ALICE IFIN-HH

Activities and Achievements
November 2024 - November 2025

Highlights of the last year

Overview of contributions across all activity domains

Physics

- Run 3 multidifferential analyses
- Event-shape observables
- Systematic survey of published experimental results

R&D

- MSMGRPC
- Direct Flow prototypes: 53 ps @ >95% efficiency

GRID

- NIHAM Tier-2 top efficiency

Operations & Service Work

- Training Coordinator
- 2 x Run Manager
- 93% Shift quota

Training & Outreach

- New PhD & diploma students
- Doctoral School lectures
- Summer Student program
- DUROCERN first full year
- >600 visitors

Challenge

- Sustain high collaboration involvement while accelerating publication output

Highlights of the last year

Summary of group activities in the reporting period

Physics:

- Results within O^2 environment in terms of transverse momentum spectra and correlations obtained for isotropic and jetty events conditioned with multiplicity and *modified Fox-Wolfram moments* (FWM) - *Master Thesis*
- Features of strangeness production in pp and heavy-ion collisions, A. Pop and M. Petrovici, Phys. Rev. C 111, 014908
- We compared our previous systematics on suppression with the new results in ALICE for O-O.
- The *event isotropy* event shape variable has been investigated with Pythia8
- Co-authors to 35 ALICE published papers
- Contribution to 4 conference presentations on behalf of ALICE Collaboration
- “ALICE Status Report”, Cristian Andrei on behalf of the ALICE Collaboration, 162nd LHCC Meeting – Open Session
- "QCD Challenges" - invited lecture, Carpathian Summer School of Physics, 22 June - 3 July 2025, Sinaia, Romania
- 1 Internal review Committee, 2 Analysis Review Committees and 1 institutional review

R&D:

In-beam tests of the direct flow Multi-Strip Multi-Gap RPC (MSMGRPC) prototypes showed a measured time resolution of 53 ± 2 ps while the efficiency overpassed 95%

Computing:

NIHAM Data Centre was one of the most efficient Tier2s ALICE GRID centres.
NIHAM Analysis Facility (NAF) is efficiently managed and running.

Experiment Operation:

Participating in running the ALICE experiment by performing Shift Leader (13), QC (24), DCS (12) and ECS (2) shifts – 93% of the due quota.
We have assured the role of ALICE Training Coordinator for the present year (will also continue for the next year).
Service work activities were done as Training Coordinator and via two Run Manager mandates (0.833 FTE).
Nomination for the position of CB Representative on the Service Work Board

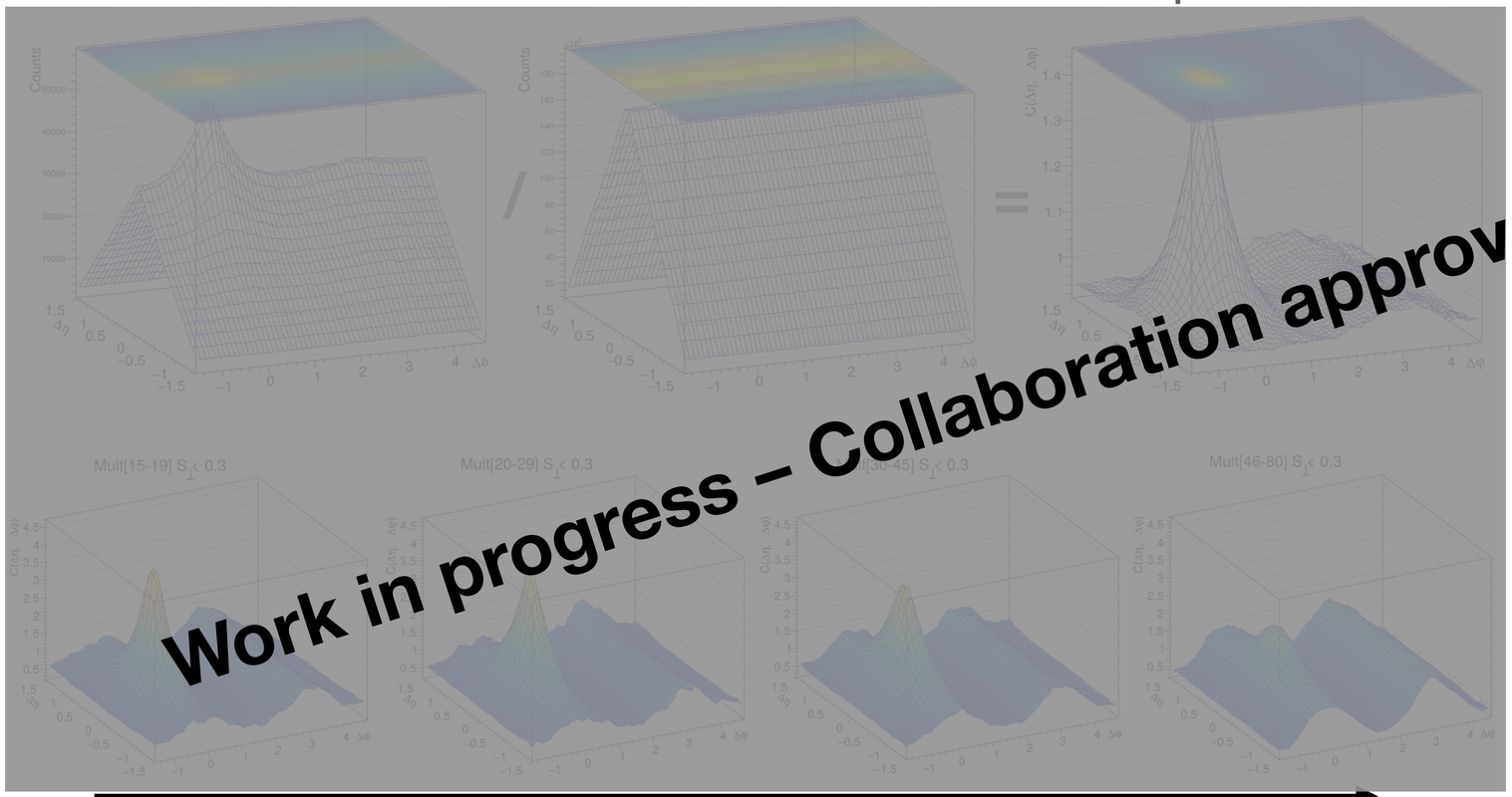
Outreach:

Our group has maintained and significantly expanded its involvement in the DUROCERN exhibition
The ALICE brochure, offering an attractive and accessible overview of the experiment was translated and adapted to Romanian

Two-particle correlations

Migration from AliRoot → O2 & Run 2 → Run 3

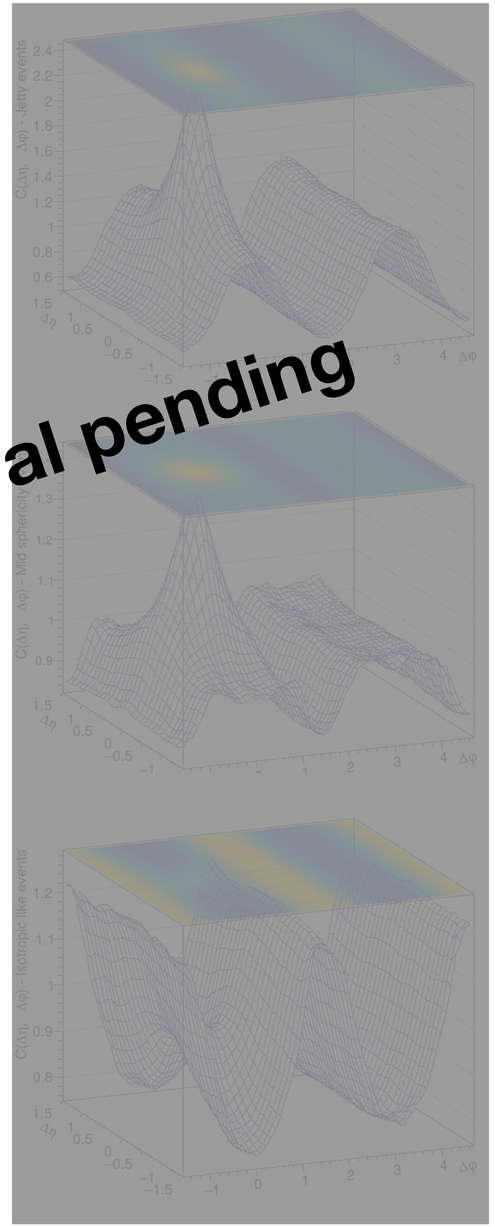
Same **E**vent correlation | **M**ixed **E**vent correlation | **Two particle** correlation



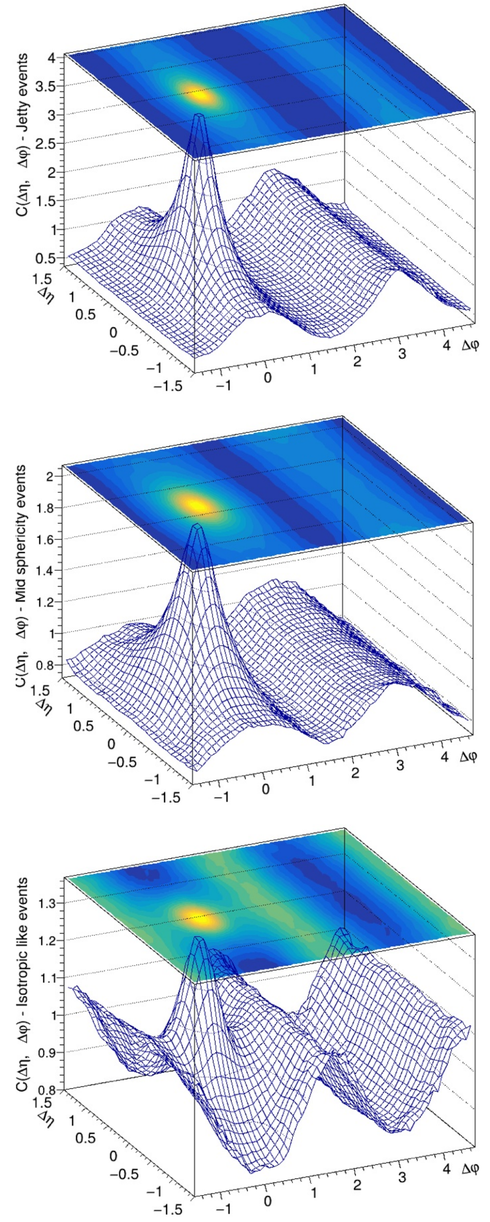
Work in progress – Collaboration approval pending

Charged Particle Multiplicity

Raw Data - pp @ 13 TeV, Run3



Phythia8 Monash 2013



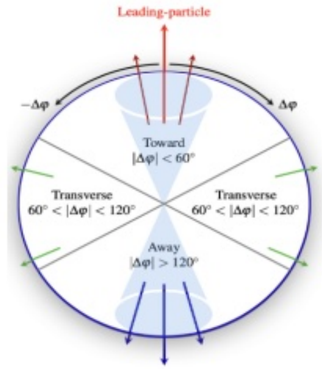
Sphericity

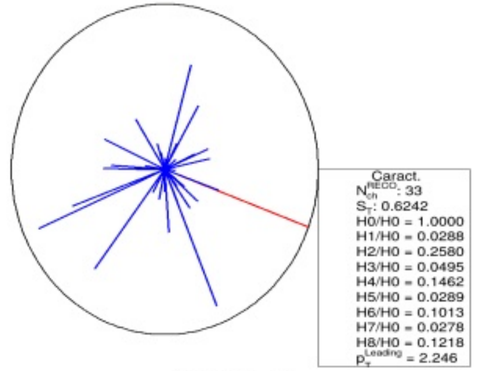
A fully migrated, Run-3-ready O2 analysis chain now delivers results consistent with earlier studies.

Evaluation of the modified Fox–Wolfram moments

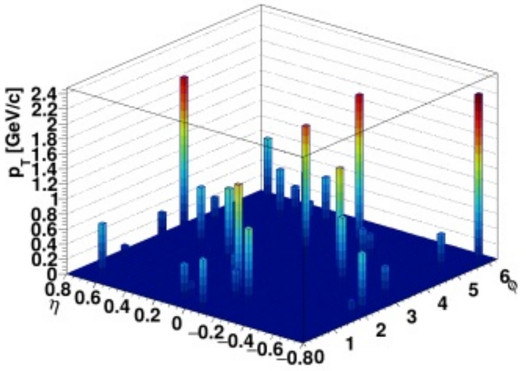
Event selection

Work in progress – Collaboration approval pending





p_T in (ϕ, η)



FWM selection forms a relatively flat plateau for isotropic events

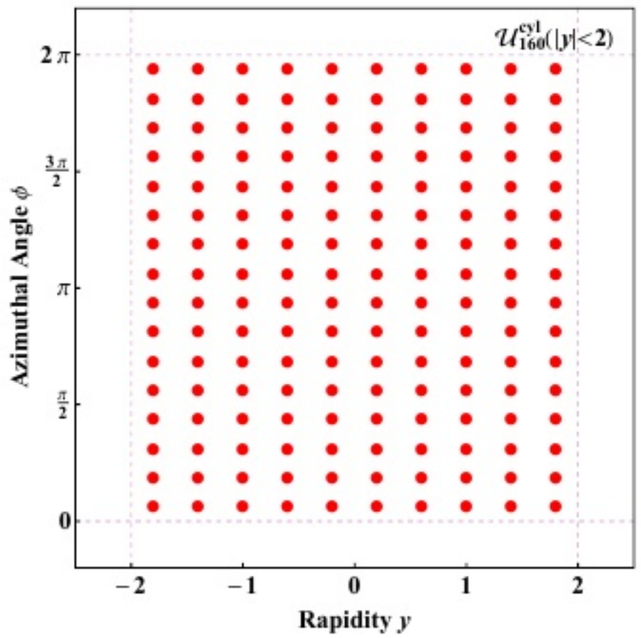
Evaluation of the modified Fox–Wolfram moments

p_T spectra

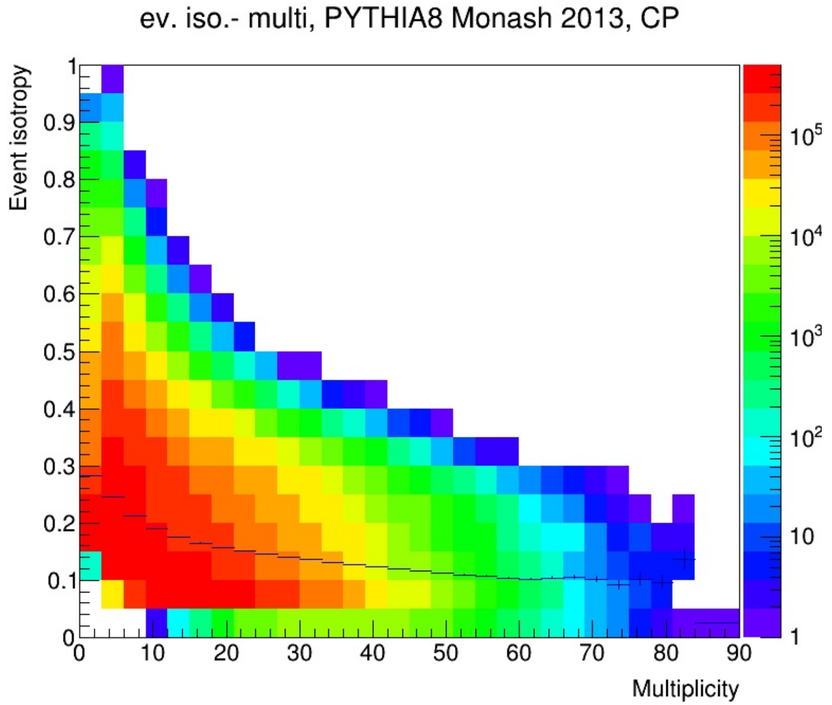
The most pronounced difference between raw data and reconstructed PYTHIA 8 is observed for ISO events

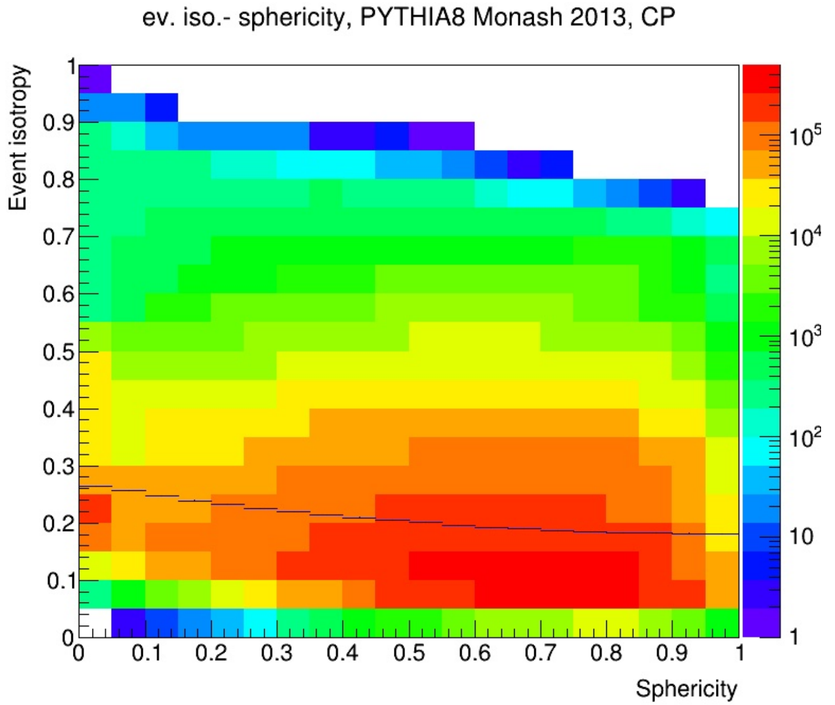
Event isotropy

Event selection



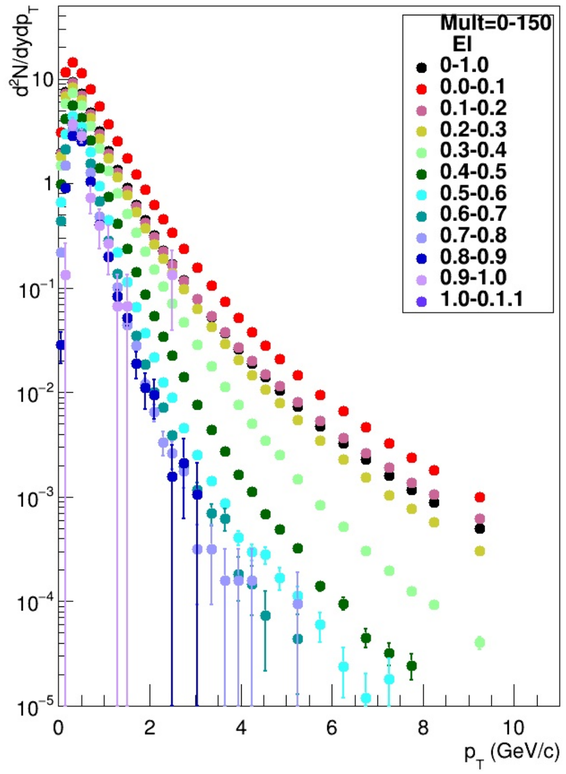
Event isotropy quantifies how close the radiation pattern of a collider event is to a uniform distribution, based on a normalized version of the energy mover's distance, which is the minimum "work" needed to rearrange one radiation pattern into another of equal energy. (C. Cesarotti and J. Thaler, JHEP08(2020)084)

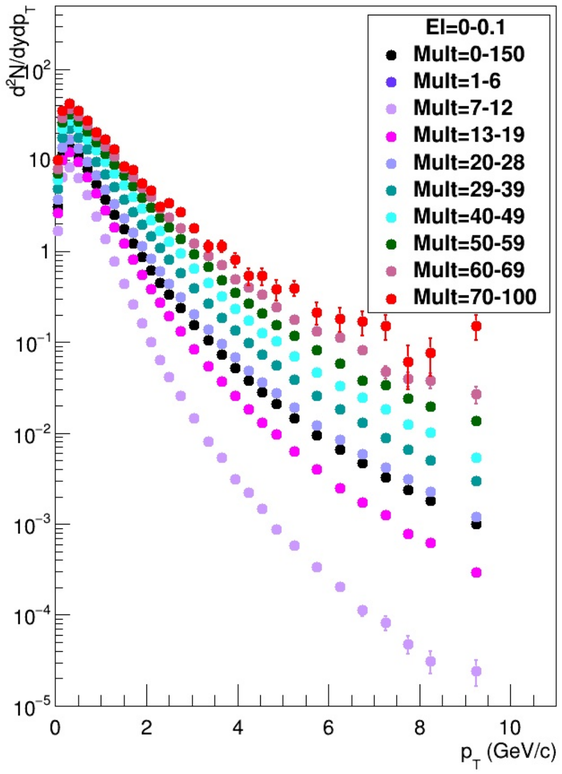


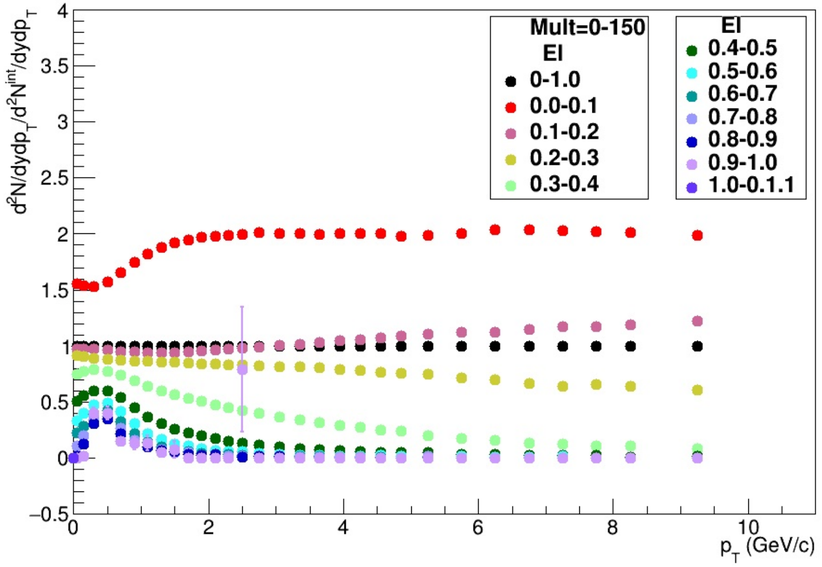


Event isotropy

p_T spectra

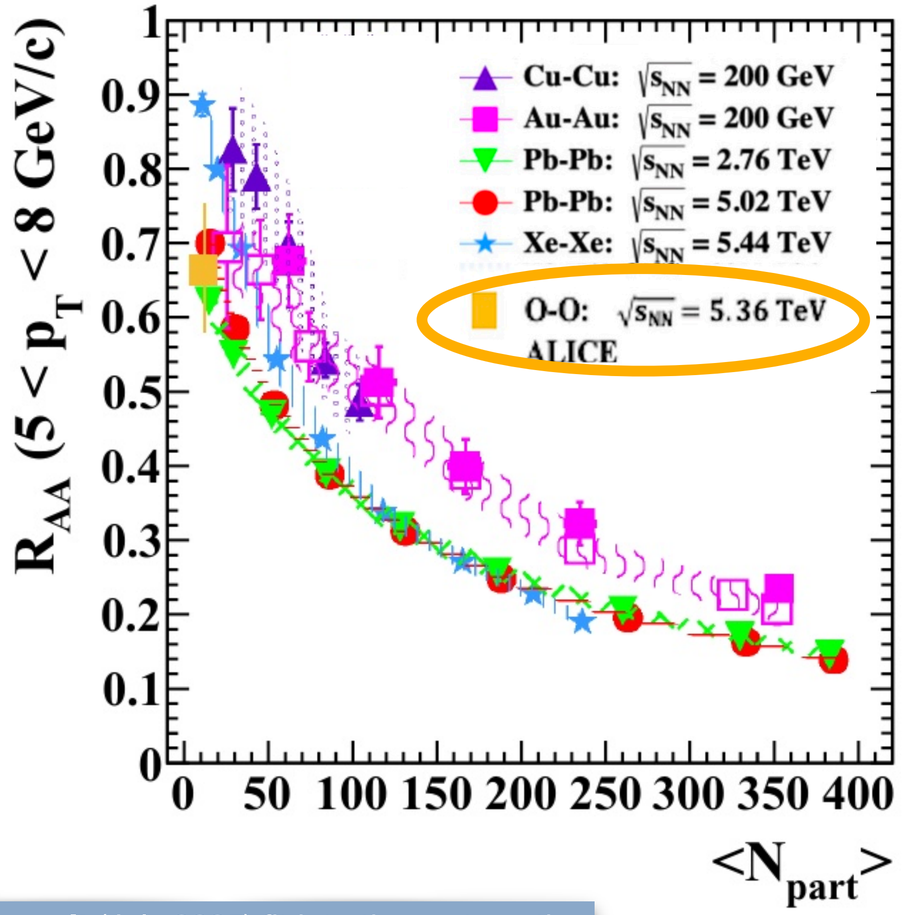


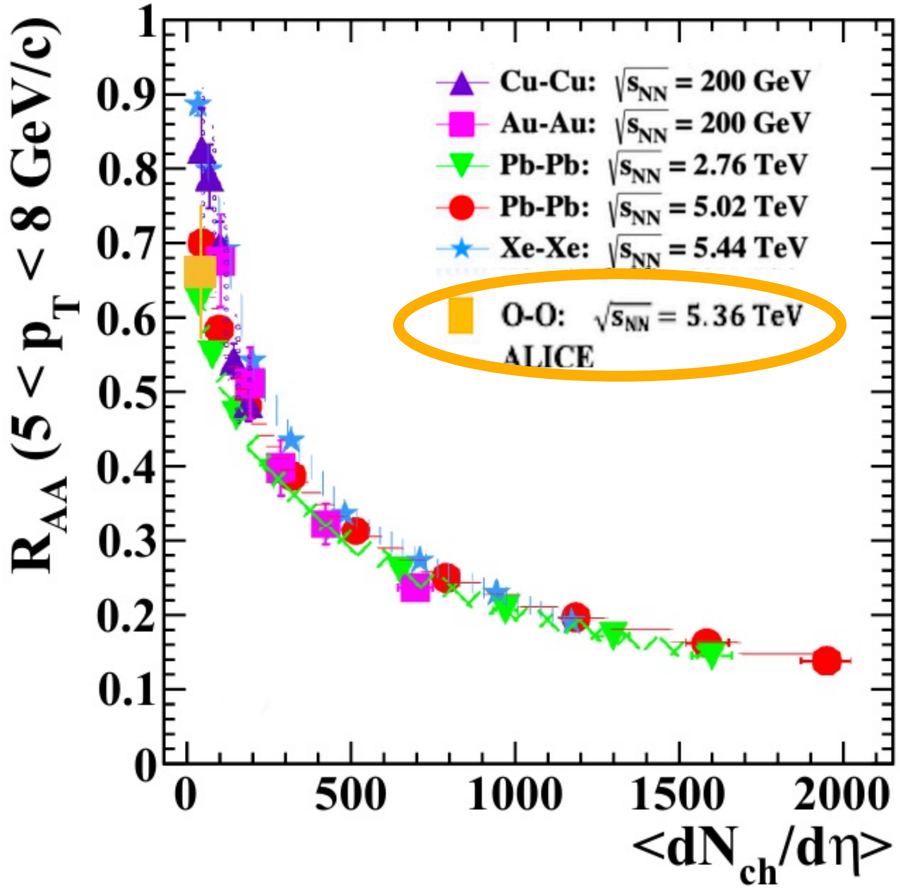




It compares two distributions of energy (or transverse momentum) rather than just comparing their values directly.

R_{AA} in O-O collisions



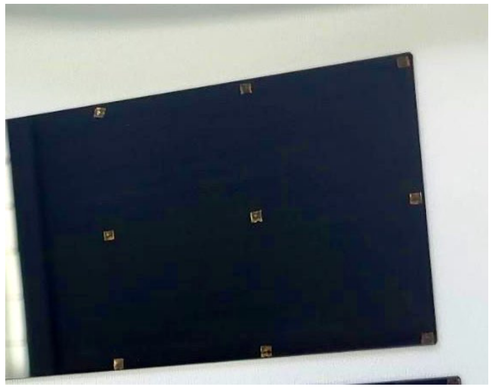


New O-O result (July 2025) fit into the systematics of A-A collisions from *M. Petrovici, A. Lindner, A. Pop, Phys. Rev., C 103 (2021) 034903*

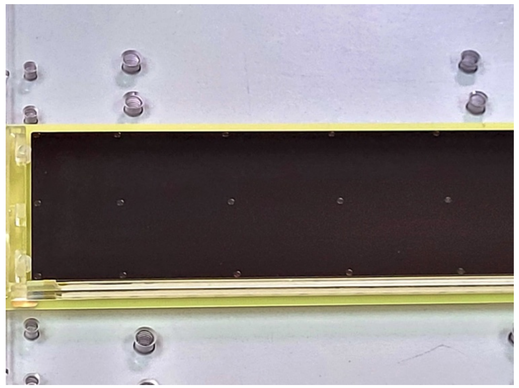
MSMGRPC

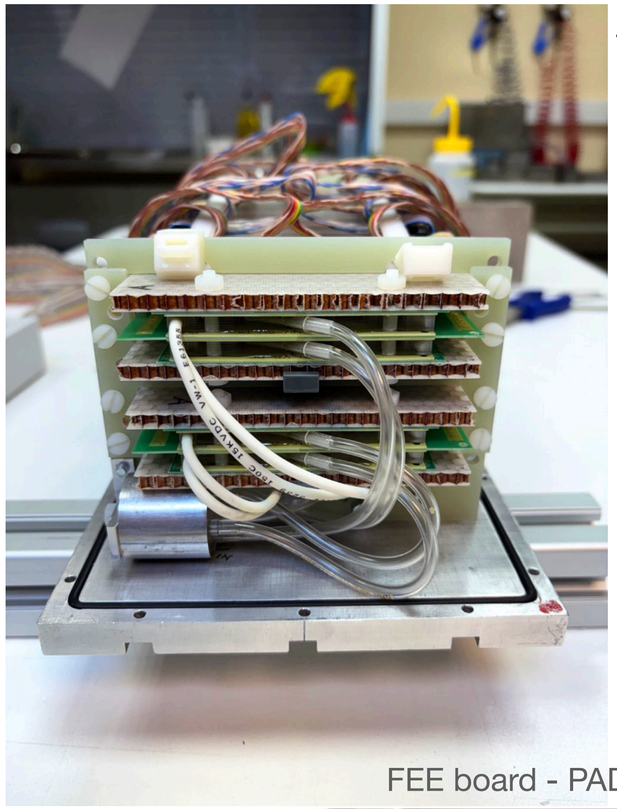
Assembling

Rectangular 200 µm spacers



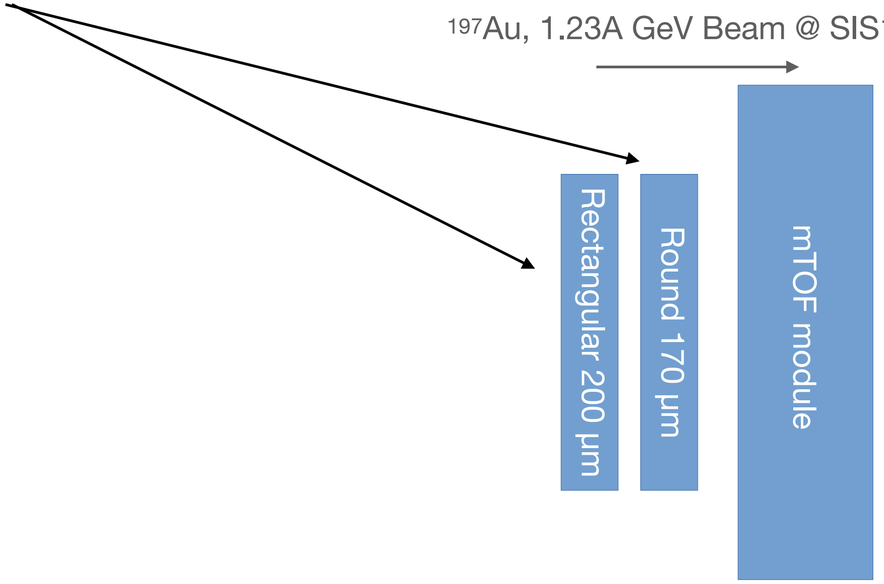
Round 170 µm spacers



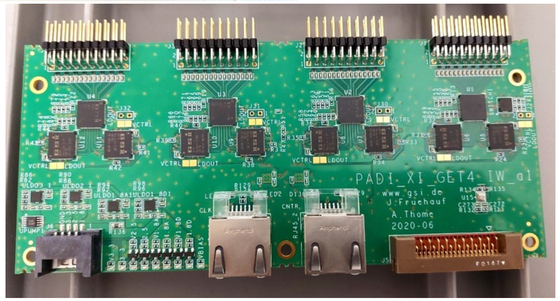


In-beam test

^{197}Au, 1.23A GeV Beam @ SIS18/GSI

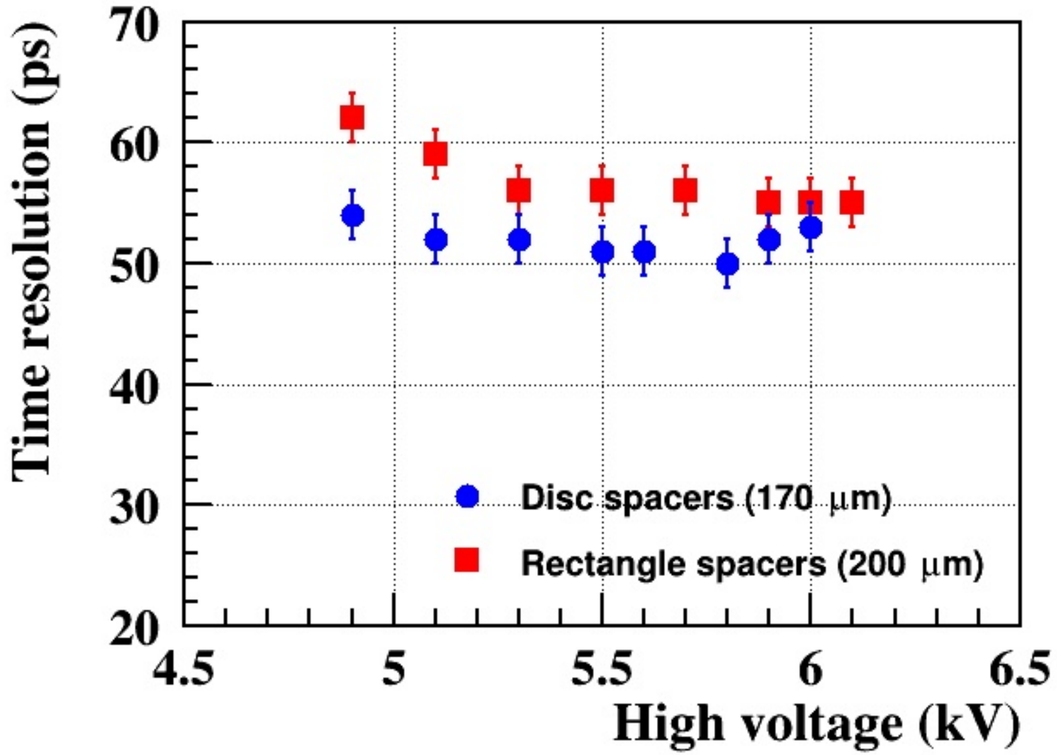


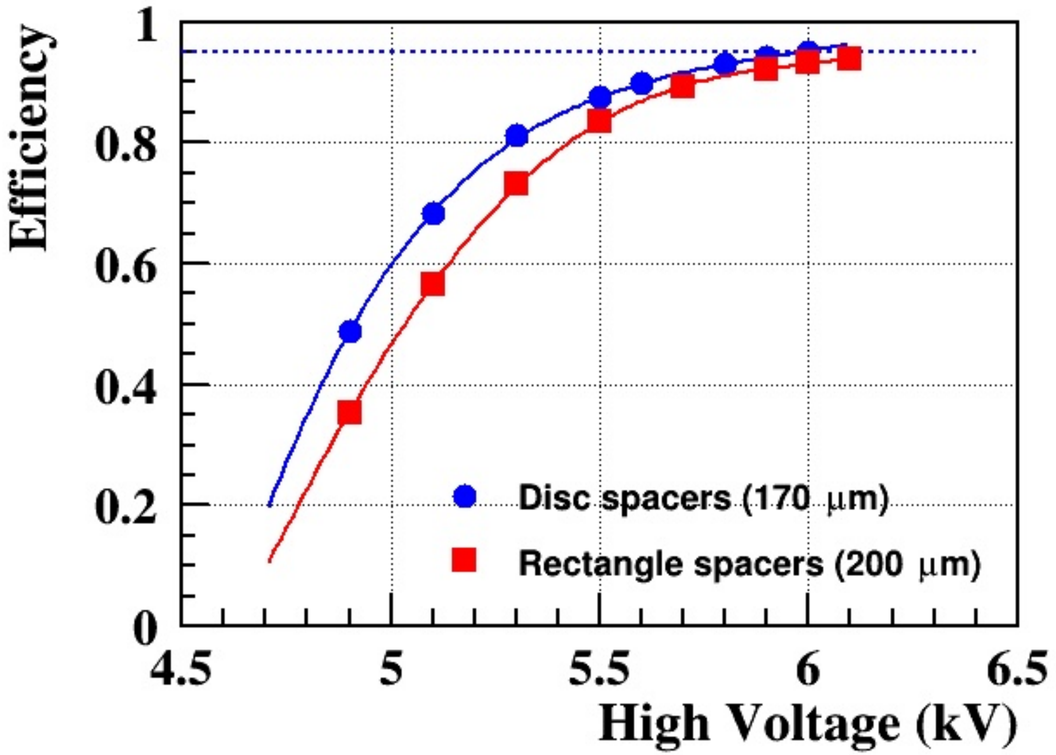
FEE board - PADI XI + GET4



MSMGRPC

Time resolution

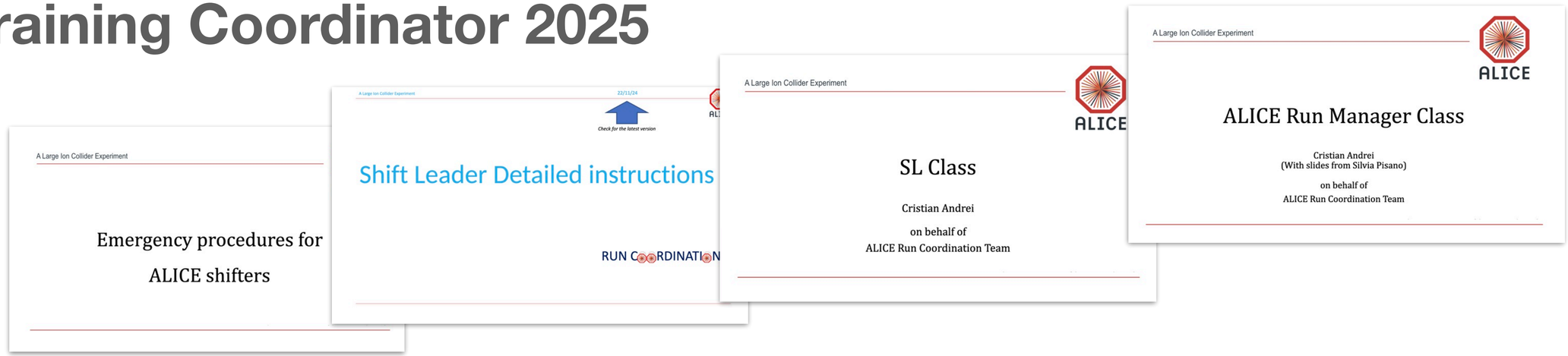




53 ps time resolution @ >95% efficiency

Data taking operations

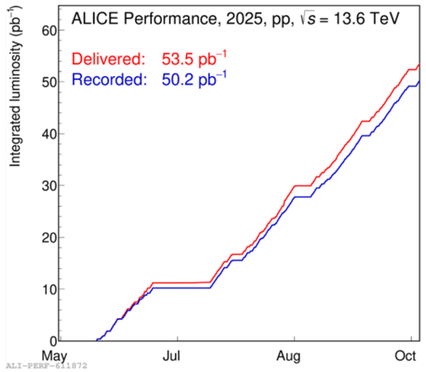
Training Coordinator 2025



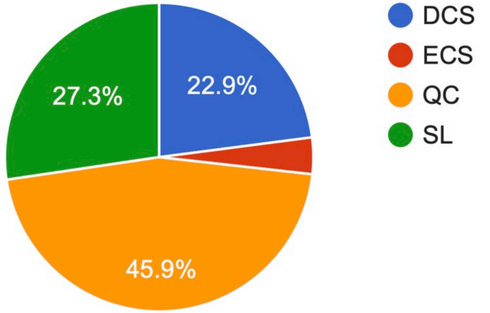
Run Manager & Shifts

First **Run Manager** mandate of the year - setup, start of data taking, instructions and procedures, cosmic data for detector alignment

End of the pp data taking (second **Run Manager** mandate) - 50 pb^{-1} target reached



Shift Leader (13), QC (24), DCS (12) and ECS (2) shifts.



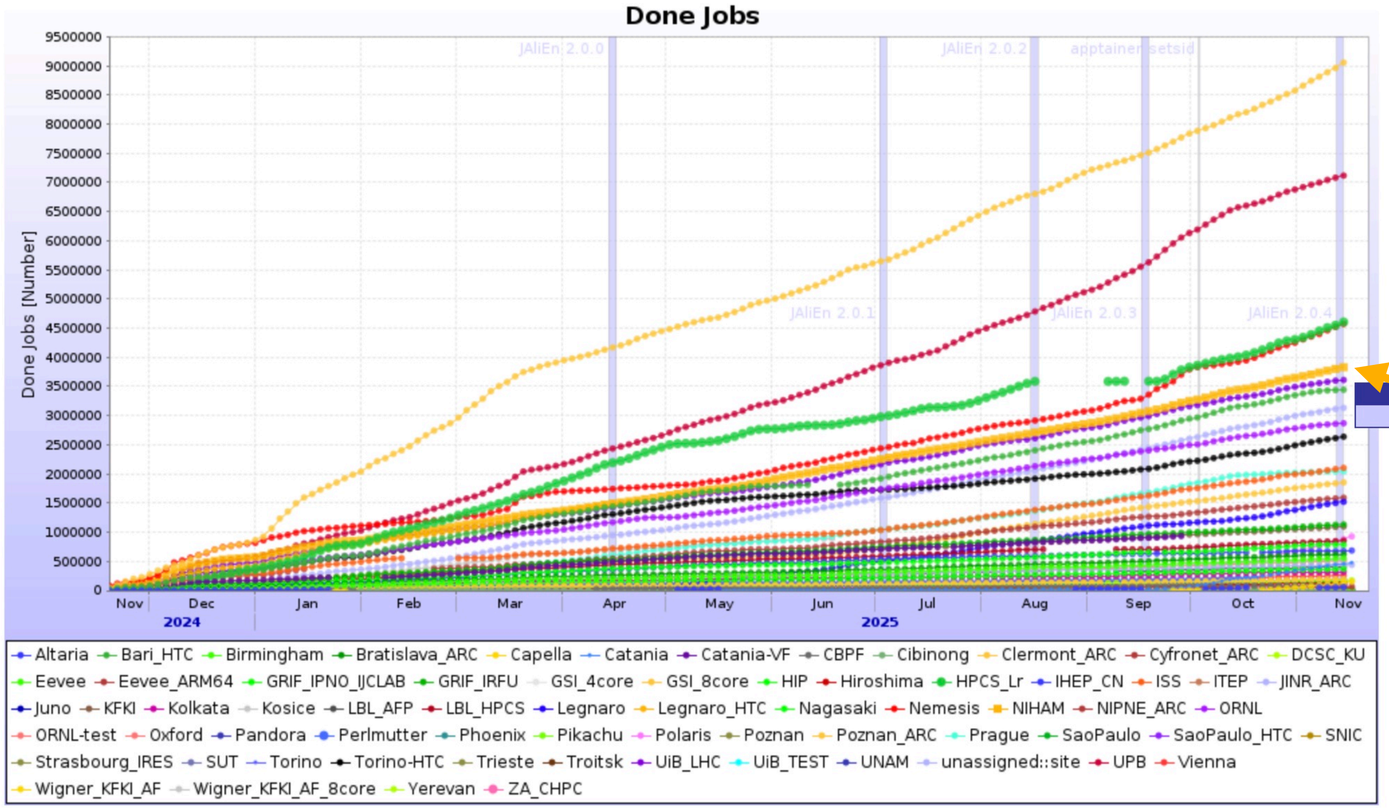
Service work - 0.833 FTE

93% of the due quota

Computing

Contribution to ALICE GRID

Tier 2 Centers only



Done jobs:

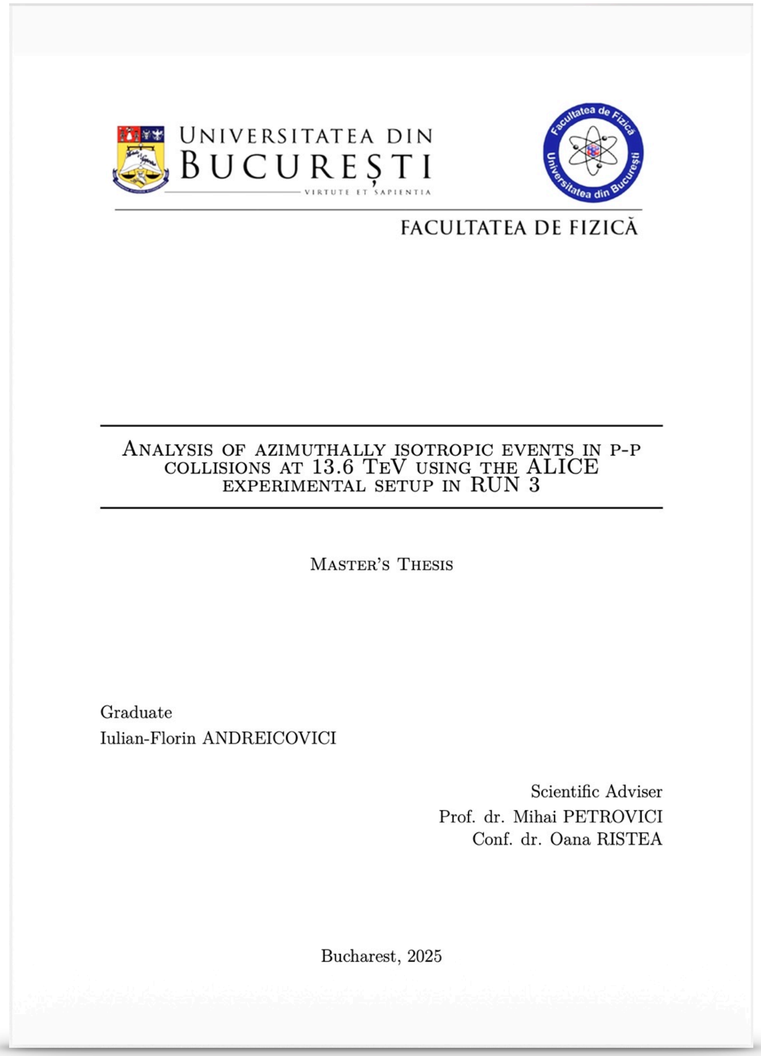
- $3.8 \cdot 10^6$
- **1.8 % of total** ALICE contribution

CPU:

- 20.3 Mhours
- 1.6 % of total ALICE contribution

1.8 % of total ALICE contribution

Training & teaching



UNIVERSITATEA DIN BUCUREȘTI
VIRTUTE ET SAPIENTIA

FACULTATEA DE FIZICĂ

ANALYSIS OF AZIMUTHALLY ISOTROPIC EVENTS IN P-P COLLISIONS AT 13.6 TEV USING THE ALICE EXPERIMENTAL SETUP IN RUN 3

MASTER'S THESIS

Graduate
Iulian-Florin ANDREICOVICI

Scientific Adviser
Prof. dr. Mihai PETROVICI
Conf. dr. Oana RISTEA

Bucharest, 2025

Master Thesis

Successful Summer Student program - 2 Diploma Students joined the group long-term

Outreach

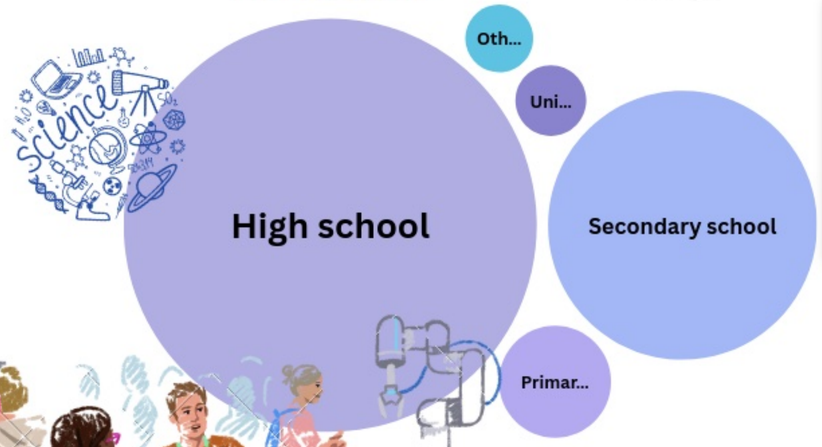
- First full year of activity with **over 600 visitors**.
- **Exhibition guides team:** 3 students (Florin G., Mădălina S., Iulian A.) and 1 researcher (Mădălina T.)
- **Audience:** secondary & high school students, university students, teachers, researchers, policy makers.
- Visitors from both local schools and long-distance institutions (Moldova Nouă, Constanța).
- Also hosted participants from CSSP 2025 and MSciTeh Summer School.

- Hands-on exploration of **ALICE detector components** (TPC, TRD, RPC) and direct interaction with researchers.
- The **ALICE brochure** was translated and adapted into Romanian to provide an accessible introduction to the experiment.
- Helped raise awareness of **CERN's mission**, detector physics, and Romania's scientific role.

Who Visited DUROCERN?

Breakdown by Education Level

EXHIBITION



- DUROCERN is steadily emerging as a **central outreach hub** while we continue to rely on our core laboratory infrastructure to support student training and hands-on visits.
- Seamless collaboration with IFA as host.

A Year of Visitors at a Glance

Monthly load