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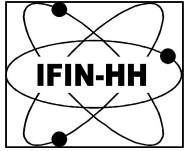
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Romania's Nuclear Research Landscape: PhD Opportunities and Pathways

Assoc. Prof. Gabriel SULIMAN
POLITEHNICA Bucharest
ELI-NP/IFIN-HH, Magurele

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gabriel.suliman@upb.ro



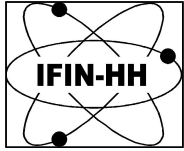
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Outline

- Where we are
- Who we are
- What do we do
- Photographs (many photographs)



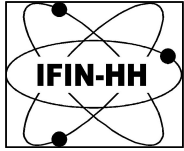
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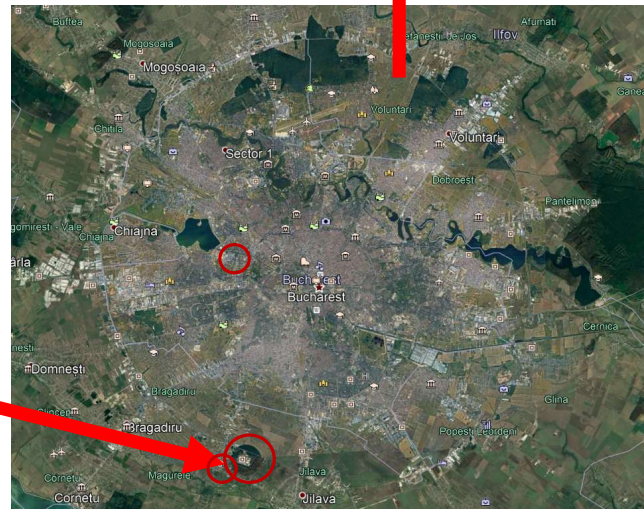
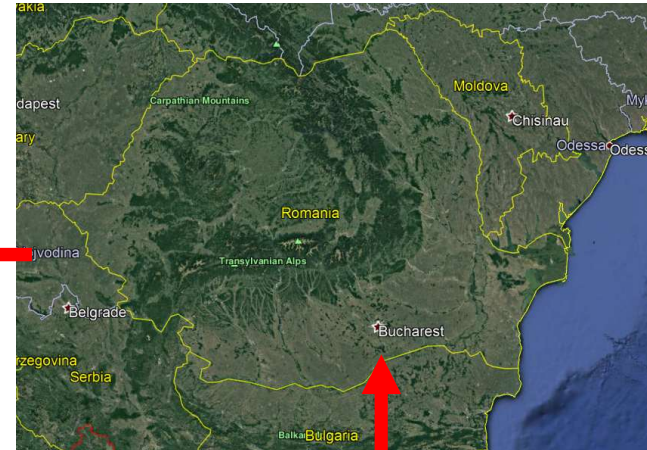
Institutions with nuclear physics programs

- IFIN-HH, ELI-NP, Bucharest - Magurele
- Faculty of Applied Sciences, POLITEHNICA University
- Faculty of Physics, Bucharest University
- Other institutes and universities

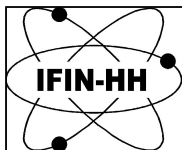


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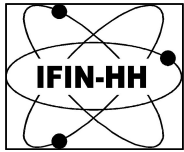
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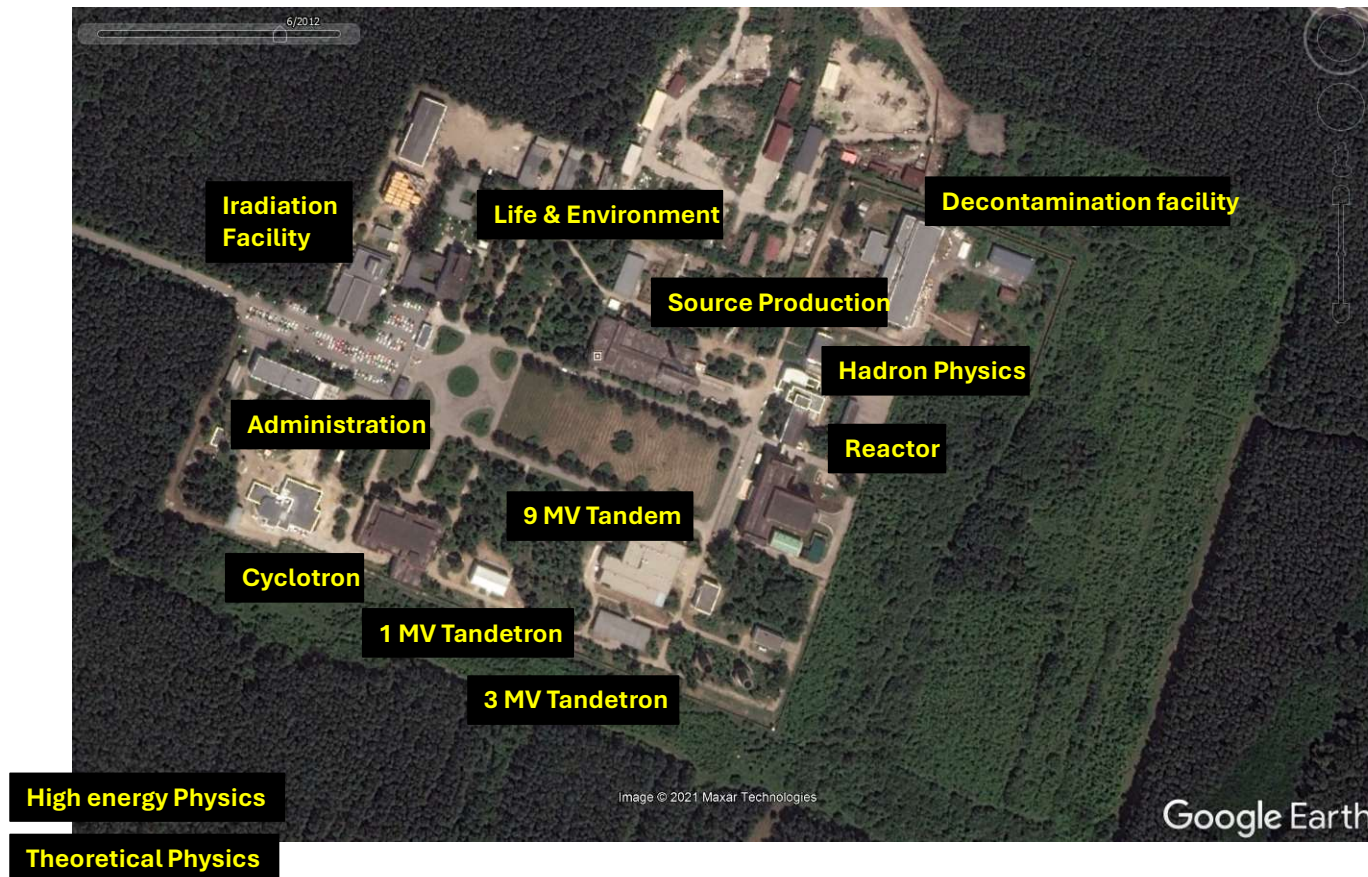


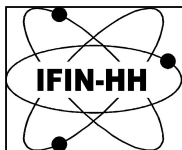
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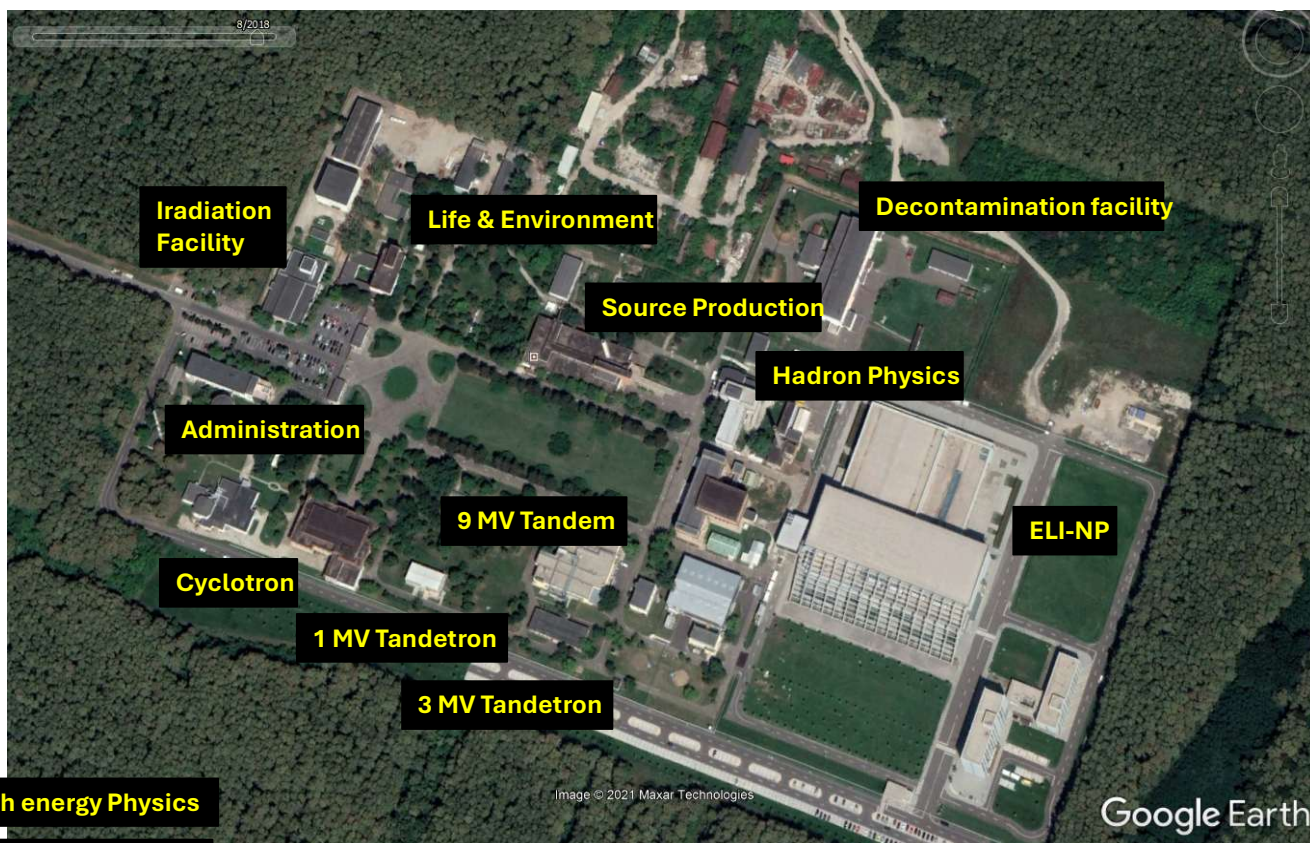
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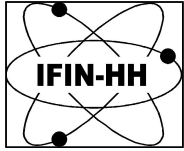
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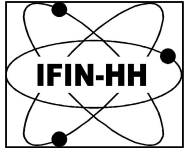


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History of IFIN-HH

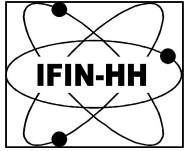


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- 1949: The Institute of Physics of the Romanian Academy established in Bucharest under the direction of Horia Hulubei.
- 1956: Institute of Atomic Physics (IFA) - The Institute of Physics of the Romanian Academy
 - The first computer designed in Romania is CIFA1 and runs 50 instructions per second
 - A VVRS research reactor and a U120 cyclotron (both made in USSR) are installed at IFA.
- 1962: First Romanian laser is built at IFA (group of I. Agarbiceanu)
- 1974: A FN Tandem accelerator (7.5 MV, later upgraded to 9 MV) produced by High Voltage Engineering Corporation (US) was installed.

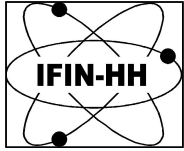


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- 1996: The institute becomes a *national laboratory* and takes the current name:
IFIN-HH: Institutul National pentru Fizica si Inginerie Nucleara “Horia Hulubei”
- 2000: A multipurpose high-dose, gamma-ray irradiator (IRASM) is commissioned
- 2008-2010:
 - A 1-MV Tandetron is installed for Accelerated Mass Spectroscopy studies (^{14}C dating, etc.)
 - A 3-MV Tandetron is installed for Astrophysics and material studies
 - The 9-MV Tandem is modernized, the detection system is upgraded (RoSPHERE)
- 2010: Romania joins FAIR
- 2012 – today: implementation of the ELI-NP project
- 2016: Romania becomes the 22nd Member State of CERN



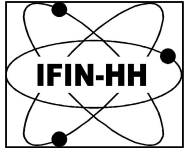
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IFIN-HH (www.nipne.ro)

- 380 PhD researchers (45 from abroad)
 - 76 at ELI-NP (35 from abroad)
- 18 PhD coordinators
- 80 PhD students
- 25 post-doc
- 700 papers in ISI journals (320 Q1) (2020-2024)



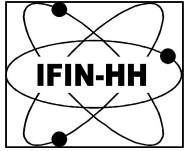
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POLITEHNICA University (www.upb.ro)

- Founded in 1818
- Nearly 40 000 students
- 21 Faculties
 - Faculty of Applied Sciences (<http://fsa.pub.ro/>)
 - Bachelor: Physics Engineering (Romanian)
 - Master: Engineering and Applications of Lasers and Accelerators (soon in English) (<http://fsa.pub.ro/iala>)



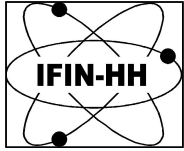
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Bucharest University (www.unibuc.ro)

- Founded in 1864
- Nearly 35 000 students
- 21 Faculties
 - Faculty of Physics (<https://unibuc.ro/studii/facultati/facultatea-de-fizica/?lang=en>)
 - Bachelor: Physics, Physics Engineering
 - Masters:
 - Nuclear Physics
 - High Energy Physics



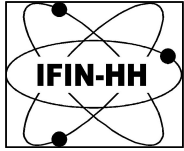
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Doctoral Schools

- Associated with a university (research university)
- Employed anywhere (enroll for PhD studies like for any other degree)
 - As teaching staff at the university
 - As research staff in a laboratory
- As PhD student you can try your hand at teaching (university lab, applications, also in English)
- You choose your adviser
- PhD supervision committee



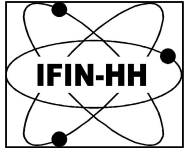
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Doctoral Schools

- POLITEHNICA University
 - IFIN-HH/ELI-NP: SDIALA (<https://www.eli-np.ro/students/index.php>)
(https://www.eli-np.ro/doctoral_studies.php)
 - UPB: SDSA (<https://www.sdsa.upb.ro/>)
- Faculty of Physics, Bucharest University
(<https://www.fizica.unibuc.ro/Doctorat/Prezentare/Conducatori/>)



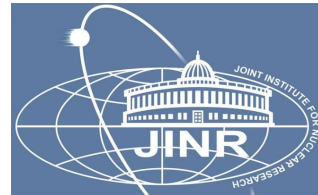
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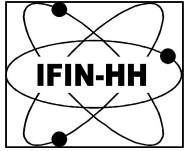
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Nuclear Physics Research

International cooperation:





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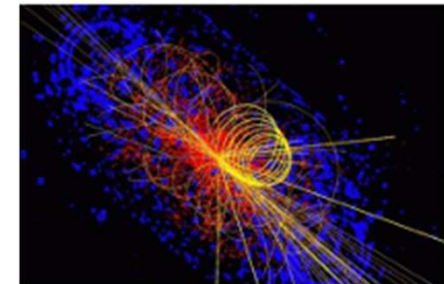
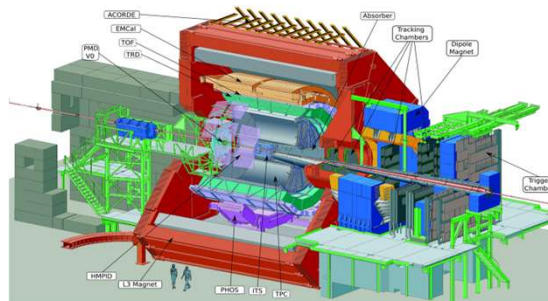
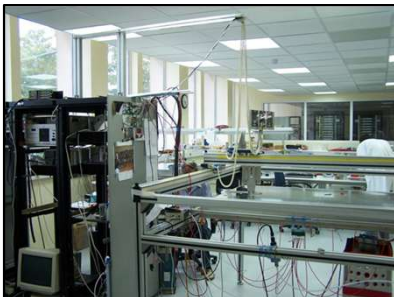
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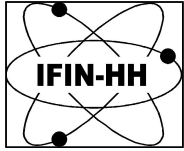


Nuclear Physics Research

Theoretical physics / High energy physics:

- ATLAS (Calin ALEXA) <http://dfpe.nipne.ro/>
- Theoretical Physics (Virgil BARAN) <https://web.theory.nipne.ro/>
- ALICE (Mihai PETROVICI) <https://niham.nipne.ro/>





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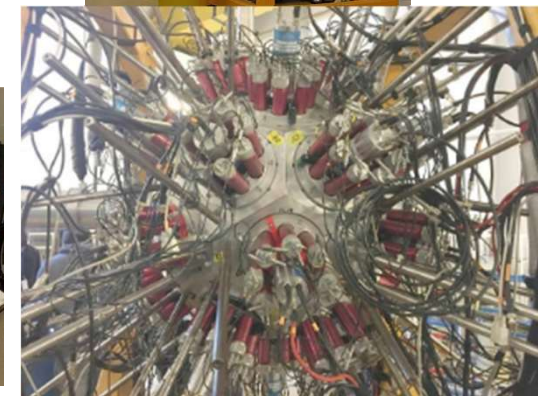
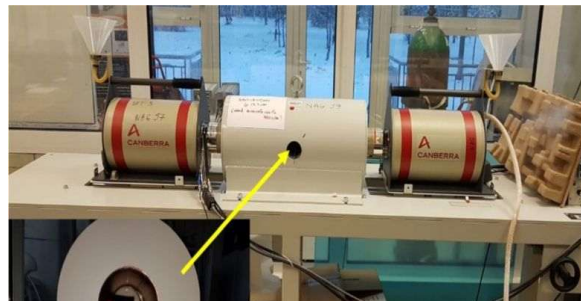
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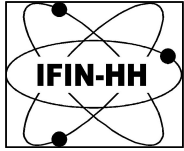


Nuclear Physics Research

Department of nuclear physics:

- <https://tandem.nipne.ro/dfn.php>
- 7 MV Tandem
 - Constantin MIHAI
- ISOLDE
 - Razvan LICA
- nTOF
 - Alexandru NEGRET
- Nuclear Astrophysics
 - D.FILIPESCU, A.RADUTA





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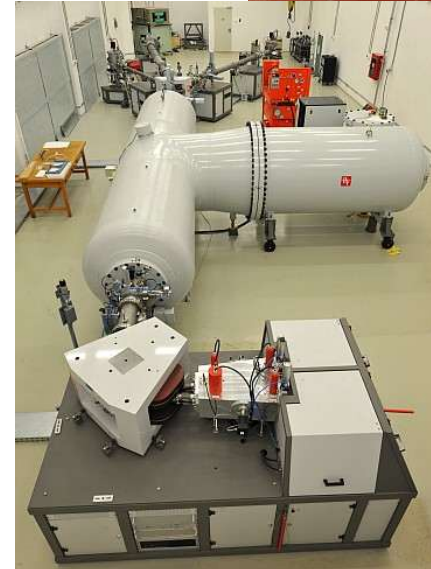
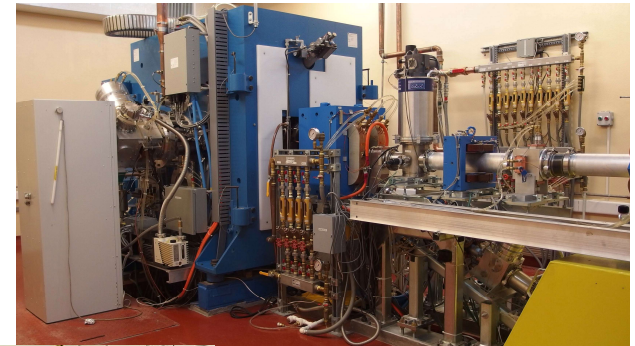
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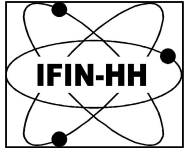


Nuclear Physics Research

Department of Applied Nuclear Physics:

- <https://dfna.nipne.ro/>
- TR-19 Cyclotron – radiopharmaceuticals
Ana ENE
- 3MV Tandetron – material applications
Mihai STRATICIUC
- 1MV Tandetron – AMS
Gihan VELISA





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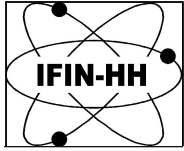


Nuclear Physics Research

Extreme Light Infrastructure – Nuclear Physics:

- <https://www.eli-np.ro/>
- 2 x 10 PW lasers, 2 x 1 PW lasers, 2 x 0.1 PW lasers
- Gamma Beam Source (2026)
- Gamma Beam Experiments
- Laser Beam Experiments





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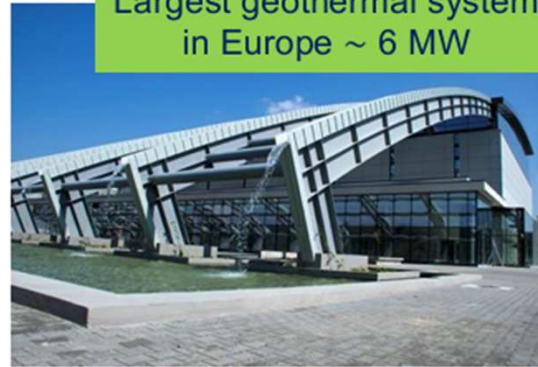
ELI-NP Infrastructure



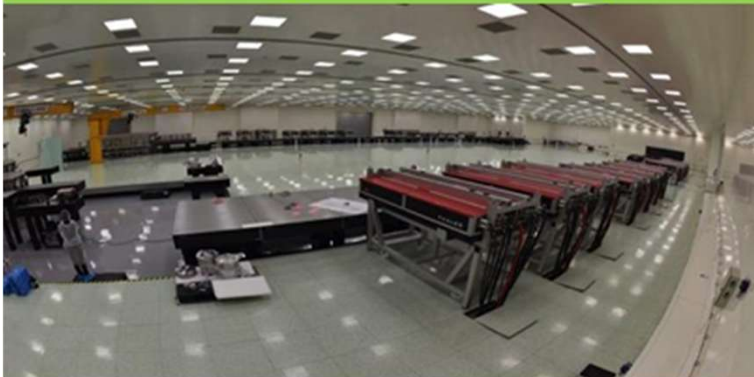
Project co-financed by the European Regional Development Fund through the Competitiveness Operational Programme
“Investing in Sustainable Development”

Extreme Light Infrastructure-Nuclear Physics (ELI-NP) - Phase II

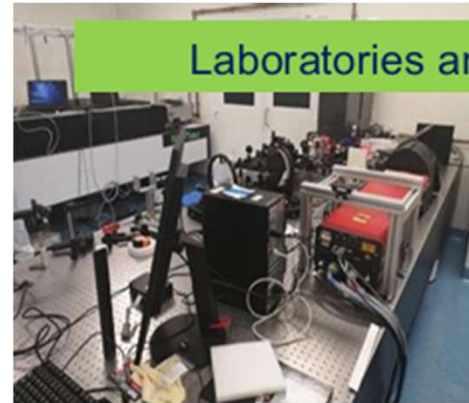
Largest geothermal system
in Europe ~ 6 MW

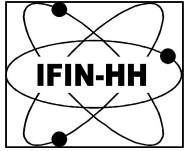


2 x 10 PW High-Power Laser System



Laboratories and workshops





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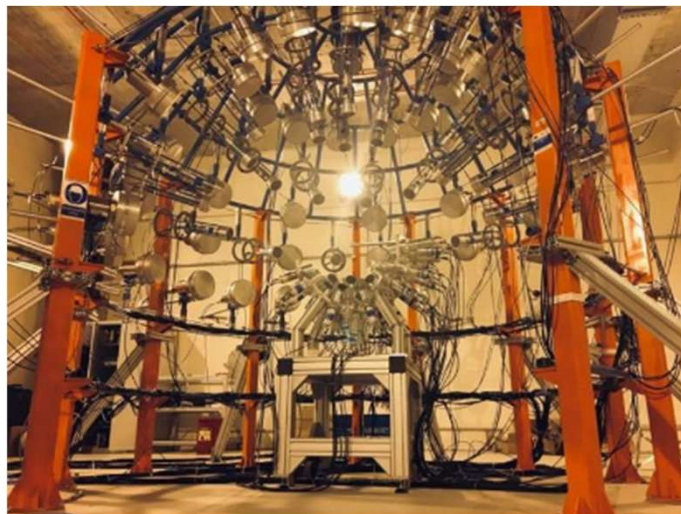
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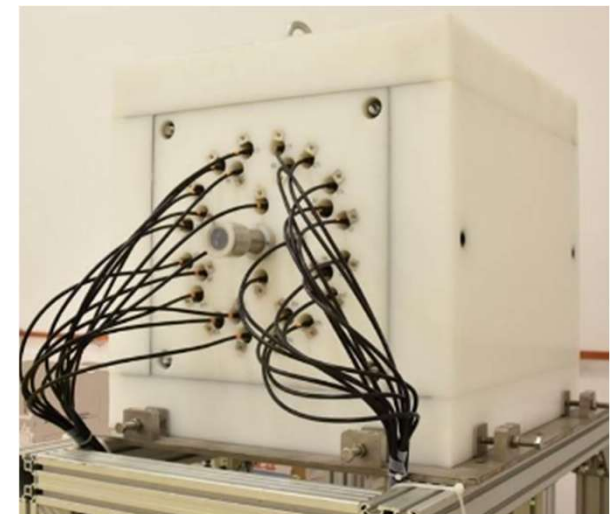
- <https://www.eli-np.ro/>



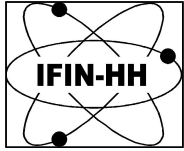
ELIAD



ELIGANT - GN

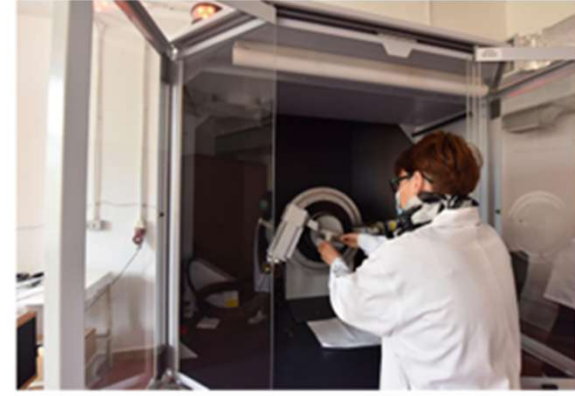


ELIGANT - TN



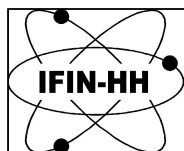
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- Transportation
 - Preliminary storage
 - Characterization
 - Final storage
- } of radioactive waste

Radioactive waste management

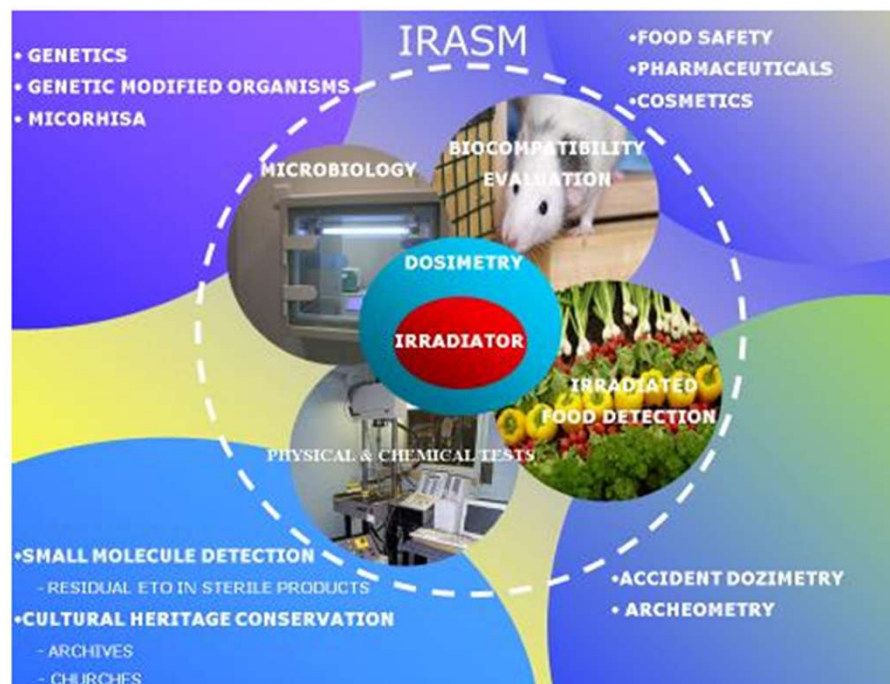


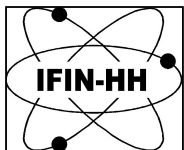
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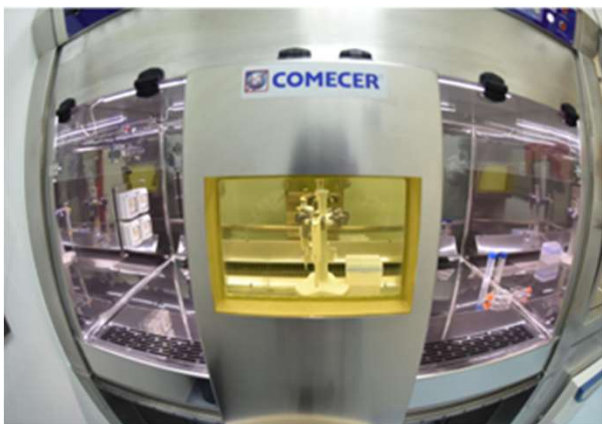
Multipurpose irradiation facility IRASM



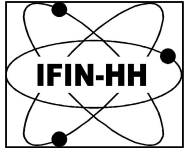


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TR-19 cyclotron and CCR

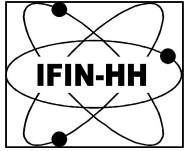


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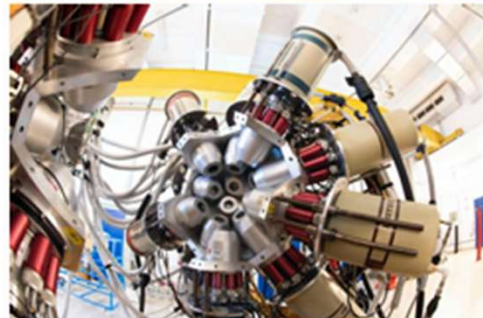
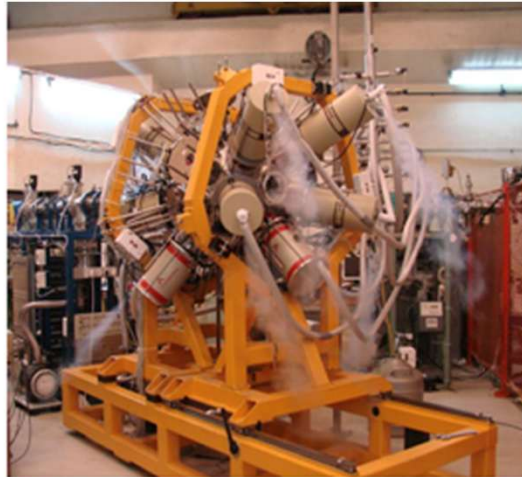


- Applications:
 - AMS – Carbon dating
 - Material characterization
- Fundamental physics:
 - Astrophysics
 - Radiobiology
 - Solid state physics



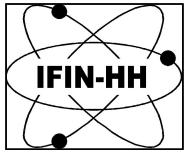
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- ♦ Nuclear Structure
- ♦ Nuclear Reactions
- ♦ Nuclear Astrophysics
- ♦ Physics of Cosmic Rays
- ♦ Evaluation of Nuclear Data

**with a large and well-established
international users community**

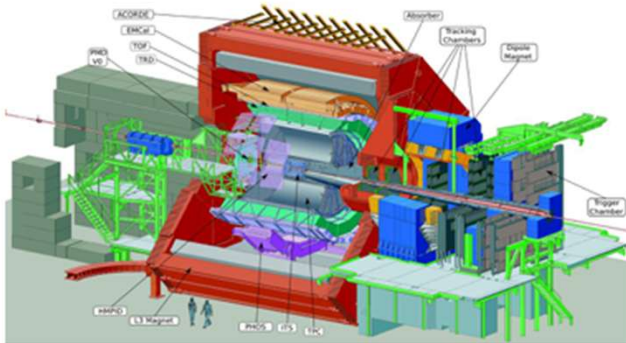


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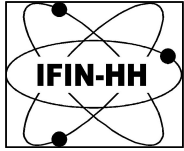


CERN Collaborations



- Physics cases and data analysis
- Detector development and construction
- Electronics
- Advanced computing





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Thank you for your attention!