

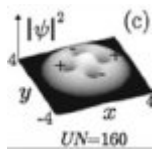
“Horia Hulubei” National Institute of Physics and Nuclear Engineering - IFIN HH

OUR MISSION

IFIN-HH is committed to the development of the knowledge in physics, especially of the sub-atomic one, and growing of the nuclear domain impact in society, through advanced research and the most professional services. We believe that our first-rate results in some of the most exciting areas of the physics can be a genuine source of wisdom for our community and an inspiring model of excellent inquiry for our youths.

With a contribution of almost 10% of the national scientific output, IFIN-HH is one of the most important public R&D organizations in Romania. The institute is dedicated to the research and development in physical and natural sciences, mainly Nuclear Physics and Nuclear Engineering, and in related areas including Astrophysics and Particle Physics, Field Theory, Mathematical and Computational Physics, Atomic Physics and Physics of Condensed Matter, Life and Environmental Physics. In all these fields, IFIN-HH conducts theoretical and experimental research.

IFIN-HH Research Departments



The Department of Theoretical Physics (DFT) - The research activity is carried out in the following fields: Condensed Matter Physics, Exotic Nuclei and Astrophysics, Fields and Particles, Mathematical Physics, Nanophysics and Emerging Materials, Nuclear Structure and Reactions, Nonlinear Optics, Open Systems and Physics of Quantum Information.

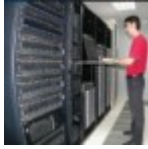


The Department of Nuclear Physics (DFN-TANDEM) is a multidisciplinary research unit in the field of nuclear and atomic physics. The Department's mission lies in the areas of basic and applied research, particularly in the fields which are relevant for sustainable development and the national endeavour for integration in the European Union. The research projects underway in DFNT are also of a major importance for training and education.

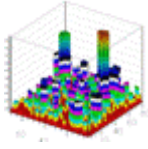


Hadronic Physics Department (DFH) although recently founded, is based on the existing structure of the NIHAM Centre of Excellence, group with a rich experience in: nuclear interactions, hadronic matter, nuclear structure and dynamics. Over the years the members of our group have been involved in several international collaborations. Detector R&D, front-end electronics development, simulations, detector construction, calibration, data

analysis and their interpretation and development of microscopical models are the fields in which HPD is constantly playing an important role.



The Department of Elementary Particles Physics (DFPE) - is currently investigating hot topics like the Standard Model and its extensions, generalized field theories, quark-gluon plasma and charm particles, neutrinos, and classical and quantum gravity.



The Department of Computational Physics and Information Technologies (DFCTI) represents a key component of the research infrastructure of IFIN-HH, providing computing resources and services for the scientific research in the fields of numerical modeling and simulation of physical phenomena. As coordinator of the Romanian Tier-2 Federation RO-LCG, of the National Grid for Physics Research and Related Fields, and of the Romanian participation in the SE European HPC collaboration, DFCTI supports the computational science at national and international levels.



The Department of Life and Environmental Sciences (DFVM) seeks to secure, maintain and develop appropriate tools enabling it to perform comprehensive radiological assessments relating to nuclear facility siting, operations, and decommissioning, the management of radioactive sources and radiation devices, the occupational and public exposure, and the nuclear emergency planning, preparedness and response, the developing of biological studies and analysis for the evaluation of biological response associated with ionizing radiation and other physical or chemical stress factors.



Radioisotopes and Radiation Metrology Department (DRMR) - is unique in our country by its activity profile and also by its complexity. The basic activity of CPR in research, technology transfer and technical services are in the areas of radioactive products and their use in medicine, industry, agriculture, biology, and others.



Applied Nuclear Physics (DFNA) - Applied Nuclear Physics Department focuses on designing and exploiting experimental facilities for interdisciplinary applications. The main fields of activities are: accelerator mass spectrometry, archaeometry studies (XRF PIXE, X Ray tomography), and materials studies (AFM, NAA, positron spectroscopy RBS), nuclear applications in medicine (PET, boron therapy), advanced detection systems custom design.



Multipurpose Irradiation Facility Center (IRASM) - is a production and R&D center offering industrial irradiation services, consultation, analyses, training and research in radiation processing.

The main target is radiation treatment for sterilization of medical devices and microbial control for foodstuffs. The facility and the project may be considered as a strategic investment for healthcare and upgrading the live quality in Romania.



International Nuclear Information System (INIS Department of IFIN-HH) - is the world's largest database in the field of nuclear science and technology, of nuclear energy and peaceful applications of nuclear radiation and radioisotopes. It contains more than 2.5 million documents, and incorporates annually around 80 000 - 100 000 items. Romania is a state member of INIS since 1972.



Nuclear Training Centre (CPSDN) - Department within IFIN-HH, developing activities related to the qualification and/or specialization of personnel for the nuclear applications or other related fields. CPSDN activity is carried out in compliance with a Quality Management System certified in accordance with EN ISO 9001:2000 by TUV HESSEN through TUV CERT (Technischen Überwachungs-Vereine) certification body.



Reactor Decommissioning Department (DDR) - is part of the Center for Decommissioning and Radioactive Waste Management (CDRWM) which is carrying out activities in the nuclear field using a Quality Management System approved by CNCAN. DDR mission is fulfilled by deploying activities with highly qualified and experienced staff, using advanced world class equipment, always aiming the safety of the personnel and public and the environmental protection.



Radiation Safety (CRPMMPF) - To be communicated]



The Center for Technology Transfer and Marketing (CTTM) - was set up as IFIN-HH's vehicle for valorizing the results of the Scientific Research developed in the institute through patent licensing, augmented volume of services rendered to the industry, increased visibility, collaboration with national and international research institutes, academia-industry meetings, participation to specialized fairs and exhibitions, training activities and students participation to research experiments.

IFIN-HH International Cooperation

Projects with EU

- Framework Programme: [FP7](#) , [FP6](#) , [FP5](#)
- [EURATOM](#)
- [PHARE](#)
- [Other EU Projects](#)

International Organizations

- [ELI-NP - Extreme Light Infrastructure - Nuclear Physics](#)
- [CERN - European Organization for Nuclear Research](#), Geneva
- [JINR - Joint Institute for Nuclear Research](#), Dubna
- [IAEA - International Atomic Energy Agency](#), Vienna
- [FAIR - Facility for Antiproton and Ion Research](#), Darmstadt
- [ECT* - European Centre for Theoretical Studies in Nuclear Physics and Related Areas](#), Trento

National Organizations from abroad

- [CEA - Commissariat a l'Energie Atomique](#), France
- [IN2P3 - Institut National de Physique Nucleaire et de Physique des Particules](#), France
- [INFN - Istituto Nazionale di Fisica Nucleare](#), Italy

International Experiments

- SPIRAL 2 - GANIL, France
- [KASCADE - Grande - FZK](#), Germany
- [LOPES - FZK](#), Germany
- [H1 - DESY](#), Hamburg, Germany

Other types of collaborations

- [Bilateral Collaborations](#)
- [Inter-academic Exchanges](#)
- [Other collaborations](#)

ELI-NP

THE ELI - NUCLEAR PHYSICS FACILITY

To be built in Bucharest-Magurele, ELI-NP will be one of the three pillars of ELI - THE EXTREME LIGHT INFRASTRUCTURE, along with the facilities dedicated to the study of secondary sources (Dolni Brezany, near Prague) and attosecond pulses (Szeged). ELI-NP is a very complex facility which will host two machines of extreme performances:

- A very high intensity laser, where beams from two 10 PW lasers are coherently added to get intensities of the order of 10^{23} - 10^{24} W/cm² and electrical fields of 10^{15} V/m;

- A very intense (10^{13} γ/s), brilliant γ beam, 0.1 % bandwidth, with $E_{\gamma} > 19$ MeV, which is obtained by incoherent Compton back scattering of a laser light off a very brilliant, intense, classical electron beam ($E_e > 700$ MeV) produced by a warm linac.

ELI-NP will create a new European laboratory to consistently investigate a very broad range of science domains, from new fields of fundamental physics, new nuclear physics and astrophysics topics, to applications in material science, life sciences and nuclear materials management.

Extreme Light Infrastructure (ELI) will be the only European and International Centre for high-level research on ultra-high intensity laser, laser-matter interaction and secondary sources with unparalleled possibilities. Its pulse peak power and briefness will go beyond the current state-of-the-art by several orders of magnitude. Because of its unique properties, this multidisciplinary facility will provide magnificent new opportunities to study the fundamental processes unfolded during light-matter interaction. ELI will create a platform, where Extreme Light applications for the benefit of society will be dynamically promoted.

In its mission ELI will practice a vigorous technology transfer to European SMEs and large firms. High on ELI agenda will be the training of aspiring scientists and engineers in the numerous disciplines associated with the Extreme Light. The ELI project, a collaboration of 13 European countries, will comprise four pillars:

- High Energy Beam Science devoted to the development and usage of dedicated beam lines with ultra-short pulses of high energy radiation and particles reaching almost the speed of light. This part of ELI will be realized in Prague (Czech Republic)
- Attosecond Laser Science designed to conduct temporal investigation of electron dynamics in atoms, molecules, plasmas and solids at attosecond scale (10⁻¹⁸ sec.). Szeged (Hungary) will host the short pulse pillar of ELI.
- Laser-based Nuclear Physics pillar will be built in Magurele (near Bucharest/Romania) and will focus on laser-based nuclear physics. While atomic processes are well suited to the visible or near visible laser radiation, as a third pillar ELI-NP will generate radiation and particle beams with much higher energies, brilliances suited to studies of nuclear and fundamental processes.
- Ultra High Field Science that will explore relativistic laser-matter interaction in an energy range where totally new phenomena like radiation dominated interaction become dominant. The decision on the location of the technologically most challenging pillar will be taken in 2012 after validation of the technology.