STATE FUNDED RESEARCH INSTITUTE
CENTER FOR PHYSICAL SCIENCES AND TECHNOLOGY

Appropriation manager code 302496128

2017-2019 STRATEGIC ACTIVITY PLAN

I. MISSION AND STRATEGIC CHANGES

▪ MISSION

Implementation of research for the development of high technologies and creation of knowledge economy in Lithuania.

▪ PRIORITIES OF PRACTICE

The science and education system operates in a constantly changing environment and is influenced by political, economic, social, technological and other factors. It relates to all processes taking place in the country and affects the influence of global processes.

The priorities of the activities of the State Funded Research Institute Center for Physical Sciences and Technology (hereinafter – the Center) are defined in the approved directions of activities:

– OPTOELECTRONICS AND LASER TECHNOLOGIES – the creation and development of a scientific and technological base of new optoelectronic devices and new optoelectronic systems for diverse applications.

– ENVIRONMENTAL TECHNOLOGIES – the development of scientific competence in the field of renewable energy sources, environmental pollution and climate change research, as well as application in the creation and development of advanced sustainable and environmental technologies.

– NUCLEAR PHYSICS AND RADIOECOLOGY – the development of nuclear physics and spectroscopy, as well as advanced sustainable and environmental nuclear fuel cycle technologies, and introduction of new materials' analysis and modification methods.

– ORGANIC CHEMISTRY AND BIONANOTECHNOLOGY – the development of scientific media for the synthesis of new functional organic substances and characterization of physicochemical properties, development of scientific competencies in the field of nanoscience and nanotechnology and development of scientific basis for molecular nanoelectronics, nanobiotechnology and nanosensors and their application to advanced technology development.

– ELECTROCHEMICAL MATERIALS SCIENCE AND FUNCTIONAL MATERIALS TECHNOLOGIES – the development of competences required by physical, electrochemical and chemical methods for the creation of new, high added value technologies of materials. The development of new electrochemical and other non-destructive materials testing methods.

– ELECTRONICS AND SENSORS – the development of research and technology for new types of sensors/converters/controllers, the creation of sensors with predefined properties, operating in a wide range of external parameters and creating multi-functional detection systems based on them.

– METROLOGY – to strengthen the international position of the national metrology system, to open up possibilities for providing services to foreign consumers, to improve the prospects of international cooperation in metrology research programs; to perform functions of the National Metrology Institute established by the Law of Metrology of the Republic of Lithuania, as well as the functions of the state laboratories for chemical measurements of units and state measurement methods and instruments, and other functions regulating their activities in the Republic of Lithuania according to the Law of Metrology and other legal acts related to the metrological guarantee.

– FUNDAMENTAL RESEARCH – to investigate the phenomena of chaos and dynamics in nonlinear and quantum dynamical systems; to investigate the femto-picosecond fluctuation correlations in excited nanometric systems of fermions and bosons; to develop research of stochastic self-study star-collation processes in galactic disk.

– TEXTILE TECHNOLOGIES AND MATERIALS SCIENCE, SMART AND ECO-CLOTHING MATERIALS SYSTEM – to develop activated plasma-chemical surface, micro- and nanostructured particles onto textile materials surface technology, to develop methods for evaluating new properties and conduct high-level research that can reveal the efficiency of application of new technologies. Development of ecological textile based on the application of new biosciences fibres, intensification of technological processes, shortening of the production cycle and analysis of the lifecycle of the product; complex solutions to the problems of theoretical research, numerical modelling, design, functional and ergonomic properties of new systems of personal protective equipment systems, in order to achieve important results for practical application.

The implementation of operational priorities has been approved (by the Minister of Education and Science of the Republic of Lithuania, 23-02-2012, No. V-323) and long-term programs of institutional research and experimental development are carried out:

1) Environmentally friendly energy and environmental technologies;
2) Functional materials and technologies;
3) Measurement technologies and devices;
4) Molecular electronics and nanoengineering;
5) Nanostructured materials and electronics;
6) Optoelectronics and laser technologies;
7) Dynamics and characterization of complex systems;
8) Textile technologies and technical textile clothing systems.

The program FUNDAMENTAL AND APPLIED RESEARCH DEVELOPMENT IN PHYSICAL AND TECHNOLOGICAL SCIENCES is being implemented in the development of the Center's priority areas of scientific activity, it has two sources of financing: 1) state budget funds; 2) contributions from budget institutions.

Appropriations for implementation of operational priorities according to sources of financing

Name	Appropriations, EUR
Fundamental and applied research in the field of physical and technological sciences – *state budget funds*	7,241,000
Fundamental and applied research in the field of physical and technological sciences – *contributions from budget institutions*	5,080,000

▪ OPERATIONAL EFFICIENCY DEVELOPMENT DIRECTIONS

The overall information system, the personnel database, the accounting of material assets, and the general management of archives and libraries are being developed to improve the efficiency of the Center's structures. In order to increase the efficiency of asset utilization, the non-used assets are withdrawn; the information system is being developed in order to expand the use of existing and newly acquired scientific equipment for both the Center's scientists and operators

through the established Open Access Centers. Four Open Access Centers successfully operate at the Center: Electronic Microscopy, X-Ray Diffractometry and Spectrometric Open Access Center, Open Access Center for Processing Technologies, Open Access Center for Convertible and Chemical Coatings, and Open Access Center for Prototype Generation and Integration.

▪ STRATEGIC OBJECTIVES AND PROGRAMS

STRATEGIC OBJECTIVE
It is to conduct fundamental and applied research in the field of physical and technological sciences and to train highly qualified specialists and scientists.

01 10 program:
Fundamental and applied research in the field of physical and technological sciences – state budget funds
Appropriations in total – EUR 7,241,000, from it DU – EUR 4,293,000

01 10 program:
Fundamental and applied research in the field of physical and technological sciences – *contributions from budget institutions*
Appropriations in total – EUR 5,080,000, from it DU – EUR 1,000,000

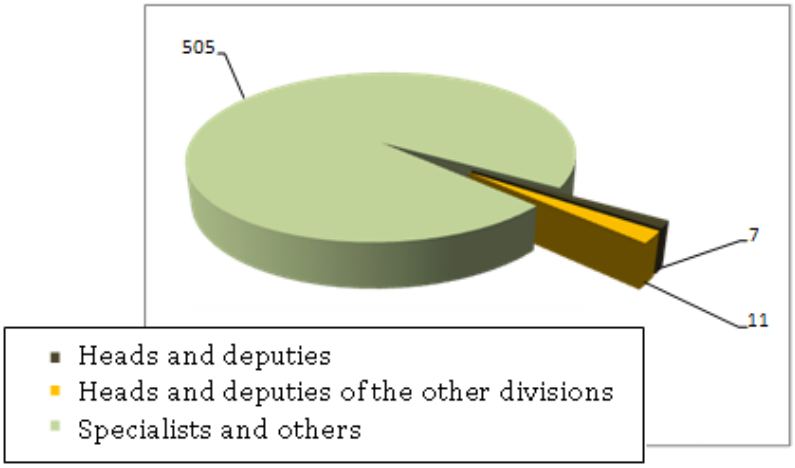
ALLOCATION OF 2017 APPROPRIATIONS BY FINANCING SOURCES

▪ HUMAN RESOURCES

According to the Center's scientific activities, the structure of scientific departments was formed: Department of Chemical Technologies, Department of Electrochemical Materials Science, Department of Catalysis, Department of Characterisation of Materials Structure, Department of Organic Chemistry, Department of Environmental Research, Department of Nuclear Research, Department of Laser Technologies, Department of Molecular Compound Physics, Department of Nanoengineering, Department of Electronics, Department of Physical Technologies, Department of Fundamental Research, Department of Material Science and Electrical Engineering, Department of Optoelectronics, Department of Metrology, Department of Textile Technologies, Accredited Department of Textiles Physical-Chemical Testing and Department of Textile Product's Technological Development. The transferring of the main structures of the Center to the new premises in Saulėtekis has started the process of transformation of scientific units: some of the inefficient laboratories have been eliminated. Several industrial laboratories have been set up instead: Laboratory of Chemical Coating, Tribology Laboratory, Technology Laboratory of Appliances, Laboratory of Hybrid Technology.
The Center's administrative units are efficiently operating: the Administration, Department of Internal Audit, Department of Economics and Public Procurement, Department of Scientific Technical Information, Department of Finances, Department of Law and Personnel, Maintenance Department.

	2017	2018	2019
Number of positions, unit.	523	523	523
Expenditures on wages, EUR	5,293,000	5,293,000	5,293,000

ALLOCATION OF THE NUMBER OF EMPLOYMENT AND EXPENDITURE OF 2017 BY WORKING GROUPS



II. IMPLEMENTATION OF STRATEGIC OBJECTIVES AND PROGRAMS

ACTIVITY CONTEXT

State Funded Research Institute Center for Physical Sciences and Technology (hereinafter – the Center) is a state budget institution that performs long-term scientific research and experimental development of the directions established by the Regulations of Center which are important to the public, international cooperation or economic entities. The founder of the Center is the Government of the Republic of Lithuania. The Center follows the Constitution of the Republic of Lithuania, the Law on Science and Studies of the Republic of Lithuania (Official Gazette, 2009, No. 54-2140), the Law on Metrology of the Republic of Lithuania and other legal acts of the Republic of Lithuania, as well as the Regulations of the Center. The Articles of the Center were approved by the Government of the Republic of Lithuania on 25 June 2014, Act No. 596.

The Center operates in a dynamically changing environment and is affected both by external and internal factors related to local and global processes. Lithuanian science and studies policy ensures the quality of science and studies, supports integration into the international research area and cares about the relevance of science and studies to the needs of society and the economy of the country. The country's long-term development strategy, the Lithuanian economic development strategy, the research and experimental development strategy enable the potential of business which is open to research, study and knowledge in order to create the core of the international science and knowledge economy and to accelerate the development of the knowledge society and to strengthen the competitiveness of the economy in Lithuania.

The Center's activity is research and experimental development in the field of physical, biomedical and technological sciences.

The Center implements the objectives of the activity according to the regulations: to ensure the international level competence of the state in the field of physical and technological sciences, to carry out scientific research and experimental development of the physics, chemistry and technology which are important for the continuity and development of the country's economy and society; to cooperate with representatives of business, government and society, to implement research and experimental development, to provide methodological and other assistance; to participate in Lithuanian and international research programs; to consolidate the research of modern Lithuanian chemistry, physics and technology, to satisfy the needs of the country's economic growth and the training of the highest qualification of scientists optimally; spread economic knowledge to the public, culture, education, health, and social activity, contributing to the development of economy based on innovation and knowledge and the development of the keen society's education; to maintain creative relations with other Lithuanian and foreign scientific and educational institutions, scientists; to participate in research and experimental development projects, programs and other expertise corresponding to the competence of the Center, provide scientific advice, perform patent activities; to perform functions of the National Metrology Institute established by the

Law of Metrology, national reference laboratories or reference measurement methods and instruments for measuring units of chemical substances by the state laboratories and other legal acts regulating metrology in the Republic of Lithuania and other metrological guarantees.

The Center's research level is very high. Doctoral studies are well evaluated. After the reorganization, the optimal number and structure of the staff has been established, aiming to ensure a high level of qualification of employees. This is illustrated by the quantitative and qualitative indicators of scientific publications and the financial indicators of outsourced work. The experimental database is updated from international projects and from the European Union Structural Funds.

SWOT analysis

STRENGTHS	WEAKNESSES
Center's intellectual resources. Recognition of the Center in Lithuania and abroad. Participation in European and NATO science programs. Participation in Lithuanian science programs.	Insufficient communication with Lithuanian economic entities. Lack of maintenance and renovation of studies and research basis. Insufficiently decreasing average age of researchers.
OPPORTUNITIES	**THREATS**
Implementation of fundamental and applied research. Development of modern technology. Participation in the creation of a knowledge society. Development of international cooperation. Providing a scientific research base for the study process and the training of highly qualified specialists. Creating links between applied research and high technology business. Possibility to invite foreigners for practical training, internships and preparation of dissertations.	Insufficient renewal of the Center's scientific potential. The science policy of Lithuania is characterized by ignoring fundamental research. Insufficient research competitiveness in European and global markets due to the limited possibilities of maintaining and updating the material research base.

- STRATEGIC OBJECTIVE

To carry out basic and applied research in the field of physical and technological sciences and to train highly qualified specialists and scientists (01)

Progress in the world is driven by the science based on technologies and economics, and the society who is able to use it. Therefore, science, with its impact on technology, economy and society, performs important functions, which form the basis for progress and, at the same time, affect daily life. Only worldwide scientific research and development of priority scientific fields can open up access to the achievements in science and technology of the world, and creates preconditions for increasing the competitiveness of Lithuanian economy. The guarantee of worldwide science is international scientific publications, those are important for the training of specialists and scientists, participating in the international division of scientific and technical activities, maintaining a high level of competences. The Center's strategic goals are to achieve breakthrough research development and excellence in today's world and in the field of science relevant to Lithuania: new materials and technologies; sustainable technologies, nuclear and alternative energy; lasers and laser technology; spectroscopy; spectroelectrochemistry, synthesis and investigations; electrochemical, catalytic and sorption processes; microwave and terahertz electronics, optoelectronics, fluctuations; chaotic and dynamic motions in nonlinear dynamical systems; sensors and controls; the influence of external factors on the solid and biological objects; the creation, characterization and management of structures; material science and metal corrosion; environmental chemistry and physics; measurement unit benchmarks and primary measurement methods, development, usage, and measurement technologies.

- **ASSESSMENT CRITERIA OF STRATEGIC OBJECTIVE**

Code of the assessment criteria	The name and measurement unit of the criteria for evaluating the effect	2017	2018	2019
E-01-01	Number of scientists and researchers participating in international, national research and economic entities projects, units.	260	270	270
E-01-02	High scientific qualification, allowing to carry out international and national project expertise, pcs.	65	70	70

- **PROGRAMS IMPLEMENTING STRATEGIC OBJECTIVE**

General information about the program

The program implements the strategic goal "To carry out fundamental and applied research in the fields of physical and technological sciences, and to train highly qualified specialists and scientists" as well it is continuous.

FUNDAMENTAL AND APPLIED RESEARCH DEVELOPMENT IN PHYSICAL AND TECHNOLOGY SCIENCES (code 01.10). Sources of financing – state budget funds

Arguments for preparation the part of the program financed from the state budget:

Taking into account the possibilities of scientific potential and technical base of the State Funded Research Institute Center for Physical Sciences and Technology, it is needed to carry out fundamental and applied research in the fields of physical and technological sciences. International fundamental and applied research in the areas perspective to Lithuania and the European Union will ensure sufficient scientific and technological level of the Center, which is necessary for competing in international projects in the united European research area and successful implementation of industrial and governmental orders. Modern fundamental and applied research in the field of physical and technological sciences are closely interrelated, and the successful application of the results in practice requires extensive knowledge and experienced specialists.

In the field of high technology, the EU-supported programs for the practical application of scientific results are actively integrated into the field. Participating in these programs together with partners from foreign and Lithuanian industry would provide not only direct benefits to the Center, but also help to acquire experience in the field of technology implementation in Lithuania. The program is carried out in accordance with the approved directions of science by the Articles of the Center (Item 7).

The implementation of the program is related to the following priorities approved by the Government of Lithuania:

- To raise productivity in all sectors of the economy and increase competitiveness, expand economic infrastructure and create a business-friendly environment and strengthen economic security.
- To promote the country's scientific and technological progress, to develop the information and knowledge society, to increase funding for education, culture, science and health.
- To implement a coordinated foreign policy, to participate actively in the activities of the European Union and to develop national defence as part of NATO's collective security and defence system.

FUNDAMENTAL AND APPLIED RESEARCH DEVELOPMENT IN PHYSICAL AND TECHNOLOGY SCIENCES (code 01.10).
Sources of financing – contributions from budget institutions

Arguments for preparation of the part of the program financed by the assigner's income contribution:

The program is directly aimed at creating a safe and human-friendly environment, promoting the technical and scientific progress and further development of Lithuanian enterprises. The program is in line with the main priorities published both in the European Union documents and in Lithuania's strategic plans and in the Center's development plans. The program corresponds with the strategic development directions of Lithuania and the mission of the Center. The program seeks to ensure the Center's independent academic and economic-financial activities.

The implementation of the program is related to the following priorities approved by the Government of Lithuania:

- To promote the country's scientific and technological progress, to develop the information and knowledge society, to increase funding for education, culture, science and health.
- To implement a coordinated foreign policy, to participate actively in the activities of the European Union and to develop national defence as part of NATO's collective security and defence system.

THE GOALS, OBJECTIVES AND IMPLEMENTING MEASURES OF THE PROGRAM:

GOAL:
01 To develop perspective fields of physical and technological sciences, to carry out basic research.

OBJECTIVE:
01.01 To carry out worldwide physical and technological research in the field of optoelectronics and laser technologies, environmentally friendly technologies, nuclear physics and radioecology, organic chemistry and biotechnology, electrochemical materials and functional materials technologies, electronics, sensors, and metrology.

IMPLEMENTING MEASURES:
01.01.01 To conduct international and national research projects.
01.01.02 To train highly qualified specialists and scientists.

Description of the goal's implementation

The development of science and modern technology is at the heart of the country's economic, social and cultural progress. The accumulated scientific potential, experimental and informational tools are factors that enable the implementation of scientific and applied orders of the country's economy, education and culture, to participate in international scientific and technological exchange, to train highly qualified specialists and scientists. The Center carries out worldwide research in the field of physical, biomedical and technological sciences. The Center's scientists are world-class experts and specialists in the field who can make important decisions in developing the country's economic progress and taking global technological innovations.
The accumulation of new knowledge in these areas, based on the experience already gained at the Center and the results achieved at international level, is one of the main objectives of the Center. The trends of fundamental and applied research will be coordinated with the priorities of the European Union and Lithuania. This will enable the Center's scientists to participate actively in the international projects, to integrate into the European research area, thus contributing to the integration of Lithuania into the European Union.
For the implementation of Goal 1, the criteria for evaluation of the result and product are foreseen:

RESULT:
01 Number of scientific articles in ISI Web of Science journals

02 Number of scientific articles in highly quoted scientific journals
03 Number of graduates of the highest qualification

PRODUCT:
01 Number of reports at international and national conferences
02 Number of doctoral students

GOAL:
02 To create and develop new technologies, to develop applied research and high-tech business interfaces, to provide comprehensive *know-how* and high-tech services.

OBJECTIVE:
02.01 To create devices and technologies and high-tech service packages.

IMPLEMENTING MEASURES:
02.01.01 To organize the development of devices and new technologies and to provide technological services to high-tech businesses.

Description of the goal's implementation

The goal will be achieved through the cooperation of high-tech business with the Center's research units – business ideas will be considered, scientifically substantiated, approved by scientific departments. Collaboration with business partners will allow for the development of scientific ideas, there will be created a competitive product, while research will be brought closer to the needs of the state and society. It is expected that, along with business partners, international science projects will be carried out. The preconditions will be created for integrated research, study and business centers with a modern research infrastructure.
For the implementation of Goal 2, the criteria for evaluation of the result and product are foreseen:

RESULT'S:
01 Number of clients, international projects and other legally obtained funds per scientist (in euros)

PRODUCT'S:
01 Number of technologies, methodologies and patents developed

Expected result of program implementation:

On average, there will be published annually 230 publications in ISI Web of Science journals, the number of high-quoted scientific journals is 170. Each year about 18 highly qualified scientists will be trained.
Annually, there will be 300 announcements at international and national conferences, 80 doctoral students will study at doctoral level.
The Center will receive additional revenues from provided services, participation in international programs, applied research, developed technology and methodologies.
The implementation of the program is ensured by the Center's administrative activities, personnel qualifications, financial accounting, improvement of the modern information system and updating of the experimental database.
The program is continuous. The promoters of the program are all the Center's staff: researchers, doctoral students and engineering performing R & D activities. 523 workplaces are appointed to implement the program.
Program Coordinator – Deputy Director Vidmantas Remeikis, tel. +370 5 2661640,
e-mail: vidmantas.remeikis@ftmc.lt