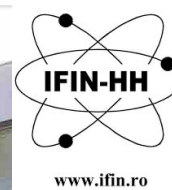
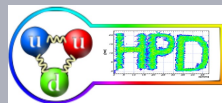


MINISTERUL CERCETĂRII
INOVARII ȘI DIGITALIZĂRII



End of the year Seminar 2024 achievements

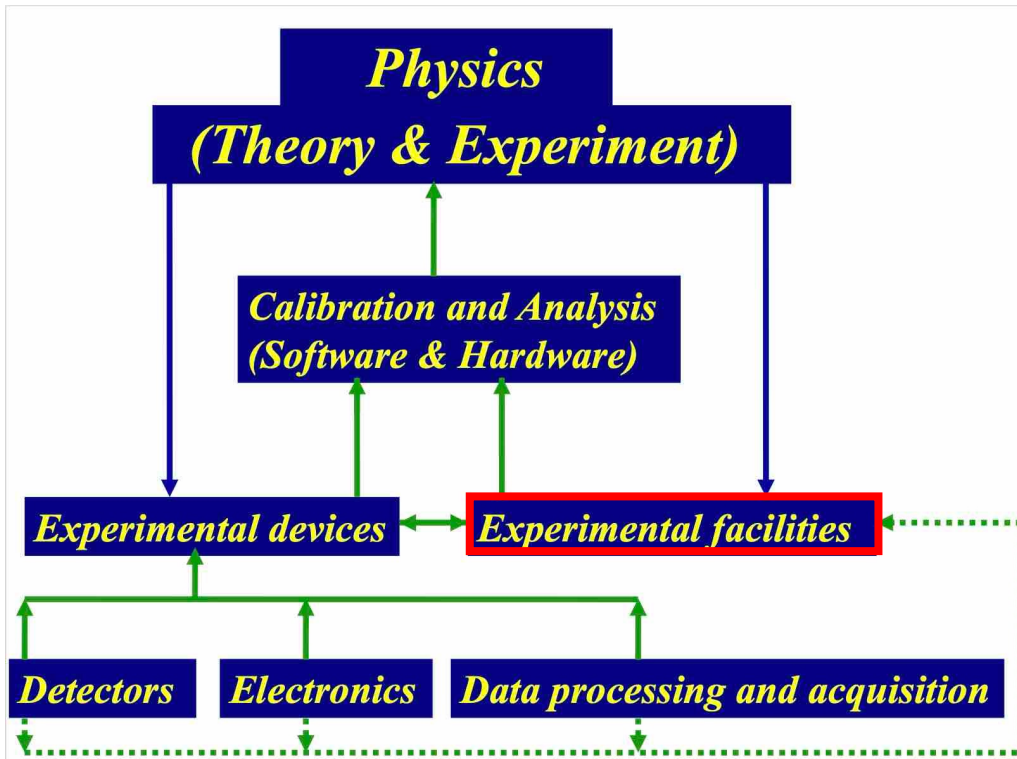


Hadron Physics Department

HPD Conference Hall, 10:00 a.m.

December 11, 2024

Hadron Physics Department strategy and present manpower

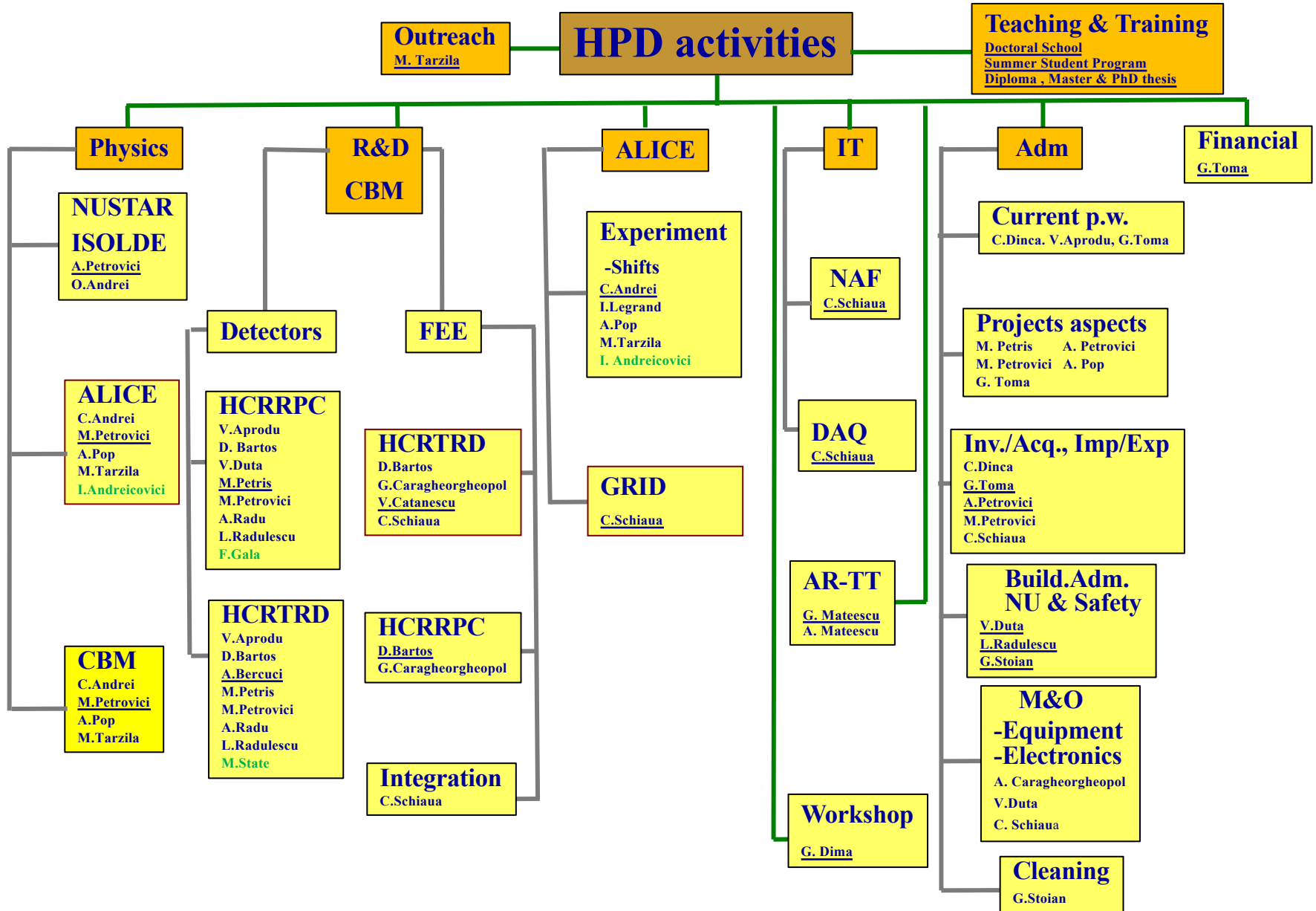


HPD Staff

- 3 - CS1
- 5 - CS2
- 1 - IDT1
- 2 - IDT2
- 2 - CS3
- 1 - CS
- 1 - Administrator IT
- 2 - Asistenti cercetare
- 1 - Fizician
- 3 - Ingineri
- 4 - Tehnicieni
- 1 - Frezor/Strungar
- 1 - Economist
- 1 - Ingrijitor

CIA (Complex Integrated Activity)

Organizational chart of Hadron Physics Department



Outlook

- *Physics*
 - *Nuclear Structure and Dynamics*
 - *Strongly Interacting Matter*

- *R&D related to the CBM Experiment at FAIR*
 - *Multi-strip multi-gap RPCs* ⇒ *CBM-ToF*
 - *TRD-2D* ⇒ *CBM-TRD*

- *Applied Physics & Technological Transfer*

- *Training & Teaching*

- *Outreach*

Nuclear Structure and Dynamics

➤ 2 papers published

PHYSICAL REVIEW C 109, 024303 (2024)

Shape coexistence and first-forbidden decay of ^{92}Rb to ^{92}Sr

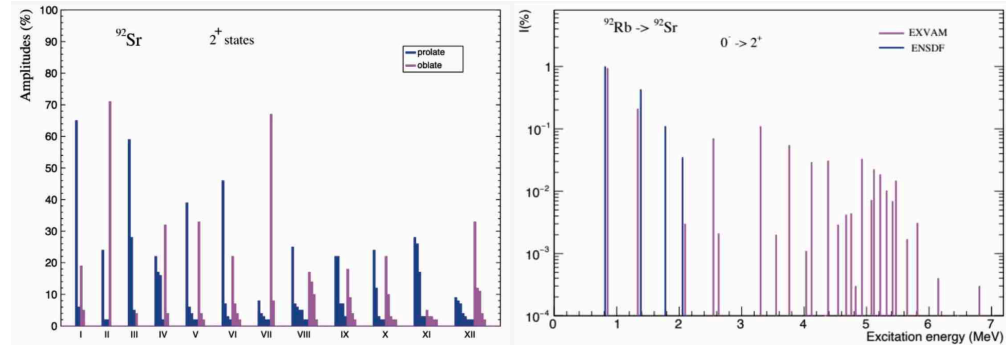
A. Petrovici

Horia Hulubei National Institute for Physics and Nuclear Engineering, R-077125 Bucharest, Romania

Multifaceted impact of shape coexistence in proton rich nuclei

A. Petrovici and O. Andrei

➤ 2 papers under review



*Shape coexistence and first-forbidden β decay of ^{92}Rb to ^{92}Sr
relevant for reactor antineutrino anomalies within the beyond-mean-field complex
Excited Vampire model*

➤ 4 talks at International Conferences



➤ UEFISCDI - Project - finalized with excellent results

➤ Contributions to NUSTAR (RO-FAIR) and ISOLDE (RO-CERN) projects, recently positively evaluated by the corresponding ISABs

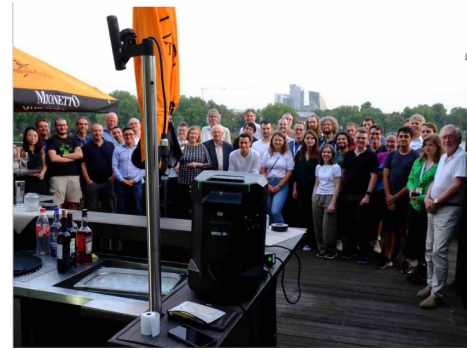
➤ Physics case for an experiment recently approved by PAC at ILL-Grenoble

Strongly Interacting Matter

➤ *2 talks*

An overview
on some global trends observed in heavy ion collisions
based on experimental results from AGS up to LHC energies
and
on similarities between pp and Pb-Pb collisions at LHC

QCD Challenges Workshop, 2-6 September 2024, Munster, Germany



QCD Challenges
Workshop on Advances, Innovation and Future Perspectives
in High Energy Nuclear Physics
19-24 October, Wuhan, China



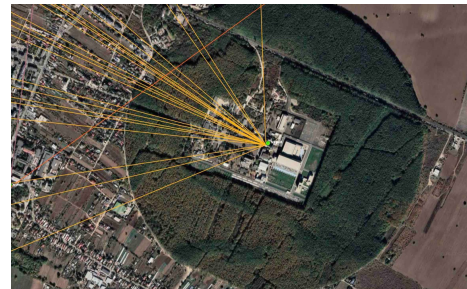
➤ *Seminar General IFIN-HH*

QCD Challenges
November 21, 2024

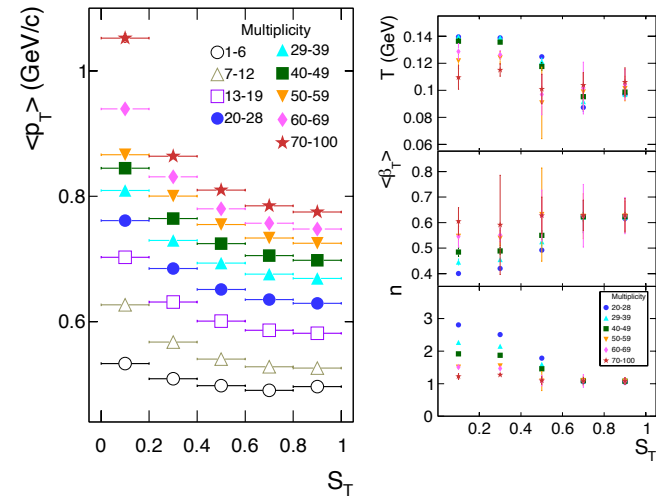


➤ *Computing - NIHAM Tier2 ALICE GRID*

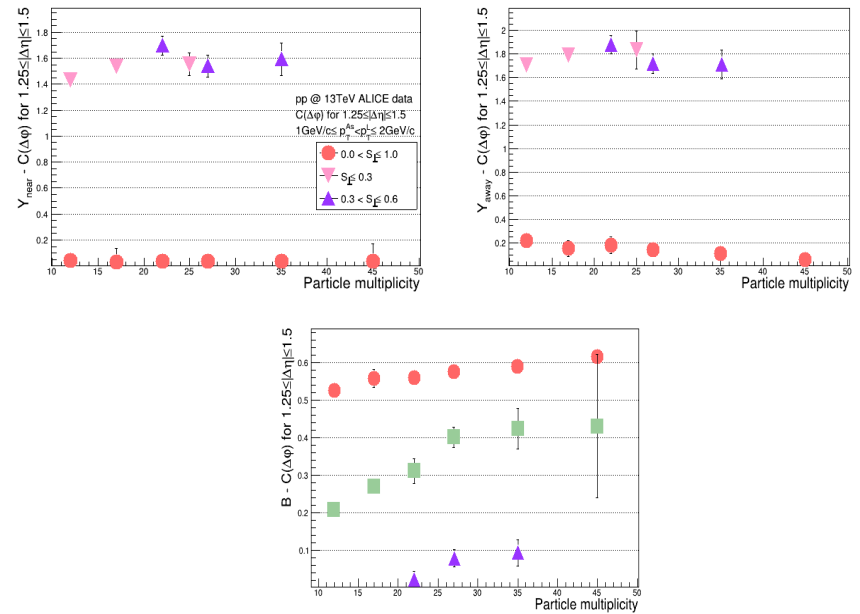
- 10 Mhours CPU
- 3.8 M Done Jobs



- *Charged particles p_T spectra as a function of charged particle multiplicity and sphericity relative to the leading particle in pp collisions at $\sqrt{s} = 13$ TeV based on multi-dimensional unfolding procedures.*



- *Studies of two charged particles correlations as a function of multiplicity and sphericity in pp collisions at $\sqrt{s} = 13$ TeV.*



- *Charged particles p_T spectra as a function of charged particle multiplicity and FW moments - in progress*

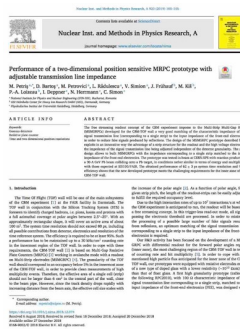
- *Co-authors to 42 ALICE published papers*
- *Contribution to 17 conference presentations on behalf of ALICE Collaboration*
- *1 institutional review for 1 ALICE paper*
- *Analysis Note Referee Committee (ARC) for 2 Analysis Notes*
- *Internal Referee Committee (IRC) for 1 paper*
- *Experimental measurements with the ALICE detector:*
 - *Run manager (1 block)*
 - *SL (5 blocks)*
 - *DCS (2 blocks)**shifts at the ALICE Experiment*

- *ALICE-IFIN (RO-CERN) project, recently positively evaluated by the corresponding ISAB*

- *I. Andreicovici - master student*

*R&D Activities
&
Steps towards construction & tests
of
CBM ToF & TRD subdetectors
for
CBM Experiment @ FAIR*

➤ **RPC**



➤ **NIM Paper**

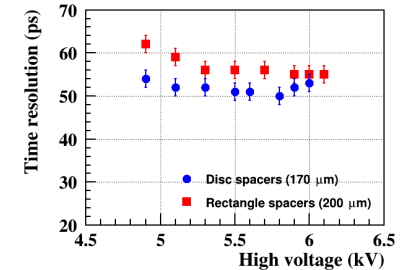
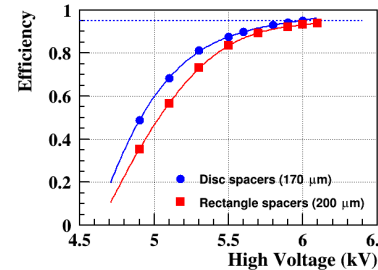
- **Talk**
XVII Conference on Resistive Plate Chambers and Related Detectors
9-13 September 2024, Santiago de Compostella
“Radiation hard Multi-Strip Multi-Gap Resistive Plate Chamber architecture for low polar angles of the CBM-TOF wall ”
- will be published in NIM



- **3 contributions to the CBM Progress Report**
- **2 presentations at CBM Collaboration meetings**



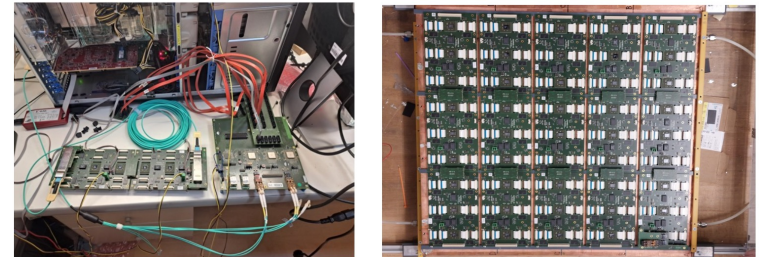
➤ **In-beam tests within mCBM**
direct flow & discrete spacers of MSMGRPCs



- **Assembling of the 3 types of MSMGRPCs for PRR - in progress**
- **Production and assembling of different components for CBM ToF inner zone Modules - in progress**
- **1 diploma thesis**
- **F. Gala - master student**

➤ **TRD**

- *New TRD-2D Front End Board finalized, tested and implemented on the TRD-2D chamber in mCBM fully tested and calibrated using pulser signals*

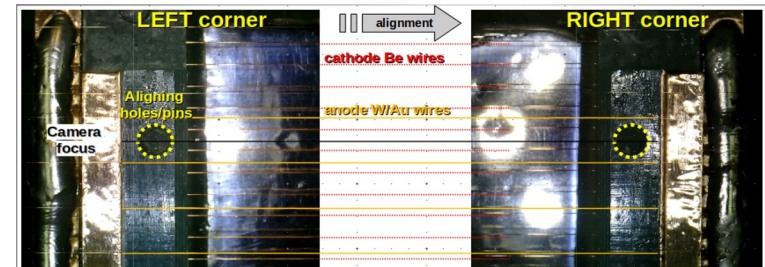


- *New 2D computer controlled optical alignment device*

- *Tracking software development*

- *4 contributions to the CBM Progress Report*

- *6 presentations at CBM Collaboration meetings*



- *TRD-2D FEB - Conceptual Design Report (CDR)*

- *Engineering run for FASP CHIP - launched*

- *Different components for starting assembling of TRD-2D chambers - ordered*

- *Design of a ADC CHIP - in progress*

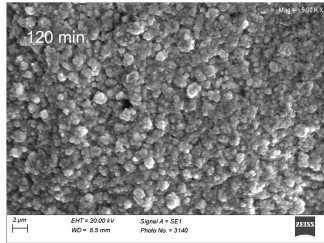
- *M. State - diploma student*



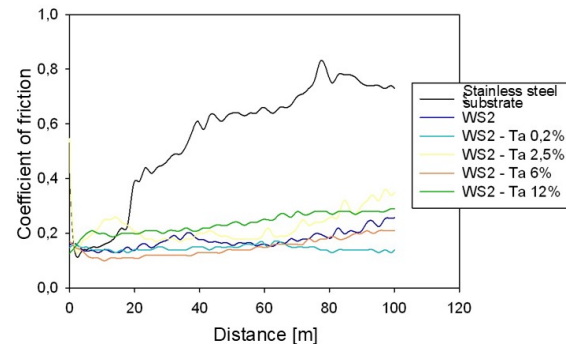
*Applied Research
&
Technological Transfer*

GRAFTID project, contract Ro-No 29/2020

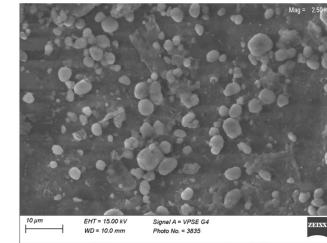
Immobilized TiO_2+GO (9:1) nanoparticles on stainless steel mesh by alternating Electrophoretic Deposition and plasma treatment



**Improved functional properties of thin films deposited by magnetron sputtering from a top lubricant material and a metallic element:
=>Lower coefficient of friction**



Immobilized Au-TiNT-TrGO-based nanomaterials on pumice stone



- **Significantly increased hardness**
- **Improved elasticity modulus**
- **Higher capacity to undergo elastic deformations and to resist to plastic deformations for increased Ta concentrations**
- **Higher efficiency for protection against corrosion**

➤ **patent application A00086/ 04.03.2024**

➤ **2 contributions at the 22nd International Balkan Workshop on Applied Physics and Materials Science Constanta, Romania, 09-12.07.2024**

Training & teaching



STUDIUL COMPORTĂRII DETECTORILOR MSMGRPC OPERATI ÎN REGIM DE CĂUTARE DIRECTĂ, A CĂMILII DE OPERARE ȘI INSTANȚIERE DISCRETE LA DOZE MARI DE RADIAȚIE

LUCRARE DE LICENȚĂ

Analizator
Diana-Petia GILĂ

Coordonatori științifici
Prof. Dr. Mihai PETRONIUC
CS.U.U. MARIUS PETRESCU
Prof. Dr. Alexandru ZIFA



București, 2024

1 diploma finalized

Presentation @ Doctoral School



Summer Student Program

Would you like to contribute to understand the secrets of the Universe?

High Energy Physics
Nuclear Astrophysics
Particle Detection Systems
Front-End Electronics & IT

Summer Student Program 2024

Dedicated to advanced undergraduate level (3rd to 5th year of study, i.e. last year of Bachelor or during Master studies)

Organized by: Hadron Physics Department
Horia Hulubei National Institute of Physics and Nuclear Engineering

Duration: July 15 - September 15 / Deadline for application: March 31, 2024
Contact: 0040-22-40461135; spst@ihp.npne.ro
For further information visit the Training / Summer Student Program at <http://ihp.npne.ro>

=> 3 excellent participants

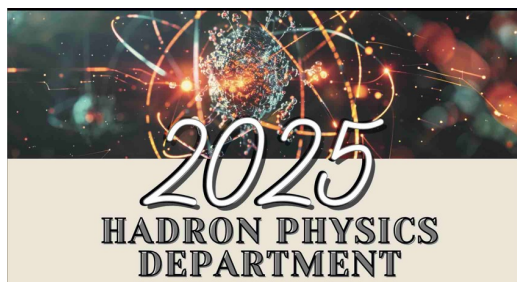
Students and pupils

Visits



Outreach

HPD Calendar



- JAN** Welcome 2024
- FEB** Shape coexistence and first forbidden decay of ^{82}Br to ^{82}Se
- MAR** Features of strangeness production in pp and heavy ion collisions
- APR** CBM Meeting
- MAY** NSD2024 Conference
- JUN** EUROBI 2024 Conference
- JUL** HPD Summer Student Program
- AUG** Prof. Mark Thomson visit
- SEP** XVII Conference on BPCs and Related Detectors
- OCT** Workshop Wuhan, China
- NOV** SSNET 2024 Conference
- DEC** Conceptual Design Report CDRI
- DEC** Goodbye 2024

2024 - Year of Anniversaries

➤ *75th Anniversary of IFAR - precursor of IFA => IFIN-HH*

➤ *70th Anniversary of CERN*

➤ *50th Anniversary of High Energy Heavy-Ion*

➤ *25th Anniversary of our membership in ALICE @ CERN*

➤ *20th Anniversary of the DetLab of Hadron Physics Department*

➤ *20th Anniversary of CBM Collaboration*

CERN 70th Anniversary

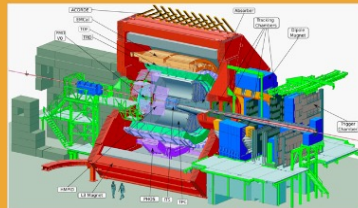
ATLAS

ALICE

CMS

LHCb

Romania in ALICE - 25th Anniversary



20 years of R&D activities for developing a new generation of RPC & TRD

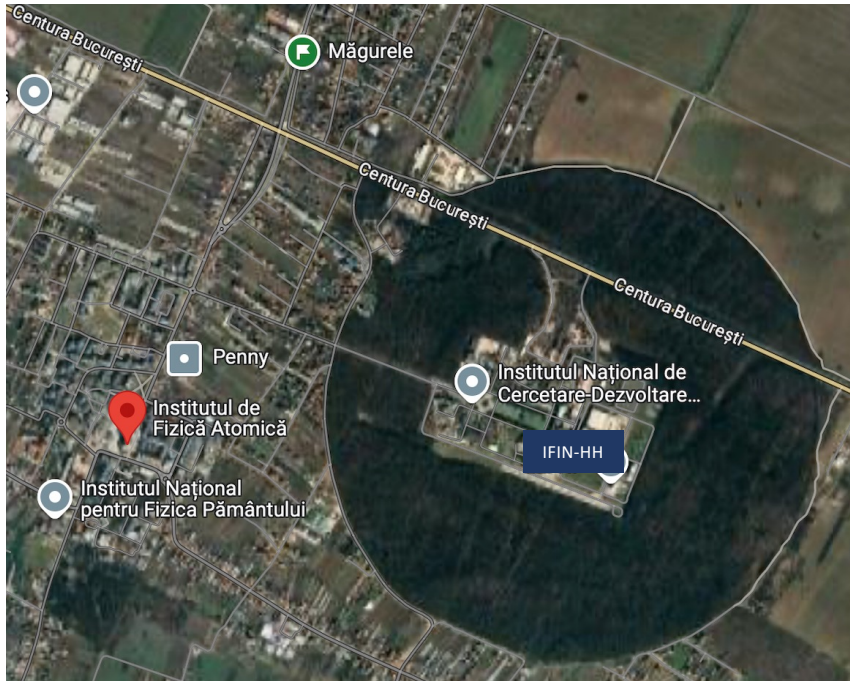


Electronic version
HPD Couriers can be accessed at:
http://niham.nipne.ro/HPD_Courier.html

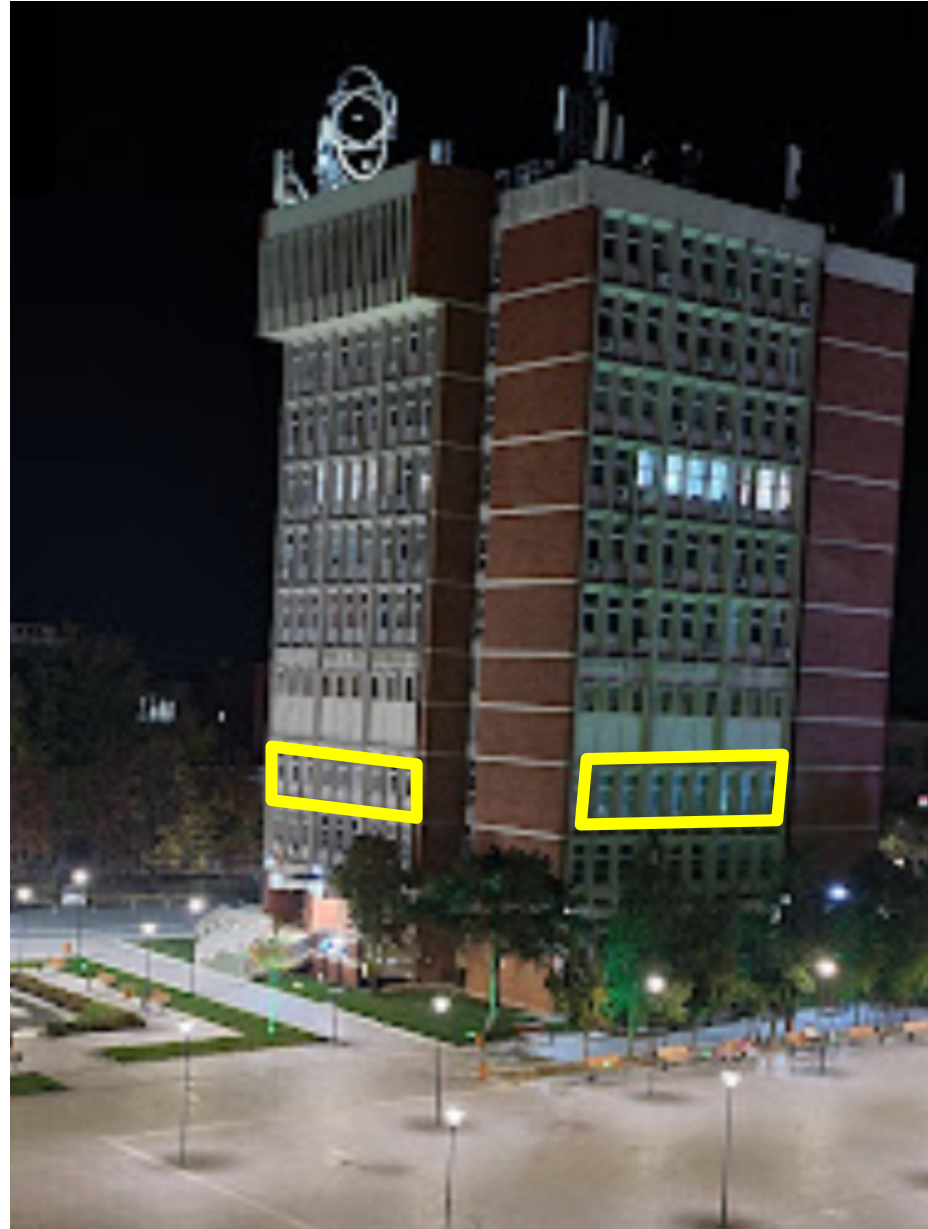
*70th CERN anniversary, Romania in ALICE 25th anniversary
QUANTA exhibition, 5-31 October 2024*



Romanian Science Gateway IFA building, 2nd floor



***IFA, Atomistilor street, no. 407
Magurele 077125
ifa-mg.ro
021 457 4493***



ALICE exhibition - entrance hall

accelerated particle bunches in LHC - animation

*Access to
ALICE exhibition*

*collision event within
ALICE Experiment - animation*

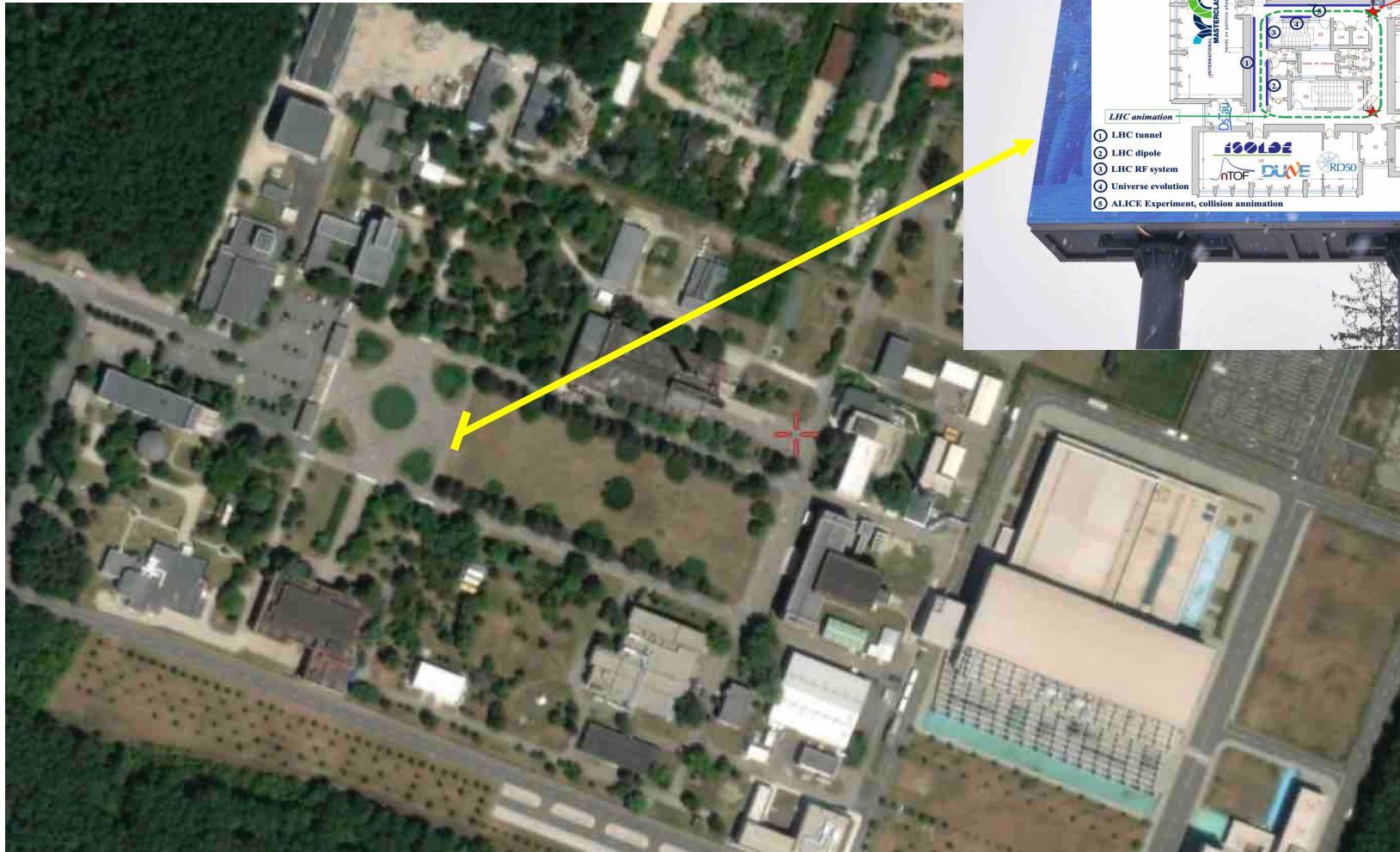
Section II



Section III



Multi-purpose IFIN-HH LED billboard





*Merry Christmas, Season's greetings
and
A happy, healthy and successful
2025!*