



**MHTC**

Magurele High Tech Cluster

**Membrii fondatori ai Magurele High Tech Cluster (MHTC) - 18.11.2013 data**  
semnarii statutului

1. Institutul Național de C-D pentru Fizică și Inginerie Nucleară “ Horia Hulubei”- IFIN-HH
2. Primăria Orașului Măgurele,
3. Institutul Național de C-D pentru Fizica Laserilor, Plasmei și Radiației - INFLPR,
4. Fundatia pentru Democratie, Cultura si Libertate - Filiala Calarași (FDCL Cl.),
5. Institutul Național de C-D pentru Mecatronică și Tehnică Măsurării - INCDMTM,
6. Institutul Național de Cercetări Economice – Costin C. Kirițescu,
7. Institutul Național de C-D pentru Microtehnologie IMT-București,
8. Institutul de Fizică Atomică,
9. S.C. MIRA TELECOM S.R.L.
10. S.C. ASCENDIA DESIGN S.R.L.
11. S.C. ACCENT PRO 2000 S.R.L.
12. S.C. APEL LASER S.R.L.
13. S.C. NITECH S.R.L.
14. S.C. SAMWAY ELECTRONIC S.R.L.
15. S.C. TOTAL CONSTRUCȚII S.R.L.
16. S.C. MATEFIN S.R.L.
17. S.C. COM INOX S.R.L.
18. S.C. FRESH AIR S.R.L.
19. S.C. SIGMA STAR SERVICE S.R.L.
20. S.C. SIGMA PATENT STUDIO S.R.L.
21. S.C. AVITECH CO S.R.L.
22. S.C. NHN ECOINVEST S.R.L.
23. S.C. CAUTIS JB'93 S.R.L.
24. Institutul Național de C-D pentru Fizica Materialelor - INCDFM,
25. S.C. PELL AMAR COSMETICS S.R.L.



- 26 Institutul Național de C-D pentru Optoelectronică - INOE 2000,
27. Institutul Național de C-D pentru Metale Neferoase si Rare - IMNR,
28. S.C. NUCLEAR INGINERY S.R.L.
29. S.C. NUCLEAR VACUUM S.A.
30. S.C. NANOLINE OPTICS S.R.L.
31. S.C. FIBER LASER OPTICS S.R.L.
32. Regia Autonomă Tehnologii pentru Energia Nucleară – Sucursala Centrul de Inginerie Tehnologică pentru Obiective Nucleare București Măgurele – CITON
33. Institutul Național de C-D pentru Fizica Pământului –INCDFP-
34. S.C. OPTOELECTRONICA-2001 S.A.
35. S.C. ELECTRO OPTIC COMPONENTS S.R.L,

**Noi membri în MHTC în urma Adunarii Generale din 19.03.2014:**

36. Institutul Național de C-D si Incercari pentru Electrotehnica – ICMET Craiova
37. Institutul Național de C-D pentru Tehnologii Criogenice si Izotopi – ICSI Ramnicu Valcea
38. S.C. TELEELECTRON S.R.L.
39. S.C. CROMAFOR S.R.L.
40. S.C. CONCIF COMPANY S.R.L.
41. S.C. TRIADA PROD IMPEX S.R.L.
42. S.C. AR PARTNERSHIP S.R.L.
43. Consiliul Judetean Ilfov
44. S.C. PANCO S.A.
45. Institutul Național de C-D pentru Inginerie Electrica – ICPE CA S.C. ADREM INVEST S.R.L.



65 ani de Fizică 2014  
la Măgurele

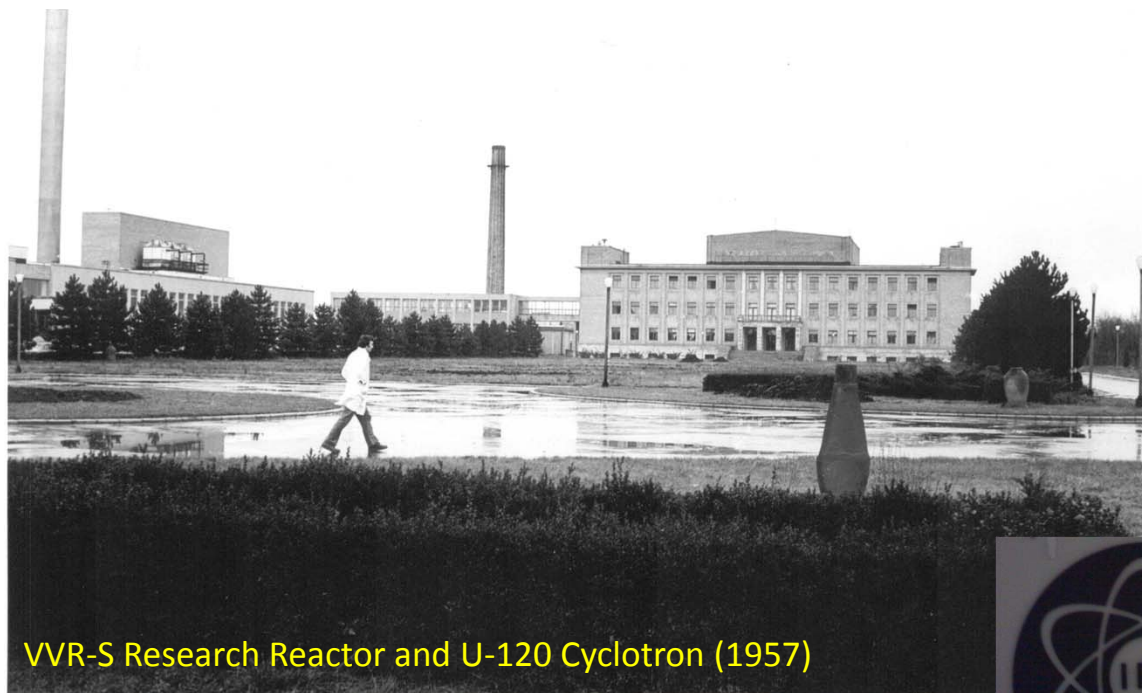
1949

Știința...  la noi acasă





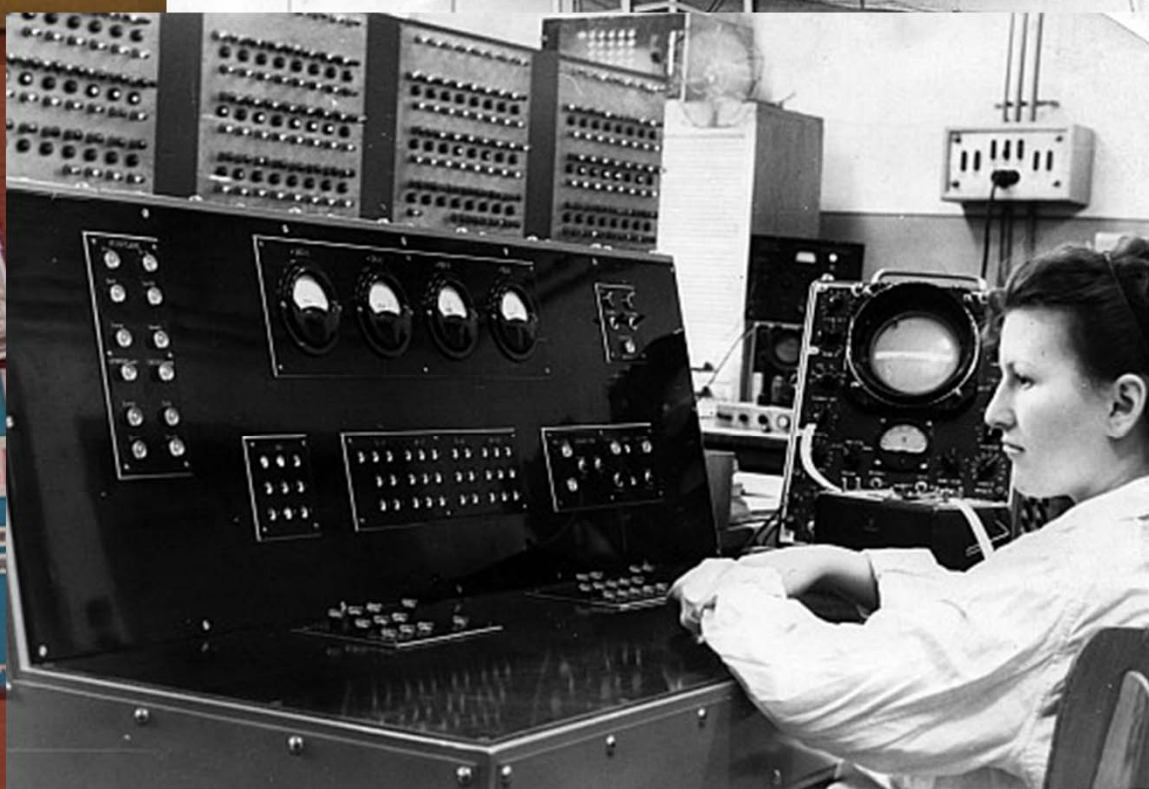
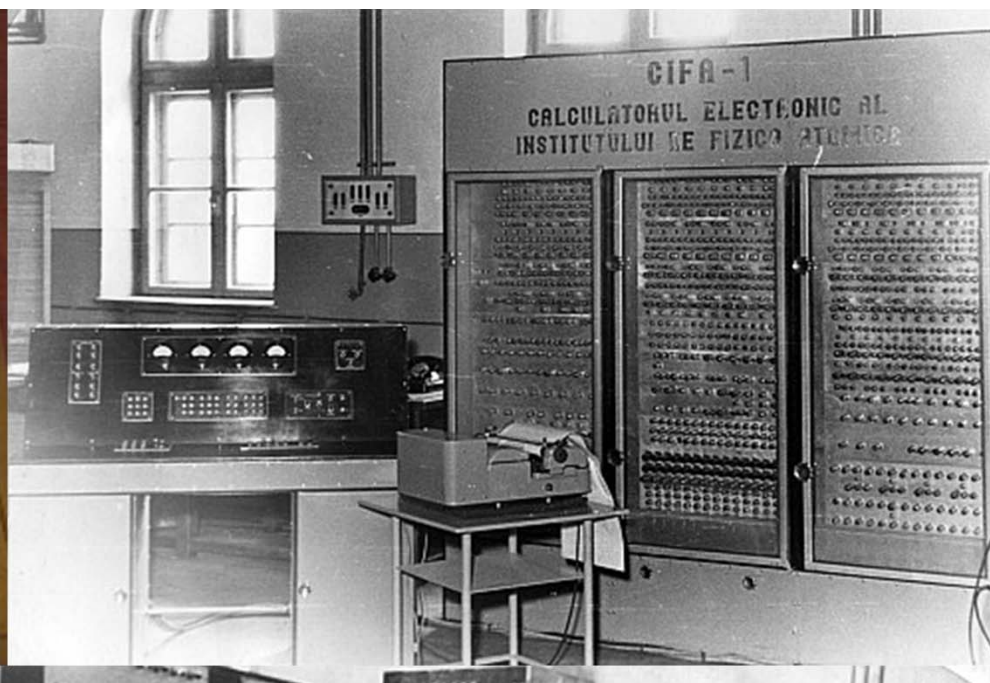




VVR-S Research Reactor and U-120 Cyclotron (1957)



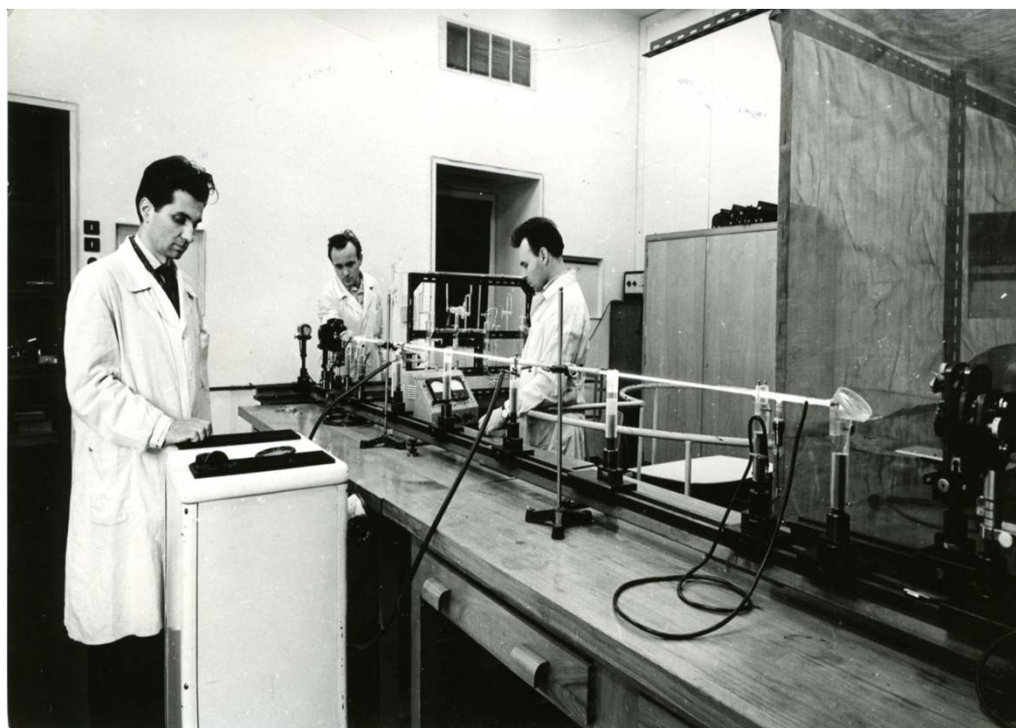




**October 20, 1962 – the first Romanian (He-Ne) Laser was obtained by a team headed by Prof. Ion Agârbiceanu at the Institute of Atomic Physics, Bucharest**



**ION AGÂRBICEANU (1907 – 1971)**



**Laurențiu Blănaru, Virgil Vasiliu and Anton Agafiței (from left to right)**

The achievement of this He-Ne laser, **less than two years** after that of Javan, Bennett and Herriott was a direct consequence of the scientific background (advanced gas spectroscopy - theory and experiments, vacuum deposition, Fabry-Pérot etalons and radiation detection) of the earlier Laboratory *“Optical Methods in Nuclear Physics”* at the Institute of Atomic Physics.

Coutesy of Acad. Valentin.I. Vlad



### Heavy-ion radioactivity

In 1980 A. Sandulescu, D.N. Poenaru, and W. Greiner described calculations indicating the possibility of a new type of decay of heavy nuclei intermediate between alpha decay and spontaneous fission. The first observation of heavy-ion radioactivity was that of a 30-MeV, carbon-14 emission from radium-223 by H.J. Rose and G.A. Jones in 1984. (*Encyclopædia Britannica Online 2011*)

Sandulescu, A., Poenaru, D. N. and Greiner W. "New type of decay of heavy nuclei intermediate between fission and alpha-decay". *Sov. J. Part. Nucl.* **11**: 528–541.



## Highlights



### ***Hadron Physics Department -IFIN-HH Contribution to ALICE Experiment @ LHC***

#### **Building the ALICE-TRD Subdetector**

together with GSI-Darmstadt, JINR-Dubna, IK-Frankfurt and PI-Heidelberg.

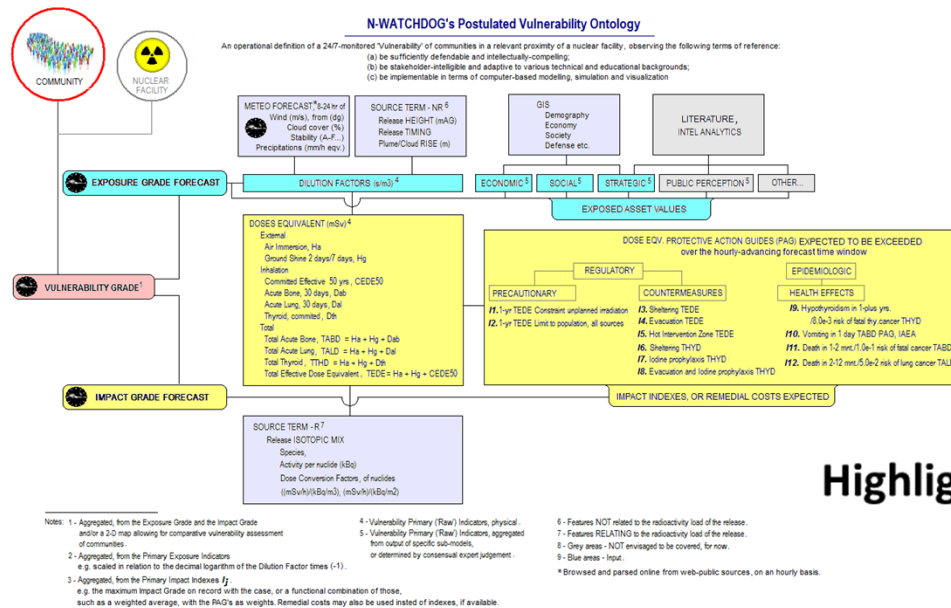
According to the TRD Technical Design Report, initially 108 modules, covering an area of 147 m<sup>2</sup> and having 232,000 read-out channels, have been constructed and tested at NIHAM Centre of Excellence (**Prof. Mihai Petrovici et al.**)

- followed by an overtask of 22 modules, representing 24% of the total 540 modules.

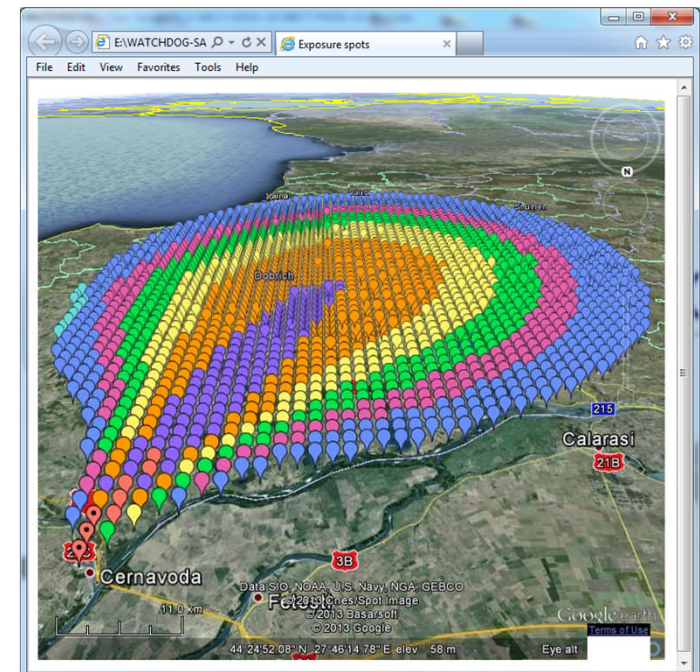
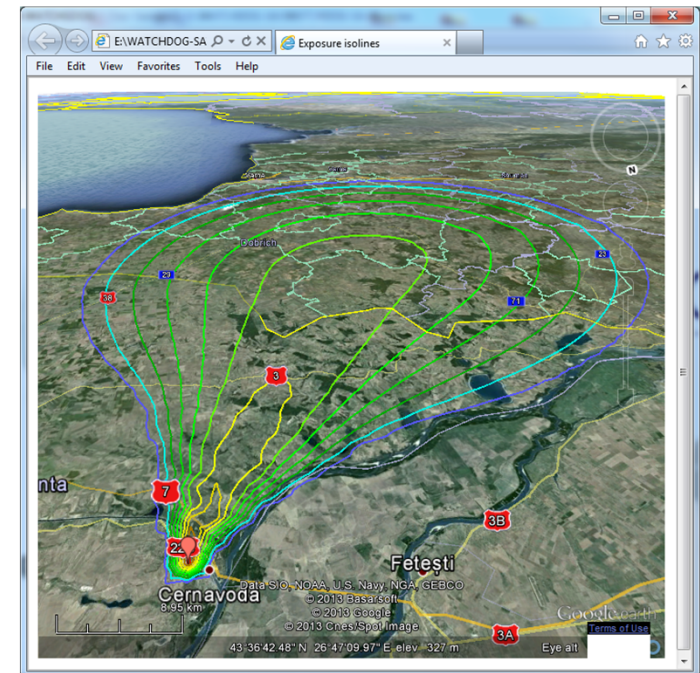
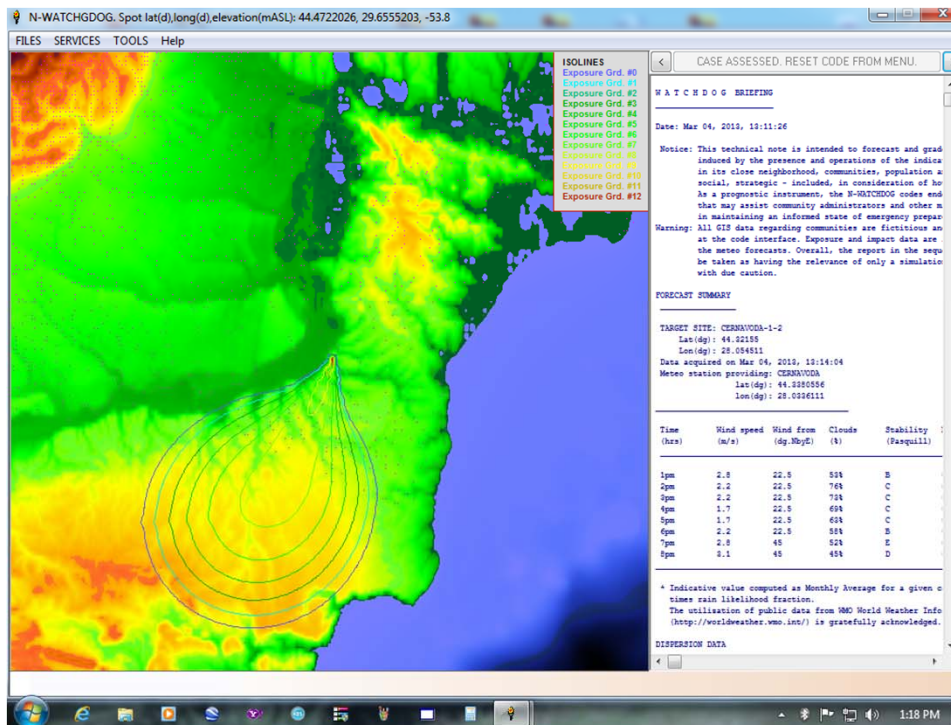
The most substantial contribution of a Romanian research institute to a large international collaboration







## Highlights





- GENETICS
- GENETIC MODIFIED ORGANISMS
- MICORHISA

MICROBIOLOGY

BIOCOMPATIBILITY  
EVALUATION

- FOOD SAFETY
- PHARMACEUTICALS
- COSMETICS

DOSIMETRY

IRRADIATOR

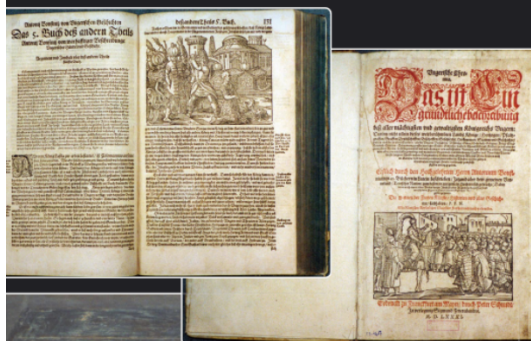
IRRADIATED  
FOOD DETECTION

PHYSICAL & CHEMICAL TESTS

- SMALL MOLECULE DETECTION
  - RESIDUAL ETO IN STERILE PRODUCTS
- CULTURAL HERITAGE CONSERVATION
  - ARCHIVES
  - CHURCHES

- ACCIDENT DOZIMETRY
- ARCHEOMETRY





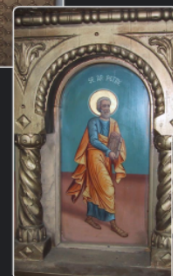
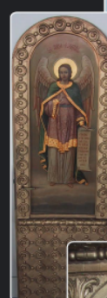
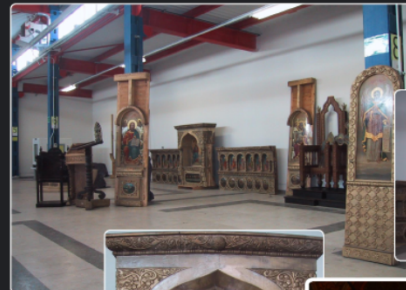
IFIN-HH, Bucharest, ROMANIA

**iRASM**  
Radiation Processing Center

**Conservation  
by Irradiation**



IFIN-HH, Bucharest, ROMANIA



Izvoarele Church,  
Prahova County

**Conservation  
by Irradiation**

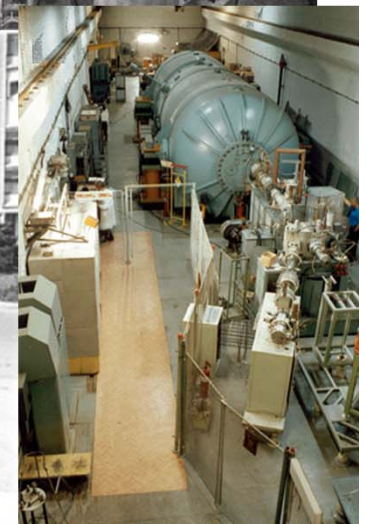
**iRASM**  
Radiation Processing Center





## Investment waves that shaped the Magurele Platform as a National Laboratory

- the mid-fifties, when the Institute of Atomic Physics was founded, with large-scale installations –a premiere for South-Eastern Europe: the Nuclear Reactor, the Cyclotron, the Betatron and the first electronic computer, CIFA-1,
- followed by the second wave, during the seventies, with new and modern departments, among which one should mention the Tandem Accelerator, the Center for Radioisotope Production the Center for Nuclear Medicine, the Radioactive Waste Processing Unit a.o.



In that time the Magurele Platform has been constructed, socially integrating the students of the Faculty of Physics and researchers of different generations who chose not only to work but also to live here.

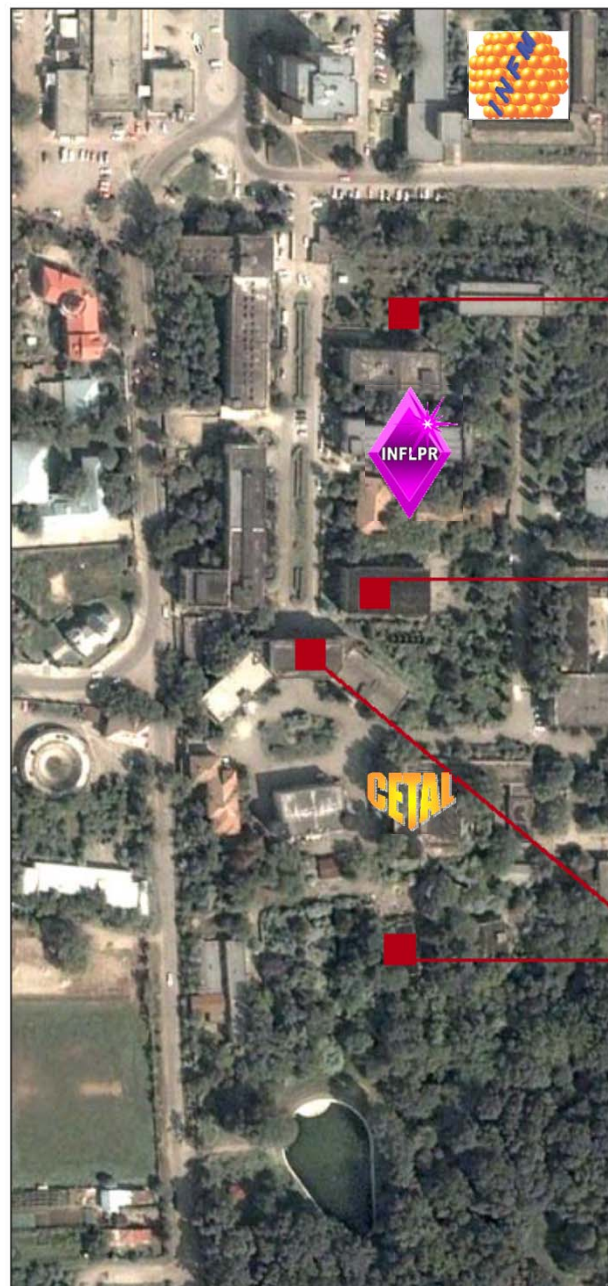
It was in the logic of this history that a third wave should follow, with features reflecting the new political and social context as well as the new statute of Romania in Europe:

- 2009-2013 - a major investment project “Infrastructure development for frontier research in nuclear physics and related fields”
- 2012 the implementation of the Extreme Light Infrastructure (ELI-NP) project.

They were great, tragic, saints... Ei au fost mari, tragici, sfinti...  
Parents to our parents being. Parintilor nostri le-au fost parinti.  
Well, what about us? Bun, dar cu noi cum rămâne?  
(Nichita Stanescu, Din nou, noi)







## Research Infrastructure Investments planned or in progress

High Performance Computing Centre

Radiopharmaceutical Research Centre

Centre for Radiological Surveillance of the Environment

Physics National Library

Radiocarbon center for environment and biosciences **TANDIMED**

**TRITIULAB**

Center of Nuclear Spectrometry for Energy, Environment, Materials and Health

ICTP@Ro

Ro@NUSTAR

Hadron Physics Centre



To turn its strength to the best account, the institute concentrates resources on two directions: (a) steadily develop a sound in-house capability to get and stay in the forefront of nuclear science and technology; and (ii) substantially participate in the European collaborations centered on Large Scale Facilities such as GSI-Darmstadt (Germany), GANIL-Caen (France), CERN (Geneva), JINR (Dubna). This is a strategy meant to harmonize limited domestic resources with the tall orders of the contemporary, top-level nuclear physics research, and the imperative need for Continental co-operation and integration.





EUROPEAN UNION



GOVERNMENT OF ROMANIA



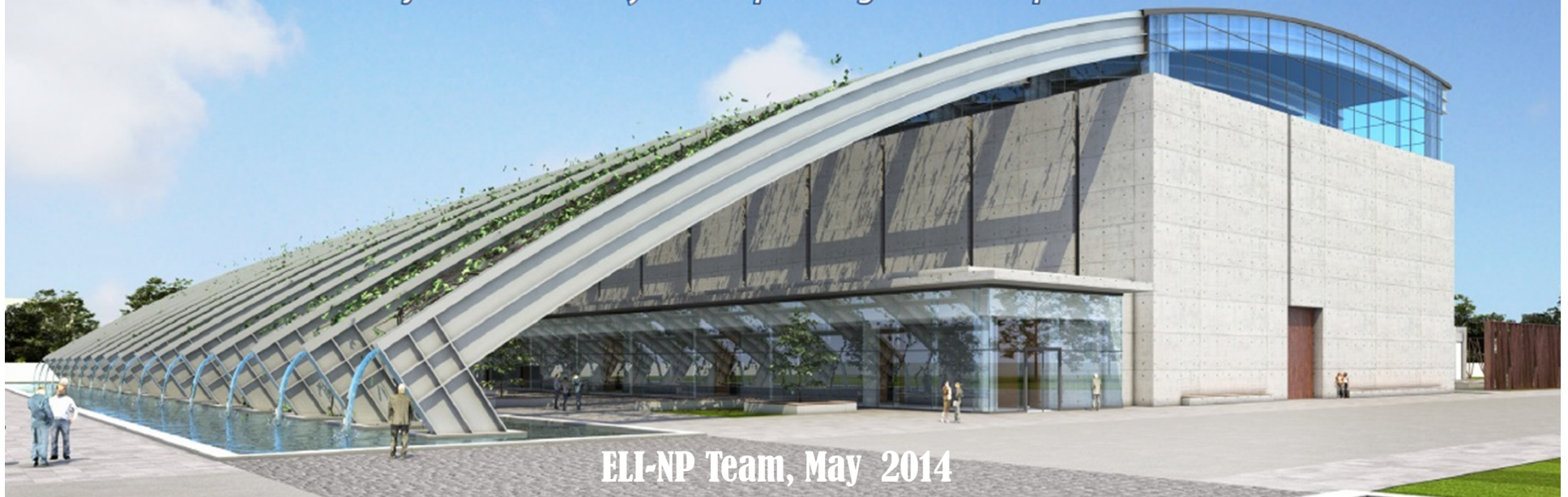
Sectoral Operational Programme “Increase of Economic Competitiveness”  
*“Investments for Your Future!”*



# Extreme Light Infrastructure - Nuclear Physics (ELI-NP) - Phase I



*Project co-financed by the European Regional Development Fund*



ELI-NP Team, May 2014

# *Extreme Light Infrastructure*

*2006 – ELI on ESFRI Roadmap*

*ELI-PP 2007-2010 (FP7)*

*ELI-Beamlines (Czech Republic)*

*ELI-Attoseconds (Hungary)*

*ELI-Nuclear Physics (Romania)*

*ELI-DC (Delivery Consortium): 2010,*

*Legal entity: March 2013*

*Czech Republic, Hungary, Romania, Italy, Germany*

*ELI-NP: 293 M€, project approved by EC in September 2012*

*First phase (2012-2015) 180 M€ ( EC Structural funds: 149 M€)*

*Second Phase: 2015 - 2017*





# *ELI-Nuclear Physics*

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## *Large equipments:*

- *High power laser system,  $2 \times 10\text{PW}$  maximum power*
- *Gamma beam, high intensity, up to  $20\text{MeV}$ ,  
produced by Compton scattering of a laser beam  
on a  $700\text{ MeV}$  electron beam produced by a warm LINAC*

## *Scientific program:*

- *Nuclear Physics experiments  
to characterize laser – target interaction*
- *Photonuclear reactions*
- *Exotic Nuclear Physics and astrophysics*
- *Applied Research*



# *ELI-NP Next Steps*

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- **August 2012: Tender Procedures**
- **September 18, 2012: The funding of the ELI-NP project from Structural Funds was approved by the European Commission.**
- **December 12, 2012: Signing of the ELI-NP Contract**
- **January 2013- April 2015: June 14 Civil Construction Start**
- **June 2013 – Signing the High Power Laser contract**
- **March 2014 Signing the Gamma System contract**
- *June 2015 : Lasers and Gamma Beam – Phase 1*
- *June 2017 : Lasers and Gamma Beam Phase 2*
- *2013-2015: TDR for experiments*
- *2015-2017: Experimental set-ups*
- *2018: Beginning of operation*





## Moments



Signing of the contract with the association Thales Optronique and Thales Romania for the High Power Laser System – Bucharest, July 11, 2013

Signing of the contract with the EuroGammaS Consortium for the Gama Beam System – Rome, March 19, 2014

Foundation Stone Ceremony – June 14, 2013

(May 10, 2013, in Bucharest, signing of the construction contract)





## Milestones of Extreme Light Infrastructure – Nuclear Physics

Signing of the ELI-NP Contract; December 12, 2012



ELI - Delivery Consortium; April 11, 2013



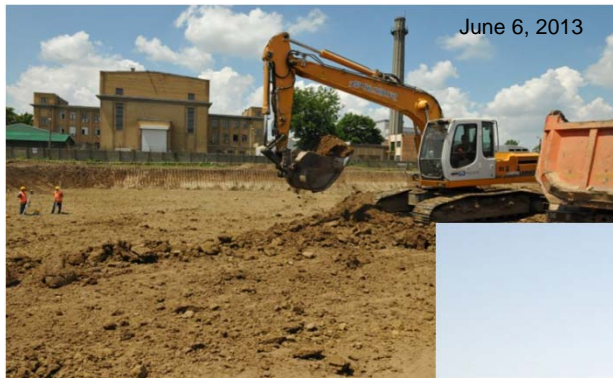
Foundation Stone Ceremony; June 14, 2013



May 28, 2013



June 6, 2013



June 14, 2013



July 16, 2013



August 7, 2013














**RADIO BUCUREȘTI 98.3**






Parlamentul României

## 0 Fizică modernă 0 Românie prosperă

Prima întâlnire a fizicienilor  
cu oamenii politici  
și oamenii de afaceri



„În mijlocul dificultăților  
se află ocaziile favorabile”  
A. Einstein



Parlamentul României  
22 iunie 2005











Senatul României • Comisiile pentru Învățământ, Știință, Tineret și Sport • Camera Deputaților  
 Autoritatea Națională pentru Cercetarea Științifică

Institutul Național de Fizică și Inginerie Nucleară «Horia Hulubei»

# Știință Societate

Spre o societate bazată pe cunoaștere în România  
Contribuția Științei la dezvoltarea culturală, economică și socială a țării

• Pentru cine • Pentru ce • De ce • Cine •

- ȘTIINȚA – GENERAȚIA URMĂTOARE •
- ȘTIINȚA – O AFACERE ? •
- ȘTIINȚA ÎN SOCIETATE •



Palatul Parlamentului  
14 noiembrie 2007  
ora 13<sup>00</sup>

Parteneri: Camera de Comerț și Industrie a României • Fundația pentru Știință și Tehnică • Global Video Media

Parteneri media:     

# FAPT<sub>3</sub>

Fizică • Afaceri • Politică • Tehnologie

## Oferta Fizicii

Fizica pentru Societatea Românească  
și Economia Națională



Palatul Parlamentului  
29 aprilie 2010  
ora 10<sup>00</sup>

Organizatori:

Camera Deputaților – Comisia pentru Învățământ, Știință, Tineret și Sport  
 Ministerul Educației, Cercetării, Tineretului și Sportului  
 Autoritatea Națională pentru Cercetarea Științifică  
 Institutul Național de Fizică și Inginerie Nucleară «Horia Hulubei»





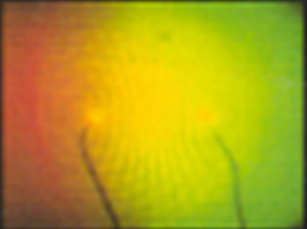
As a student in Holland and elsewhere in western Europe in the 1920s and 1930s, Hendrik Casimir studied with three of the giants of twentieth-century physics: Niels Bohr, Wolfgang Pauli, Paul Dirac. A brilliant theoretician himself, Casimir participated in and observed first hand the astonishing growth of early atomic physics to quantum physics—a revolution in our understanding of science and one that has affected the modern world more than even the early atomic physicists could have.

ISBN 0-06-017024-8 (paper) U.S. & Canada

Hendrik B.G. Casimir  
**Haphazard Reality**

Harper  
& Row

# Haphazard Reality



## Half a Century of Science

Hendrik B.G. Casimir



# ELI-NP Academic Forum

- Promoting a long-term partnerships with academic institutions, stimulating initiatives enabling the ELI-NP project to secure the fulfilment of its needs in terms of PhD students, junior researchers, engineers, and technicians (creation of training programs, MSc and PhD, etc.).
- Partnerships to facilitate the dissemination of the results of the ELI-NP Project to the academic community.
- A forum where academic institutions are encouraged to define and implement initiatives to support the ELI-NP Project in the achievement of its objectives in terms of scientific excellence.

1<sup>st</sup> Meeting: April 24<sup>th</sup>, 2012. Magurele  
– the 4<sup>th</sup>, on December 9, 2013



Gathered together in the Academic Forum of ELI-NP, representative academic and research institutions are acting jointly to exploit the extraordinary opportunities opened by ELI-NP, to eventually establish a reference centre for scientific culture in Magurele.

# ELI-NP Industrial Forum

- Body promoting relationships with local and foreign companies.
- Objective of the ELI-NP team: focus on the development with the business and industrial sector (promotion of contractual research, technology transfer and commercialisation of results, etc.).
- Associating local companies with foreign companies is an important objective of the ELI-NP Industrial Forum.
- Members are encouraged to set up initiatives consistent with the objectives of the ELI-NP project in terms of socio-economic impact (local development, creation of jobs, etc.).

1<sup>st</sup> Meeting: April 25<sup>th</sup>, 2012. Magurele  
– the 4<sup>th</sup> on December 10, 2013



In order to create a breeding ground for the typical beneficiaries settled in a technological park like structure around a major infrastructure, the Măgurele High Tech Cluster (MHTC), an open association of research and business entities was formed: (initiated in June 2013, becomes a legal entity in February 2014 )



Committed to exploit the extraordinary opportunities that ELI-NP opens for high level research as well as to applications having a high societal impact, concurrent actions and approaches were performed :

- a) setting up a dedicated center for technological transfer and marketing CTTM (<http://www.nipne.ro/cttm/index.php> )
- b) acting towards the realization of an open association of research and for profit entities: Măgurele High Tech Cluster – 35 founding members initiated in June 2013 the MHTC, the association acquired its legal status (February 4, 2014). Extended in March 18, 2014, to 46 members.
- c) stimulating the establishment of “innovation culture”:
  - HEPTech Forum (8-9 October 2013) and Workshop HEPTech On Open Innovation (7 October 2013).
  - Academic (December 9, 2013) and Industrial (December 10, 2013) Forums
  - Intellectual Property and Technological Transfer – with the Federal Politechnical Institute Lausanne (EPFL) (March 3, 2014)
- d) Funding application for the initiation of a innovative cluster (October 2013) -successful: April 4, 2014



Str. Atomistilor nr. 409, Magurele, Judetul Ilfov, Tel: +40.21.404.23.03  
Fax: +40.21.457.44.40, E-mail: [ursui@nipne.ro](mailto:ursui@nipne.ro), [dseuleanu@fdcl.ru](mailto:dseuleanu@fdcl.ru)

Extreme Light Infrastructure – Nuclear Physics - Cluster Inovativ

- e) Applying for a “Pole of Excellence” project – with the Elias Foundation – towards a joint medical imaging center

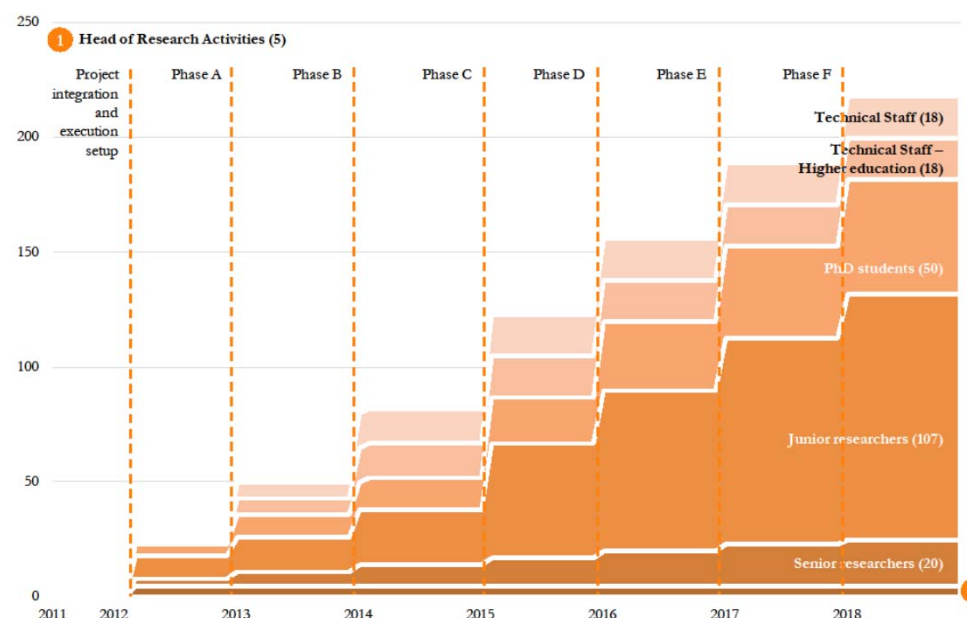


- f) Magurele Cluster Initiative: “EU - Romania Center for Excellence in Laser & Nuclear Radiation applications, engineering, technology transfer and marketing - CLARA”

## Conclusions: Expected Impact of ELI-NP

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.

- World-class research infrastructure (+250 positions of researchers)
- Education – high-level training in science and engineering
- Increasing employment opportunities in research, decreasing brain drain
- Knowledge and technology transfer as a primary objective, collaboration with the local for-profit sector (contractual research); significant expectations of International Patents
- Positive direct and indirect effects on the local and regional economic environment – opportunities for frontier research for companies, stimulating effects on high-tech industries



**The technology and knowledge transfer, the stimulating effects on high tech industries, the exciting opportunities for companies to perform frontier research as well fostering the research to the benefit of innovative companies ....all these positive impacts are viable only for those who will be prepared and able to exploit the existence of ELI-NP.**

*Scientists, entrepreneurs, politicians... join us!  
Come here to shape your future. To meet your destiny. Where?! Here, at ELI-NP, in Magurele, of Romania, of Europe. Science is forever.*

