SELF-ASSESSMENT REPORT
AND INSTITUTIONAL DEVELOPMENT PLAN

3. Institutional development plan for the next 4 years

3.1. Scientific SWOT analysis.

STRENGHTS	WEAKNESSES
- pursued research and education activities, with acknowledged results and outstanding international visibility - active participation in the large international collaborations in the field of competence - research activities, applications and technological developments in domains of scientific relevance and of major social interest - modernised research infrastructure, recently upgraded to European level - new laboratories comprising state of the art research equipment, on the way to commissioning (2012)	- inefficient tehnological transfer - considerable decrease of the atractiveness of research work as emphasized by the steadily declining number and droping quality of the available human resources
OPPORTUNITIES	**THREATS**
- full right participation in major international collaborations in the field - initiation și achievement of the European project ELI-NP - National and European, as mentioned in Horizon 2020 and guvernmental foresights	- discontinuous and unpredictable financing - instability of the evaluation criteria of the scientific research

3.2. Strategic scientific objectives and directions.

In a nutshell, the strategic objectives of IFIN-HH include:

- keeping up the institute's tradition and boosting its role in basic nuclear and subnuclear physics research;
- increasing the share of applied research and turning the results to good account via technological transfer and certified services;
- improving the status of the IFIN-HH facilities of national relevance and integrating them in the emerging structure of Small-Scale European Facilities;
- rehabilitating the utility infrastructure and narrowing the gap between the institute's research infrastructure and the European average down to a mutually acceptable level;
- rebalancing the age profile of the research staff;
- joining forces with physics education to create an enduring human research potential by creating an attractive scientific environment and a credible financial and cultural motivation.
- getting efficiently involved in European projects and raising the share of work on EU Framework Programs to 10% of total contracted volume;
- continuing to work together with historical partners, particularly those with an appropriate strategic potential, and developing the legal, organizational, financial, and logistic sides of the concept of privileged strategic partnership, based on principle agreement and growing support from the government;
- creating viable corporate structures, including a scientific and technological park and specific incubators, to promote physics for profit;
- taking the technical, scientific, managerial, and financial opportunities provided by the decommissioning of the IFIN-HH research reactor for turning the institute into a pilot station, a national expert center, and a training ground in dismantling nuclear facilities – throughout the decommissioning project;
- promoting expertise and competence resources through an aggressive, adequately funded certification campaign;
- earning for IFIN-HH the official status of an expert body of the National Commission for Nuclear Activity Control, Nuclear Agency, and National Agency for Radioactive Waste; and
- keeping up efforts to multiply large scale, high value projects, improve their management, and maximize their scientific results.

The earlier mentioned background and strategic objectives advocate the promotion of the following strategic research directions, which are proved viable and competitive and in agreement with the vocation, history, and scientific and technical potential of IFIN-HH:

- theoretical physics;
- atomic nucleus physics;
- particle physics;
- particle accelerator physics;
- applied nuclear physics and nuclear engineering;
- life and environmental physics; and
- information technologies.

Theoretical physics research at IFIN-HH deals with a distinctively broad range of issues and is recognized for excellence in academic circles worldwide. It will continue to prove its viability and come across as a brand image of the Institute.

Atomic nucleus physics, a key IFIN-HH contributor to Europe's main basic experimental research centers, will enjoy a similar status, strengthened by its firm productive roots in continental research.

The Institute's ***particle physics*** research that has earned European and Transatlantic recognition for its painstaking contributions, including many significant achievements, for the past half-century, will further build on its involvement in Europe's great experiments.

Particle accelerator physics has to and will rise to prominence in the near future. It will nevertheless be faced with the inherent trouble of transition between generations before younger scientists can launch their own research and investment projects.

Applied nuclear physics and nuclear engineering, which go back a long way at IFIN-HH, are important in some sensitive areas of domestic industry and health care. They are currently recovering from a successful, though painful and protracted, shakeup and should be able to maintain their domestic status as sole suppliers of some products and services.

Life and environmental physics have been propelled into the limelight by growing postindustrial concerns about security, environmental protection, and quality of life in Europe and America. They will also gain momentum at IFIN-HH where specific laboratories will be established to focus on some advanced sectors of biophysics and biomedical technologies. Once duly certified, they will be able to supply key services to governmental bodies and society in areas such as risk management, vulnerability to natural and technical emergencies, and the assessment of how nuclear and industrial activities impact on human health and the environment.

Information technologies, whose role is constantly rising in the top-notch fields of physics, will be developed at IFIN-HH in close connection with the large GRID systems extending at European and global levels.

3.3. The human resource strategy.

Background

IFIN-HH is one of the most complex institutes of research and development in terms of research areas and thematic, which have a direct impact not only on the human resources needs, but also on the distribution of the positions and the responsibilities. The institute has 12 research departments, each of them representing a very specific area of research in physics. In order to ensure the performance and efficiency of the activity, a complex and well planned scheme of personnel is needed.

The research staff consists of research assistants (most of them PhD students), junior researchers (postdoctoral students or graduates) and senior researchers (with experience and recognized reputation). As most of the researchers are conducting experiments using the facilities of the institute, the auxiliary staff in distributed in three types of positions, namely engineering staff (with specific tasks of doing high-qualified technical work), technicians (allocated to research teams and projects for ensuring specific technical support and assistance for experiments) and maintenance and operation technical staff (in charge with monitoring and ensuring the functioning of the large nuclear equipments). Considering the requirements for technical support and assistance for research staff and for ensuring the functioning and the operation of the research facilities and, in this respect the workload implied by this specific requirements, the correct distribution of the technical workforce has to respect a ratio of 2 technical to one researcher.

Another specificity of IFIN-HH's staff is the one related to the administrative staff which does not follow the standard schemes of personnel in the sense that only part of them are administrative people doing usual administrative activities (financial, human resources, accountancy, legal, procurement, administration etc), the other significant part consisting of staff ensuring the proper work environment for performing top-level research (The National Library of Physics, the IT Network Department, the Marketing and Technological Transfer Center)

General objectives of Human Resources Strategy

The Human Resources Strategy for the next five years has two main objectives:
- Strengthening the components which have proved their efficiency.
- Identifying new approaches which have either been successfully applied in prestigious research institutions or arise from the national or international environment and fits the needs and the objectives of the institute.

One of the major pursuits of the management is to succeed in maintaining the most appropriate scheme of personnel in terms of quantity and quality of people. Therefore, the following will be strengthened:

- Keeping a consistent and coherent salary grid based mainly on the individual and team performance
- Maintaining the existing system of performance assessment and improving it with elements which are required by the evolution of the European and international research standards and by the necessity of adapting it to the institute future needs;
- Maintaining the actual policy of encouraging and promoting trainings in research and technical fields for the respective staff
- Ensuring permanent access to resources of information in all fields of physics research (electronic libraries, prestigious journals etc)
- Encouraging the active participation at scientific national and international events (conferences, workshops etc)
- Constant development of research programmes and thematic corresponding to the European and international trends and to the individual objectives and topics of scientific interest
- Maintaining the research infrastructure at top-level scales through the constant improvement of the technology and the acquisition of the most performing equipments able to support high-standard experiments
- Constant participation at large scale international collaboration
- Partnerships with prestigious research institutes and universities
- Active participation of IFIN-HH's researchers (especially senior researchers) at the educational programmes (doctoral schools, postdoctoral programmes etc.)
- Collaboration with technical universities in defining, within the curricular area, specific disciplines and topics related to the research area of the institute
- Organizing periodically visits on the site (at the institute's departments and research groups and laboratories) for students
- Developing the training programmes associated to the specific jobs of the auxiliary staff of the institute
- Persisting in organizing constantly scientific seminars inside each research department
- Offering permanent information on the website of the institute regarding the scientific events and opportunities
- Encouraging young researchers in assuming direct responsibilities within the international collaborations of the institute
- Encouraging the return of Romanian scientists from abroad by strengthening the dissemination of the career development opportunities offered by the institute within the scientific community
- Maintaining the administrative decentralization at the level of research departments
- Keeping the policy of periodical competition for promotion and employment of qualitative research staff
- Keeping and strengthening the policy of college recruiting
- Maintaining fairness/equity in the recruitment process
- Maintaining the social and financial support for PhD students
- Maintaining the procedure of evaluation which includes an ex-ante self-evaluation having the role of strengthening the perception of its own work and results. Annually, at the beginning

of every year, the staff will have to continue to fill in the evaluation form and to pass it to his direct coordinator which will confirm or correct it and communicate the Scientific Director the results.

New approaches for the future human resources policy:

- Focusing on the capitalization of the research results by the establishment of related additional criteria for evaluation in parallel with a system of financial stimulation in this respect
- Preparing the commissioning of the new facilities in terms of human resources needs (scientific expertise: training for PhD students and young researchers at prestigious research institutions with similar facilities and technical expertise: engineering and technicians benefiting from specific trainings dedicated to the operation and the maintenance of the facilities)
- Enlarging the thematic areas of the training programmes dedicated to the auxiliary staff following the new directions of research instituted by the new infrastructures built in the institute in order to cover the expertise needs in technical support and redefining the scheme of personnel considering the human resources needs for each new facility
- Exploring new opportunities in collaborating with industry in the common areas of interests
- Establishing a system of periodical assessment of the general and individual workload as a basis for evaluating the necessary workforce in terms of expertise, type of personnel and individual tasks in such a manner that the individual objectives comply with the general objectives of the institute. Depending on the results of evaluation, the necessary actions will be decided in the sense that, on a case to case basis, specific measures of improving and stimulating performance, reallocating tasks, rewarding the quality will be adopted. The most appropriate proportion of numbers of positions will have to be respected in order to keep the qualitative and quantitative level of research work within the standards applicable to research infrastructures. A goal which will be followed in this respect will be ensuring the correct scheme of the distribution of the positions in the sense of maintaining the balance between the competencies and the activities.
- Extending the regular competitions for research position beyond the national level, up to the European and international levels
- The responsibility of the career development will be shared between the individuals and the management by finding the best methods to challenge and stimulate the individual performance in order to finally reach the project objectives.
- Encouraging the permanent exchange of good practice between research groups and departments in terms of a proper assignment of team member roles and responsibilities;
- Establishing a solid and coherent proposal of joint doctoral programme between the institute and the universities on the basis of partnership agreements with the involvement of the senior researchers of the institute having the legal capacity of coordinating PhD students
- Establishing a system of scholarships dedicated to attract best students having a real scientific potential
- Fostering partnerships with industry through an institutional strategy developed by the Center for Marketing and Technological Transfer Center of the institute
- Establishing a system of proper assignment of tasks and responsibilities between the research staff, the engineering staff and the technical staff
- Securing the participation of the best researchers at the research projects conducted by the institute of the best scientists, engineers and technicians in accordance with the needs and the allocated budget
- Adapting the system of recruitment, evaluation and career development to the ones developed by the prestigious research institutions from abroad and in accordance with the European Conduct of Research
- Successfully finalizing the plan for establishing a qualitative labor environment

- Assessing and adapting the compensations policy according to the European standards and with respect for the objective of attracting the best scientists
- Maintaining the most appropriate proportion of numbers of positions in order to keep the qualitative and quantitative level of research work within the standards applicable to research infrastructures. A goal which will be followed in this respect will be continuously ensuring the correct scheme of the distribution of the positions in the sense of maintaining the balance between the competencies and the activities.

3.4. Mechanisms for stimulating the appearance of new research directions.

The new experimental facilities that will be developed in the frame of large international collaborations can become the main sources of new research directions of high interest for the nuclear physics community. Our Institute is involved in several such large international collaborations like ELI-NP, FAIR, CERN and SPIRAL2 and in this respect is an active part of the nuclear physics community seeking for new phenomena, new theories, new methods and techniques.

From this point of view, the main mechanisms that will be used by the Institute for opening new research directions are:

- to be an active partner in the development of infrastructure that supports new types of research, with human, material and financial resources
- to identify new types of experiments that can be accomplished only at large-scale experimental facilities. After such types of experiments are identified, the Institute will support the creation of a core-workgroup of researchers interested in the obtainable physics results and the process of creating a larger scientific community, of disseminating information and attracting young specialists and students. The Institute will grant its support from the very beginning, if possible even when no funds for the new research directions were obtained.

New research directions can also be triggered by the new research infrastructures that are currently under development in the institute. In this respect, the Institute will:

- Encourage interaction between its own researchers and research groups from other institutes and Universities, including those acting in other domains of science, in order to identify new opportunities
- Stimulate the increase and the strengthening of the quality for the human resource involved
- Support from the very beginning emerging collaborations
- Offer institutional support for attracting both external users at and beneficiaries of the new research infrastructures

Related to the existing small scale international experimental facility (the Tandem Accelerator), the Institute will continue to:

- Encourage the activity of attracting external users and the development of international and domestic collaborations in order to gain a critic mass that can lead to new ideas and techniques
- Support all activities that can lead to an increase of the visibility

Other mechanisms for opening new research directions that can be used by the Institute are:

- Stimulate cross-departmental works and/or collaboration between research teams in order to develop an interdisciplinary approach of the research and/or to strengthen the quality of the human resource involved
- Support emerging research and new techniques in the Institute
- Collaborate with academic staff in order to develop PhD and MSc programs of interdisciplinary nature or covering research directions related to its own research

facilities/ large-scale experimental facilities
- Continue to actively participate to the existing international cooperation
- Support information dissemination and access to information for its researchers

3.5. Financial SWOT Analysis

Financial SWOT analysis is done taking to account that the economic and financial activity is a support activity to reach the scientific objectives of the institute. In this respect this analysis should be correlated with the scientific SWOT analysis (pct. 3.1.)

Strengths
- Financial stability;
- Payments in due time (salaries, suppliers, taxes, etc.);
- Existence of a fund for investment (over 1,000,000 euro);
- Organization of the Economic and financial activities by cost centers;
- Online tracking of expenditures, revenues and cash-flow by department, project and phase.

Weaknesses
- Impossibility of establishing a fund available to finance research projects considered with high risk or co-financing of projects;
- High costs maintenance of the administrative infrastructure (IFIN owns 46ha land and over 50.000 sqm of construction);
- High costs of research infrastructure.

Opportunities
- Romania's commitment to increase the research budget to 3% by 2020 (1% public funds and 3% private funds);
- Increased funding possibility according to the construction of new major research infrastructure: FAIR, ELI-NP, SPIRAL2;
- Awareness of the political factor that research is an important factor for overcoming the economic crisis.

Threats
- The global economic situation may have repercussions on the amount of allocations for research and development;
- Lack of private funds to finance research and development activities;
- Lack of regulation for attract the private fund for research.

3.6. Infrastructure: investment plan and strategy

The investment strategy of the institute is focus on two fundamental components in its further development:

- Maintaining and developing administrative infrastructure;
- Developing of research infrastructure in accordance with the new directions of research for the institute: interaction of high power lasers with matter, photonuclear reactions, radiopharmaceutical research, applications of nuclear methods and techniques etc.

Thus, to meet the first component, in the next period the Institute will try to ensure optimal functioning of the administrative infrastructure. In this respect the institute will rehabilitate the gas network, water network, expansion of administrative building, construction of the Student Center, construction of the second Ph.D. Center.

To fulfill the component on development research infrastructure, institute is considering several direction: implementation of the project to build research infrastructure Extreme Light Infrastructure - Nuclear Physics, completion of new research laboratories according to the project "Infrastructure development for frontier research in nuclear physics and related fields" and existing research infrastructure.

The Extreme Light Infrastructure - Nuclear Physics facility (ELI-NP) will create a new European laboratory with a broad range of science covering frontier fundamental physics, new nuclear physics and astrophysics as well as applications in nuclear materials, radioactive waste management, material science and life sciences. The site of ELI-NP Research Infrastructure is located adjacent to the beneficiary's current site hosting several national installations in the field of nuclear physics. ELI-NP will add about 36,500 sqm of new, high quality, energy efficient buildings. About 23,700 sqm are allocated for high-power laser system, gamma-beam production system and instrumentation for experiments distributed in 8 experimental halls designed in a reconfigurable arrangement through the use of movable concrete blocks

In the framework of the project "Infrastructure development for frontier research in nuclear physics and related fields" (2010-2012) the institute will build 8 new laboratories to support the nuclear applications and to support participation in large international collaborations. The project components are follows:

1. Laboratory for developing and testing the method of the FAIR international project (RO @ NUSTAR);
2. Centre for radiocarbon for Environment and Biosciences (TANDIMED);
3. Tritium laboratory with multiple users (TRITIULAB);
4. Nuclear spectrometry center for energy, environment, materials and health (EMMAS);
5. Research Centre for Radiopharmaceuticals (CCR);
6. Research center of excellence for distributed computing, methodical, physical and participation in large international collaborations (CEXMECDIF);
7. Local center for radiological environmental monitoring (CLRSMA);
8. Development of underground laboratory measurement and detection of ultra background atmospheric muons (LNSP)

3.7. Technology transfer and the attraction of non-public funds.

The next four years are vital for the development of the technology transfer (TT) and marketing activities aimed at strongly anchoring IFIN-HH in the socio-economic development of the country, based on an increased visibility, conversion of scientific and technological advances into marketable goods and services, a higher rate of return per euro invested in research and attraction of private funds.

Unfortunately, the prolongation of the economic crisis and stagnation of most European economies will represent a strong challenge for IFIN-HH's capability to adapt to a new environment, leading to tough measures that will have to be taken by its management in order to cope with.

Investing in R&D at national and European levels will produce positive results in terms of economic growth and employment, if and only if, research and development translated later on in innovation, i.e. new knowledge and technologies effectively available to companies for commercial purpose.

Large-scale research infrastructures, enriched with new projects such as the ELI-NP, have the potential of becoming the catalysts of the strategy shift implementation towards a knowledge-based economy, by connecting the research community with both the academic sector and the industry.

IFIN-HH, in collaboration with The University of Bucharest and Polytechnic University of Bucharest will train during the next four years a large number of PhD and MSc students, as well as a wide pool of individuals well prepared in using modern nuclear equipment and services.

The strategic objectives of the technology transfer can be defined as follows:

- Generating economic growth and employment generation;
- Bringing the intellectual property generated by the Research Infrastructure into public use as rapidly as possible while protecting academic freedom and research ethics and generating an eventual financial return to the Research Infrastructure and their inventors.

Means and ways to fulfill the strategic objectives:

- A pro-active policy towards industrial relationships;
- Translation of strategic industrial trends for IFIN-HH's future research programs;
- Creation of a genuine business and entrepreneurial culture through:
    - Recruitment process;
    - Creation of a Contact Point Engineers/Scientists within the Center for Technology Transfer and Marketing (CTTM);
    - Training of new recruits in business and technology transfer;
    - Pecuniary and non-pecuniary schemes, like creating a fund for innovation.

Specific measures:

- Rethinking the importance of registering and licensing the intellectual property rights of IFIN-HH research team as core of TT activity, with a careful orientation to a broader international licensing (for better use and protection) using a process based on the following steps:

a. Invention disclosure,
b. Evaluation of the commercial potential of the invention,
c. Decision to patent the invention or not,
d. Invention marketing,
e. Negotiation and closing a deal,
f. Monitoring and following-up deals,
g. Patent renewals.

- Exploring new fields and developing new research programs in joint venture with other research institutes especially in the agricultural, industrial, biochemical, environmental and medical fields based on real commercial applications;
- Establishing an active dialogue between academia and industry (through conferences, meetings, round tables etc) in order to identify new business opportunities;
- Negotiating and signing industry sponsored research agreements;
- Joining other research networks (such as HEP Tech) and actively participating in common research programs for both fundamental and applied sciences;
- Using the skilled IFIN-HH's personnel for outsourcing parts/phases of research projects initiated by foreign research institutes in partnership;
- Expanding the fee based services of consulting and training on nuclear activities in accordance with the present and future level of the development of such applications;
- Structuring a "catalogue" (list of) of commercially oriented products and services aimed at offering a contract/price based framework for negotiating with domestic and foreign industry in view of selling IFIN-HH output;
- Special emphasis on manufacturing prototypes and developing small scale production facilities, based on industry support/orders and selling opportunities.

ELI-NP

As the only facility of its kind in Europe, the ELI-NP project (to be implemented in the next four years) will represent a unique opportunity for many Romanian companies to conduct experiments required to secure or maintain a technological advantage. It is not an overstatement to claim that the ELI-NP project will increases the capacity of worldwide research and innovation in this field by a factor of 10, given the levels of brilliance and intensity its laser and gamma systems will be able to develop. Taking into account these specificities, companies eager to obtain or maintain a competitive advantage are likely to apply for access time at the facility. It will be an important task to prepare in advance the technology transfer schemes for this new project in order to maximize its financial return opportunities.

3.8. Strategic partnerships and visibility: events, communications, collaborations.

IFIN-HH's most prominent strategic partners at this stage include:

CERN, Geneva, Switzerland
Participation in multinational research projects – research, equipment design and supply, design and execution of basic experiments, scientific and computing services, etc.

GSI, Darmstadt, Germany
The FAIR (Facility for Antiproton and Ion Research) Project – construction of an international research center in the nuclear area and related aplications that will concentrate the world's most advanced research in nuclear and atomic physics in the medium term.

ELI-NP, Bucharest-Magurele, Romania - construction of the nuclear physics pillar of ELI. It will be the first truly international physics center in Romania, fostering strong and manifold cooperation in practically all fields of physics among the member-countries of the ELI Consortium and other interested parties.

GANIL, Caen, France
The SPIRAL 2 Project – a complex project in particle accelerator physics, enlisting IFIN-HH collaboration in the area of ion beam transport and monitoring.

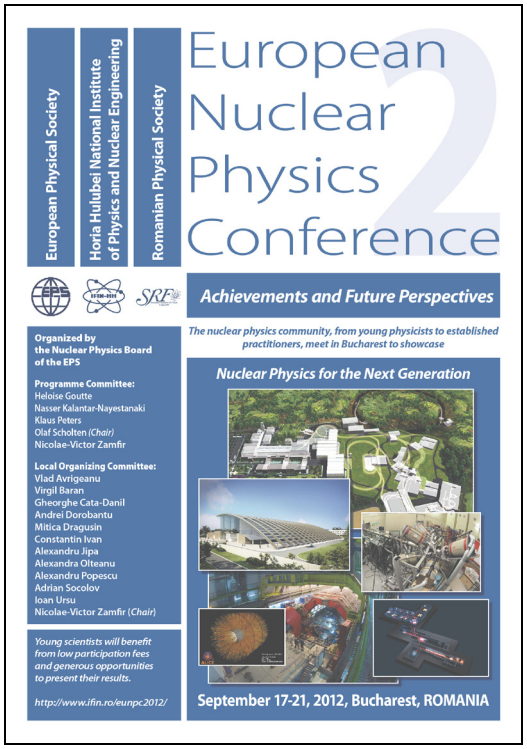
The Joint Institute for Nuclear Research (JINR), Dubna, Russian Federation: multilateral scientific cooperation based on membership status and a number of programs agreed upon.

IN2P3 (France) and INFN (Italy)
Agreements with these national institutes provide the frameworks for collaboration with research centers in their countries in various areas of nuclear physics.

Physics communication for the next four years will focus on these largest European/International scientific collaboration projects of IFIN-HH:

- Building and preparing for full scale operation of ELI-NP, the nuclear physics pillar of the pan-European project ELI (Extreme Light Infrastructure) - Bucharest-Magurele,
- Full participation in the building and scientific program of FAIR - The Facility for Antiproton and Ion Research - Darmstadt, in view of making it fully operational by 2018
- Participation in the experiments and general activities at CERN/LHC - Geneva. It will also target the research and results of the partnerships with Ganil, JINR, IN2P3 and INFN.

IFIN-HH communication activities in the next four years will be developed along two main directions: • Building gateways with the public and • Inspiring the next generations of scientists. They will both continue traditional initiatives (OPEN GATES, "Science Fest", "FAPT") and introduce new forms of communication/outreach, targetting the lay public as well as school and university students.



Along the lines mentioned here, IFIN-HH will continue to develop its infrastructure, manpower, and expertise. Bringing bright young people at the frontiers of Science and blending their enthusiasm with the experience and educated tenacity of the elder is believed to make a sure recipe to guarantee a long-term sustainability of our plans.

A good opportunity in this respect will be offered by the main scientific event of 2012: the second edition of the European Nuclear Physics Conference (**EuNPC2012**), to be organized by the Nuclear Physics Board of the European Physical Society in Romania, with IFIN-HH as local organizer. It will be a **blend of plenary talks given by outstanding personalities in the field of Nuclear Physics and contributions of young researchers and students, with a strong impact on future international collaborations in nuclear physics and an important contribution** to enhancing the visibility of Romanian physics.