcom období sme pripravili nové typy nanočastíc na báze Au, Ag, magnetitu a ZnO. Výsledky boli opublikované v :
VALUŠOVÁ, Eva - VANDŽUROVÁ, Anna - PRISTAŠ, Peter - ANTALÍK, Marián - JAVORSKÝ, Peter. Water treatment using activated carbon supporting silver and magnetite. In Water science and technology, 2012, vol. 66, no. 12, p. 2772-2778.
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2.) Spektrometria kozmických energetických častíc na palube vedeckých satelitov
(Spectrometry of space energetic particles on board of the scientific spacecraft)

Zodpovedný riešiteľ:	Ján Baláž
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	2/0094/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Baláž,J., Gladyšev,V.A., Kudela,K., Petrukovič, A.A., Sarris, E., Sarris,T., Slivka,M., Strharsky,I.: Izmerenija energičnoj plazmy v eksperimente MEP-2 na bortu kosmičeskogo apparata Spektr-R. Kosmičeskie Issledovania, 2013, vol. 51, No. 2, s. 1-6., ADC, podiel problematiky 1.0, (http://space.saske.sk/projects/mep2/kosiss.pdf)

Baláž,J., Strhárský,I.: ENERGETIC PARTICLE SPECTROMETER DOK-M FOR SPACE EXPLORATION PROJECT RESONANCE, IEP-SAS Košice, December 2012 (http://space.saske.sk/projects/dokm/DOKM-TDUG.pdf)

Technologický prototyp spektrometra DOK-M/EM (Engineering Model) pre misiu RESONANCE je pred dokončením, vyexpedovanie do IKI Moskva je plánované vo februári 2013.

Rozpracovanie architektúry a 3D modelu senzorovej časti imagera energetických neutrálnych atómov NAIS-H pre čínsky vesmírny projekt MIT (Mesosphere-Ionosphere-Termosphere).

3.) Anomálne transportné vlastnosti silne korelovaných elektrónových systémov *(Anomalous transport properties of strongly correlated electron systems)*

Zodpovedný riešiteľ:	Ivan Baťko
Trvanie projektu:	1.1.2009 / 31.12.2012
Evidenčné číslo projektu:	2/0133/09
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
BAŤKO, Ivan - BAŤKOVÁ, Marianna. AFM-utilizing approach to search for new oxide materials for perspective applications in memristive devices. In European Physical Journal - Applied Physics, 2012, vol. 58, no. 2, art. no. 20102. (0.771 - IF2011). (2012 - Current Contents, SCOPUS). ISSN 1286-0042.Typ: ADCA

Memristive behaviour of Nb/NbOx/Nb structures prepared by local anodic oxidation, I. Baťko, M. Baťková, Abstract Book, 9th International Conference on Nanosciences & Nanotechnologies (NN12), p. 230.

4.) Vplyv štruktúrnych zmien na deformáciu a porušovanie amorfných a nanoštruktúrovaných zliatin. *(Influence of structural changes on deformation and failure of amorphous and nanostructured alloys)*

Zodpovedný riešiteľ:	Kornel Csach
Trvanie projektu:	1.1.2011 / 31.12.2013
Evidenčné číslo projektu:	2/0185/11
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV

Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Boli získané poznatky o vplyve lokalizovanej plastickej deformácie a napäťových polí v blízkosti sklzových pásov na magnetické vlastnosti amorfných zliatín.

ADCA61MIŠKUF, Jozef - CSACH, Kornel - JURÍKOVÁ, Alena. Influence of Plastic deformation on Magnetic Transition in Soft Magnetic Amorphous Alloys. In Acta Physica Polonica A, 2012, vol. 121, no. 5-6, p. 1273-1275. (0.444 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0587-4246. PM´11 : proceedings of the European Conference Physics of Magnetism, Poznan, Poland, June 27-July 1, 2011. (0.444 - IF2011).

ADEA03JURÍKOVÁ, Alena - CSACH, Kornel - MIŠKUF, Jozef. Evolution of structure during local plastic deformation in Fe-Ni-B metallic glass. In Chemické listy, 2012, vol. 106, sp. iss. s3, p. s448-s449. (0.529 - IF2011). (2012 - SCOPUS). ISSN 0009-2770. LMP 2011: Local Mechanical Properties, Olomouc, Czech Republic, 9-11 November 2011. (0.529 - IF2011).

5.) Nanoštruktúrované komplexné oxidy s perovskitovou štruktúrou *(Nanostructured complex oxides with perovskite structure)*

Zodpovedný riešiteľ:	Pavel Diko
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	2/0211/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 16871 €

Dosiahnuté výsledky:
Študovali sme kryštalizácia v systéme Y1.5Ba2Cu3Ox (zmes YBa2Cu3Ox a Y2O3 fáz) a prídavkom 1 hm. % CeO2. Pozorovali sme a popísali blokovú a sferoidálnu formu kryštalizácie YBa2Cu3Ox fázy.
V systéme FeSe pniktidového supravodiča sme metódami polarizačnej svetelnej mikroskopie a diferencálnej skenovacej kalorimetrie identifikovali atermickú transformáciu v pniktidovom supravodiči FeSe.
[1]P. Diko, M. Šefčiková, K. Zmorayová, M. Kalmanová, D. Volochová, S. Piovarči, Blocky and spheroidal growth in Y1.5Ba2Cu3Ox system, Journal of Crystal Growth 338 (2012) 239–243.
[2]P. Diko, V. Antal, V. Kavečanský, Ch. Yang, I. Chen, Microstructure and phase transformations in FeSe superconductor, Physica C 476 (2012) 29–31.

6.) Štúdium korelačných efektov v silne interagujúcich sústavách fermiónov

Zodpovedný riešiteľ:	Pavol Farkašovský
Trvanie projektu:	1.1.2010 / 31.12.2012

Evidenčné číslo projektu:	2/0175/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 7649 €

Dosiahnuté výsledky:
Medzi najhodnotnejšie výsledky dosiahnuté v roku 2012 patria výsledky publikované v práci P. Farkašovský, Ferromagnetism in the asymmetric Hubbard model, Eur. Phys. J. B 85, 253 (2012) pojednávajúcej o možnosti stabilizácie feromagnetického stavu v asymetrickom Hubbardovom modeli, kedy amplitúdy preskokov pre elektróny so spinom hore t?, a spinom dole t? sú odlišné. Naše výsledky ukázali, že už malé odchýlky od symetrického bodu t?=t? stabilizujú feromagnetický stav v širokej oblasti parametrov modelu, čo poukazuje na fakt, že v reálnych systémoch by feromagnetický stav mohol byť stabilizovaný takými mechanizmami, ktoré narúšajú túto symetrickú podmienku, napr. v dôsledku tzv. korelovaného skákania elektrónov, kedy amplitúda preskoku jedného typu elektrónu medzi i-tou a j-tou polohou závisí od obsadenia polôh elektrónmi s opačne orientovanými spinmi. To otvára novú cestu k hlbšiemu pochopeniu itinerantného feromagnetizmu v korelovaných systémoch.

7.) Iónové kvapaliny - vplyv na štruktúru a stabilitu proteínov *(Ionic liquids - influence on structure and stability of proteins)*

Zodpovedný riešiteľ:	Diana Fedunová
Trvanie projektu:	1.1.2011 / 31.12.2013
Evidenčné číslo projektu:	2/0155/11
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 4750 €

Dosiahnuté výsledky:
V rámci riešenia cieľov projektu sme študovali viskozitu a kolektívnu difúziu albumínu v prostredí s vysokou koncentráciou nízkomolekulových iónov pomocou experimentálnych a teoretických prístupov. Bol zostavený analytický model proteínu, ktorého validita bola potvrdená porovnaním s experimentálnymi výsledkami.
Študovali sme vplyv rôznych typov polyaniónov na optické vlastnosti tioflavínu, ktorý sa používa ako amyloid-špecifická fluorescenčná sonda. Zistili sme, že tioflavín v prítomnosti nepolypetidových polyaniónov vykazuje indukovanú optickú aktivitu v závislosti od chirality polyaniónu.
Pripravili sme iónové kvapaliny s rôznym typom aniónu, ktoré budeme ďalej používať pri štúdiu ich vplyvu na stabilitu proteínov a tvorbu amyloidných agregátov.

ANTOŠOVÁ, Andrea - GAŽOVÁ, Zuzana - FEDUNOVÁ, Diana - VALUŠOVÁ, Eva - BYSTRENOVÁ, Eva - VALLE, Francesco - DAXNEROVÁ, Zuzana - 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.

FEDUNOVÁ, Diana - HUBA, P. - BÁGEĽOVÁ, Jaroslava - ANTALÍK, Marián. Interaction of Thioflavin T with non-polypeptide polyanions . induced circular dichroism study. In FEBS Journal, 2012, vol. 279, suppl. 1, abstr. P20-210, p. 471. (3.790 - IF2011). (2012 - WOS). ISSN 1742-464X. 22nd IUBMB Congress and 37th FEBS Congress Conference, Seville, Spain, September 4-9, 2011. (

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.

8.) Amyloidná agregácia proteínov *(Amyloid aggregation of proteins)*

Zodpovedný riešiteľ:	Zuzana Gažová
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	2/0079/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:

Študovali sme účinok nanočastíc na amyloidnú agregáciu proteínov (inzulín a lyzozým), ktorá je sprievodným znakom lyzozýmovej systémovej amyloidózy a spôsobuje vážne problémy pri liečbe diabetických pacientov pomocou inzulínu ako aj pri aplikácii inzulínových púmp. Anti-amyloidná aktivita bola zistená pre biokompatibilné zlaté nanočastice pokryté glutationom. Z koncentračných závislostí inhibičnej a depolymerizačnej aktivity Au nanočastíc sme určili polovičnú inhibičnú koncentráciu IC50 = 6,19 ?M a polovičnú depolymerizačnú koncentráciu DC50 = 8,26 ?M [Antošová et al. Anti-amyloidogenic activity of glutathione-covered gold nanoparticles, Materials Science & Engineering C, 2012, 32 (8), 2529-2535].

Pre lepšie pochopenie vplyvu fyzikálno-chemických vlastností na anti-amyloidnú aktivitu magnetickej kvapaliny sme sledovali účinok 18 magnetických kvapalín zložených z magnetitových nanočastíc s rozdielnym obsahom hovädzieho sérového albumínu (MFBSAs; w/w (BSA:Fe3O4) od 0.005 do 15) na inzulínové amyloidné fibrily. Zistili sme, že prítomnosť MFBSAs viedla ku značnej deštrukcii inzulínových amyloidných agregátov in vitro, pričom táto aktivita bola ovplyvnená hlavne rozmerom nanočastíc a do istej miery aj zeta potenciálom a izoelektrickým bodom [Šipošová et al. Nanotechnology, 2012, 23 (5) , art. no. 055101]. Podobný anti-amyloidný účinok bol pozorovaný pre magnetické kvapaliny, ktoré boli stabilizované oleátom sodným nanočastíc a modifikované dextránom [Gazova et al. Acta Phys Polonica A 2012, 121 (5-6) , 1305-1307].

9.) Štúdium anomálneho škálovania v stochastických a turbulentných systémoch s narušenými symetriami *(Study of anomalous scaling in stochastic and turbulent systems with symmetry breaking)*

Zodpovedný riešiteľ:	Michal Hnatič
Trvanie projektu:	1.1.2009 / 31.12.2012
Evidenčné číslo projektu:	VEGA-0173-09

Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Boli študované javy v stochastických prostrediach včítane rozvinutej turbulencie.
Boli stanovené tri hlavné ciele - štúdium difúzie skalarnej prímesi v turbulentných prostrediach, štúdium reprezentatívných konštánt v teórii rozvinutej turublencie a štúdium helikálnej magnetohydrodynamickej turbulencie včítane transportu častíc v kozmickom prostredi.
Pri plnení cieľov a podcieľov boli formulované úlohy, riešenie ktorých priviedlo k dosiahnutiu následovných výsledkov:
- Bol študovaný vplyv hydrodynamických fluktuácií na difúziu a priebeh chemických reakcií chemicky aktívných častíc, nájdená závislosť ich koncentrácie na čase a odvodená integrálno-diferenciálna nelineárna rovnica pre pole koncentrácie [ADCA3; AEC1; AFDA2].
- V dvojslučkovom priblížení bolo nájdené turbulentné Prandtlovo číslo. Bolo ukázané, že turbulentné Prandtlovo číslo je silne stabilne voči poruchovému počtu [ADCA1; AFDA1] .
- Bol študovaný vplyv anizotropie na veľkosť a smer generovaného veľkoškálového magnetického poľa v MHD turbulencii s narušenou priestorovou paritou [ADEB1].
Všetky výpočty boli urobené s presnosťou do jedno- alebo do dvojsľučkového priblíženia.
- Skúmal sa problém štatistického urýchľovania nabitých vysokoenergetických častíc a ich následnej difúzie v homogénnom i ohraničenom priestore. Získané boli analytické riešenia transportných rovníc pre pasívnu nabitú prímes pre obe oblasti – vnútri i mimo urýchľovacej oblasti [ADCA2; ADEB2]

ADCA Vedecké práce v zahraničných karentovaných časopisoch impaktovaných
1. ADCA GLADYSHEV, A.V. - JURČIŠINOVÁ, E. - JURČIŠIN, M. - REMECKÝ, R., ZALOM, P.. Anomalous scaling of a passive scalar field near two dimensions. In Physical Review E, 2012, vol. 86, no. 3, art. no. 036302.
2. ADCA FEDOROV Yu. I., SHAKHOV B.A., STEHLIK M.: Statistical acceleration of energetic particles and their diffusion in the turbulent magnetic fields. In J.Phys. B. 45 (2012) 165702-1-14.
3.ADCA M. HNATIC, J. HONKONEN , T. LUCIVJANSKY: Field-theoretic technique for irreversible reaction processes. In review journal "Physics of Elementary Particles and Atomic Nuclei" V.44 part 2, march-april 2013, p. 70

ADEB Vedecké práce v zahraničných nekarentovaných časopisoch neimpaktovaných
1.ADEB SHAKHOV, B.A. - JURČIŠINOVÁ, Eva - JURČIŠIN, Marián - STEHLÍK, Milan. The spontaneous magnetic field direction in an anisotropic MHD dynamo. In Kinetics and Physics of Celestian Bodies, vol. 28, no. 5, (2012) p. 27-36.
2.ADEB FEDOROV Yu. I., SHAKHOV B.A., STEHLIK M.: Statistical acceleration and spatial diffusion of cosmic rays in the turbulent medium. In Kinetics and Physics of Celestian Bodies, 2012, vol. 28, no. 6, (2012) 1-25.

AEC Vedecké práce v zahraničných recenzovaných vedeckých zborníkoch (aj konferenčných), monografiách
1.AEC HNATIČ, M. , HONKONEN, J. LUCIVJANSKY T. : On the mathematical modelling of the annihilation process. In Lecture Notes in Computer Science, Springer LNCS 7125, Int. Conf. MMCP11, Selected papers, Eds. G. Adam, J.Busa, M.Hnatic, ISBN 978-3-642-28211-9, (2012) p.154-159.

AFDA Publikované príspevky na medzinárodných vedeckých konferenciách poriadaných v SR
1.AFDA GLADYSHEV, A.V. - JURČIŠINOVÁ, Eva - JURČIŠIN, Marián - REMECKÝ, Richard. Helicity and the Turbulent Prandtl Number. In STM 13 : 13th Small Triangle Meeting on Theoretical Physics, November 14-16, 2011, Stará Lesná. Eds. Ján Buša, Michal Hnatič, Peter Kopčanský. - Košice : Institute of Experimental Physics SAS, 2012, s. 14-19. ISBN 978-80-8143-017-6.
2.AFDA M. HNATIC, J. HONKONEN, T. LUCIVJANSKY: Critical Behaviour Of Directed Percolation In The Presence Of Synthetic Velocity FieldIn STM 13 : 13th Small Triangle Meeting on Theoretical Physics, November 14-16, 2011, Stará Lesná. Eds. Ján Buša, Michal Hnatič, Peter Kopčanský. - Košice : Institute of Experimental Physics SAS, 2012, s. 14-19. ISBN 978-80-8143-017-6.

10.) Magnetizmus a supravodivosť. Experimentálne štúdium v extrémnych podmienkach.
(Magnetism and superconductivity. Experimental study at extreme conditions.)

Zodpovedný riešiteľ:	Jozef Kačmarčík
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	2/0148/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	7 - Rakúsko: 1, Česko: 1, Španielsko: 1, Francúzsko: 1, Japonsko: 1, Rusko: 1, Ukrajina: 1
Čerpané financie:	SAV: 19276 €

Dosiahnuté výsledky:
T. Samuely, P. Szabó, Z. Pribulová, N. H. Sung, B. K. Cho, T. Klein, V. Cambel, J. G. Rodrigo and P. Samuely:
Type II superconductivity in SrPd2Ge2,
Supercon. Sci. Technol. 26 015010 (2013)

T. Samuely, P. Szabó, J. G. Rodrigo and P. Samuely:
Superconducting density of states and vortex studies on SrPd2Ge2,
Physica C 479 95 (2012).

A.V. Bogach, V.V. Glushkov, S.V. Demishev, N.E. Sluchanko, N.Yu. Shitsevalova, V.B. Fillipov, K. Flachbart:
Magnetic field enhancement of the Hall effect in diluted magnetic system La1_xCexB6 (x ? 0.1),
Solid State Sciences 14 (2012) 1629-1631.

S. Gabáni, I. Baťko., M. Baťková, K. Flachbart, E. Gažo, M. Reiffers, N. Shitsevalova, K. Siemensmeyer, N. Sluchanko:
Influence of Lu – Substitution on the frustrated antiferomagnetic system HoB12,
Solid State Sciences 14 (2012) 1722-1724.

S. Gabáni, E. Gažo, G. Pristáš, I. Takáčová, K. Flachbart, N. Shitsevalova, K. Siemensmeyer, N. Sluchanko:
Magnetic properties of Ho1-xLuxB12 solid solutions,
Journal of the Korean Physical Society (2012) – prijaté.

S. Gabáni, I. Baťko, M. Baťková, K. Flachbart, E. Gažo, G. Pristáš, I. Takáčová, A. Bogach, N. Sluchanko, N. Shitsevalova:
Transport properties of Ho1-xLuxB12 solid solutions,
Journal of the Korean Physical Society (2012) – prijaté.

11.) Štrukturalizačné javy v samousporiadajúcich štruktúrach proteínov ovplyvňované nanočasticami *(Structure-forming phenomena in self-assembly structures of proteins influenced by nanoparticles)*

Zodpovedný riešiteľ:	Martina Koneracká
Trvanie projektu:	1.1.2012 / 31.12.2015
Evidenčné číslo projektu:	2/0041/12
Organizácia je koordinátorom projektu:	Áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	UEF SAV: 5354 €

Dosiahnuté výsledky:
Intenzívne sa sledoval vplyv magnetických nanočastíc na amyloídnú agregáciu proteínov, ktorá zohráva významnú úlohu pri mnohých závažných a v súčasnej dobe neliečiteľných ochoreniach. V nižšie uvedenej publikácii sú zhrnuté najdôležitejšie nové vedecké výsledky skúmajúce interakciu magnetických nanočastíc s amyloidnou agregáciou proteínov detegovanou pri Alzheimerovej chorobe, familiárnej systémovej amyloidóze a liečbe cukrovky. Bolo zistené, že magnetické nanočastice majú schopnosť redukovať tvorbu amyloidných agregátov, čo predstavuje veľký potenciál pre ich využitie pri liečbe amyloidných chorôb.

Z.Gažová, K.Šipošová, M.Koneracká, A.Antošová, V.Závišová, M.Kubovčíková, D. Fedunová, J.Bágeľová, N.Tomašovičová, Z.Daxnerová, P. Kopčanský. Presence of Magnetic Fluids Leads to the Inhibition of Insulin Amyloid Aggregation.
In Acta Physica Polonica A, 2012, vol. 121, no. 5-6, p. 1305-1307. (0.444 - IF2011).

12.) Vplyv rôznych nanočastíc na štruktúrne prechody vo feronematikách a na dielektricke vlastnosti magnetických kvapalín *(Influence of different nanoparticles on the structural transitions in ferronematics and dielectric properties of magnetic fluids)*

Zodpovedný riešiteľ:	Peter Kopčanský
Trvanie projektu:	1.1.2009 / 31.12.2012
Evidenčné číslo projektu:	VEGA 2/0077/09
Organizácia je koordinátorom projektu:	Áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	4 - Slovensko: 4

Dosiahnuté výsledky:
V rámci riešenia projektu boli pripravené špeciálne druhy magnetických častíc ako SWCNT funkcionalizované magnetitom, magnetoferitín a retiazkové magnetické častice získane z

magnetotaktických baktérii. Boli pripravené kompozitné systémy magnetických nanočastíc rôznych tvarov s rôznými kvapalnými kryštálmi, tzv. feronematika, kde sa podarilo zvýšiť citlivosť na vonkajšie magnetické polia a po prvýkrát bol pozorovaný indukovaný prechod z izotrópnej do nematickej fázy pomocou vonkajšieho magnetického poľa. Bola vypracovaná nová metóda na určovanie kotviacej energie vo feronematiku na báze kvapalného kryštálu s veľmi nízkou a zápornou hodnotou anizotrópie diamagnetickej susceptibility. Boli pripravené magnetické kvapaliny na báze transformátorových olejov. Ukázalo sa, že nízka koncentrácia magnetických častíc vedie k zvýšeniu prierazných napätí a k zvýšeniu chladiacich vlastnosti. Uvedené výsledky môžu mať aj aplikačný charakter a to v senzoroch na magnetické polia a vo vysokonapäťových transformátoroch.

Počas riešenia projektu bolo opublikovaných 21 prác v zahraničných karentovaných (CC) časopisoch (6 prijatých k opublikovaniu), jedna práca v domácom CC časopise, 14 prác v nekarentovaných časopisoch (z nich viaceré sledované v databázach WoS a Scopus), ako aj množstvo ďalších príspevkov vo vedeckých zborníkoch recenzovaných (20) aj nerecenzovaných. Okolo desiatky prednášok na konferenciách bolo pozvaných, celkove sa ich počet blíži k stovke.

13.) Vplyv interakcie feromagnetických častíc na báze železa na magnetické vlastnosti kompozitných materiálov

Zodpovedný riešiteľ:	Jozef Kováč
Trvanie projektu:	1.1.2012 / 31.12.2015
Evidenčné číslo projektu:	1/0861/12
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Prírodovedecká fakulta UPJŠ
Počet spoluriešiteľských inštitúcií:	8 - Česko: 2, Nemecko: 3, Poľsko: 3

Dosiahnuté výsledky:

Birčáková, Z. – Kollár, P. – Füzer, J. – Fáberová, M. – Bureš, R.. Magnetic properties of iron-based composite materials: Power losses as a function of maximum induction, Proceedings of the scientific conference Physics of materials 2012, 17-19 October 2012, 83-88. AED

Olekšáková, D. – Kollár, P. – Füzer, J.. Ni-based soft magnetic materials. Proceedings of the scientific conference Physics of materials 2012, 17-19 October 2012, 68-72. AED

FÜZER, J. – FÜZEROVÁ, J. – KOLLÁR, P. - FÁBEROVÁ, M. - BUREŠ, R.. Soft magnetic compacted materials, Proceedings of the scientific conference Physics of materials 2012, October 2012, 39-40., 83-88. AED

Zeleňáková, A. – Zeleňák, V.- Kováč, J. - Hrubovčák, P. – Vainio, U.. Inter-particle interactions in magnetic nanocomposites synthesized using periodic mesoporous silica,v Colloids and Surfaces A: Physicochemical and Engineering Aspects, ADC v recenznom konaní

Zeleňák, V. - Halamová, D. - Zeleňáková, A. - Kováč, J. - Vainio U.. Cubic mesoporous silica as a matrix for the drug delivery of indomethacin Chemical Engineering Journal ADC v recenznom konaní

14.) Výpočty lektín-ligand interakcií s perspektívou vývoja nových inhibítorov *(Calculations of lectin-ligand interactions intended for new inhibitor design)*

Zodpovedný riešiteľ:	Tibor Kožár
Trvanie projektu:	1.1.2010 / 31.12.2013
Evidenčné číslo projektu:	2/0073/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	ÚEF SAV: 1836 €

Dosiahnuté výsledky:
Priebežne sa pokračovalo v štúdiách lektín-ligand interakcií, pričom pozornosť sa zamerala aj na možnosti zahrnutia molekúl vody do docking výpočtov. Nainštaloval a otestoval sa k tomu úlne nový metodologický postup autorov Biggin a spol., ktorý bol opublikovaný v marci 2012 (viď. Biggin et al, PLoS ONE, e32036, 2012). Výsledky riešenia projektu spolu s metodologickým prístupom sa zverejnili na niekoľkých fórach [1-3], medziiným formou pozvanej prednášky na medzinárodnej biofyzikálnej konferencii v Taipei, Taiwan [3].
[1] T. Kozar, GPU Computing in Biomolecular Modeling and Nanodesign, in: G. Adam, J. Buaa, M. Hnatic (Eds.) Lecture Notes in Computer Science: Mathematical Modeling and Computational Sciences, vol. 7125, Springer Verlag, Heidelberg, Dordrecht, 2012, pp. 276-283.

[2] S. Hayryan, M.-C. Wu, C.-K. Hu, Z. Gazova, T. Kozar, GPGPU Enhaced Protocols for Modeling of Biomolecules and Nanostructures, in: M.H. J. Busa, P. Kopcansky (Ed.) Small Triangle Meeting, IEP SAS, Stara Lesna, 2012, pp. 20-25.

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15.) Energetické kozmické častice a ich úloha v kozmickom počasí *(Energetic cosmic particles and its role in space weather)*

Zodpovedný riešiteľ:	Karel Kudela
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	2/0081/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Bol implementovaný model šírenia protónov galaktického kozmického žiarenia (GKŽ) v heliosfére s použitím metody Monte Carlo na určenie jeho diferenciálnej intenzity pre 23. cyklus slnečnej aktivity pri transporte GKŽ od heliopauzy, a to s uvažovaním zmien slnečnej aktivity a so zahrnutím driftových efektov.Boli analyzované niektoré kvaziperiodicity v intenzite KŽ z pozemných meraní a určené súvislosti medzi ich amplitudou a parametrami medziplanetárneho prostredia.
Výsledky riešenia úlohy v poslednom roku sú v dolu uvedenom zozname publikácií a v ďalších publikáciách, resp. prezentáciách.

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16.) Štúdium vybraných silne korelovaných elektrónových systémov *(Study of selected strongly correlated electron systems)*

Zodpovedný riešiteľ: Marián Mihalik

Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	2/0057/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 6139 €

Dosiahnuté výsledky:

Zaujímavé výsledky sa dosiahli pri štúdiu magnetických špongií. Magnetické špongie patria medzi multifunkčné molekulárne magnetické materiály, u ktorých v závislosti od teploty dochádza k reverzibilnému uvoľňovaniu molekúl vody a to v dvoch stupňoch. V prípade nami skúmanej {[MnII(pydz)(H2O)2][MnII(H2O)2][NbIV(CN)8]3H2O}n zlúčeniny je tento proces sprevádzaný lokálnymi zmenami štruktúry v okolí magnetických iónov a následnou zmenou magnetických vlastností. Za účelom lepšieho pochopenia magnetických interakcii sme študovaný systém podrobili systematickému štúdiu magnetických vlastností, ktoré zahrňovalo štúdium magnetických fázových prechodov pri atmosférickom tlaku a vysokom hydrostatickom tlaku, kritických exponentov a magnetokalorického javu. Podarilo sa nám ukázať, že charakter dehydratovaním vyvolaných zmien je rovnaký ako v prípade zmien vyvolaných aplikáciou vonkajšieho hydrostatického tlaku.

Podrobne sme preštudovali magnetické vlastnosti vrstevnatého materiálu (NH3OH)2CoF4 pomocou meraní magnetizácie, AC susceptibility a tepelnej kapacity. Pozornosť bola venovaná vplyvu vysokého tlaku a magnetického poľa na magnetické vlastnosti tejto zlúčeniny. Veľkolepá manifestácia komplexnosti magnetického správania tohto systému je posuv izotermickej magnetickej hysteréznej slučky v teplotnej oblasti pod 20 K po chladení v magnetickom poli to jest EB jav. Pozorovaný EB jav sme pripísali výmennej anizotropii v dôsledku kvazi -2D štruktúry tohto vrstevnatého materiálu.

EB jav (exchange bias effect) bol po prvýkrát pozorovaný na La1-xAgxMnO3 čerstvo pripravených alebo tepelne spracovaných (300 oC/2 h) nanopráškoch (x = 0.10, 0.15 a 0.20), ktoré boli pripravené samovznietením glycín - nitrátovou metódou.

V roku 2012 sme v optickej peci úspešne pripravili zlúčeniny NdMn1-xFexO3 (x = 0; 0,1; 0,2; 0,25; 0,3) a tiež sme preštudovali ich fyzikálne vlastnosti. Pri štúdiu týchto látok sme okrem síce zaujímavých, ale predpokladaných fyzikálnych vlastností ako napríklad vývoj magnetického usporiadania v závislosti od pomeru Mn:Fe, objavili aj celkom unikátny jav a to negatívnu magnetizáciu odmeranú pri chladení v nulovom poli a následnom aplikovaní magnetického poľa (vzorka NdMn0,8Fe0,2O3)

Študium vplyvu tlaku na magnetické vlastnosti KMn[Cr(CN)6] ukázalo, že s rastúcim tlakom sa Curieho teplota posúva k vyšším teplotam, čo je v súlade s výsledkami získanými na podobnom type materiálov. Aplikácia tlaku vedie k vzniku stupienka na krivke teplotnej zavislosti magnetizácie v oblasti magnetického fázového prechodu a v derivacii tejto krivky sa pozorujú dve minima.

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8. MIHALIK, M. - MIHALIK, M - LAZUROVÁ, J. - FITTA, M. – VAVRA, M.: Magnetic properties of NdMn1-xFexO3+? system, EPJ Web of Conferences 40, 15007 (2013) DOI: 10.1051/epjconf/20134015007
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10. MIHALIK, M. - ANTOŇÁK, M. - CSACH, K - FITTA, M. - MIHALIK, M.jr. - VÁVRA, M. - ZENTKOVÁ, M.: Exchange bias effect in La1-xAgxMnO3 nanopowders, EPJ Web of Conferences 40, 15006 (2013), DOI: 10.1051/epjconf/20134015006

17.) Dynamika produkcie častíc v hadrónových zrážkach pri vysokých energiách *(Dynamics of particle production in high-energy hadronic collisions)*

Zodpovedný riešiteľ:	Ján Nemčík
Trvanie projektu:	1.1.2010 / 31.12.2013
Evidenčné číslo projektu:	2/0092/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 2754 €

Dosiahnuté výsledky:
Skúmala sa produkcia hadrónov s veľkými pT v zrážkach ťažkých iónov.

Hlavná príčina jadrového potlačenia hadrónov je spojená s efektami farebnej priezračnosti pri prechode vzniknutého bezfarebného dipólu jadrovou matériou. Boli určené hodnoty tzv. transportného koeficienta pri rôznych energiách, ktorý charakterizuje vlastnosti jadrovej matérie. Boli popísané experimentálne data jadrového modifikačného faktora a azimutálnej anizotropie pri rôznych energiách, centralitách zrážky a pT hadrónov v dobrom súhlase s experimentami na urýchľovačoch RHIC a LHC.

1. B.Z. Kopeliovich, J. Nemchik, I.K. Potashnikova, Ivan Schmidt;
Quenching of high-pT hadrons: Energy Loss vs Color Transparency,
Phys. Rev. C86, 054904 (2012).

2. B.Z. Kopeliovich, J. Nemchik, I.K. Potashnikova, Ivan Schmidt;
High-pT hadrons in heavy ion collisions: From RHIC to LHC,
PoS QNP2012 (2012) 155

3. Jan Nemchik;
"High-pT hadrons in nuclear collisions: from RHIC to LHC";
Invited talk in the 4th international workshop: High Energy Physics in the LHC Era, January 4-10, 2012, Valparaiso, Chile.

4. Jan Nemchik;
"High-pT hadrons in heavy ion collisions: from RHIC to LHC"
Invited talk in the 6th International Conference on Quarks and Nuclear Physics, April 16-20, 2012, Palaiseau, Paris, France.
Book of abstracts E, p.10

5. Jan Nemchik;
"Color Transparency in Incoherent Electroproduction of rho Mesons off Nuclei";
Invited talk in the International Workshop on Diffraction in High-Energy Physics DIFFRACTION 2012, September 10-15, 2012, Puerto del Carmen, Lanzarote, Spain.
Contributions book (book of abstracts), p.22:

18.) Elektrónové vlastnosti nanoštruktúr *(Electronic properties of the nanoscale structures)*

Zodpovedný riešiteľ:	Michal Pudlák
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	2/0069/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

19.) Vplyv teploty, magnetického poľa, vysokých tlakov a rozmeru na základný stav zlúčenín s neobvyklým chovaním *(The influence of temperature, magnetic fields, high pressure and dimension on the ground state of compounds)*

Zodpovedný riešiteľ:	Marián Reiffers
Trvanie projektu:	1.1.2012 / 31.12.2015

Evidenčné číslo projektu:	VEGA 2/0070/12
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	ÚEF SAV: 3327 €

Dosiahnuté výsledky:
Boli študované fyzikálne vlastnosti systému C-Ni-Ge, kde bol stanovený vplyv spinových fluktuácií na tento systém. Boli porovnané vlastnosti YbPd3Sn2 s podobným systémom EuPd3Sn2. Prvá zlúčenina nevykazuje prechod do magneticky usporiadaného stavu, ale Eu-zlúčenina áno.

20.) Samousporiadanie vodorozpustných polymérov *(Self-assembly of water soluble polymers)*

Zodpovedný riešiteľ:	Marián Sedlák
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	2/0215/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Bol získaný patent týkajúci sa novej filozofie (nového princípu) tvorby nanočastíc z polymérnych reťazcov ako prekurzorov (stavebného materiálu) [1]. Bolo detailne preštudované chovanie polykarboxylových polymérov v okolí kritického bodu v závislosti od teploty metódami rozptylu svetla, infračervenej spektroskópie (FTIR), rozptylu synchrotronového žiarenia a rozptylu neutrónov[2,3].Bola analyzovaná možnosť potenciálneho použitia polymérnych nanočastíc na báze poly(etylakrylovej kyseliny) a poly(propylakrylovej kyseliny) na intrabunkový cielený transport biomolekulárnych liečiv.

[1] M. Sedlák, Č. Koňák: Spôsob prípravy polymérnych nanočastíc na báze homopolyméru poly(etylakrylovej kyseliny), Úrad Priemyselného vlastníctva SR. Patent č. 287951. Udelený 27.4.2012.

[2] M. Sedlák: Homopolymer Self-assembly into Stable Nanoparticles: Concerted Action of Hydrophobic Association and Hydrogen Bonding in Thermoresponsive Poly(alkylacrylic acid)s, J. Phys. Chem. B, 116 (8), 2356–2364,2012.

[3] Prednáška: M.Sedlák, Critical behavior of hydrophobic polyelectrolytes: from basic research to applied self-assembly, 9th International Symposium on Polyelectrolytes - ISP 2012, Lausanne, Switzerland, July 9 - July 12, 2012.

21.) Andrejev-Majorana excitácie v supratekutom 3He-B *(Andreev-Majorana excitations in superfluid 3He-B)*

Zodpovedný riešiteľ:	Peter Skyba
Trvanie projektu:	1.1.2012 / 31.12.2014
Evidenčné číslo projektu:	2/0128/12

Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	3 - Fínsko: 1, Veľká Británia: 2
Čerpané financie:	ÚEF SAV: 5737 €

Dosiahnuté výsledky:
S.N. Fisher G.R. Pickett, P. Skyba, N. Suramlishvili: Decay of persistent precessing domains in 3He-B at very low temperatures, Phys. Rev. B 86, 024506 (2012).

M. Kupka, P. Skyba: BEC of Magnons in Superfluid 3He-B and Symmetry Breaking Fields, Phys. Rev. B 85, 184529 (2012).

S. Holt, P. Skyba: Electrometric direct I/V converter with wide bandwidth, Rev. Sci. Instruments 83, 064703 (2012).

22.) Vývoj a implementácia postupov pre rekonštrukciu a analýzu dát z protón-protónových zrážok na urýchľovači LHC *(Development and implementation of procedures for reconstruction and analysis of data from proton-proton interactions on LHC accelerator)*

Zodpovedný riešiteľ:	Pavol Stríženec
Trvanie projektu:	1.1.2012 / 31.12.2015
Evidenčné číslo projektu:	VEGA 2/0097/12
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	VEGA: 9202 €

Dosiahnuté výsledky:
Výsledky činnosti kolektívu boli metodického charakteru, ako to predpokladá projekt. Najväčšia časť práce smerovala ku zlepšeniu kalibrácie a zaistení kvality dát z kalorimetrov detektora ATLAS, čo sa prejavilo na ich veľmi vysokej efektivite počas celého roka, čím sme významne prispeli ku kvalite množstva fyzikálnych výsledkov.
Rozbehli sme analýzu niektorých vlastností top kvarku v tzv. dileptónovom kanáli (čo znamená že top kvark sa rozpadne na dva leptóny s veľkou priečnou energiou), ktorá môže zlepšiť doteraz známe výsledky.
Podarilo sa udržať presnosť tzv. "lokálnej hadrónovej kalibrácie" aj v prostredí veľmi vysokého pile-up (keď prichádza k zrážke v priemere 40 protónov v jednom prípade), čo umožnilo veľmi presnú kalibráciu jetov (spŕšok častíc), ktoré sú základom mnohých fyzikálnych analýz.
Výsledky práce sú týmto zahrnuté v mnohých publikáciách, ktoré kolaborácia ATLAS publikovala minulý rok, vo väčšine publikácií v karentovaných časopisoch (viď zoznam publikácií vo výročnej správe ÚEF SAV ADCA1-ADCA58), ako aj v mnohých preprintoch a interných nótach kolaborácie ATLAS, ktorých zoznam pre jeho dĺžku neuvádzame.

23.) Modifikácia funkčných vlastností nanokryštalických magnetických materiálov tepelným

spracovaním v magnetickom poli *(Tailoring of functional properties of nanocrystalline magnetic materials by thermal processing in magnetic field)*

Zodpovedný riešiteľ:	Ivan Škorvánek
Trvanie projektu:	1.1.2010 / 31.12.2012
Evidenčné číslo projektu:	2/0209/10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Naše aktivity v poslednom roku riešenia projektu boli orientované na vyšetrovanie efektov tepelného spracovania vybraných magnetických systémov v externom magnetickom poli za účelom cieleného ovplyvňovania ich funkčných vlastností. V prípade nanokryštalických materiálov na báze FeCoBPCu, CoFeNbB and FeNiNbB viedlo tepelné spracovanie v pozdĺžnom magnetickom poli k zlepšeniu ich magneticky mäkkých vlastností čo sa prejavilo najmä na extrémne nízkych hodnotách ic koercitívneho poľa. Na druhej strane, tepelné spracovanie v priečnom magnetickom poli malo za následok sklopenie hysteréznych slučiek, ktoré naviac vykazovali veľmi dobrú lineárnu odozvu magnetizácie voči aplikovanému magnetickému poľu. Možnosť „ušitia magnetických charakteristík študovaných materiálov na mieru“ je dôležitá pre ich využitie v rôznych senzorových systémoch.

1. ŠKORVÁNEK, Ivan - MARCIN, Jozef - CAPIK, Marek - VARGA, Marek - TURČANOVÁ, Jana - KOVÁČ, Jozef - ŠVEC, Peter - JANIČKOVIČ, Dušan - KOVÁČ, František - STOYKA, Volodymyr. Tailoring of functional properties in Fe-based soft magnetic alloys by thermal processing under magnetic field. In Magnetohydrodynamics, 2012, vol. 48, no. 2, p. 371-377.

2. Ivan ŠKORVÁNEK, Jozef MARCIN, Marek CAPIK, Marek VARGA, Jozef KOVÁČ, Irena JANOTOVA, Peter ŠVEC, Bogdan IDZIKOWSKI, Soft Magnetic Melt-Spun Ribbons for Energy and Sensor Applications. In Acta electrotechnica et informatica, 2013, ISSN 1335-8243

3. Jozef MARCIN, Marek CAPIK, Jozef KOVÁČ, Peter ŠVEC, Ivan PETRYSHYNETS, Františk KOVÁČ, Ivan ŠKORVÁNEK, TUNING OF MAGNETIC PROPERTIES AND DOMAIN STRUCTURE IN FeCo- AND FeSi-BASED SOFT MAGNETIC ALLOYS BY THERMAL PROCESSING UNDER MAGNETIC FIELD, In Acta electrotechnica et informatica, 2013, ISSN 1335-8243

4. VARGA, Marek - MARCIN, Jozef - CAPIK, Marek - KOVÁČ, Jozef - ŠVEC, Peter - ŠKORVÁNEK, Ivan. Field - annealed Fe-Ni-Nb-B amorphous and nanocrystalline alloys for magnetic sensor applications. In ICM 2012: The 19th International Conference on Magnetism, July 8-13, 2012, Bexco, Busan, Korea, invited lecture

5. ŠKORVÁNEK, Ivan - MARCIN, Jozef - CAPIK, Marek – JANOTOVA, Irena - KOVÁČ, Jozef - ŠVEC, Peter - IDZIKOWSKI, Bogdan. Soft magnetic Fe-based alloys for energy applications. In PM 12: Proceedings of the scientific
conference, Physics of materials 2012, 17 – 19 October 2012, invited lecture, p. 59

6. ŠKORVÁNEK, Ivan - MARCIN, Jozef - VARGA, Marek - CAPIK, Marek - KOVÁČ, Jozef - ŠVEC, Peter. FeNi- and FeCo-based amorphous and nanocrystalline alloys for magnetic sensors: the effect of field annealing. In MAP 5 : 5th
International Workshop on Materials Analysis and Processing in Magnetic Fields, May 13-17,

2012, Autrans, France, talk, p. 54-56

7. MARCIN, Jozef - KOVÁČ, Jozef - ŠVEC, Peter - ŠKORVÁNEK, Ivan. Induced anisotropy in Co-rich amorphous and nanocrystalline ribbons annealed in external magnetic field. In PM 2012: Proceedings of the scientific conference, Physics of materials 2012, 17 – 19 October 2012, p. 117-119

8. ŠKORVÁNEK, Ivan - MARCIN, Jozef - VARGA, Marek - KOVÁČ, Jozef – KOVÁČ, František - ŠVEC, Peter. Tuning of magnetic anisotropy and domain structure of soft magnetic Fe-based alloys by thermal processing under magnetic field. In EPM2012: The 7th International Conference on Electromagnetic Processing of Materials, 22-26 October 2012, Beijing, China, Technical Program, p. 21

9. VARGA, Marek – MARCIN, Jozef - KOVÁČ, Jozef - CAPIK, Marek - ŠVEC, Peter - ŠKORVÁNEK, Ivan. Giant magnetoimpedance effect in field annealed Fe(Ni,Co)NbB amorphous and nanocrystalline ribbons. In JEMS 2012: Joint European Magnetic Symposia, Parma - Italy, September 9th-14th, 2012, Book of Abstracts, p. 98

24.) Aplikácia magnetických kvapalín v elektrotechnike *(Application of magnetic fluids in electrical engineering)*

Zodpovedný riešiteľ:	Milan Timko
Trvanie projektu:	1.1.2012 / 31.12.2015
Evidenčné číslo projektu:	2/0043/12
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Boli merané dielektrické a magnetodielektrické charakteristiky magnetickej kvapaliny na báze transformátorových olejov. Bola pozorovaná anizotrópia meraných veličín pri rôznej orientácii magnetického poľa a lineárna závislosť permitivity od koncentrácie magnetických nanočastíc v súlade s teóriou.
Dosiahnuté výsledky sú uvedené v nasledujúcich príspevkoch:

1.TIMKO, Milan - KOPČANSKÝ, Peter - MOLČAN, Matúš - TOMČO, Ladislav - MARTON, Karol - MOLOKÁČ, Štefan - RYBÁR, P. - STOIAN, Floriana - HOLOTESCU, Sorin - TACULESCU, A. Magnetodielectric Properties of Transformer Oil Based Magnetic Fluids. In Acta Physica Polonica A, 2012, vol. 121, no. 5-6, p. 1253-1255. (0.444 - IF2011).
2. TIMKO, Milan - MARTON, Karol - TOMČO, Ladislav - KIRALY, J. - MOLČAN, Matúš - RAJŇÁK, Michal - KOPČANSKÝ, Peter - CIMBALA, Roman - STOIAN, Floriana - HOLOTESCU, Sorin - TACULESCU, A. Magneto-dielectric properties of transformer oil based magnetic fluids in the frequency range up to 2 MHz. In Magnetohydrodynamics, 2012, vol. 48, no. 2, p. 427-434. (0.413 - IF2011). (2012 - WOS). ISSN 0024-998X.

25.) Molekulárne mechanizmy interakcií nanočastíc magnetitu po internalizácii a akumulácii v bunkách in vitro *(Molecular mechanisms of magnetite nanoparticle interactions due to internalisation and accumulation in cells in vitro)*

Zodpovedný riešiteľ:	Milan Timko

Trvanie projektu:	1.1.2009 / 31.12.2012
Evidenčné číslo projektu:	0051-09
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Ústav experimentálnej onkológie, RNDr. E. Gábelová, Csc.
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1

Dosiahnuté výsledky:
V rámci riešenia projektu boli v našich laboratóriách pripravené rôzne druhy vzoriek obsahujúcich magnetické nanočastice a následne charakterizované. Bol študovaný ich vplyv na biologickú aktivitu, internalizáciu a distribúcia v ľudských pľúcnych epiteliálných bunkách kultivovaných in vitro. Výsledky boli publikované v nasledujúcich prácach

1.GAZOVA Z.; SIPOSOVA K.; KONERACKA M.; ANTOSOVA, A., ZAVISOVA, V., KUBOVCIKOVA, M.; FEDUNOVA, D.; BAGELOVA, J., TOMASOVICOVA, N.; DAXNEROVA, Z.; KOPCANSKY, P.
Presence of Magnetic Fluids Leads to the Inhibition of Insulin Amyloid Aggregation
Conference: European Conference on Physics of Magnetism (PM) Location: Poznan, POLAND Date: JUN 27-JUL 01, 2011

2.M. TIMKO; P. KOPČANSKÝ, M. ANTALIK, M. SIMSIKOVA, E. VALUSOVA, M. MOLCAN AND J. KOVÁČ, Physical Properties of Magnetite Nanoparticles Covered by 11-Mercaptoundecanoic Acid, Acta Physica Polonica A 121 No. 5_6 (2012) 1321–1323

3.A. HASHIM, M. MOLČAN, J. KOVAČ, Z. VARCHULOVÁ, H. GOJZEWSKI, M. MAKOWSKI, P. KOPČANSKY, Z. TOMORI, M. TIMKO, The Influence of Morphology on Magnetic Properties of Magnetosomes, Acta Physica Polonica A No. 5_6 Vol. 121 (2012) 1250–1252

4. GÁBELOVÁ A., MESÁROŠOVÁ M., KOVÁČIKOVÁ Z., KOZICS K., BULIAKOVÁ B., ZÁVIŠOVÁ V., KONERACKÁ M., TOMAŠOVIČOVÁ N., HASHIM A., TIMKO M., VÁVRA I., KRIŽANOVÁ Z., HUŠEKOVÁ Z., URSÍNYOVÁ M., ČIAMPOR F.
Odpoveď ľudských pľúcnych buniek A549 a HEL na expozíciu nanočasticami magnetitu s rôznou povrchovou úpravou Genetická toxikologie a prevencie Rakoviny 35. pracovní dny České a slovenské společnosti pro mutagenezi zevním prostředímČeskoslovenské biologické společnosti, NCO NZO Brno, 9. – 11.5.2012
ISBN 978-80-7013-546-4

5.M. MESAROSOVA, F. CIAMPOR, V. ZAVISOVA, M. KONERACKA, M. URSINYOVA, K. KOZICS, N. TOMASOVICOVA, A. HASHIM, I. VAVRA, Z. KRIZANOVA, Z. HUSEKOVA, M. KUBOVCIKOVA, P. KOPCANSKY, M. TIMKO, A. GABELOVA, The intensity of internalization and cytotoxicity of superparamagnetic iron oxide nanoparticles with different surface modifications in human tumor and diploid lung cells, Neoplasma 59, 5, 2012

26.) Interaktívne algoritmy spracovania obrazu založené na minimalizácii energetickej funkcie a metóde "Graph-cuts". *(Interactive Image Processing Algorithms Based on Energy Minimization and "Graph-cuts" Method)*

Zodpovedný riešiteľ:	Zoltán Tomori
Trvanie projektu:	1.1.2011 / 31.12.2013

Evidenčné číslo projektu:	2-0191-11
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	ÚEF SAV: 4350 €

Dosiahnuté výsledky:
Pri riešení problematiky boli výsledky dosiahnuté v rámci grantu publikované v dvoch časopisoch kategórie CC, jednej medzinárodnej a jednej domácej konferencii.

[1] R. Navarro, S. Juhas, S. Keshavarzi, J. Juhasova, J. Motlik, K. Johe, S. Marsala, M. Scadeng, P. Lazar, Z. Tomori, G. Schulteis, M. Beattie, J. D. Ciacci, and M. Marsala, "Chronic Spinal Compression Model in Minipigs: A Systematic Behavioral, Qualitative, and Quantitative Neuropathological Study," Journal of Neurotrauma, vol. 29, pp. 499-513, Feb 2012.

[2] H. Gojzewski, M. Makowski, A. Hashim, P. Kopcansky, Z. Tomori, and M. Timko, "Magnetosomes on surface: an imaging study approach," SCANNING, vol. 34, pp. 159-169, May-Jun 2012.

[3] R. Gargalik and Z. Tomori, "Object tracking in 3D using depth map," Proc. of the 28th Spring Conference on Computer Graphics - Conference Materials and Posters, Smolenice, Slovakia 2012.

[4] Z. Tomori, R. Gargalik, and I. Hrmo, "Active Segmentation in 3D using Kinect Sensor," Proc. of the 20th International Conference on Computer Graphics, Visualization and Computer Vision '2012 (WSCG 2012), Part 2, Pilsen, Czech Republic, 2012.

Programy: APVV

27.) Nekonvenčné kvantové stavy v nanoskopických magnetických systémoch. *(Novel quantum states in nanoscopic magnetic systems.)*

Zodpovedný riešiteľ:	Slavomír Gabáni
Trvanie projektu:	1.7.2012 / 31.12.2015
Evidenčné číslo projektu:	APVV-0132-11
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Univerzita Pavla Jozefa Šafárika v Košiciach
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	ÚEF SAV: 4282 €

Dosiahnuté výsledky:
Bolo prevedené experimentálne štúdium vplyvu substitúcie magnetického iónu Ho3+ v geometricky frustrovanom kovovom antiferomagnete HoB12 (TN ? 7.4 K) nemagnetickým iónom Lu3+ meraním tepelnej kapacity v PPMS (2-300 K, 0-9 T), magnetizácie v MPMS (2-400 K, 0-5

T), rezistivity (He4 kryostat a He3-He4 minirefrigerátor: 0.06-300 K, 0-8 T) a Hallovho javu (2-300 K, 0.36-8 T). Všetky merania boli realizované na ÚEF SAV v Košiciach okrem merania Hallovho javu, ktorý bol realizovaný v GPI Moscow. Monokryštalické vzorky tuhých roztokov Ho1-xLuxB12 (x = 0.2, 0.5, 0.7 a 0.9) boli vyrobené v IPMS Kiev. Výsledky boli prezentované dvoma posterovými príspevkami na konferencii ICM´12 v Južnej Kórei a publikované v troch CC publikáciách. Tento podrobný výskum poukazuje na existenciu kvantového kritického bodu (QCP) pri xc = 0.9, ktorý oddeľuje oblasť s AF usporiadaním (počnúc HoB12 pre x=0) od nemagnetickej (supravodič LuB12 pre x=1). Chemický tlak a zároveň magnetické riedenie vplyvom rastúcej koncentrácie Lu3+ spôsobuje pokles spinových fluktuácií a zoslabovanie RKKY interakcie medzi Ho3+, čo vedie k poklesu TN až na nulu.
Prvýkrát sme zmerali vplyv hydrostatického tlaku na rezistivitu frustrovaného systému TmB4 (1.6-300K, 0-4 T, do 3 GPa). Zároveň sa previedli merania tepelnej kapacity ďalších tetraboridov HoB4 a ErB4 (He3-PPMS). Výsledky sú v štádiu spracovania.
V kondovskom izolátore SmB6 bola po prvýkrát skúmaná teplotná závislosť spin-mriežkovej relaxácie, T1, pod tlakom až do 6 GPa metódou 11B-NMR. Výsledky boli prezentované na XII. konferencii mladých vedcov v Soči (Rusko) a sú v štádiu spracovania.
Meranie QHE na tenkých vrstvách na báze Ge v minirefrigerátore (0.09-2K, 0-8T). Pripravuje sa publikácia.
EB jav (exchange bias effect) bol po prvýkrát pozorovaný na La1-xAgxMnO3 čerstvo pripravených alebo tepelne spracovaných (300 oC/2 h) nanopráškoch (x = 0.10, 0.15 a 0.20), ktoré boli pripravené samovznietením glycín - nitrátovou metódou. Stredná veľkosť nanočastice v týchto práškoch je asi 25 nm. Materiál kryštalizujú v ortorombickej Pnma kryštálovej štruktúre. Chladenie v magnetickom poli Hcf ? 0 pod Curieho teplotu TC posúva hysteréznu slučku v horizontálnom aj vertikálnom smere. Hodnoty výmenného priloženého poľa HE, koercitívného poľa Hc, zvyškovej ?E a koercitívnej ?c magnetizácie rastú do nasýtenia s rastom hodnoty Hcf. Študovali sme vplyv niekoľkonásobného premagnetovania vzorky v poliach do 9T na EB jav (trainning effect). Po teplotnom spracovani 600 oC/2 h sa kryštálova štruktúra mení na romboedrálnu a stredný rozmer časti rastie až na hodnotu 25 nm a EB jav sa nepozoruje. Predbežné výsledky boli prezentované na konferencii JEMS 2012: Joint European Magnetic Symposia, 9 - 14.9 2012, Parma - Taliansko a boli prijaté na publikovanie v časopise EPJ Web of Conferences. Výsledky štúdia vplyvu tlaku na EB jav a magnetické vlastnosti La1-xAgxMnO3 boli prezentované na 50th EHPRG Meeting, 16 - 21 September 2012, Thessaloniki - Greece.

MIHALIK, M. - ANTOŇÁK, M. - CSACH, K - FITTA, M. - MIHALIK, M.jr. - VÁVRA, M. - ZENTKOVÁ, M.: Exchange bias effect in La1-xAgxMnO3 nanopowders, EPJ Web of Conferences, 2013, Typ: ADEB

MIHALIK, M. - ANTOŇÁK, M. - CSACH, K - FITTA, M. - VÁVRA, M. - ZENTKOVÁ, M.: Exchange bias effect in La1-xAgxMnO3 nanopowders. In JEMS 2012: Joint European Magnetic Symposia, 9 - 14 September 2012, Parma- Italy. Book of Abstracts, poster MO-166, p. 96.Typ: AFG

ANTOŇÁK, M. - ZENTKOVÁ, M. - MIHALIK, M. - MIHALIK, M.Jr. - VÁVRA, M. - LAZUROVÁ, J.: Magnetic properties of La0.9Ag0.1(Mn1-xCox)O3 under pressure. In 50th EHPRG Meeting, 16 - 21 September 2012, Thessaloniki - Greece. Book of Abstracts, poster P36, p. 156.Typ: AFG

Gabáni S., Baťko I., Baťková M., Flachbart K., Gažo E., Reiffers M., Shitsevalova N., Siemensmeyer K., Sluchanko N.: Influence of Lu – Substitution on the frustrated antiferomagnetic system HoB12.
Solid State Sciences 14 (2012) 1722-1724,

Gabáni S., Gažo E., Pristáš G., Takáčová I., Flachbart K., Shitsevalova N., Siemensmeyer K., Sluchanko N.: Magnetic properties of Ho1-xLuxB12 solid solutions.
Journal of the Korean Physical Society (2012?) - prijaté

Gabáni S., Baťko I., Baťková M., Flachbart K., Gažo E., Pristáš G., Takáčová I., Bogach A., Sluchanko N., Shitsevalova N.: Transport properties of Ho1-xLuxB12 solid solutions.
Journal of the Korean Physical Society (2012?) – prijaté

28.) Štrukturalizačné javy v systémoch s nanočasticami *(Structuralization phenomena in systems with nanoparticles)*

Zodpovedný riešiteľ:	Peter Kopčanský
Trvanie projektu:	1.5.2011 / 31.10.2014
Evidenčné číslo projektu:	APVV-0171-10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
V súlade s harmonogramom riešeného projektu, aj v druhej etape riešenia projektu boli pripravené magnetické kvapaliny obsahujúce sférické magnetické nanočastice. Pripravené magnetické kvapaliny (MK) boli charakterizované z hľadiska štruktúry a morfológie. Ďalším úspešne syntetizovaným magnetickým materiálom bol magnetoferitín. Pripravili sme magnetoferitín s rôznym LF (loading faktor -množstvo atómov železa na jednu molekulu bielkoviny) za účelom štúdia štruktúry pomocou rôznych metód. Jedným z hlavných cieľov štúdia amyloidnej agregácie proteínov je zistenie mechanizmu tvorby amyloidných agregátov ako aj ich štruktúry na molekulárnej úrovni a detailného poznania účinku látok schopných ovplyvniť tvornu amyloidných agregátov. Venovali sme sa určeniu podmienok stimulujúcich amyloidnú agregáciu rôznych poly/peptidov, hlavne lyzozýmu, inzulínu a Abeta peptidu. Zistili sme, že extrémne hodnoty pH, vyššia teplota a intenzívne miešanie významne inicializujú alebo urýchľujú tvorbu amyloidných agregátov.
Feronematické vzorky pre štúdium magnetickým poľom indukovaných štruktúrnych prechodov boli pripravené na báze kvapalného kryštálu 6CHBT dopovaného jednostennými uhlíkovými nanorurkami (SWCNT), SWCNT – COOH a SWCNT funkcionalizované Fe3O4 a sférickymi magnetickými časticami.

Zamerali sme sa tiež na štúdium štruktúrnych nestabilít pri malých magnetických poliach (do 0,2T), ktoré boli pozorované feronematických vzorkach.
S využitím rôznych počiatočných látok, z ktorých sme syntetizovali ZnO nanočastice sa nám podarilo pripraviť dva druhy a to s kladných nábojom na povrchu a so záporným nábojom na povrchu nanočastíc, v prostrediach s neutrálnym pH. S cieľom využitia samoorganizujúcich sa vlastností prirodzených biomakromolekúl sme prešetrili interakciu nami nasyntetizovaných ZnO nanočastíc s cytochrómom c v oblasti neutrálnych a mierne zásaditých prostrediach.
Dosiahnuté výsledky boli publikované v 19CC publikáciach a prezentované na viacerých medzinárodných konferenciach.

29.) Vysokopevné elektrotechnické kompozitné ocele *(High strength electrotechnical composite steels)*

Zodpovedný riešiteľ:	František Kováč
Zodpovedný riešiteľ v organizácii SAV:	Ivan Škorvánek
Trvanie projektu:	1.7.2012 / 31.12.2015
Evidenčné číslo projektu:	0147-11
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Projekt bol zameraný na cielený dizajn mikroštruktúry vysokopevných neorientovaných ocelí zabezpečujúci zlepšenú kombináciu ich pevnostných a elektromagnetických vlastností. Na ÚEF SAV boli charakterizované štruktúrne a magnetické vlastnosti týchto materiálov.

1. MARCIN, Jozef - CAPIK, Marek - KOVÁČ, Jozef - ŠVEC, Peter - PETRYSHYNETS, Ivan - KOVÁČ, František - ŠKORVÁNEK, Ivan. Tailoring of functional properties in FeSi steels and FeCo-based soft magnetic alloys by thermal processing under magnetic field. In PHYSICS OF MATERIALS 2012- Proceedings of the scientific conference, October 17-19, 2012, Košice. Eds. J. Tóthová, V. Lisý. - Košice : Technical University of Košice, 2012, p. 149-152. ISBN 978-80-553-1175-3.

30.) Magneticky tvrdé mikrodrôty FePt@Pyrex *(FePt@Pyrex hard magnetic microvires)*

Zodpovedný riešiteľ:	Jozef Kováč
Trvanie projektu:	1.1.2012 / 31.12.2013
Evidenčné číslo projektu:	SK-FR-0035-11
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	1 - Francúzsko: 1

Dosiahnuté výsledky:
Náš doterajší výskum ukázal, že príprava magneticky tvrdých mikrodrôtov na báze FePt je možná. Na základe navzájom sa doplňujúcich experimentálnych meraní sme určili zmeny v mikroštruktúre spôsobené vhodným tepelným spracovaním a ich spätosť s magnetickými vlastnosťami sklom pokrytých mikrodrôtov zloženia Fe46Pt27Nb2B25. Bolo dokázané, že za magnetickú tvrdosť mikrodrôtov na báze FePt je zodpovedná tvrdá magnetická fáza L10 FePt. Najlepšie magneticky tvrdé vlastnosti s koercivitou HC = 440kA/m boli dosiahnuté po izotermálnom žíhaní sklom pokrytých mikrodrôtov zloženia Fe46Pt27Nb2B25 pri teplote 750°C počas jednej hodiny. Prednosťou sklom pokrytých mikrodrôtov je predovšetkým ich vysoká odolnosť voči korózii, resp. oxidácii. Nami dosiahnuté výsledky sú dôležité najmä v súvislosti so snahou nahradiť prvky vzácnych zemín, ktorých cena stále rastie, dostupnejšími materiálmi, ktoré sa môžu uplatniť predovšetkým v maloobjemových aplikáciách, ako sú napr. mikromotory, mikrosenzory a záznamové média rôznych typov. Publikácia zhrnujúca doteraz dosiahnuté výsledky je pripravovaná na zaslanie vydavateľovi.

31.) Kvantová elektrodynamika umelých nanoštruktúr *(Quantum electrodynamics of artificial nanostructures)*

Zodpovedný riešiteľ:	Martin Kupka
Trvanie projektu:	1.5.2011 / 31.10.2014
Evidenčné číslo projektu:	APVV-0515-10
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Grajcar Miroslav, doc. RNDr., DrSc.
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Výstupy projektu sú uvedené v kapitole 2.3. Najvýznamnejšie výsledky vedeckej práce za základný výskum pod názvom: Boseho-Einsteinova kondenzácia magnónov a polia narušujúce ich symetriu.

32.) Progresívne polymérne technológie v biomedicíne: Polymérne mikrokapsule pre imunitnú ochranu transplantovaných pankreatických ostrovčekov v liečbe cukrovky
(Advanced polymer technologies in biomedicine: Polymer microcapsules for immunoprotection of transplanted pancreatic islets in diabetes treatment)

Zodpovedný riešiteľ:	Igor Lacík
Zodpovedný riešiteľ v organizácii SAV:	Marián Sedlák
Trvanie projektu:	1.5.2011 / 31.10.2014
Evidenčné číslo projektu:	048610
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Na jednej strane sa nám podarilo patentovať vynález (udelený patent) [1] a na druhej strane získať významné výsledky v oblasti základného výskumu umožňujúce publikovanie v prestížnych časopisoch [2] a rovnako sme získali i pozvanú prednášku na medzinárodnej konferencii v USA [3]. Udelený patent sa týka novej filozofie (nového princípu) tvorby nanočastíc z polymérnych reťazcov ako prekurzorov (stavebného materiálu). Bol detailne preštudovaný mechanizmus tvorby nanočastíc z polykarboxylových kyselín resp. chovanie týchto polymérov v okolí kritického bodu v závislosti od teploty metódami rozptylu svetla a infračervenej spektroskópie (FTIR). V súlade s návrhom projektu sme skúmali detailnejšie architektúru nanočastíc a konformácie individuálnych reťazcov v nanočasticiach na čo sme použili cryo-TEM technológiu v spolupráci s Biocenter Finland National Cryoelectron Microscopy Unit a malouhlový rozptyl synchrotronového žiarenia v spolupráci s European Synchrotron Radiation Facility, Grenoble, France. Jedna práca z tejto oblasti už vyšla tlačou, druhá bola zaslaná.

[1] M. Sedlák, Č. Koňák: Spôsob prípravy polymérnych nanočastíc na báze homopolyméru poly(etylakrylovej kyseliny), Úrad Priemyselného vlastníctva SR. Patent č. 287951. Udelený 27.4.2012.

[2] M. Sedlák: Homopolymer Self-assembly into Stable Nanoparticles: Concerted Action of Hydrophobic Association and Hydrogen Bonding in Thermoresponsive Poly(alkylacrylic acid)s, J. Phys. Chem. B, 116 (8), 2356–2364, 2012.

[3] M. Sedlák: Mesoscopic properties of solutions and liquid mixtures as revealed by light scattering techniques, 18th Symposium on Thermophysical Properties, Boulder, Colorado, USA, 24. 6. – 29. 6. 2012.

[4] M. Sedlák : Critical behavior of hydrophobic polyelectrolytes: from basic research to applied self-assembly, 9th International Symposium on Polyelectrolytes - ISP 2012, Lausanne, Switzerland, July 9 - July 12, 2012.

33.) Interaktívne aktivity pre prispôsobenie žiakom ZŠ, ich učiteľom a širokej verejnosti *(Interactive activities to make physics attractive for basic school, their teachers and general public)*

Zodpovedný riešiteľ:	Marián Mihalik
Trvanie projektu:	1.9.2009 / 31.12.2012
Evidenčné číslo projektu:	LPP-0124-09
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	SAV: 3558 €

Dosiahnuté výsledky:

Boli pripravené pracovné listy pre učiteľov a následne prebehli aktivity pre žiakov druhého stupňa základných škôl na témy: „Magnetický fázový prechod“ a „Žiacke projekty z kuchárskej chémie”. V rámci týchto aktivít tri skupiny žiakov s tomocou odborného garanta a ich učiteľov vypracovali prezentácie výsledkov, s ktorými vystúpili na žiackej vedeckej konferencií 18.12. v aule ústavou SAV, Watsonova 47.

V rámci Dňa otvorených dverí na ÚEF SAV dňa 7.12. prebehli demonštračné aktivity "Silové účinky magnetického poľa" a "Tajné písmo", ktorých sa zúčastnilo asi 500 žiakov a študentov.

Počas "Noci výskumníkov" dňa 28.9. v obcodnom centre OPTIMA sa tisíce záujemcov interaktivne podieľalo na demonštračných aktivitách "Silové účinky magnetického poľa" a "Tajné písmo".

Na seminári DIDFYZ2012,17.-20.10.2012, Račkova dolina, boli prezentované výsdky vo forme prednášky a posteru:
1.Mária Zentková, Danka Janková, Katarína Šterbáková, .Pastelková fyzika – zážitkový kurz fyziky pre deti, prednáška
2.Mária Zentková, Marian Mihalik, Mária Šviková, Mária Horváthová, VEDECKÝ INKUBÁTOR PRE ŽIAKOV A ŠTUDENTOV, poster

34.) MULTIFERROICKÉ MATERIÁLY NA BÁZE OXIDOV MANGÁNU *(Manganese Oxides Based Multiferroics)*

Zodpovedný riešiteľ:	Marián Mihalik
Trvanie projektu:	1.1.2012 / 31.12.2013
Evidenčné číslo projektu:	SK-SRB-0054-11
Organizácia je koordinátorom projektu:	áno

Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	2 - Srbsko: 2

35.) Silno interagujuca hmota v extremnych podmienkach *(Strongly interacting matter under extreme conditions)*

Zodpovedný riešiteľ:	Štefan Olejník
Zodpovedný riešiteľ v organizácii SAV:	Ján Nemčík
Trvanie projektu:	1.7.2012 / 31.12.2015
Evidenčné číslo projektu:	APVV-0050-11
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	ÚEF SAV Košice: 3606 €

Dosiahnuté výsledky:
Skúmala sa produkcia hadrónov s veľkými pT v zrážkach ťažkých iónov.
Hlavná príčina jadrového potlačenia hadrónov je spojená s efektami farebnej priezračnosti pri prechode vzniknutého bezfarebného dipólu jadrovou matériou. Boli určené hodnoty tzv. transportného koeficienta pri
rôznych energiách, ktorý charakterizuje vlastnosti jadrovej matérie. Boli popísané experimentálne data jadrového modifikačného faktora a azimutálnej
anizotropie pri rôznych energiách, centralitách zrážky a pT hadrónov v dobrom súhlase s experimentami na urýchľovačoch RHIC a LHC.

1. B.Z. Kopeliovich, J. Nemchik, I.K. Potashnikova, Ivan Schmidt;
Quenching of high-pT hadrons: Energy Loss vs Color Transparency,
Phys. Rev. C86, 054904 (2012).

2. B.Z. Kopeliovich, J. Nemchik, I.K. Potashnikova, Ivan Schmidt;
High-pT hadrons in heavy ion collisions: From RHIC to LHC,
PoS QNP2012 (2012) 155

3. Jan Nemchik;
"High-pT hadrons in nuclear collisions: from RHIC to LHC";
Invited talk in the 4th international workshop: High Energy Physics in
the LHC Era, January 4-10, 2012, Valparaiso, Chile.

4. Jan Nemchik;
"High-pT hadrons in heavy ion collisions: from RHIC to LHC"
Invited talk in the 6th International Conference on Quarks and Nuclear Physics, April 16-20, 2012, Palaiseau, Paris, France.
Book of abstracts E, p.10

5. Jan Nemchik;

"Color Transparency in Incoherent Electroproduction of rho Mesons off Nuclei";
Invited talk in the International Workshop on Diffraction in High-Energy Physics DIFFRACTION 2012, September 10-15, 2012, Puerto del Carmen, Lanzarote, Spain.
Contributions book (book of abstracts), p.22:

36.) Účinok aliskirénu viazaného na nanočastice pri experimentálnej hypertenzii *(The effect of aliskiren loaded nanoparticles in experimental hypertension)*

Zodpovedný riešiteľ:	Oľga Pecháňová
Zodpovedný riešiteľ v organizácii SAV:	Martina Koneracká
Trvanie projektu:	1.5.2011 / 31.10.2014
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	UEF SAV: 12979 €

Dosiahnuté výsledky:
Boli pripravené magnetické kvapaliny zložené z magnetických nanočastíc s rozdielnym obsahom hovädzieho sérového albumínu (MFBSAs) na inzulínové amyloidné fibrily. Prítomnosť MFBSAs viedla ku značnej deštrukcii inzulínových amyloidných agregátov pričom rozsah depolymerizácie fibríl závisel od fyzikálno-chemických vlastností študovaných magnetických kvapalín (hydrodynamický priemer, zeta potenciál, izoelektrický bod); najväčší efekt bol pozorovaný pre veľkosť nanočastíc. Dosiahnuté výsledky predstavujú východiskový bod pre využitie identifikovaných inhibítorov amyloidného samousporiadania proteínov (efektívne plnanárne akridíny a aktívne MFBSAs) ako terapeutík vhodných na liečbu amyloidóz.

Z.Gažová, K.Šipošová, M.Koneracká, A.Antošová, V.Závišová, M.Kubovčíková, D. Fedunová, J.Bágeľová, N.Tomašovičová, Z.Daxnerová, P. Kopčanský. Presence of Magnetic Fluids Leads to the Inhibition of Insulin Amyloid Aggregation.
In Acta Physica Polonica A, 2012, vol. 121, no. 5-6, p. 1305-1307. (0.444 - IF2011).

37.) Progresívne materiály s konkurenčnými parametrami usporiadania *(Progressive materials with competing order parameters.)*

Zodpovedný riešiteľ:	Peter Samuely
Trvanie projektu:	1.7.2012 / 31.12.2015
Evidenčné číslo projektu:	APVV-0036-11
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:

Projekt riešil v r. 2012 tieto úlohy:
1. Štúdium energetickej medzery a mechanizmu párovania v pniktidoch
1.A. Porovnávacie štúdie pniktidov a izoštruktúrnych systémov
V práci [1] sme študovali elektrónovú štruktúru na supravodivých monokryštáloch SrPd2Ge2, ktoré sú izoštruktúrne so železnými pniktidmi typu „122“, napr. (Ba,K)Fe2As2, ale neobsahujú ani železo ani pniktid (As, alebo P). Experimentálne štúdium bolo urobené pomocou fotoemisnej spektroskopie s uhlovým rozlíšením (ARPES v Drážďanoch), rastrovacej tunelovej spektroskopie (STM/S v Košiciach). Teoretické výpočty pásovej štruktúry v rámci priblíženia lokálnej hustoty (LDA) boli urobené v Štutgarte. STS merania ukázali existenciu jedinej s-vlnovej supravodivej energetickej medzery s veľkosťou ?(0) = 0.5 meV. Fermiho plocha vykázala silný trojrozmerný charakter. Z porovnania experimentálne získanej a teoreticky vypočítanej Fermiho rýchlosti (bez započítania elektrónových korelácií) sme určili renormalizačný faktor 0.95, z čoho vyplýva, že renormalizačný efekt je tu rádovo menší ako u železných pniktidov. Nezvyčajne malá pásová renormalizácia je spôsobená iným orbitálnym charakterom SrPd2Ge2, kde napr. d elektróny hrajú minimálnu rolu na rozdiel od železných pniktidov. Tiež tu absentuje multipásový a multimedzerový efekt. Naše merania teda jasne ukazujú, že ide o konvenčný supravodič, pravdepodobne s elektrónovo-fonónovou supravodivou väzbou. Za exotické vlastnosti železných pniktidov teda nezodpovedá ich kryštálová štruktúra, ale odlišné elektrónové vlastnosti. Z našich meraní a následnej analýzy tiež vyplynulo, že u SrPd2Ge2 ide o supravodivosť typu I, čo je pomerne vzácny jav u viackomponentovej intermetalickej zlúčeniny.
Pomocou subkelvinového STM mikroskopu s využitím CITS módu (Current Imaging Tunneling Spectroscopy) sme študovali magnetické charakteristiky supravodiča SrPd2Ge2. V práci [2] sme ukázali, že hoci intrinzicky patrí ku typu I supravodivosti, vďaka tzv. špinavej limite existuje ako typ II s abrikosovskou mriežkou supravodivých vírov. Tú sa nám podarilo priamo zobraziť pomocou metódy STS CITS. Zmenou technologických parametrov príprav bude možné uskutočniť prechod od typu-II ku typu-I, čo otvára veľmi zaujímavé možnosti štúdia fyzikálnych vlastností systém na rozhraní dvoch typov.

1.C. Príprava proximity štruktúr
Pomocou magnetrónového naprašovania sme pripravili tenké filmy supravodivého nióbu, ktoré sme merali pri rôznych tlakoch kvázihydrostatických tlakoch [3], ale aj hybridné štruktúry supravodič/normálny kov. Supravodivý film z nióbu hrúbky niekoľkých desiatok nanometrov bol následne pokrytý vrstvou zlatého filmu hrúbky niekoľkých nanometrov. Takéto pokrytie študovaného materiálu, napr. supravodiča vrstvou chemicky stáleho kovu s hrúbkou menšou ako je koherenčná hĺbka supravodiča slúži ako pasivátor inak chemicky aktívneho povrchu, resp. na zlepšenie korugácie povrchu. To umožní následné merania povrchov, mriežok/skla supravodivých vírov, resp. spektier rastrovacím tunelovým mikroskopom. Podobným spôsobom sme pasivovali aj povrchy monokryštálov supravodivých pniktidov, ktoré inak nemožno pomocou STM vôbec merať.

Ad 2. Kovalentné supravodiče
2.A.Výskum bórom dopovaného kremíka
Supravodivý kremík vzniká nerovnovážnym dopovaním bórom, keď až 10 percent kremíka je nahradených bórom. Je to dávka vysoko prevyšujúca rozpustnosť bóru v Si. Vzorky sú pripravované metódou GILD - gas immersion laser doping na Université Paris Sud. V tomto roku sme sa venovali príprave a výrobe unikátneho zariadenia na chladenie vzoriek adiabatickou demagnetizáciou paramagnetických solí, ktoré by bolo vhodné pre rýchlu charakterizáciu vzoriek. Zariadenie dosiahlo minimálnu teplotu 40 milikelvinov. Ochladenie z 2 K na túto teplotu trvá niekoľko minút a v priebehu hodiny sa systém vyhreje znova na 2 K (merací čas). Boli zmerané rezistívne prechody tenkých vrstiev bórom dopovaného kremíka do supravodivého stavu pre rôzne stupne dopovania a hrúbky. Predbežné analýzy ukazujú, že teplota prechodu do supravodivého stavu je univerzálnou funkciou nie dopovania, ale súčinu dopovania a hrúbky dopovanej vrstvy. Maximálne Tc je okolo 0,8 K. Vzorky vykazujú dvojroznernú supravodivosť.

2.C. Boridy pri vysokých tlakoch
Lortz et al. [Phys. Rev. B 73, 024512 (2006)] použili merania tepelnej kapacity a elektrického odporu ako tzv. „tepelné spektroskopie“ a pomocou dekonvolúcie nameraných závislostí získali spektrá elektrónovo-fonónovej interakcie v hexaboride ytria. Táto procedúra bola založená na predpoklade, že rozhodujúcu úlohu v elektrónovo-fonónovej interakcii hrá jediný nízkofrekvenčný fonónový mód. V práci [4] sme získali mikrokontaktové spektrá energetickej medzery pri rôznych teplotách a magnetických poliach, ako aj spektrá elektrónovo-fonónovej interakcie, ktoré ukázali, že ide o supravodič so silnou väzbou s renormalizovanou medzerou 2??kTc = 4 a supravodivosť sprostredkuje fonónový mód einsteinovského typu s energiou 7.6 meV v súlade s prácou Lortza. Výsledky týchto ako aj termodynamických meraní boli prezentované aj na konferenciách [K1,K2] a v konferenčnom zborníku [K3]
Počas celého roka prebiehali merania transportných vlastností YB6 pri extrémne vysokých tlakoch do 50 kbarov v diamantovej komôrke v zmiešavacom refrigerátore do milikelvinových teplôt a v poliach do 8 Tesla. Bola určená závislosť kritickej teploty Tc na vonkajšom tlaku, ako aj zmena priebehu teplotnej závislosti odporu medzi izbovou teplotou a nízkymi teplotami po Tc. Experimenty, ktoré budú pokračovať do vyšších tlakov sú v štádiu vyhodnocovania.

3. Supravodivé dichalkogenidy s vlnami nábojovej hustoty
3.A. Príprava monokryštálov dichalkogenidov
Boli pripravené vzorky CuxTiSe2 metódou ...s rôznym obsahom medi. Pre x=0,06 a 0,07 ide o poddopvané vzroky a x= 0,09 a 0,1 sú predopované vzorky. Pri optimálnom dopovaní okolo x = 0,08 sa dosahuje Tc niečo nad 4 K.

3.B. Fyzikálne štúdium dichalkogenidov
Pomocou meraní tepelnej kapacity, magnetizácie prostredníctvom hallovských sond a merného elektrického odporu sme začali charakterizáciu vzoriek CuxTiSe2 s x=0,06, 0,07, 0,09 a 0,1 obsahom medi, ktorým zodpovedá prechod do supravodivého stavu Tc =2,8 K, 3,5 K, 4 K a 4 K, získaný z rezistívnych prechodov. Merania horného kritického magnetického poľa v smere kolmom a paralelnom s bazálnou rovinou (ab) poskytli údaje o supravodivej anizotropii ??????, ktorá sa s dopovaním nemení. Elektrónové merné teplo dokazuje, že ide o jednomedzerový supravodič s-vlnovej symetrie s redukovanou energetickou medzerou 2??kTc = 3,7 [K4]

3.C. Výskum kvázi-dvojrozmernej supravodivosti v misfitoch
Pomocou skenovacieho tunelového mikroskopu vyvinutého v laboratóriu sme merali tunelové spektrá na nových monokryštáloch (LaSe)1.14(NbSe2), ktoré pre nás pripravil Dr. Cario z univerzity v Nantes vo Francúzsku. Prvé výsledky podporujúce hypotézu vnútorných josephsonovských spojov v systéme boli publikované v Refs.[K5,K6].

Supravodiče v blízkosti prechodu kov-izolátor

Izolačný stav je ďalším konkurenčným usporiadaním nielen pre kov, ale aj samotný supravodivý stav (bozónové izolátory). Ani 100 rokov po objave supravodivosti nebol ešte experimentálne detegovaný fundamentálny jav koherentného kvantového prekĺzavania supravodivej fázy (coherent quantum phase slip - CQPS). Ide o jav komplementárny ku Josephsonovmu javu: zatiaľ čo pri Josephsonovom jave dochádza ku koherentnému prenosu Cooperových párov medzi supravodivými kontaktmi, pri CQPS by mali ísť o koherentný transport supravodivých vírov cez supravodivý drôt. Pozorovanie tohto fundamentálneho javu je pravdepodobnejšie v silne neusporiadaných supravodičoch v blízkosti prechodu supravodič – izolátor. Systém s CQPS bude mať podobne ako Josephsonove spoje uplatnenie v metrológií (napäťový štandard). Skupina doc. Grajcara na FMFI UK Bratislava sa pokúša pripraviť zariadenie CQPS na súčiastke z karbidu molybdénu. V

spolupráci s touto skupinou sme študovali ultratenké supravodivé filmy z karbidu molybdénu (MoC) v rôznych hrúbkach od 5 do 10 nm. Kritická supravodivá teplota škáluje s hrúbkou filmu. Zmerali sme exponenciálnu teplotnú závislosť doby života v tomto supravodiči s vysokým stupňom neusporiadanosti a to pomocou dvoch experimentov. Jeden bol urobený pomocou mikrovlnových meraní na rezonátore z MoC pri teplotách nad 300 mK (FMFI UK Bratislava). Druhý experiment boli STM merania v ÚEF SAV Košice pri teplotách nad 280 mK. Oba experimenty analyzované pomocou modelu Mattisa a Bardeena indikujú, že doba života kvázičastíc síce exponenciálne rastie so znižovaním teploty, ale má tendenciu saturovať ku konečnej hodnote (Ref.[5]). To by mohlo mať nepriaznivé dôsledky na dekoherenciu v qubitoch na báze CQPS.

V tomto roku sme uskutočnili aj spoločný experiment košického pracoviska a Fyzilálneho ústavu AV ČR, zameraný na charakterizáciu tenkých supravodivých filmov NbN komplementárnymi technikami. V Prahe boli filmy študované v kolmom poli do 7 Tesla film in pomocou terahertzovej spektroskópie (Time Domain Terahertz Spectroscopy (TD TS)), zatiaľ čo v Košiciach pomocou rastrovacej tunelovej mikroskopie a spektroskopie STM/STS. TD TS spriemeruje optické vlastnosti cez celú meranú vzorku, na druhej strane STM/STS odráža lokálne vlastnosti na nanoškále. Získané charakteristiky umožňujú porovnať vysokofrekvenčnú vodivosť s teoretickými modelmi bez ďalších fitovacích parametrov. Komplexná vodivosť v nulovom magnetickom poli je dobre popísaná Zimmermanovým modelom. V magnetickom poli je dynamika supravodivých vírov popísaná modifikovanou Londonovou rovnicou (selfkonzistentné riešenie Coffeyho a Clema. Taktiež sme použili časovo rozlíšenú teóriu Ginzburga a Landaua. Výsledky sú pripravené na publikovanie v Ref. [6].

1.T. K. Kim, A. N. Yaresko, V. B. Zabolotnyy, A. A. Kordyuk, D. V. Evtushinsky, N. H. Sung, B. K. Cho, T. Samuely, P. Szabo, J. G. Rodrigo, J. T. Park, D. S. Inosov, P. Samuely, B. Bueuchner and S. V. Borisenko, Evidences for conventional superconductivity in SrPd2Ge2 from combined ARPES,STS and LDA studies, Phys. Rev. B 85 (2012), 014520
2.T. Samuely, P. Szabó, Z. Pribulová, N. H. Sung, B. K. Cho, T. Klein, V. Cambel, J.G. Rodrigo, and P. Samuely: Type II superconductivity in SrPd2Ge2, Supercond. Sci. Technol. 26 (2013) 015010 (7pp)
3.G. Pristáš, S. Gabáni, E. Gažo, V. Komanický, M. Orendáč, H. You, Influence of hydrostatic pressure on superconducting properties of nanostructured Nb films, in preparation
4.P. Szabó, J. Kačmarčik, Z. Pribulová, J. Girovský, S. Gabáni, G. Pristáš, T Mori and P. Samuely, Point-contact spectroscopy of the phononic mechanism of superconductivity in YB6, zaslané do Supercond. Sci. Technol.
5.P. Neilinger, M. Trgala, M. Žemlička, M. Rehák, M. Leporis, J. Greguš, M. Grajcar P. Szabo, P. Samuely, Comparisson of finite quasiparticle lifetime in disordered superconductors measured by microwaves and tunneling spectroscopy, in preparation
6.Šindler M., Tesař R., Szábo P., Samuely P., Kadlec C., Kadlec F., Kužel P., Koláček J., Spectroscopic investigations of thin superconducting NbN film in perpendicular magnetic field studied by Time Domain Terahertz Spectroscopy and Scanning Tunneling Spectroscopy, in preparation

Konferenčné príspevky

[K1] P. Szabó, J. Kačmarčík, Z. Pribulová, J. Girovský, S. Gabáni, G. Pristáš, I. Takáčová, K. Flachbart, T. Mori, and P. Samuely, Strong-coupling superconductivity of YB6, International conference on MATERIALS & MECHANISMS OF SUPERCONDUCTIVITY - M2S 2012, Washington, D.C., USA July 29 - August 3, 2012. Book of abstracts P3-07.
[K2] J. Kačmarčík, Z. Pribulová, P. Szabó, S. Gabáni, T. Mori, P. Samuely, YB6- superconductor with an Einstein lattice, International Conference on Physics of Materials, 17 – 19 October 2012, Košice, invited lecture (J. Kačmarčík).
[K3] J. Kačmarčík, Z. Pribulová, P. Szabó, S. Gabáni, T. Mori, P. Samuely, YB6- superconductor

with an Einstein lattice, Proceedings of International Conference on Physics of Materials, 17 – 19 October 2012, Košice, pp. 55 – 58.
[K4] Z. Pribulová, J. Kačmarčík, P. Samuely, P. Barančeková and G. Karapetrov, Systematic study of CuxTiSe2 by ac-calorimetry, International conference on MATERIALS & MECHANISMS OF SUPERCONDUCTIVITY - M2S 2012, Washington, D.C., USA July 29 - August 3, 2012. Book of abstracts P1-114.
[K5] P. Szabó, T. Samuely, J. Kačmarčík, P. Samuely, J. G .Rodrigo, L. Cario, STM studies on the intrinsic Josephson junction behavior of the low temperature (LaSe)1.14(NbSe2) superconductor, International Conference on Phase Separation and Superstripes in High Temperature Superconductors and Related Materials. SUPERSTRIPES (2012), Erice, Sicily, from July 11 to 17, 2012 at the Ettore Majorana Foundation and Centre for Scientific Culture, abstract book, p.114, invited lecture (P. Szabó).
[K6] P. Szabo, T. Samuely, J.G.Rodrigo, P. Samuely, Scanning Tunneling Spectroscopy and Vortex Imaging on Transition Metal Dichalcogenides, International conference on MATERIALS & MECHANISMS OF SUPERCONDUCTIVITY - M2S 2012, Washington, D.C., USA July 29 - August 3, 2012. Book of abstracts P1-111.

38.) Multifunkčné nanoštruktúrne magnetické materiály pre senzorové aplikácie
(Multifunctional nanostructured magnetic materials for sensor applications)

Zodpovedný riešiteľ:	Ivan Škorvánek
Trvanie projektu:	1.1.2011 / 31.12.2012
Evidenčné číslo projektu:	SK-RO-0027-10
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
V r. 2012 sme sa v ramci riešenia úloh projektu zamerali na štúdium štruktúrnych a magnetických vlastností dvoch skupín materiálov:
i) multifunkčné zliatiny s vysokou magnetostrikciou na báze FeGa pre applikácie v senzoroch a aktuátoroch v tvare tenkých pások a mikrodrôtov
ii) magneticky mäkké nanoštruktúrne zliatiny na báze FeCoNbB a FeNiNbB v tvare sklom potiahnutých mikrodrôtov a tenkých pások pre senzorické aplikácie.

1. LUPU, Nicoleta - ŠKORVÁNEK, Ivan – GRIGORAS, M. – TIBU, Mihai - MARCIN, Jozef - CHIRIAC, Horia. The effect of magnetic field annealing on polycrystalline Fe-Ga melt-spun ribbons. In INTERMAG 2012: IEEE International Magnetics Conference, May 7th - 11th, 2012, Vancouver, BF-06

2.VARGA, Marek - KOVÁČ, Jozef – LUPU, Nicoleta - ŠKORVÁNEK, Ivan. Effect of magnetic field annealing on magnetic properties of rapidly solidified FeGa alloys. In PM 2012: Proceedings of the scientific conference, Physics of materials 2012, 17 – 19 October 2012, p. 125-127

3. ŠKORVÁNEK, Ivan - MARCIN, Jozef - CAPIK, Marek - VARGA, Marek - TURČANOVÁ, Jana - KOVÁČ, Jozef - ŠVEC, Peter - JANIČKOVIČ, Dušan - KOVÁČ, František - STOYKA, Volodymyr. Tailoring of functional properties in Fe-based soft magnetic alloys by thermal

processing under magnetic field. In Magnetohydrodynamics, 2012, vol. 48, no. 2, p. 371-377.

4. ŠKORVÁNEK, Ivan - MARCIN, Jozef - VARGA, Marek - CAPIK, Marek - KOVÁČ, Jozef - ŠVEC, Peter. FeNi- and FeCo-based amorphous and nanocrystalline alloys for magnetic sensors: the effect of field annealing. In MAP 5 : 5th
International Workshop on Materials Analysis and Processing in Magnetic Fields, May 13-17, 2012, Autrans, France, talk, p. 54-56

39.) Senzory na báze magnetických mikrodrôtov *(Sensors based on magnetic microwires)*

Zodpovedný riešiteľ:	Ivan Škorvánek
Trvanie projektu:	1.5.2011 / 30.12.2014
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Náš výskum zameraný na kompozičnú sériu zliatin (Fe1?xNix)81Nb7B12 zliatin (x= 0.14, 0,25, 0.33, 0.5, a 0.66) prispel k novým poznatkom o optimalizácii zloženia a podmienok spracovania nanokryštalických zliatin na báze FeNi, ktoré môžu byť použité na cielené ovplyvňovanie ich magneticky mäkkých vlastností pre potenciálne technické aplikácie. Sľubné výsledky pre tieto zliatiny boli dosiahnuté pri štúdiu vplyvu tepelného spracovania v magnetickom poli na magnetické a elektromagnetické charakteristíky s ohľadom na ich využitie v GMI senzoroch.

1. ŠKORVÁNEK, Ivan - MARCIN, Jozef - CAPIK, Marek - VARGA, Marek - TURČANOVÁ, Jana - KOVÁČ, Jozef - ŠVEC, Peter - JANIČKOVIČ, Dušan - KOVÁČ, František - STOYKA, Volodymyr. Tailoring of functional properties in Fe-based soft magnetic alloys by thermal processing under magnetic field. In Magnetohydrodynamics, 2012, vol. 48, no. 2, p. 371-377

2. VARGA, Marek - MARCIN, Jozef - CAPIK, Marek - KOVÁČ, Jozef - ŠVEC, Peter - ŠKORVÁNEK, Ivan. Field - annealed Fe-Ni-Nb-B amorphous and nanocrystalline alloys for magnetic sensor applications. In ICM 2012: The 19th International Conference on magnetism, July 8-13, 2012, Bexco, Busan, Korea, Pozvaná prednáška, number IB01

3. ŠKORVÁNEK, Ivan - MARCIN, Jozef - CAPIK, Marek – JANOTOVÁ, Irena - KOVÁČ, Jozef - ŠVEC, Peter - IDZIKOWSKI, Bogdan. Soft magnetic Fe-based alloys for energy applications. In PM 12: Proceedings of the scientific conference, Physics of materials 2012, 17 – 19 October 2012, Pozvaná prednáška, page 59

4. ŠKORVÁNEK, Ivan - MARCIN, Jozef - VARGA, Marek - CAPIK, Marek - KOVÁČ, Jozef - ŠVEC, Peter. FeNi- and FeCo-based amorphous and nanocrystalline alloys for magnetic sensors: the effect of field annealing. In MAP 5 : 5th International Workshop on Materials Analysis and Processing in Magnetic Fields, May 13-17, 2012, Autrans, France, talk, p. 54-56

40.) Nanokryštalické a kvázikryštalické kovové systémy s cielene modifikovanou štruktúrou a morfológiou *(Nanocrystalline and quasicrystalline metallic systems with tailored structure and*

morfology)

Zodpovedný riešiteľ:	Peter Švec
Zodpovedný riešiteľ v organizácii SAV:	Ivan Škorvánek
Trvanie projektu:	1.7.2012 / 31.12.2015
Evidenčné číslo projektu:	APVV-0492-11
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Výskumné aktivity pri riešení projektu boli orientované na využitie statických magnetických polí v procese tepelného spracovania nových
nanokryštalických a amorfných materiálov za účelom cielenej modifikácie ich magnetických vlastností. V spolupráci s FÚ SAV v Bratislave bola pripravená séria rýchlo chladených amorfných kovových zliatin na báze
Fe(Co)PBCu,bez kobaltu a s kobaltom. V týchto zliatinách sme študovali efekty legovania malým množstvom fosforu a medi na procesy tvorby (nano)kryštalických zŕn počas ich amorfno/kryštalickej transformácie ako i vplyv tepelného spracovania vo vonkajšom magnetickom poli a na ich magneticky mäkké charakteristiky. Efekty tepelného spravovania vo vonkajšom magnetickom poli na magnetické a magnetoimpedančné charakteristiky boli študované i v prípade amorfných a nanokryštalických zliatin so zložením (Fe0.5Ni0.5)81Nb7B12, (Fe0.67Ni033)81Nb7B12 a (Fe0.5Co0.5)81Nb7B12. V prípade (Fe0.5Ni0.5)81Nb7B12 zliatin boli pozorované podstatne vyššie hodnoty GMI efektu po prechode vzorky do nanokryštalického stavu v porovnaní s východiskovým amorfným materiálom.

1. Ivan ŠKORVÁNEK, Jozef MARCIN, Marek CAPIK, Marek VARGA, Jozef KOVÁČ, Irena JANOTOVA, Peter ŠVEC, Bogdan IDZIKOWSKI, Soft Magnetic Melt-Spun Ribbons for Energy and Sensor Applications. In Acta electrotechnica et informatica, 2013, ISSN 1335-8243.(pozvaná prednáška).

2. ŠKORVÁNEK, Ivan - MARCIN, Jozef - VARGA, Marek - KOVÁČ, Jozef – KOVÁČ, František - ŠVEC, Peter. Tuning of magnetic anisotropy and domain structure of soft magnetic Fe-based alloys by thermal processing under magnetic field. In EPM2012: The 7th International Conference on Electromagnetic Processing of Materials, 22-26 October 2012, Beijing, China, Technical Program, p. 21

3. VARGA, Marek – MARCIN, Jozef - KOVÁČ, Jozef - CAPIK, Marek - ŠVEC, Peter - ŠKORVÁNEK, Ivan. Giant magnetoimpedance effect in field annealed Fe(Ni,Co)NbB amorphous and nanocrystalline ribbons. In JEMS 2012: Joint European Magnetic Symposia, Parma - Italy, September 9th-14th, 2012, Book of Abstracts, p. 98

41.) Magneto-optické vlastnosti polymérnych tenkých filmov *(Magneto-optic properties of polymer thin films)*

Zodpovedný riešiteľ:	Milan Timko
Trvanie projektu:	1.1.2012 / 31.12.2013

Evidenčné číslo projektu:	SK-FR-0012-11
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Boli pripravené magnetické nanočastice vo forme retiazok (magnetozomy) procesom biomineralizácie a pripravené štrukturalizované polymérne tenké vrstvy vo vonkajšom magnetickom poli.. Merania magnetotoptických a magnetických meraní ukazujú na anizotrópne vlastnosti.
1. M. Timko, A. Hashim, M. Molčan, A. Skumiel, J . Kováč, M. Rajňak, P. Kopčanský, H. Gojzewski, M. Makowski, F. Royer
Bacterial magnetic nanoparticles – aspects of preparation, characterization and applications. Pozvaná prednáška na
10th Conference on Colloid Chemistry, August 2012, Budapešť, Maďarsko
2. A. Hashim, ÚEF SAV, Košice
Magnetic nanoparticles prepared by biomineralization process - preparation, characterization and utilization. Pozvaná prednáška na konferencii Fyzika Materiálov, TUKE Košice 17.-19.10.2012

42.) Interaktívny zber a spracovanie obrazov v mikroskopii použitím prirodzeného užívateľského rozhrania *(Interactive methods of image acquisition and processing in microscopy using natural user interface)*

Zodpovedný riešiteľ:	Zoltán Tomori
Trvanie projektu:	1.7.2012 / 31.12.2015
Evidenčné číslo projektu:	APVV-0526-11
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	ÚEF SAV: 18731 €

Dosiahnuté výsledky:
V úvodnej fáze projektu boli testovaná vlastnosti 3D kamery Kinect na segmentáciu a výsledky boli popísané v príspevku na medzinárodnú konferenciu:

[1] Tomori, R. Gargalik, and I. Hrmo, "Active Segmentation in 3D using Kinect Sensor," Proc. of the 20th International Conference on Computer Graphics, Visualization and Computer Vision '2012 (WSCG 2012), Part 2, Pilsen, Czech Republic, 2012.

43.) Environmenálne nano-aplikácie bližšie k študentom *(Enviromental nano-aplications closely to students)*

Zodpovedný riešiteľ:	Mária Zentková
Trvanie projektu:	1.9.2009 / 31.8.2012
Evidenčné číslo projektu:	LPP 093-09
Organizácia je	nie

koordinátorom projektu:
Koordinátor:
Počet spoluriešiteľských inštitúcií: 2 - Slovensko: 2

Dosiahnuté výsledky:
Projektové aktivity smerovali k popularizácii fyziky medzi žiakmi a študentami mimokošických škôl. Projekt participoval na akciách ako Noc Výskumníkov,deň otvorených dverí a podobne. Výsledky boli prezentované:
DIDFYZ2012,17.-20.10.2012, Račkova dolina,
1.Mária Zentková, Danka Janková, Katarína Šterbáková, .Pastelková fyzika – zážitkový kurz fyziky pre deti, prednáška
2.Mária Zentková, Marian Mihalik, Mária Šviková, Mária Horváthová, VEDECKÝ INKUBÁTOR PRE ŽIAKOV A ŠTUDENTOV, poster

44.) Prírodné vedy pre každého *(Scicence - user friendly)*

Zodpovedný riešiteľ: Mária Zentková
Trvanie projektu: 1.9.2009 / 31.8.2012
Evidenčné číslo projektu: LPP - 0270-09
Organizácia je koordinátorom projektu: áno
Koordinátor: Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií: 6 - Slovensko: 6

Dosiahnuté výsledky:
Pastelková fyzika-kurz fyziky pre škôlkárov a žiakov prvého stupňa skompletovaný.Rozhodnutím Ministerstva školstva,vedy,výskumu a športu SR zo dňa 17.9.2012 bol program :Nový model predprimárneho prírodovedného vzdelávania-Pastelková fyzika schválený ako program kontinuálneho vzdelávania pre učiteľov predprimárneho vzdelávania.Poskytovateľom je Katolícka Univerzita Ružomberok.
Študentské projekty v rámci vedeckého inkubátora boli úspešné v národných kolách Scientia pro futuro a Amavet. Všetky boli prezentované na Študentskej vedeckej konferencii v aule UEF SAV. Okrem účasti projektu na akciách ako Noc výskumníkov, Deň otvorených dverí, Creative factory projekt propagoval svoje aktivity na futbalovom kempe v Plejsoch. Projekt prezentoval svoje aktivity na konferencii
DIDFYZ2012,17.-20.10.2012, Račkova dolina v dvoch príspevkoch:
1.Mária Zentková, Danka Janková, Katarína Šterbáková,Pastelková fyzika – zážitkový kurz fyziky pre deti, prednáška
2.Mária Zentková, Marian Mihalik, Mária Šviková, Mária Horváthová, Vedecký inkubátor pre žiakov a študentov, poster.
Boli zorganizované dva workshopy pre učiteľov ZŠ tématicky súvisiace s vydanými učebnými textami :
1.Ľubomír Šnajder,Danka Daneshjoová,Valéria Gondová: Informatické pracovné listy s bádateľskými aktivitami, Ústav Experimentálnej fyziky SAV, Prvé vydanie, Počet strán: 66, 2012, ISBN-978-80-970779-7-6
2. Mária Zentková,Danka Janková,Marián Mihalik: Pastelková fyzika-zásobník pokusov, Ústav Experimentálnej fyziky SAV, Prvé vydanie, Počet strán: 80, 2012, ISBN-978-80-970779-8-3

Programy: Štrukturálne fondy EÚ Regionálny operačný program

45.) SIVVP - Slovenská infraštruktúra pre vysokovýkonné počítanie *(The Slovak Infrastructure for High Performance Computing)*

Zodpovedný riešiteľ:	Tomáš Lacko
Zodpovedný riešiteľ v organizácii SAV:	Tibor Kožár
Trvanie projektu:	15.1.2010 / 31.12.2014
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Výpočtové stredisko SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	Ministerstvo školstva, vedy, výskumu a športu SR: 774393 €

Dosiahnuté výsledky:
Začiatkom roka 2012 boli pre SIVVP gridový uzol na ÚEF SAV v Košiciach dodané 2 riadiace („management“), 2 dátové („storage“) nódy a 46 výpočtových („compute“) nódov, z ktorých 16 bolo rozšírené o NVIDIA GPGPU akcelerátory. Na jednotlivých nódoch sa nainštaloval Scientific Linux operačný systém, verzia 2.6.32. Okrem toho, nainštalovali sa aj MPI a torque/maui programy pre paralelné a dávkové spracovanie výpočtov. Do gridového uzla bolo následne dodané a sprevádzkované aj CONTEG klimatizačné zariadenie pre efektívne chladenie výpočtového klastra. V prvej etape budovania SIVVP hardvérových prostriedkov vznikol tak v Košiciach výkonný gridový uzol s unikátnym výpočtovým výkonom, najmä vďaka GPGPU prostriedkom. Na klastri sa nainštalovali vybrané nekomerčné softvérové produkty pre prírodovedecké oblasti, najmä molekulárny výskum. V súčasnosti sa pripravujú výberové konania pre nákupy komerčných softvérových produktov.

Programy: Štrukturálne fondy EÚ Výskum a vývoj

46.) Nové materiály a technológie pre energetiku *(New materials and technologies for energetics)*

Zodpovedný riešiteľ:	Pavel Diko
Trvanie projektu:	1.5.2010 / 30.4.2013
Evidenčné číslo projektu:	262220220061
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Študovali sme izotermický rast masívneho YBa2Cu3Ox kryštálu v systéme Y1.5Ba2Cu3Ox (zmes YBa2Cu3Ox a Y2O3 fáz) a prídavkom 1 hm. % CeO2. Ukázali sme vplyv teploty na rýchlosť rastu kryštálu, jeho kvalitu a zmenu zloženia taveniny s časom rasu kryštálu.

Publikácie

D. Volochova P.Diko, M.Radusovska, V.Antal,S.Piovarci, K.Zmorayova, M. Sefcikova, Growth of Y123 bulk crystals in Y1.5Ba2Cu3Ox system with CeO2 addition, Journal of Crystal Growth 353 (2012) 31–34.
D. Volochova, P.Diko,V.Antal, M.Radusovska, S.Piovarci, Influence of Y2O3 and CeO2 additions on growth of YBCO bulk superconductors, Journal of Crystal Growth 356 (2012) 75–80.

47.) Výskum a vývoj masívnych YBCO supravodičov druhej generácie *(Research and Development of the Second Generation of YBCO Bulk Superconductors)*

Zodpovedný riešiteľ:	Pavel Diko
Trvanie projektu:	1.1.2010 / 31.5.2012
Evidenčné číslo projektu:	26220220041
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Študovali sme vplyv dopovanie hliníkom na vlastnosti a štruktúru GdBCO masívneho monokryštalického supravodiča. Pripravili sme supravodič s vysokým zachyteným magnetickým poľom.

Publikácie
D. Volochova, P Diko, S Piovarci, M Kalmanova, K Iida, B Holzapfel, A E Carrillo, B Bozzo and X Granados, Microstructure and trapped field of Al-doped GdBCO–Ag bulk superconductors, Supercond. Sci. Technol. 25 (2012) 025023 (4pp).

48.) Budovanie infraštruktúry Centra excelentnosti progresívnych materiálov s nano a submikrónovou štruktúrou *(Infrastructure Improving of Centre of Excellence of Advanced Materials with Nano- and Submicron- Structure)*

Zodpovedný riešiteľ:	Ján Dusza
Zodpovedný riešiteľ v organizácii SAV:	Ivan Škorvánek
Trvanie projektu:	1.5.2010 / 30.4.2013
Evidenčné číslo projektu:	ITMS 26220120035
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Pokračovalo sa v naplánovaných prácach spojených s budovaním experimentálnej základne centra v oblasti prípravy a charakterizácie fyzikálnych vlastností materiálov s nano a submikrónovou štruktúrou. Aktivity spojené s verejným obstarávaním, nákupmi nových, prístrojov, ich inštaláciou a spustením do prevádzky boli realizované v LNAM, LMF a LECHF ÚEF SAV.

49.) Dobudovanie centra pre kooperatívne javy a fázové prechody v nanosystémoch s pespektívou využitia v nano- a biotechnológiách

Zodpovedný riešiteľ:	Peter Kopčanský
Trvanie projektu:	1.4.2010 / 31.3.2013
Evidenčné číslo projektu:	ITMS: 26220220033
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Projekt je zameraný na dobudovanie laboratórii na prípravu a charakterizáciu magnetických nanočastíc a ich kompozitov a na štúdium ich fyzikálnych vlastnosti.
Bol uvedený do prevádzky kryogenický uzavretý merací systém na meranie magnetických, elektrických a tepelných charakteristík, ktorý bol zakúpený v rámci tejto aktivity. Boli otestované všetky meracie sondy a realizované prvé experimenty vo vysokom magnetickom poli do 18 Tesla. Bola navrhnutá dodatočná meracia sonda na meranie dielektrických vlastností systémov s magnetickými nanočasticami, ktorá umožní meranie fázových prechodov vo vysokom magnetickom poli v požadovanom teplotnom intervale, a to tak v systémoch feronematík (magnetické nanočastice - kvapalný kryštál) ako aj v samouspariadaných magnetických štruktúrach, resp. v systémoch so štrukturalizovanými magnetickými nanočasticami pomocou vonkajšieho magnetického poľa. Zavedenie tohto meracieho systému nám umožňuje realizáciu experimentov, ktoré predtým museli byť realizované na zahraničných pracoviskách. Bol zakúpený vákuový fourierovsky infračervený spektrometer.
Pomocou teórie stredného poľa Landaua de Gennes pokračovalo sa v štúdiu vplyvu magnetického poľa na fázový prechod medzi nematickou a izotrópnou fázou v kompozitných systémoch zložených z kvapalných kryštálov a magnetických nanočastíc. Teoretické výpočty ukazujú, že podobne ako v prípade tzv. Fredericksz ového štruktúrneho fázového prechodu tak aj v tomto fázovom prechode môže dodanie magnetických nanočastíc viesť k zmene teploty fázového prechodu v závislosti od okrajových podmienok, t.j. prilepenie častíc kvapalného kryštálu na magnetické nanočastice. Na základe našich výpočtov boli navrhnuté experimenty, ktoré môžu potvrdiť alebo vyvrátiť uvedené hypotézy a sú dôležité z hľadiska aplikácií kvapalných kryštálov.
Boli realizované merania infračervených spektier biokompatibilných vzoriek magnetitu obaleného BSA neožiareného a po ožiarení s cieľom sledovať stabilitu týchto materiálov.
Metódou diferenciálnej skenovacej kalorimetrie boli charakterizované tepelné vlastnosti polymérnych PLA nanosfér s enkapsulovaným liečivom Aliskirém s rôznymi koncentráciami. Boli realizované série TGDTA experimentov systému magnetických nanočastíc modifikovaných PEGom s molekulárnou hmotnosťou 20 000 (MKPEG20k) s rôznou koncentráciou PEGu. Ďalej boli študované fázové prechody kvapalných kryštálov rôzneho typu počas ohrevu a ochladzovania a relaxácia ich tepelných vlastností.
Sledovali sme účinok magnetických kvapalín na amyloidnú agregáciu poly/peptidov, hlavne na lyzozým, inzulín a Abeta peptid. Zistili sme, že anti-amyloidná aktivita je závislá od rozmeru nanočastíc dispergovaných v nosiči magnetickej kvapaliny. V prípade magnetickej kvapaliny modifikovanej dextránom bol zistený najlepší účinok pre magnetickú kvapalinu, u ktorej bol diameter magnetitových nanočastíc okolo 20 nm. Zväčšenie veľkosti hydrodynamického priemeru na hodnotu 150 nm spôsobilo zníženie inhibičného účinku magnetických kvapalín na tvorbu amyloidných agregátov. Študovali sme tiež morfológiu agregátov v prítomnosti magnetickej kvapaliny pomocou atómovej silovej mikroskopie.
Bol realizovaná kalibráca a testovanie kompaktnej optickej pinzety a jej konkrétne aplikácie v kombinácii s optickým skalpelom vrátane ovládania externého triggera na vzorkách SiO2

mikročastíc s presne definovanou veľkosťou. Štúdium a rozbor hardvérových súčastí zostavy multifunkčného fluorescenčného mikroskopu s optickou pinzetou, ich postupné uvedenie do chodu vrátane detekcie ich správneho režimu.
Niektoré výsledky boli prezentované na vedeckých konferenciách alebo vo vedeckých časopisoch.

50.) Vývoj tecnologických postupov magnetických kvapalín pre biomedecínske účely

Zodpovedný riešiteľ:	Peter Kopčanský
Trvanie projektu:	1.1.2010 / 30.6.2012
Evidenčné číslo projektu:	ITMS: 26220220005
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
V rámci projektu bola doplnená experimentálna základňa slúžiaca na návrh, prípravu a charakterizáciu magnetických nanočastíc, magnetických kvapalín a biologicky účinných komplexov obsahujúcich nanočastice. V rámci projektu boli ďalej pripravené nanočastice rôznymi metodikami: magnetické nanočastice a magnetické kvapaliny chemickou cestou – precipitačnou metódou; magnetoferitín s rôznym obsahom atómov železa na molekulu proteínu apoferitínu; magnetozómy pripravené biomineralizáciou (založené na kultivácii magnetotaktických baktérii Magnetospirillum magnetotacticum sp. AMB-1) a následne charakterizované. Ďalej boli preskúmané terapeutické účinky pripravených nanočastíc a ich komplexov. Tieto testy nám umožnili porovnať účinky týchto látok na cicavčích nenádorových bunkách ako aj nádorových bunkových líniách in vitro v MTT teste a sledovaním rastovej aktivity buniek. Ďalej boli testované účinky magnetických nanočastíc in vitro na amyloidné štruktúry proteínov, ktoré sú spojené s viac ako 30 nevyliečiteľnými amyloidnými chorobami, ako je napríklad Alzheimerova a Parkinsonova choroba alebo diabetes typu II.

Vybrané výsledky boli publikované vo viacerých publikáciách:

1.Siposova K.; Kubovcikova M.; Bednarikova Z.; Koneracka, M., Zavisova, V.; Antosova, A.; Kopcansky, P.; Daxnerova, Z.; Gazova, Z.
Depolymerization of insulin amyloid fibrils by albumin-modified magnetic fluid
NANOTECHNOLOGY 23 Iss. 5, Article Number: 055101 (2012)
2.Gojzewski, H; Makowski, M; Hashim, A; Kopcansky, P; Tomori, Z; Timko, M.
Magnetosomes on surface: an imaging study approach.
SCANNING Vol. 34 Iss 3, Pages: 159-169 DOI: 10.1002/sca.20292 (2012)
3.Gazova Z.; Siposova K.; Koneracka M.; Antosova, A., Zavisova, V., Kubovcikova, M.; Fedunova, D.; Bagelova, J., Tomasovicova, N.; Daxnerova, Z.; Kopcansky, P.
Presence of Magnetic Fluids Leads to the Inhibition of Insulin Amyloid Aggregation
Conference: European Conference on Physics of Magnetism (PM) Location: Poznan, POLAND Date: JUN 27-JUL 01, 2011
Acta Physica Polonica A 121 Iss. 5-6 (2012) 1305-1307
4.N. Tomašovičová, I. Haysak, M. Koneracká, J. Kováč, M. Timko, V. Závišová, A. Okunev, A. Parlag, A. Fradkin, V. Sakhno, P. Kopčanský
Magnetic Properties of Biocompatible Magnetic Fluid after Electron Irradiation
Acta Physica Polonica A No. 5_6 Vol. 121 (2012) 1302 – 1304
5.M. Timko; P. Kopčanský, M. Antalik, M. Simsikova, E. Valusova, M. Molcan and J. Kováč

Physical Properties of Magnetite Nanoparticles Covered by 11-Mercaptoundecanoic Acid
Acta Physica Polonica A 121 No. 5_6 (2012) 1321–1323
6.Hashim, M. Molčan, J. Kovač, Z. Varchulová, H. Gojzewski, M. Makowski, P. Kopčansky, Z. Tomori, M. Timko
The Influence of Morphology on Magnetic Properties of Magnetosomes
Acta Physica Polonica A No. 5_6 Vol. 121 (2012) 1250–1252
7.A.Józefczak, T. Hornowski, A. Skumiel, V. Závišová, M. Koneracká, N. Tomašovičová, M. Timko, P. Kopčanský, H. N. Kelani
Effect of the Molecular Weight of Poly(ethylene glycol) on the Properties of Biocompatible Magnetic Fluids, Int. J. Thermophys, DOI 10.1007/s10765-011-1061-4

51.) Rozvoj centra excelentnosti pre výskum fyziológie tráviaceho traktu –CEFT II.etapa *(Center of Excellence for Research on Physiology of the Digestive Tract)*

Zodpovedný riešiteľ:	Juraj Koppel
Zodpovedný riešiteľ v organizácii SAV:	Marián Antalík
Trvanie projektu:	1.11.2010 / 1.2.2013
Evidenčné číslo projektu:	ITMS:26220120043
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Boli pripravene magnetické častice s antimikrobiálnymi účinkami založené na uhlíkových kompozitoch obsahujúcich nanočastice magnetitu a katióny striebra. Výsledky boli publikované v :Eva Valušová, Anna Vandžurová, Peter Pristaš, Marián Antalík
and Peter Javorský, Water treatment using activated carbon supporting silver
and magnetite, Water Science & Technology, 66,2772,2012

52.) Technológia prípravy elektrotechnických ocelí s vysokou permeabilitou pre elektromotory s vyššou účinnosťou *(Technology of the fabrication of electrical steels for the electric motors with higher efficiency)*

Zodpovedný riešiteľ:	František Kováč
Zodpovedný riešiteľ v organizácii SAV:	Ivan Škorvánek
Trvanie projektu:	1.11.2010 / 31.12.2012
Evidenčné číslo projektu:	ITMS:26220220037
Organizácia je koordinátorom projektu:	nie
Koordinátor:	
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
V r. 2012 bola naša pozornosť orientovaná na experimentálnu charakterizáciu vybraných elektromagnetických vlastností izotrópnych elektromagnetických ocelí s vysokou permeabilitou a na ich optimalizáciu pomocou procesov riadenej evolúcie mikroštruktúry a kryštalografickej

textúry. Časť vzoriek bola tepelne spracovaná v externom magnetickom poli za účelom overenia potenciálu tejto žíhacej techniky dostupnej na ÚEF SAV pre zlepšenie magneticky mäkkých vlastností neorientovaných FeSi ocelí. Výsledky experimentov získané z týchto meraní boli použité na posúdenie vhodnosti magnetických charakteristík študovaných elektrotechnických ocelí pre potenciálne aplikácie vo vysokoúčinných elektromotoroch.

53.) Centrum kozmických výskumov: vplyvy kozmického počasia *(Center of Space Research: influence of space weather)*

Zodpovedný riešiteľ:	Karel Kudela
Trvanie projektu:	24.4.2009 / 31.8.2012
Evidenčné číslo projektu:	ITMS: 26220120009
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Astronomický ústav SAV Tatranská Lomnica, Svoreň Ján Doc., RNDr. DrSc.
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Pokračovalo vybavenie a podľa možností testovanie nových zariadení vo všetkých 3 častiach úlohy. Osobitne náročnou bolo zlepšenie podmienok pre doterajšie a pripravované nové merania kozmického žiarenia na Lomnickom štíte.

Poďakovanie podpore projektu JEM-EUSO na Slovensku (support from the Centre of Space Research, EU, project ITMS No. 26220120009, of the European Regional Development Fund) uvádza materiál "STATUS OF THE ACTIVITIES OF THE JEM-EUSO CONSORTIUM, 13 November 2012" pripravený ústavom RIKEN v Japonsku.

54.) Extrem II - Dobudovanie Centra pokročilých fyzikálnych štúdii materiálov v extrémnych podmienkach *(Extrem II - Center of advanced physical studies for materials in extreme conditions)*

Zodpovedný riešiteľ:	Peter Skyba
Trvanie projektu:	28.8.2010 / 31.7.2013
Evidenčné číslo projektu:	ITMS26220120047
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Univerzita P. J. Šafárika v Košiciach
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
V roku 2012 boli dobudované alebo obnovené experimentálne laboratória fyziky kondenzovaných látok. Bohatá škála unikátnych experimentálnych metódy týchto laboratórií umožňujú komplexný výskum kondenzovaných látok v širokej teplotnej oblasti, pri vysokých tlakoch až do 1 GPa a magnetických poliach do 10Tesla. Nízkotpelotný AFM umožňuje študovať povrchy tuhých látok s nanometrovým rozlíšením v teplotnej oblasti od 300mK po 1K, pri magnetických poliach do 8T.

55.) Centrum kozmických výskumov: vplyvy kozmického počasia – druhá etapa

Zodpovedný riešiteľ:	Ján Svoreň
Zodpovedný riešiteľ v	Karel Kudela

organizácii SAV:	
Trvanie projektu:	1.3.2010 / 28.2.2013
Evidenčné číslo projektu:	ITMS 26220120029
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Astronomický ústav SAV, Svoreň Ján Doc., RNDr. DrSc.
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Okrem obstarávania nových prístrojov a zariadení boli pripravené dolu uvedené publikácie s poďakovaním príslušnému ITMS. Úloha je predĺžená do konca roku 2013.

K. Kudela, Sto rokov od objavu kozmického žiarenia. Niekoľko poznámok k meraniam vo Vysokých Tatrách, 21st National Solar Physics Meeting, Stara Tura, June 2012, článok dostupný na http://stara.suh.sk/obs/slnsem/21css/22w.pdf

JURČIŠINOVÁ, Eva - JURČIŠIN, Marián. Anomalous scaling of the magnetic field in the Kazantsev–Kraichnan model. In Journal of Physics A: Mathematical and Theoretical, 2012, vol. 45, no. 48, art. no. 485501

GLADYSHEV, A.V. - JURČIŠINOVÁ, Eva - JURČIŠIN, Marián - REMECKÝ, Richard - ZALOM, Peter. Anomalous scaling of a passive scalar field near two dimensions. In Physical Review E. Statistical, Nonlinear and Soft Matter Physics, 2012, vol. 86, no. 3, art. no. 036302.

JURČIŠINOVÁ, Eva - JURČIŠIN, Marián. The Ising Model on Pure Husimi Lattices: A General Formulation and the Critical Temperatures. In Journal of Statistical Physics, 2012, vol. 147, no. 6, p. 1077-1093.

FEDOROV, Yu. – SHAKHOV ,B. – STEHLIK, M. Statistical acceleration of energetic particles and their diffusion in turbulent nmagnetic fields, J.Phys. B: At. Mol.Opt. Phys., Vol. 45, 165702(14pp), DOI: 10.1088/0953-4075/45/16/165702, 2012

56.) Centrum excelentnosti výkonových elektronických systémov a materiálov pre ich komponenty II *(Center of excellence for power electronics and their material components II)*

Zodpovedný riešiteľ:	Milan Timko
Trvanie projektu:	30.9.2010 / 31.8.2013
Evidenčné číslo projektu:	26220220061
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Žilinská Univerzita, Žilina
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Štruktúrne usporiadanie magnetických nanočastíc v magnetickej kvapaline na báze transformátorového oleja bolo merané pomocou akustickej spektroskópie. Boli merané dielektrické a magnetodielektrické charakteristiky magnetickej kvapaliny na báze transformátorových olejov. Bola pozorovaná anizotrópia meraných veličín pri rôznej orientácii magnetického poľa a lineárna závislosť permitivity od koncentrácie magnetických nanočastíc v súlade s teóriou.
1. KÚDELČÍK, J. - BURY, P. - DRGA, J. - KOPČANSKÝ, Peter - ZÁVIŠOVÁ, Vlasta - TIMKO,

Milan. Temperature Effect on the Structure of Transformer Oil Based Magnetic Fluids Using Acoustic Spectroscopy. In Acta Physica Polonica A, 2012, vol. 121, no. 5-6, p. 1169-1171. (0.444 - IF2011).
2.TIMKO, Milan - KOPČANSKÝ, Peter - MOLČAN, Matúš - TOMČO, Ladislav - MARTON, Karol - MOLOKÁČ, Štefan - RYBÁR, P. - STOIAN, Floriana - HOLOTESCU, Sorin - TACULESCU, A. Magnetodielectric Properties of Transformer Oil Based Magnetic Fluids. In Acta Physica Polonica A, 2012, vol. 121, no. 5-6, p. 1253-1255. (0.444 - IF2011).
3. TIMKO, Milan - MARTON, Karol - TOMČO, Ladislav - KIRALY, J. - MOLČAN, Matúš - RAJŇÁK, Michal - KOPČANSKÝ, Peter - CIMBALA, Roman - STOIAN, Floriana - HOLOTESCU, Sorin - TACULESCU, A. Magneto-dielectric properties of transformer oil based magnetic fluids in the frequency range up to 2 MHz. In Magnetohydrodynamics, 2012, vol. 48, no. 2, p. 427-434. (0.413 - IF2011). (2012 - WOS). ISSN 0024-998X.

Programy: Štrukturálne fondy EÚ Vzdelávanie

57.) Edukačné fyzikálne centrum ÚEF SAV

Zodpovedný riešiteľ:	Mária Zentková
Trvanie projektu:	1.9.2010 / 30.8.2013
Evidenčné číslo projektu:	ITMS: 26110230034
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Prebehla séria prednášok v rámci Jesennej školy prednesených domácimi i zahraničnými expertmi v oblasti fyziky pevných látok a biofyziky. PhD študenti a postdoktorandi ÚEF SAV vycestovali na 15 krátkodobých a 3 dlhodobé vedecké stáže. V rámci inovácie doktorandského štúdia v odbore Fyzika kondenzovaných látok a akustika začali prednášky v novom voliteľnom predmete Fyzika vysokých tlakov. Okrem toho prebehli 3 prednáškové kurzy zahraničných expertov pre PhD študentov a to Prof.T.Klein:Thermodynamic properties of superconductors I-Magnetic properties, Dr. Christophe Marcenat:Thermodynamic properties of superconductors II-Specific heat measurement, Prof.Maryna Balanda:AC susceptometry in study of phase transitions and magnetic relaxation
in low-dimensional and molecular magnets.
Boli vydané tieto učebné texty :
1. Peter Samuely,Zuzana Pribulová,José Gabriel Rodrigo,Tomáš Samuely: Supravodivosť a tunelová spektroskopia, Eds. M.Mihalik, M.Zentkova,Vydavateľ:Ústav Experimentálnej fyziky SAV, 2012, Počet strán :150, Prvé vydanie, ISBN 978-80-970779-4-5
2. Matúš Mihalik,Ivan Škorvánek, Rastislav Varga,Jozef Kováč,Marcel Miglierini, Martin Orendáč,Maryna Balanda: Magnetizmus, Eds. M.Mihalik, M.Zentkova,Vydavateľ:Ústav Experimentálnej fyziky SAV, 2012, Počet strán :150, Prvé vydanie, ISBN 978-80-970779-6-9

Programy: Centrá excelentnosti SAV

58.) Centrum excelentnosti SAV - Nanokvapaliny *(Centre excelence of SAS - Nanofluids)*

Zodpovedný riešiteľ:	Peter Kopčanský
Trvanie projektu:	1.2.2009 / 31.1.2013
Evidenčné číslo projektu:	

Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
Vedecké aktivity Centra excelentnosti Nanokvapalín boli zamerané na teoretické a experimentálne štúdium nanočastíc a nanoštruktúr v rôznych oblastiach.

V kvapalných kryštáloch dopovaných magnetickými nanočasticami bol študovaný indukovaný prechod z izotropnej do nematickej fázy pomocou vonkajšieho magnetického poľa.

Skúmali sme okrajové stavy v karbónových nanočasticiach, ktoré sa podieľajú na vytvorení topologických izolátorov. Existencia takýchto stavov závisí od topológie povrchu nanočastíc. Tieto stavy môžu zmeniť elektrónové vlastnosti nanočastíc. Ich enrgia leží v zakázanom páse neohraničeného izolátora a sú lokalizované na povrchu nanočastice (izolátora). S využitím rôznych počiatočných látok, z ktorých sme syntetizovali ZnO nanočastice sa nám podarilo pripraviť dva druhy a to s kladných nábojom na povrchu a so záporným nábojom na povrchu nanočastíc, v prostrediach s neutrálnym pH. S cieľom využitia samoroganizujúcich sa vlastností prirodzených biomakromolekúl sme prešetrili interakciu nami nasyntetizovaných ZnO nanočastíc s cytochrómom c v oblasti neutrálnych a mierne zásaditých prostrediach.

Ďalšia oblasť výskumu bola zameraná na štúdium amyloidnych agregácii. Patogenéza amyloidných ochoren, ako sú Alzheimerova choroba alebo cukrovka typu II je spojená s prítomnosťou proteínových amyloidných depozitov, ktoré vedú k dysfunkcii alebo smrti buniek. Experimentálne dáta poukazujú na to, že inhibícia a depolymerizácia amyloidnej agregácie predstavuje jeden z perspektívnych terapeutických prístupov liečby týchto ochorení. Sledovali sme vplyv magnetických kvapalín zložených z magnetických nanočastíc s rozdielnym obsahom hovädzieho sérového albumínu na inzulínové amyloidné fibrily. Ich prítomnosť viedla ku značnej deštrukcii inzulínových amyloidných štruktúr.

Možnosti využitia magnetických kvapalín na báze transformátorových olejov vo výkonovej energetike predpokladajú okrem stanovenia dielektrických vlastnosti poznať ich tepelnú vodivosť a tiež odozvu na štrukturalizáciu magnetických nanočastíc vo vonkajšom magnetickom poli. Pomocou malouhlového X-ray rozptylu a útlmu zvukových vĺn v magnetickej kvapaline na báze transformátorového oleja s rôznou koncentráciou magnetických nanočastíc bolo ukázané, že vo vonkajšom magnetickom poli dochádza k formovaniu agregátov vo forme retiazok magnetických nanočastíc.

Štúdium rôznych druhov interakcií aj naďalej patrilo k základným prioritám pri analýze fyzikálnych procesov, určujúcich transport a správanie sa nanočastíc vo fluktujúcich prostrediach. Okrem čisto mechanických interakcií typu Brownovho pohybu rozhodujúcimi sú chemické reakcie častíc rôzneho alebo toho istého druhu, výsledkom ktorých je ich zliepanie.

59.) Centrum fyziky nízkych teplôt a materiálového výskumu v extrémnych podmienkach
(Centre of Low Temperature Physics And Material Research at Extreme Conditions)

Zodpovedný riešiteľ:	Peter Samuely
Trvanie projektu:	1.7.2011 / 30.6.2014
Evidenčné číslo projektu:	
Organizácia je	áno

koordinátorom projektu:
Koordinátor: Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií: 0

Dosiahnuté výsledky:
Úlohy
1/ Projekt sa zameria na ďalší rozvoj spoločných laboratórií troch ústavov SAV a Ústavu fyzikálnych vied Prírodovedeckej fakulty UPJŠ v Košiciach s dôrazom na vlastné unikátne metódy, prístroje a technológie.
2/ Pracoviská centra budú rozvíjať vlastný fyzikálny a materiálový výskumný program zameraný na fundamentálnu aj aplikovanú supravodivosť, supratekutosť, kvantový magnetizmus, nekonvenčné nové materiály, úpravu a charakterizáciu nanomagnetických materiálov pre aplikácie, ako aj rôzne formy prípravy nanomateriálov a ich skúmania v extrémnych podmienkach.
3/ Centrum bude aktívnou súčasťou ERA, bude koordinovať svoje aktivity so špičkovými svetovými partnermi a uchádzať sa o podporu medzinárodných projektov, ako Rámcových programov EU.
4/ Centrum bude koordinovať svoje rozsiahle aktivity v oblasti výchovy vedeckého dorastu, vrátane všetkých troch stupňov vysokoškolského vzdelávania, postdoktorandov a celoživotného vzdelávania.
5/ Centrum bude pôsobiť ako verejne prístupná špičková infraštruktúra, typu národného laboratória pre výskum pri ultranízkych teplotách , vysokých tlakoch, vysokých magnetických poliach a pod., otvorená pre domácu aj zahraničnú akademickú obec, ako aj pre záujemcov z podnikateľského prostredia za podmienok definovaných štatútom.
6/ Hoci je centrum zamerané primárne na špičkový základný výskum, dlhodobo sa venuje aj priamym aplikáciám pre domáci priemysel a to v oblasti hutníctva, strojárstva, senzoriky a meracej techniky. Poskytuje tiež poradenstvo v oblasti kryogénnej a vákuovej techniky.
VFNT MVEP tvoria tieto pracoviská:
Centrum fyziky nízkych teplôt ÚEF SAV a UPJŠ
Oddelenie mechanochémie Ústavu geotechniky SAV
Oddelení konštrukčnej keramiky ÚMV SAV
Laboratóriu materiálovej fyziky ÚEF SAV
Laboratóriu nanomateriálov a aplikovaného magnetizmu ÚEF SAV
Plnenie
Ad 1.
V minulom roku sme uviedli v Centre fyziky nízkych teplôt ÚEF SAV a UPJŠ do prevádzky zariadenie na optickú litografiu a nanolitografiu elektrónovým lúčom. Už boli úspešne pripravené prvé nanoštruktúry, ako nanomechanické rezonátory z hliníka pre bolometriu pri ultranízkych teplotách. Bola zvládnutá príprava matíc nanoostrovčekov elektrónovou litografiou na uhlíkovom a kremíkovom substráte. Napríklad sú to matice 2x2 mm2 s rádove miliónom 100 nm-vých platinových nanoostrovčekov. Do prevádzky bol uvedený tzv. suchý rozpúšťací refrigerátor Triton 200, Oxford Instruments, ktorý dosiahol teplotu 6.7 mK a magnetické pole 8 T. Bola zostrojená sonda pre meranie magnetizácie pomocou miniatúrnych Hallových sond pripravených v ElÚ SAV. Bol zostrojený unikátny refrigerator pre adiabatickú demagnetizáciu paramagnetických solí, ktorý umožnuje rýchle merania v milikevinovej oblasti atď. V laboratóriu vysokých tlakov sme v roku 2012 zaviedli meranie tlaku in-situ v piestikovej komôrke do 3 GPa pomocou odporového manganinového tlakomera, ktorý má použitie v širokom intervale teplôt pod 300 K.

Oddelenie mechanochémie Ústavu geotechniky SAV v r. 2012 rozšírilo svoju prístrojovú bázu o termoanalyzátor Netzsch STA 449-F3 a prístroj Photon Counting Spectrofluorimeter PC1. Na prietokovom mlyne MiniCer zakúpenom v r. 2011 bola vyvinutá unikátna metóda prípravy nanosuspenzií, ktoré sa testujú pre potenciálne onkologické aplikácie.

Na Oddelení konštrukčnej keramiky ÚMV SAV bolo zriadené špičkové PVD laboratórium, ktoré umožňuje vývoj technológií pre prípravu nanokompozitných PVD vrstiev so špičkovými vlastnosťami a širšie zapojenie do medzinárodnej spolupráce. PVD zariadenie na báze elektrónového dela predstavuje kombináciu metód odparovania s použitím záporného predpätia na povlakovanom predmete, v nízkotlakej nízkoteplotnej plazme pri teplotách nad 180 °C. Taktiež bolo zakúpené aj zariadenie: Optický profilometer/konfokálny mikroskop, Ramanovský mikroskop, Nanoindentor T 200 a zariadenia na keramografiu.

V Laboratóriu materiálovej fyziky ÚEF SAV prebieha inštalácia systému zariadení pre komplexnú RTG difrakčnú analýzu a zaškolenie personálu. Jedná sa o unikátnu kombináciu metodík zahrňujúcu RTG analýzu v teplotnom rozsahu -150 až 1200 C, analýzu textúry materiálov, tenkých vrstiev, lokálnu analýzu mikrofokusovaným RTG lúčom, malouhlový rozptyl (SAXS). Tiež prebieha inštalácia skenovacieho mikroskopu s autoemisnou katódou a unikátnou kombináciou mikroanalytických metód: energiovodisperzná a vlnovodisperzná analýza RTG lúčov (EDAX, EDX), difrakcia spätne odrazených elektrónov (EBSD). Inštalovaný bol aj laserový granulometer pre meranie rozmerovej distribúcie častíc prášku od nanorozmerovej veľkosti a hmotnostný spektrometer na kvalitatívnu a kvantitatívnu analýzu plynných produktov rozkladu pri termickej a RTG analýze materiálov.
Inštalovaný bol tiež glovebox pre prácu v čistej atmosfére (Ar alebo N).

V Laboratóriu nanomateriálov a aplikovaného magnetizmu ÚEF SAV prebehla v roku 2012 inštalácia týchto prístrojov: Supravodivý "cryogen-free" magnetický systém s príslušenstvom generujúci magnetické pole do 14T s pracovným priestorom pri izbovej teplote; Automatizovaný systém na meranie dynamických magnetických charakteristík magneticky mäkkých materiálov; Vibračný magnetometer na detekciu magnetického momentu materiálov v teplotnom intervale od 100 K do 1273 K v aplikovanom magnetickom poli do ±2,6 T a Magnetooptický Kerrov mikroskop na sledovanie doménovej štruktúry vzoriek magneticky mäkkých materiálov vo vonkajšom magnetickom poli do ±800 kA/m a v teplotnom intervale od 10 K do 900 K.

Ad 2.
Pracovníci Centra fyziky nízkych teplôt ÚEF SAV a UPJŠ v Košiciach sú zapojení do riešenia viacerých významných projektov základného výskumu v oblasti magnetizmu, supravodivosti, supratekutého hélia-3, silnokorelovaných elektrónových systémov. Ide o projekty APVV, VEGA, rámcové projekty a pod.
Študovali sme elektrónovú štruktúru na supravodivých monokryštáloch SrPd2Ge2, ktoré sú izoštruktúrne so železnými pniktidmi typu „122“, napr. (Ba,K)Fe2As2, ale neobsahujú ani železo ani pniktid (As, alebo P). Experimentálne štúdium bolo urobené pomocou fotoemisnej spektroskopie s uhlovým rozlíšením (ARPES v Drážďanoch), rastrovacej tunelovej spektroskopie (STM/S v Košiciach). Teoretické výpočty pásovej štruktúry v rámci priblíženia lokálnej hustoty (LDA) boli urobené v Štutgarte. Pomocou subkelvinového STM mikroskopu s využitím CITS módu (Current Imaging Tunneling Spectroscopy) sme študovali magnetické charakteristiky supravodiča SrPd2Ge2. V ďalšej práci sme ukázali, že hoci intrinzicky patrí ku typu I supravodivosti, vďaka tzv. špinavej limite existuje ako typ II s abrikosovskou mriežkou supravodivých vírov. V roku 2012 sme sa zaoberali experimentálnym štúdiom vplyvu substitúcie magnetického iónu Ho3+ v geometricky frustrovanom kovovom antiferomagnete HoB12 nemagnetickým iónom Lu3+ meraním tepelnej kapacity, magnetizácie, rezistivity a Hallovho javu. Skúmali sme tiež vplyv hydrostatického tlaku na supravodiče. Bola prevedená komplexná analýza Hallovho javu a rezistivity tuhého roztoku La1-xCexB6, veľmi zriedeného silne korelovaného elektrónového systému CeB6 substitúciou céru lantánom, ktorá poukazuje na nesúlad s modelom kondovskej prímesi.

V r. 2012 sa výskum Oddelenia mechanochémie ÚGT SAV sústredil na mechanickú aktiváciu, resp. mechanochemickú syntézu vyspelých materiálov. Študovali sa vlastnosti odpadového biomateriálu tvoreného vaječnými škrupinami (eggshell, ES). ES, fázovým zložením kalcit CaCO3, sa ukázal ako vhodný substrát pre environmentálne aplikácie. Pri vhodnej kombinácii termickej a mechanickej predúpravy tento materiál predstavuje efektívny sorbent toxických iónov kadmia z vodných roztokov. Prejavil sa tiež ako vhodné médium pre viazanie chlóru z odpadových materiálov na báze polyvinylchloridu.
Nanokompozity CdSe@ZnS sa syntetizovali s využitím mechanochemických postupov. Syntetizované nanoštruktúry sa testovali z hľadiska rozpúšťania toxického kadmia. Ukázalo sa, že v porovnaní s CdSe, kde kadmium prechádza do fyziologického roztoku o koncentrácii 0.8 ?g.ml-1, dosahuje jeho koncentrácia pre CdSe@ZnS menej ako 0,05 ?g.ml-1. Viazanie kadmia malo za následok veľmi nízku cytotoxicitu týchto štruktúr pri testoch na vybraných líniách rakovinových buniek. Dosiahnutý výsledok naznačuje, že nanokompozit CdSe@ZnS má potenciál ako fluorescenčný značkovač v biomedicínskom inžinierstve.

Oddelenie konštrukčnej keramiky ÚMV SAV sa venovalo príprave a štúdiu vzoriek Si3N4 s obsahom 1 hm % grafénových vločiek, spracovaných dvoma spôsobmi prípravy, tzv. tlakovým lisovaním za tepla (HIP) a spekaním v ochrannej atmosfére plynu (GPS). Študoval sa vplyv rôznych typov grafénov a spôsobov spracovania vzoriek na lomovú húževnatosť a mechanizmy zhúževnatenia Si3N4.
Zistili sme, že vzorky s obsahom grafénových vločiek vykazovali výrazne vyššiu lomovú húževnatosť v rozmedzí hodnôt od 6.1 do 9.9 MPam0.5, čo je výrazne vyššia v porovnaní s Si3N4 bez grafénových vločiek v rozmedzí od 6.5 do 6.3 MPam0.5. Najvyššia hodnota KIC 9.9 MPam0.5 bola nameraná v prípade kompozitu, kompaktizovaného metódou HIP. Boli pozorované mechanizmy zhúževnatenia ako premostenie, vetvenie a vybočenie trhliny.

V Laboratóriu materiálovej fyziky ÚEF SAV sme optimalizovali parametre rastu kvalitných masívnych YBa2Cu3Ox kryštálov a popísali fázové a štruktúrne zmeny v systéme počas kryštalizácie. Originálnym výsledkom tohto štúdia je nájdenie príčin zastavenia rastu pri izotermickej výdrži. Tento jav sme dali do súvisu s prítomnosťou nadbytku oxidu medi v systéme, ktorý vzniká pri reakcii východiskových zložiek. Počas rastu Y123 kryštálu sa koncentrácia CuO v zostávajúcej tavenine zvyšuje, klesá peritektická teplota, čo sme demonštrovali termickou analýzou, až sa rast zastaví. Ďalší rast môže pokračovať pri dodatočnom podchladení systémuV systéme Y1.5Ba2Cu3Ox (zmes YBa2Cu3Ox a Y2O3 fáz) a prídavkom 1 hm. % CeO2 sme študovali vývoj mikroštruktúry v jednotlivých štádiách prípravy masívnych monokryštalických supravodičov. Ukázali sme na možné mechanizmy zjemnenia Y211 častíc prídavkom zlúčeniny obsahujúcej cér. Študovali sme tvorbu nanorozmerových centier uchytávania magnetických tokočiar substitúciam v kryštálovej mriežke Y123 fázy (tzv. chemický pinning). Pripravili sme masívne monokryštalické Y123/Y211 supravodiče so substitúciami substitúciami Y resp. Ba (Sm, Gd, Yb). Pripravili sme vzorky GdBa2Cu3Ox masívneho monokryštalického supravodiča s prídavkom striebra dopovaného hliníkom. Pripravené vzorky supravodiča vykazovali vysoké hodnoty zachyteného magnetického poľa pri teplote 77 K, ktoré sú porovnateľné s najlepšími vzorkami tohto typu. Študovali sme tiež vzorky masívneho supravodiča FeSe pripraveného kryštalizáciou taveniny na NCK University Tainan, Taiwan. Mikroskopická a termická analýza vzoriek ukázala, že v systéme prebieha atermická fázová transformácia martenzitického typu. Toto vedie k vysokým mechanickým pnutiam v systéme, ktoré môžu byť príčinou potlačenie prechodovej teploty. Táto môže byť zvýšená dodatočným tepelným spracovaním. Pripravili sme polykryštalickú keramiku typu La0,67Ca0,33-xSrxMnO3 reakciou v tuhom stave. Optimalizovali sme režim syntézy keramiky a analyzovali jej štruktúru RTG difrakciou.

Vedecké aktivity Laboratória nanomateriálov a aplikovaného magnetizmu ÚEF SAV boli orientované na štúdium efektov tepelného spracovania magneticky mäkkých a magneticky tvrdých

materiálov vo vonkajšom magnetickom poli, ktoré sa dajú využiť na cielenú modifikáciu ich funkčných vlastností. V prípade nanokryštalických magneticky mäkkých materiálov na báze FeCoNbB and FeNiNbB viedlo tepelné spracovanie v pozdĺžnom magnetickom poli k tvorbe hranatých hysteréznych slučiek, ktoré vykazovali extrémne nízke hodnoty koercitívneho poľa. Na druhej strane, tepelné spracovanie v priečnom magnetickom poli malo za následok sklopenie hysteréznych slučiek, ktoré naviac vykazovali veľmi dobrú lineárnu odozvu magnetizácie voči aplikovanému magnetickému poľu. Sľubné výsledky boli dosiahnuté pri štúdiu vplyvu tepelného spracovania v magnetickom poli na GMI charakteristiky FeNiNbB zliatin. Možnosť „ušitia magnetických charakteristík materiálov na mieru“ je dôležitá pre ich využitie v rôznych senzorových systémoch. V prípade permanentných magnetov na báze FePtNbB nanokompozitov resp. kryštalických systémov s vysokou magnetostrikciou na báze FeGa boli efekty spracovania v magnetickom poli podstatne slabšie.

Ad 3.
V Centre fyziky nízkych teplôt ÚEF SAV a UPJŠ sme získali medzinárodný projekt COST NanoSC –Nanoscale Superconductivity: Novel Functionalities through Optimized Confinement of Condensate and Fields (NanoSC -COST) a bilaterálny slovensko – argentínsky projekt Exotické supravodiče s významným nízkoteplotným laboratóriom v Bariloche.

V Oddelení konštrukčnej keramiky ÚMV SAV roku 2012 sme zahájili riešenie projektu 7RP Innovative materials solutions for Transport, Energy and Biomedical sectors by strengthening integration and enhancing research dynamics of KMM-VIN. Boli zahájené aktivity s cieľom vylepšiť a upevniť postavenie KMM VIN (Virtuálny inštitút Knowledge based multifunctional materials, ÚMV SAV je zakladajúcim členom) v medzinárodnej vedecko – výskumnej komunite. Boli zistené požiadavky priemyslu v oblastiach ako doprava, energetika a biomedicína na Slovensku a bola up-gradovaná prístrojová databáza KMM-VIN.

Kolektív Laboratória nanomateriálov a aplikovaného magnetizmu ÚEF SAV je od r. 2012 riešiteľom 7RP projektu MNT-ERANET II STREAM Small energy harvester based on magnetostrictive amorphous and nanocrystalline materials (2012–2014). Tento projekt je zameraný na vývoj zariadenia na získavanie elektrickej energie z vibrácií v okolitom prostredí. Partnermi projektu sú National Institute of Research and Development for Technical Physics (NIRDTP), Iasi a priemyselná firma GRADIENT SRL z Rumunska

Ad 4.
V Centre fyziky nízkych teplôt ÚEF SAV a UPJŠ sú školení diplomanti v nasledujúcich témach
1.Bc. Veronika Hašková, Mikrokontaktová spektroskopia spinovej polarizácie vybraných systémov, Mgr. P. Szabó, CSc.
2.Bc. Viktória Soltészová, Ac kalorimetria supravodičov, RNDr. Jozef Kačmarčík, PhD
3.Bc. Zuzana Medvecká, Magnetizačné merania nových supravodičov pomocou miniatúrnych hallovských senzorov, RNDr. Zuzana Pribulová, PhD
4.Bc. Miroslava Lacková, Samousporiadané filmy z nanoguľôčok oxidu kremičitého ako masky pre nanolitografie, Mgr. Vladimír Komanický,PhD
5.Matúš Orendáč, Vplyv vysokého tlaku na supravodivosť a štruktúru tenkých vrstiev – bakalárska práca, RNDr. Slavomír Gabáni, PhD

Doktorandi: RNDr. I. Takáčová, RNDr. M. Zapotoková, Mgr. I. Čurlik

V Oddelení mechanochémie ÚGT SAV sa školia dvaja doktorandi: Mgr. Zdenka Bujňáková (2009-2013) a RNDr. Matej Baláž (2011-2015). Témy ich dizertačných prác súvisia s problematikou základného výskumu syntézy a charakterizácie nanomateriálov, ktoré sa skúmajú v rámci CFNT-MVEP.

V Oddelení konštrukčnej keramiky ÚMV SAV -

Ad 5.

Dňa 22.12.2011 bola uzavretá zmluva o združení medzi Ústavom materiálového výskumu SAV v Košiciach, Univerzitou Pavla Jozefa Šafárika v Košiciach, Ústavom experimentálnej fyziky SAV v Košiciach a Ústavom geotechniky SAV v Košiciach. Zmluvné strany sa dohodli rozvíjať vzájomne prospešnú spoluprácu, ako aj zúčastňovať sa na riešení inovatívnych projektov v spolupráci s ďalšími partnermi a tak prispievať k vedecko-výskumnému, technickému a ekonomickému rozvoju na Slovensku s cieľom budovania špičkových laboratórií, racionalizácie investičných nákladov a ich využívania. Účastníci združenia touto zmluvou zriadili spoločné pracovisko s názvom „Spoločné laboratórium transmisnej elektrónovej mikroskopie“, v skratke „SLTEM“, ktoré s využitím transmisnej elektrónovej mikroskopie bude schopné riešiť závažné úlohy v oblasti vývoja nanomateriálov a nanotechnológií.

Ad 6.
Infraštruktúru centra frekventovane využívajú domáci aj zahraniční záujemcovia:
Napr. Dr. Thierry Klein, Institut Néel CNRS, Grenoble, Francúzsko a Dr. Christophe Marcenat v minulom roku merali magnetizáciu a tepelnú kapacitu supravodičov pri subkelvinových teplotách.

ÚMV SAV spolupracuje s nasledujúcimi priemyselnými spoločnosťami:
-Spinea s.r.o. Prešov,
-Staton s.r.o. Turany,
-Pramet Tools s.r.o. Šumperk, Česká republika,
-COMMERC SERVICE s.r.o. Prešov.

Centrum vlani dodalo kvapalné hélium a kvapalný dusík viacerým externým záujemcom

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M. Baláž, P. Baláž, G. Tjuliev, A. Zubrík, M. J. Sayagués, A. Zorkovská, N. Kostova: Cystine-capped CdSe@ZnS Nanocomposites: Mechanochemical Synthesis, Properties and the Role of Capping Agent. In: Journal of Materials Science, ISSN 0022-2461 (IF 2011 = 2,015), prijaté 12.11.2012, DOI 10.1007/s10853-012-7029-3.

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M. Baláž, P. Baláž, A. Zorkovská, A. Šatka: Mechanochemically Treated Eggshell Waste Biomaterial for Environmental Apllications. In: Environmental Science and Technology, ISSN 0013-936X (IF 2011 = 5,228), zaslané do redakcie 27.12.2012.
P. Baláž, A. Zorkovská, M. Baláž, M. J. Sayagués, G. Mojžišová, J. Mojžiš: CdSe@ZnS Nanocomposites Prepared by a Mechanochemical Route: No Release of Cd2+ Ions and Neglible In Vivo Cytotoxicity. In: Materials Research Bulletin, ISSN 0025-5408 (IF 2011 = 2,105), zaslané do redakcie 5.12.2012.

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M. Varga, J. Marcin, M. Capik, J. Kováč, P. Švec, I. Škorvánek: Field - annealed Fe-Ni-Nb-B amorphous and nanocrystalline alloys for magnetic sensor applications. In ICM 2012: The 19th International Conference on magnetism, July 8-13, 2012, Bexco, Busan, Korea, Pozvaná prednáška , number IB01

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Programy: Podpora MVTS z prostriedkov SAV

60.) Výpočtové prístupy štúdia štruktúry, zbaľovania a interakcií biopolymérov
(Computational approaches to study structure, folding and interactions of biopolymers)

Zodpovedný riešiteľ:	Tibor Kožár
Trvanie projektu:	1.1.2011 / 31.12.2013
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	ÚEF SAV: 21995 €

Dosiahnuté výsledky:
GPGPU protokoly pre biomolekulárne počítanie boli naďalej testované. Výsledky testovania v roku 2012 boli publikované v dvoch zborníkoch [1, 2]} a prezentované v rámci pozvanej prednášky na medzinárodnej biofyzikálnej konferencie v Taipei, Taiwan [3]. Vďaka GPGPU prostrediu bolo výpočtové zrýchlenie veľmi sľubné pre simulácie molekulárnej dynamiky. Zrýchlenie bolo viac ako deväťnásobné v porovnaní simulácie bežiacej na jednom procesore versus simulácie na tom istom procesore s rozšírením o jedno GPU. Okrem toho sme sa zamerali na synergické prepojenie výpočtov a experimentálnych metód pri štúdiu amyloidnej agregácie. Prvé získané výsledky boli prezentované na Zjazde biochemickej spoločnosti v Brne, Česká republika [4]. Veľká pozornosť bola venovaná aj samotným experimentálnym štúdiám amyloidnej agregácie a možnostiam inhibície takýchto agregácií [5-8]. Zamerali sme sa aj na štúdium vzťahov medzi štruktúrou a biologickou aktivitou molekulárnych systémov a získané údaje naznačujú, že štruktúra derivátov je dôležitým faktorom, ktorý určuje ich účinok na inzulín/lyzozým amyloidnú agregáciu. Okrem toho sme študovali aj účinok nanočastíc magnetitu na inzulín/lyzozým amyloidné fibríly. Výsledky potvrdili významnú anti-amyloidogenickú účinnosť týchto nanosystémov.

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61.) MVTS Nanoveda a inžiniering v supravodičoch *(MVTS Nanoscience and Engineering in Superconductivity)*

Zodpovedný riešiteľ:	Peter Samuely
Trvanie projektu:	1.5.2007 / 30.4.2012
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav experimentálnej fyziky SAV
Počet spoluriešiteľských inštitúcií:	0

Dosiahnuté výsledky:
V rámci projektu zameraného na problémy nanovedy v supravodičoch sme výsledky prezentovali na medzinárodnej konferencii Materials and Mechanism of Superconductivity, Washington 2012: Scanning Tunneling Spectroscopy and Vortex Imaging on Transition Metal Dichalcogenides, autorov Samuelyho, Szaboa, et al.
Zúčastnil som sa tiež workshopu: On Nanoscale Superconductivity and Fluxonics, On the occasion of the 60th birthday of Prof. Dr. Victor V. Moshchalkov
June 12, 2012 v Leuvene, v Belgicku. Veľká časť účastníkov projektu NES, vrátane slovenskej časti, sa úspepešne uchádzalo o projekt NanoSC COST, ktorý sa začal v októbri 2012 a bude pokračovať 4 roky. P. Samuely je člen Riadiacej skupiny.

Príloha C
Publikačná činnosť organizácie (zoradená podľa kategórií)

ABC Kapitoly vo vedeckých monografiách vydané v zahraničných vydavateľstvách

ABC01 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.

ABC02 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.

ADCA Vedecké práce v zahraničných karentovaných časopisoch impaktovaných

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ADCA201 TOMAŠOVIČOVÁ, Natália - TIMKO, Milan - KONERACKÁ, Martina - ZÁVIŠOVÁ, Vlasta - JADZYN, Jan - BEAUGNON, Eric - CHAUD, Xavier - KOPČANSKÝ, Peter. Magnetic Field Induced Structural Transistions in 6CHBT-Based Ferronematics. In Acta Physica Polonica A, 2012, vol. 121, no. 5-6, p. 1276-1278. (0.444 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0587-4246. PM´11 : proceedings of the European Conference Physics of Magnetism, Poznan, Poland, June 27-July 1, 2011. (0.444 - IF2011).

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ADDA01 MESÁROŠOVÁ, Monika - ČIAMPOR, Fedor - ZÁVIŠOVÁ, Vlasta - KONERACKÁ, Martina - URSÍNYOVÁ, M. - KOZICS, Katarína - TOMAŠOVIČOVÁ, Natália - HASHIM, Anežka - VÁVRA, Ivo - KRIŽANOVÁ, Zuzana - HUSEKOVA, Z. - KUBOVČÍKOVÁ, Martina - KOPČANSKÝ, Peter - TIMKO, Milan - GÁBELOVÁ, Alena. The intensity of internalization and cytotoxicity of superparamagnetic iron oxide nanoparticles with different surface modifications in human tumor and diploid lung cells. In Neoplasma, 2012, vol. 59, no. 5, p. 584-597. (1.440 - IF2011). (2012 - Current Contents, WOS, SCOPUS). ISSN 0028-2685.

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ADEA02 GAŽOVÁ, Zuzana - ŠIPOŠOVÁ, Katarína - KONERACKÁ, Martina - ZÁVIŠOVÁ, Vlasta - KOPČANSKÝ, Peter - FILIPPI, A. - GANEA, C. - BARAN, I. - MOCANU, M.M. Magnetic fluids attenuate the cytotoxic effect of amyloid fibrils : poster. In FEBS Journal, 2012, vol. 279, suppl. 1, abstr. P20-205, p. 470. (3.790 - IF2011). (2012 - WOS). ISSN 1742-464X. 22nd IUBMB Congress and 37th FEBS Congress Conference, Seville, Spain, September 4-9, 2011. (3.790 - IF2011).

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ADEB Vedecké práce v zahraničných nekarentovaných časopisoch neimpaktovaných

ADEB01 ČURLIK, Ivan - REIFFERS, Marián - GIOVANNINI, M. - SOLOKHA, P. - SACCONE, A. - IĽKOVIČ, Sergej - RYAN, D. H. Crystal structure and physical properties of the novel stannide Yb3Pd2Sn2. In Journal of Physics: Conference Series, 2012, vol. 391, no. 1, art. no. 012008. (2012 - SCOPUS). ISSN 1742-6588. SCES 2011 : International Conference on Strongly Correlated Electron Systems, 29 August - 3rd September 2011, Cambridge, UK.

ADEB02 NEMČÍK, Ján - KOPELIOVICH, B.Z. - POTASHNIKOVA, I.K. High-pT hadrons in heavy ion collisions: from RHIC to LHC. In PoS - Proceedings of Science, QNP 2012, poS, p. 155. ISSN 1824-8039.

ADEB03 PINČÁK, Richard - PUDLÁK, Michal. The electronic properties of double wall carbon nanotubes. In Journal of Physics: Conference Series, 2012, vol. 393, no. 1, art. no. 012028. (2012 - SCOPUS). ISSN 1742-6588.

ADEB04 PINČÁK, Richard - SMOTLACHA, J. - PUDLÁK, Michal. Electronic properties of perturbed cylinder. In Journal of Physics: Conference Series, 2012, vol. 393, no. 1, art. no. 012029. (2012 - SCOPUS). ISSN 1742-6588.

AED Vedecké práce v domácich recenzovaných vedeckých zborníkoch (aj konferenčných), monografiách

AED01 BUTVINOVÁ, Beata - BUTVIN, Pavol - KADLEČÍKOVÁ, M. - KUZMINSKI, M. - CSACH, Kornel. Changes of magnetic properties and surfaces condition due to thermal treatment of FeNbCuBSi ribbons. In APCOM 2012 : proceedings of the 18th International Conference on Applied Physics of Condensed Matter, June 20 - 22, 2012, Štrbské Pleso, Slovak Republic. Eds. J. Vajda, I. Jamnický. - Bratislava : Slovenská technická univerzita v Bratislave, 2012, p. 169-172. ISBN 978-80-227-3720-3.

AEE Vedecké práce v zahraničných nerecenzovaných vedeckých zborníkoch (aj konferenčných), monografiách

AEE01 KUPKOVÁ, Miriam - KUPKA, Martin - KABÁTOVÁ, Margita. Efektívny Youngov modul pružnosti celulárneho materiálu určený z ohybovej tuhosti vrstevnatej vzorky. In Vrstvy a povlaky 2012 : Zborník prednášok. Rožnov pod Radhoštěm, 8.-9.9.2012. - Trenčín : Miloš Vavrík, 2012, s. 65-67. ISBN 978-80-970824-1-3.

AEF Vedecké práce v domácich nerecenzovaných vedeckých zborníkoch, monografiách

AEF01 FEDUNOVÁ, Diana - HUBA, P. - BÁGEĽOVÁ, Jaroslava - ANTALÍK, Marián. Thioflavin as probe for different biophysical processes : poster. In SKBS 2012 : Vth Slovak Biophysical Symposium, Bratislava, 19.-21.3. 2012. Program and abstracts, poster P7, p. 61-62.

AEF02 GAŽOVÁ, Zuzana - ŠIPOŠOVÁ, Katarína - ANTOŠOVÁ, Andrea - FEDUNOVÁ, Diana - BÁGEĽOVÁ, Jaroslava - IMRICH, J. Inhibitors of protein amyloid aggregation. In SKBS 2012 : Vth Slovak Biophysical Symposium, Bratislava, 19.-21.3. 2012. Program and abstracts, p. 33-34.

AEF03 ŠIPOŠOVÁ, Katarína - KUBOVČÍKOVÁ, Martina - BEDNÁRIKOVÁ, Zuzana - ANTOŠOVÁ, Andrea - KONERACKÁ, Martina - ZÁVIŠOVÁ, Vlasta - KOPČANSKÝ, Peter - DAXNEROVÁ, Zuzana - GAŽOVÁ, Zuzana. Magnetic fluid targets insulin-related amyloidosis. In SKBS 2012 : Vth Slovak Biophysical Symposium, Bratislava, 19.-21.3. 2012. Program and abstracts, poster P8, p. 63-64.

AFA Publikované pozvané príspevky na zahraničných vedeckých konferenciách

AFA01 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.

AFA02 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.

AFA03 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.

AFA04 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.

AFA05 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.

AFA06 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.

AFA07 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.

AFA08 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.

AFA09 SZABÓ, Pavol. 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.

AFA10 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.

AFA11 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.

AFBA Publikované pozvané príspevky na medzinárodných vedeckých konferenciách poriadaných v SR

AFBA01 HASHIM, Anežka - TOMAŠOVIČOVÁ, Natália - MOLČAN, Matúš - KOPČANSKÝ, Peter - TOMORI, Zoltán - ROYER, F. - JAMON, D. - GOJZEWSKI, Hubert - MAKOWSKI, Marcin - TIMKO, Milan. Magnetic nanoparticles prepared by biomineralization process - preparation, characterization and utilization. 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. 41-44. ISBN 978-80-553-1175-3.

AFBA02 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.

AFBA03 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.

AFBA04 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.

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FAI Redakčné a zostavovateľské práce knižného charakteru (bibliografie, encyklopédie,

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Príloha D

Údaje o pedagogickej činnosti organizácie

Semestrálne prednášky:

Doc. RNDr. Karol Flachbart, DrSc.
Názov semestr. predmetu: Fyzikálne princípy lekárskej techniky
Počet hodín za semester: 26
Názov katedry a vysokej školy: Univerzita Pavla Jozefa Šafárika v Košiciach, Ústav fyzikálnych vied

RNDr. Slavomír Gabáni, PhD.
Názov semestr. predmetu: Fyzika vysokých tlakov I
Počet hodín za semester: 12
Názov katedry a vysokej školy: Univerzita Pavla Jozefa Šafárika v Košiciach, Ústav fyzikálnych vied PF UPJŠ

RNDr. Marián Jurčišin, PhD.
Názov semestr. predmetu: Vseobecna teoria relativity
Počet hodín za semester: 26
Názov katedry a vysokej školy: Univerzita Pavla Jozefa Šafárika v Košiciach, Ustav fyziky

RNDr. Ivan Králik, CSc.
Názov semestr. predmetu: Úvod do štandardného modelu elektroslabých interakcií
Počet hodín za semester: 9
Názov katedry a vysokej školy: Prírodovedecká fakulta UPJŠ, Katedra jadrovej fyziky

Prof. Ing. Karel Kudela, DrSc.
Názov semestr. predmetu: Úvod do fyziky plazmy
Počet hodín za semester: 26
Názov katedry a vysokej školy: Univerzita Pavla Jozefa Šafárika v Košiciach, Ústav fyzikálnych vied

RNDr. Marián Mihalik, CSc.
Názov semestr. predmetu: Fyzika vysokých tlakov
Počet hodín za semester: 26
Názov katedry a vysokej školy: Univerzita Pavla Jozefa Šafárika v Košiciach, Ústav fyzikálných vied

Ing. Zuzana Mitróová, PhD
Názov semestr. predmetu: Kurz fyziky
Počet hodín za semester: 20
Názov katedry a vysokej školy: Technická univerzita v Košiciach, Letecká fakulta TUKE

Prof. RNDr. Peter Samuely, DrSc.
Názov semestr. predmetu: Experimentálne metódy fyziky kondenzovaných látok II
Počet hodín za semester: 28
Názov katedry a vysokej školy: Prírodovedecká fakulta UPJŠ, Ústav fyzikálnych vied

Prof. RNDr. Peter Samuely, DrSc.
Názov semestr. predmetu: Vybrané kapitoly z fyziky tuhých látok

Počet hodín za semester: 28
Názov katedry a vysokej školy: Prírodovedecká fakulta UPJŠ, Ústav fyzikálnych vied

RNDr. Mária Zentková, CSc.
Názov semestr. predmetu: Fyzika vysokých tlakov 3
Počet hodín za semester: 12
Názov katedry a vysokej školy: Prírodovedecká fakulta UPJŠ, Ústav fyzikálnych vied PFUPJŠ

Semestrálne cvičenia:

RNDr. Hana Čenčariková, PhD
Názov semestr. predmetu: Matematika I
Počet hodín za semester: 78
Názov katedry a vysokej školy: Technická univerzita v Košiciach, Katedra aplikovanej matematiky a informatiky, Ústav špeciálnych technických vied SjF

Semináre:

Terénne cvičenia:

Individuálne prednášky:

Príloha E

Medzinárodná mobilita organizácie

(A) Vyslanie vedeckých pracovníkov do zahraničia na základe dohôd:

Krajina	**D r u h d o h o d y**					
	MAD, KD, VTS		**Medziústavná**		**Ostatné**	
	Meno pracovníka	**Počet dní**	**Meno pracovníka**	**Počet dní**	**Meno pracovníka**	**Počet dní**
Belgicko					Peter Samuely	4
					Peter Samuely	3
Česko	Erna Demjén	11			Dušan Bruncko	1
	Jana Lazúrová	5			Dušan Bruncko	3
	Marián Mihalik	5			Dušan Bruncko	1
	Zoltán Tomori	9			Karel Kudela	3
	Mariana Zapotoková	6			Ján Nemčík	13
	Mária Zentková	5			Ján Nemčík	30
					Ján Nemčík	31
					Ján Nemčík	30
					Marián Sedlák	5
					Jozef Špalek	5
					Jozef Špalek	10
Čile					Ján Nemčík	23
Fínsko					Michal Hnatič	17
					Peter Kopčanský	17
					Peter Skyba	14
Francúzsko			Jozef Kováč	7	Anežka Hashim	6
			Ivan Škorvánek	7	Jozef Kačmarčík	33
					Peter Kaliňák	12
					Peter Kopčanský	6
					Peter Kopčanský	10
					Zuzana Mitróová	10
					Blahoslav Pastirčák	8
					Michal	31

					Rajňák	
					Marián Reiffers	3
					Marián Reiffers	3
					Milan Timko	10
					Milan Timko	6
Grécko					Karel Kudela	4
Írsko					Ján Baláž	4
Maďarsko	Jozef Kováč	7			Peter Kopčanský	2
	Zuzana Mitróová	6			Tibor Kožár	1
	Natália Tomašovičová	6			Martina Kubovčíková	7
					Karel Kudela	4
					Lucia Melníková	7
					Milan Timko	2
Nemecko					Pavol Bobík	5
					Karol Flachbart	4
					Peter Kopčanský	5
					Martina Kubovčíková	6
					Karel Kudela	3
					Lucia Melníková	6
					Matúš Mihálik	4
					Miloslav Straka	20
					Miloslav Straka	4
					Pavol Stríženec	5
					Pavol Szabó	2
					Ivan Škorvánek	3
					Milan Timko	5
Poľsko	Marek Capik	4			Vitaliy Antal	3
	Jozef Kováč	5			Marek Capik	1
	Jozef Marcin	5			Jozef Kováč	1
	Marián Mihalik	4			Jozef Marcin	1
	Mariana Zapotoková	4			Lucia Melníková	5
	Mária Zentková	4			Katarína Paulovičová	6

					Ladislav Šándor	4
Rakúsko					Karel Kudela	3
					Karel Kudela	4
					Tomáš Lučivjanský	8
Rumunsko					Diana Fedunová	5
					Zuzana Gažová	5
					Martina Koneracká	4
					Peter Kopčanský	4
					Peter Kopčanský	4
					Jozef Kováč	4
					Jozef Marcin	4
					Ivan Škorvánek	4
					Ivan Škorvánek	4
					Milan Timko	4
					Milan Timko	4
					Marek Varga	4
					Vlasta Závišová	4
Rusko	Slavomír Gabáni	10			Ján Baláž	5
	Gabriel Pristáš	10			Marcela Brasová	6
					Michal Dančo	12
					Michal Dančo	90
					Michal Hnatič	15
					Michal Hnatič	30
					Marián Jurčišin	29
					Marián Jurčišin	26
					Marián Jurčišin	14
					Eva Jurčišinová	29
					Eva Jurčišinová	26
					Eduard Kladiva	14

					Peter Kopčanský	15
					Martina Kubovčíková	89
					Karel Kudela	7
					Tomáš Lučivjanský	10
					Lucia Melníková	89
					Blahoslav Pastirčák	9
					Richard Pinčák	90
					Michal Pudlák	74
					Michal Rajňák	89
					Milan Stehlík	21
					Igor Strhárský	5
					Milan Timko	15
					Peter Zalom	90
Srbsko					Marián Mihalik	6
					Mária Zentková	6
Španielsko					Michal Pudlák	14
					Michal Pudlák	30
Švajčiarsko					Jaroslav Antoš	31
					Jaroslav Antoš	54
					Pavol Bobík	7
					Pavol Bobík	6
					Dušan Bruncko	7
					Dušan Bruncko	7
					Dušan Bruncko	7
					Marián Jurčišin	10
					Peter Kaliňák	48
					Eduard Kladiva	26
					Eduard Kladiva	24
					Eduard Kladiva	25

					Ivan Králik	8
					Ivan Králik	24
					Ivan Králik	19
					Ingrid Kuľková	14
					Ingrid Kuľková	14
					Richard Pinčák	10
					Marián Reiffers	4
					Miloslav Straka	14
					Miloslav Straka	18
					Pavol Stríženec	32
					Pavol Stríženec	7
					Pavol Stríženec	41
					Pavol Stríženec	23
					Pavol Stríženec	33
					Ladislav Šándor	7
					Ladislav Šándor	25
					Ladislav Šándor	37
					Ladislav Šándor	25
					Ladislav Šándor	4
					Ladislav Šándor	10
					Jozef Špalek	28
Taiwan					Michal Hnatič	10
					Peter Kopčanský	10
					Tibor Kožár	16
Taliansko					Ivan Čurlik	30
					Peter Kaliňák	6
					Mariana Zapotoková	5
Ukrajina	Slavomír Gabáni	5			Michal Hnatič	3
	Peter Kopčanský	5			Peter Kopčanský	3

	Gabriel Pristáš	5			Peter Kopčanský	3
	Milan Stehlík	12			Milan Timko	3
	Milan Timko	5			Milan Timko	3
USA					Peter Zalom	14
Počet vyslaní spolu	**22**	**138**	**2**	**14**	**147**	**2251**

(B) Prijatie vedeckých pracovníkov zo zahraničia na základe dohôd:

Krajina	**D r u h d o h o d y**					
	MAD, KD, VTS		**Medziústavná**		**Ostatné**	
	Meno pracovníka	**Počet dní**	**Meno pracovníka**	**Počet dní**	**Meno pracovníka**	**Počet dní**
Arménsko					Dr. Karen Arakelyan	8
					Ing. Davit Pokhsraryan	8
Česko	Bc. Ján Kubančák	5			Ing. Jan Kaňka	3
	Dr. Jiří Janáček, PhD.	10				
	Ing. Iva Ambrožová, PhD.	5				
Francúzsko					Damien Jamon	6
					Dr. Francois Royer	6
					prof. Nirina Randriananto andro	5
					prof. Nirina Randriananto andro	7
Maďarsko	DR. Antal Lovas	14				
	Dr. Fodor Tamásné	7				
	Dr. Tibor Tóth Katona	7				
Poľsko	Doc. Hab. Robert Pelka	5				
	prof. Bogdan Idzikowski	10				
Rumunsko					Dr. Maria-Magdalena Mocanu	5
					Mihai Tibu	9
					prof. Constanta Ganea	5

					Sorin Corodeanu	9
Rusko			Dr. Alexey V. Bogach	14	prof. Leontii Ivanovich Miroshnichenko	8
			Dr. Anatoli Petrukovich	2		
			Dr. Mikhail A Anisimov	14		
Srbsko					Dr. Jovan Blanusa	6
					Dr. Vladan Kusigerski	6
					Dr. Vojislav Spasojevic	6
Taiwan					Dr. Ming-Chya Wu	5
					Dr. Shura Hayryan	17
					prof. Chin-Kun Hu	10
Taliansko					Dr. Davide Grandi	3
					Dr. Massimo Gervasi	3
					Dr. Mauro Tacconi	3
					prof. Pier Giorgio Rancoita	3
Ukrajina	Dr. Iurii Fedorov	3			Dr. Ivan Haysak	4
	Dr. Iurii Kolesnyk	3			Dr. Ivan Nebola	4
	Dr. Oleksandr Kovalchuk	6			Dr. Mykhailo Haysak	4
	Dr. Olena Tabachnikova	6			Dr. Mykhailo Khoma	4
					Dr. Robert Lompay	4
					Dr. Yurij Muchichka	4
Počet prijatí spolu	**12**	**81**	**3**	**30**	**28**	**165**

(C) Účasť pracovníkov pracoviska na konferenciách v zahraničí (nezahrnutých v "A"):

Krajina	**Názov konferencie**	**Meno pracovníka**	**Počet dní**
Česko	PCFES	Matúš Mihálik	5
		Marián Reiffers	5
	WSCG	Zoltán Tomori	6

	XXIII. biochemický sjezd	Diana Fedunová	4
		Zuzana Gažová	4
		Katarína Šipošová	4
Čile	Workshop	Ján Nemčík	7
Čína	EPM 2012	Ivan Škorvánek	8
Francúzsko	APC 2012	Pavol Bobík	5
	MAP 5	Ivan Škorvánek	6
Grécko	EHPRG Meeting	Marek Antoňák	6
	NN12	Ivan Baťko	6
		Marianna Baťková	6
Japonsko	ISS 2012	Vitaliy Antal	5
		Pavel Diko	5
		Samuel Piovarči	5
		Daniela Volochová	5
		Katarína Zmorayová	5
Kórejská republika	ICM 2012	Ivan Čurlik	7
		Karol Flachbart	10
		Jozef Marcin	9
		Ivan Škorvánek	9
		Iveta Takáčová	11
		Mariana Zapotoková	7
Maďarsko	10CCC	Peter Kopčanský	2
		Milan Timko	2
Nemecko	DPG	Matúš Molčan	8
	EuroMagNET II	Michal Rajňák	8
	ILCC 2012	Peter Kopčanský	8
		Milan Timko	8
		Natália Tomašovičová	8
Poľsko	Workshop	Peter Kopčanský	4
		Milan Timko	4
Rakúsko	Vienna Seminar 2012	Tomáš Lučivjanský	4
Rumunsko	Workshop	Peter Kopčanský	3
		Milan Timko	3
Rusko	ECRS 2012	Karel Kudela	7
		Marián Slivka	7
	NANO-2012	Michal Pudlák	6
Španielsko	22nd IUBMB & 37 th FEBS	Diana Fedunová	7
		Zuzana Gažová	7
		Katarína Šipošová	7
	Diffraction 2012	Ján Nemčík	11
	MOLMAT 2012	Peter Kopčanský	6
		Milan Timko	6
Švajčiarsko	ISP 2012	Marián Sedlák	6
Taiwan	PASREG 2012	Vitaliy Antal	4
		Pavel Diko	4
		Samuel Piovarči	4
		Daniela Volochová	4
		Katarína Zmorayová	4

Taliansko	JEMS 2012	Marek Antoňák	6
		Hana Čenčariková	8
		Pavol Farkašovský	8
		Jozef Kováč	6
		Jana Lazúrová	6
		Jozef Marcin	6
		Matúš Mihálik	6
		Marián Reiffers	8
		Ivan Škorvánek	6
		Marek Varga	6
		Martin Vavra	6
		Mariana Zapotoková	6
		Mária Zentková	6
	SuperStripes 2012	Pavol Szabó	7
Turecko	I	Samuel Piovarči	5
	ICSM 2012	Vitaliy Antal	8
		Pavel Diko	8
		Monika Radušovská	5
		Peter Samuely	10
		Daniela Volochová	5
Ukrajina	Workshop	Karol Flachbart	3
USA	CAMC 2012	Zuzana Gažová	8
		Alena Juríková	8
		Martina Koneracká	8
		Peter Kopčanský	8
		Zuzana Mitróová	8
		Katarína Šipošová	8
		Milan Timko	8
		Natália Tomašovičová	8
		Vlasta Závišová	8
	M2S 2012	Jozef Kačmarčík	7
		Zuzana Pribulová	7
		Peter Samuely	7
	STP 2012	Marián Sedlák	10
	TMS 2012	Ivan Škorvánek	9
Veľká Británia	JdA 2012	Marián Reiffers	5
Spolu	**35**	**87**	**554**

Vysvetlivky: MAD - medziakademické dohody, KD - kultúrne dohody, VTS - vedecko-technická spolupráca v rámci vládnych dohôd

Skratky použité v tabuľke C:

10CCC - 10th Conference on Colloid Chemistry
22nd IUBMB & 37 th FEBS - Congress - From Single Molecules to Systems Biology
APC 2012 - Searching for the sources of Galactic cosmic rays
CAMC 2012 - 9th International conference on the Scientific and Clinical Applications of Magnetic Carriers
Diffraction 2012 - International Workshop on Diffraction in High-Energy Physics
DPG - 76th Annual Meeting of the DPG and DPG Spring Meeting
ECRS 2012 - European Cosmic Ray Symposium
EHPRG Meeting - 50th Meeting of the European High Pressure Research Group
EPM 2012 - 7th International Conference on Electromagnetic Processing of Materials
EuroMagNET II - Research Infrastructures for High Magnetic Field in Europe

I - 3rd International Conference on Superconductivity and Magnetism
ICM 2012 - 19th International Conference on Magnetism
ICSM 2012 - 3rd International Conference on Superconductivity and Magnetism
ILCC 2012 - 24th International Liquid Crystal Conference
ISP 2012 - 9th International Symposium on Polyelectrolytes
ISS 2012 - 25th International Symposium Superconductivity
JdA 2012 - Journées des Actinides
JEMS 2012 - Joint European Magnetic Symposia
M2S 2012 - Materials and Magnetism of Superconductivity 2012
MAP 5 - 5th International Workshop on Materials Analysis and Processing in Magnetic Fields
MOLMAT 2012 - Vth International Conference on Molecular Materials
NANO-2012 - International Conference DUBNA-NANO2012
NN12 - 9th International Conference on Nanosciences & Nanotechnolgies
PASREG 2012 - 8th International Workshop on Processing and Applications of Superconducting (RE)BCO Large Grain Materials
PCFES - 10th Prague Colloquium on f-Electron Systems
STP 2012 - 18th Symposium on Thermophysical Properties
SuperStripes 2012 - Phase Separation and Superstripes in high temperature superconductors and related materials
TMS 2012 - Annual Meeting of the Minerals, Metals and Materials Society
Vienna Seminar 2012 - 9th Vienna Central European Seminar on Particle Physics and Quantum Field Theory
Workshop - Nanoparticles and Complex Nanostructures for Biotechnology, Biomedicine and Microfluidics
Workshop - High Energy Physics in the LHC Era
Workshop - Borides - their technology, properties and future applications
Workshop - Molecular Acoustics, Relaxation and Calorimetric Methods
WSCG - Winter School of Computer Graphics
XXIII. biochemický sjezd - XXIII. biochemický sjezd