Horia Hulubei (1896-1972)

Founder and First Director of the Institute

Contribution to the study of quantum diffusion of X-rays
Supervisor: Jean Perrin (Nobel Prize)
Chairman: Marie Curie (Nobel Prize)

ABOUT US...

Personnel
512 R&D Personnel
163 PhD
55 PhD Students
22 Teaching Staff

Publications 2004-2008
Articles published in journals
ISI 1273
non ISI 445
Books 23

Scientific Meetings
during 2007: 10 international
8 national

Brief History
1949: Institute of Physics of the Romanian Academy
1956: Institute of Atomic Physics (IFA)
1977: Central Institute of Physics (ICEFIZ)
  • IFIN (nuclear),
  • IFTAR (radiation equipment),
  • IFTM (materials),
  • CFPS (earth),
  • IGSS (space).
1990: ICEFIZ became IFA
1996: IFIN-HH

Highlights
1956: First electronic computer (CIFA-1) designed at IFA
1957: VVR-S research reactor and U-120 cyclotron (SU)
1962: First laser (He-Ne) put into operation at IFA
1974: MP Tandem Accelerator from HVEC (USA)
Radioisotope Production Center (UK&RO)
Nuclear Waste Processing Center (UK&RO)
1985: National Radioactive Waste Repository (RO)
2000: Multipurpose Irradiation Facility (A&HU&RO)
2001: EC Centre of Excellence IDRANAP
2002: first GRID application in Romania

Design & DTP: A. Socolov
Printed at February 2009
The strategy tentatively spans the next five years after Romania’s accession to the European Union up to around 2012, an approximation taking into account the local economic and political uncertainties that may mark this adaptation period.

As the prime representative of Romanian scientific research and technological development in the nuclear area, IFIN-HH has based this strategy on the need to boost its own impact and stature at home and worldwide.

1. BACKGROUND

1.1. Where we stand

For the last 15 years, nuclear physics research in Romania has experienced and reflected in its own particular way the clashes and commotions the country has been through on the bumpy road to market economy, as well as the rise of new structures, social relations, and mentalities. Financing and the quality of management in-house and on the national level played a crucial role during this period.

Looking back on the Institute’s course over these 15 years, one finds that scientific productivity was rather high considering the scarcity of funds, that basic research improved in relevance and earned a growing international prestige, while applied research and most of the specialized services the Institute used to supply suffered a downturn.

Any unbiased eye would note at least two encouraging trends, namely:

- that for the past few years, IFIN-HH has slowly but undeniably improved its standing with Western academic structures and attracted a growing inflow of research grants from European institutions, and
• that the government’s stance towards it has shifted from unconcern and lip service support to a genuine recognition of the Institute’s significance and scientific potential which has materialized into a vital financial and logistic leg-up.

While building on this progress, the strategy could not have overlooked some negative tendencies, including:
• a persistent lack of communication and coordination with the physics academe amid enduring confusions about the concept, calling, and strategy of research in universities and in the national institutes of R&D;
• an ageing staff that stays behind while younger promising researchers tap at the doors of institutes abroad; and
• an ever thinning flow of graduates combined with a decline in their average training level that makes them hardly eligible for a career in cutting-edge research.

1.2. What nuclear physics can do to foster EU integration
IFIN-HH is well aware of the demands Romania has to meet to become integrated in the political, managerial, and cultural structures of the EU. The specific requirements IFIN-HH is ready to fulfill include:
• ensuring an efficient, substantial participation in the major nuclear and subnuclear physics projects going on at Europe’s main experimental facilities both under EU Framework Programs and other international collaborations;
• selecting top research areas that are appropriate for Romania and promoting them within the national research strategy;
• attaining symmetric mobility and reciprocity in academic exchanges; and
• promoting excellence research at European level.

1.3. How to react to the global themes and challenges of the 21st century
Physics rules modern material civilization. Given its primary vocation of understanding the structures and phenomenology of the universe, its outstanding results in diagnosis and prediction, and its indestructible ties to technology, physics is always, all over the world, including at IFIN-HH, involved in critical specific issues such as:
• developing new methods of investigation and pushing the limits of knowledge in the structure of matter;
• monitoring, diagnosing, and predicting the environment;
• improving health care and consumer protection;
• challenging energy addiction and finding alternatives;
• exploring problems and tendencies in the nuclear area, including the lifecycle of nuclear facilities, the development of advanced reactor systems, and the viable management of radioactive waste; and
• addressing information technology and communication needs such as the management of large amounts of data.
2. STRATEGIC OBJECTIVES

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 in 2007 and narrowing the gap between the institute’s research infrastructure and the European average down to a mutually acceptable level – in 5 years;
• rebalancing the age profile of the research staff – in 5 years;
• 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 – by 2009;
• getting efficiently involved in European projects and raising the share of work on EU Framework Programs to 10% of total contracted volume – in 3 years;
• 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 – in 2007;
• 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;
• cleansing the institute’s material inventories, work environment, and natural surrounding by a well planned, adequately equipped elimination of historic waste stocks under thorough radiation protection monitoring – in 3 years;
• promoting expertise and competence resources through an aggressive, adequately funded certification campaign – in 2007;
• 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 – in 2007; and
• keeping up efforts to multiply large scale, high value projects, improve their management, and maximize their scientific results.
3. STRATEGIC RESEARCH DIRECTIONS

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 will rise to prominence under this strategy. 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.
4. RESOURCES

4.1. Financing

IFIN-HH considers that itself and the Romanian physics research as a whole, given their social relevance and their role as favored communication and cooperation channels spearheading Romania’s integration with European structures, are entitled to seek assistance and support from:

a) the State that commissions and funds the strategic research directions and excellence in research;
b) the private sector that commissions and funds the transfer of technologies; and
c) the European Union that commissions and funds Romanian integration projects.

Raising a balanced mix of support from these sources is a chief objective of the financial strategy of IFIN-HH.

It should be noted that private financing is virtually nil in Romania at the time this strategy is being shaped. The Institute will therefore have to use particular dexterity in picking such ways and solutions that will be attractive and profitable to all parties involved.

4.2. Human resources

The Institute’s current human potential consisting of over 400 researchers, nearly half of whom are PhDs, provides enough ground for an optimistic kickoff of this strategy. Yet, continuing to ensure the right number and kind of research personnel that would be up to the Institute’s present standards and strategy may soon become a very complicated problem, as it depends on economic and social factors that are beyond the control of the IFIN-HH management. In fact, the personnel crunch linked to the looming generational change, which is expected to reach its worst in about 3 years from now, might seriously dent implementation prospects for this strategy. This is estimated to be the principal weak point of the IFIN-HH system and will as such require particular attention from the management.

To resolve the personnel crisis, a special multilateral consistent program will be needed. It will have to combine: (i) innovative intellectual incentives; (ii) convincing material incentives; and (iii) the creation of an attractive local social environment along with the appropriate legal hire and promotion schemes.

5. CONCLUSIONS

“Transition through continuity” is the motto of IFIN-HH’s development strategy launched in 2007. The goals in brief are: “high performance, competitiveness, profitability, and visibility.”

Implementing this proposed strategy will require an exceptionally focused effort from the management, a high level of solidarity and cooperation from the personnel, and a matching endorsement and commitment from Romanian society and the Government of Romania.
Note

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

**CERN, Geneva**
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 applications that will concentrate the world’s most advanced research in nuclear and atomic physics in the medium term.

**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.
ABOUT US...

BASIC & APPLIED RESEARCH
• **Theoretical Physics**: nuclei, fields & particles, condensed matter, nonlinear phenomena, mathematical & computational physics;
• **Nuclear Physics**: structure & reaction mechanisms, hadronic matter, ion beam analysis, neutron diffraction, nuclear & atomic data, nuclear astrophysics, advanced detection systems;
• **Particle Physics**: calorimetry, Monte Carlo simulations, object oriented software, statistical data analysis, phenomenology;
• **Life & Environmental Physics**: low-dose radiobiology, nuclear risk, geophysical migration, control of soil erosion, dosimetry and radiation metrology.

PRODUCTION & SERVICES
• Radioisotopes & Radiopharmaceuticals
• Technological Irradiations
• Radioactive Waste Treatment & Storage
• Decommissioning of Nuclear Installations

OTHER ACTIVITIES:
• Nuclear & Vacuum Engineering
• Informatics & Communications
• Training in Nuclear Activities

EXCELLENCE IN RESEARCH...
• for Nuclear Impact on People, Environment and Material Goods
• on Nuclear Techniques and Methods for Material Analysis, Description and Certification
• on Nuclear Structure and Application
• on Materials and Biomaterials
• on Nuclear Interaction and Hadronic Matter

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LARGE SCALE FACILITIES

- FN-15 Tandem Accelerator
- U120 Cyclotron
- Radioisotope Production Center
- Nuclear Waste Processing Center
- IRASM - Multipurpose Irradiation Facility
- VRS Reactor - in decommissioning
- Computing and GRID facilities
- Library
- Training Center

INTERNATIONAL COLLABORATIONS

With international institutions:
- EU (Brussels, Belgium)
- IAEA (Vienna, Austria)
- ICTP (Trieste, Italy)
- JRC (Ispra, Italy)
- INFN (Italy)
- GSI (Darmstadt, Germany)
- IN2P3 (Paris, France)
- GANIL (Caen, France)

With universities and research centers from abroad:
- Europe - 50
- USA & Canada - 11
- Asia - 3

Member of:
- JINR (Dubna, Russia)
- FAIR (Darmstadt, Germany)
- CERN (Geneva, Switzerland)

Participation in large scale international experiments:
- ATLAS, ALICE, LHC-b, DIRAC, FOPI, LCG, GASP, KASCADE, SPIRAL2
- and projects
- RODOS, EURONS, EURISOL

Around 250 publications / year in international journals

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