

Attività 2024
Richieste 2025

ALICE-HMPID (High Momentum Particle Identification) detector

18/07/2024

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Contributing institutes:

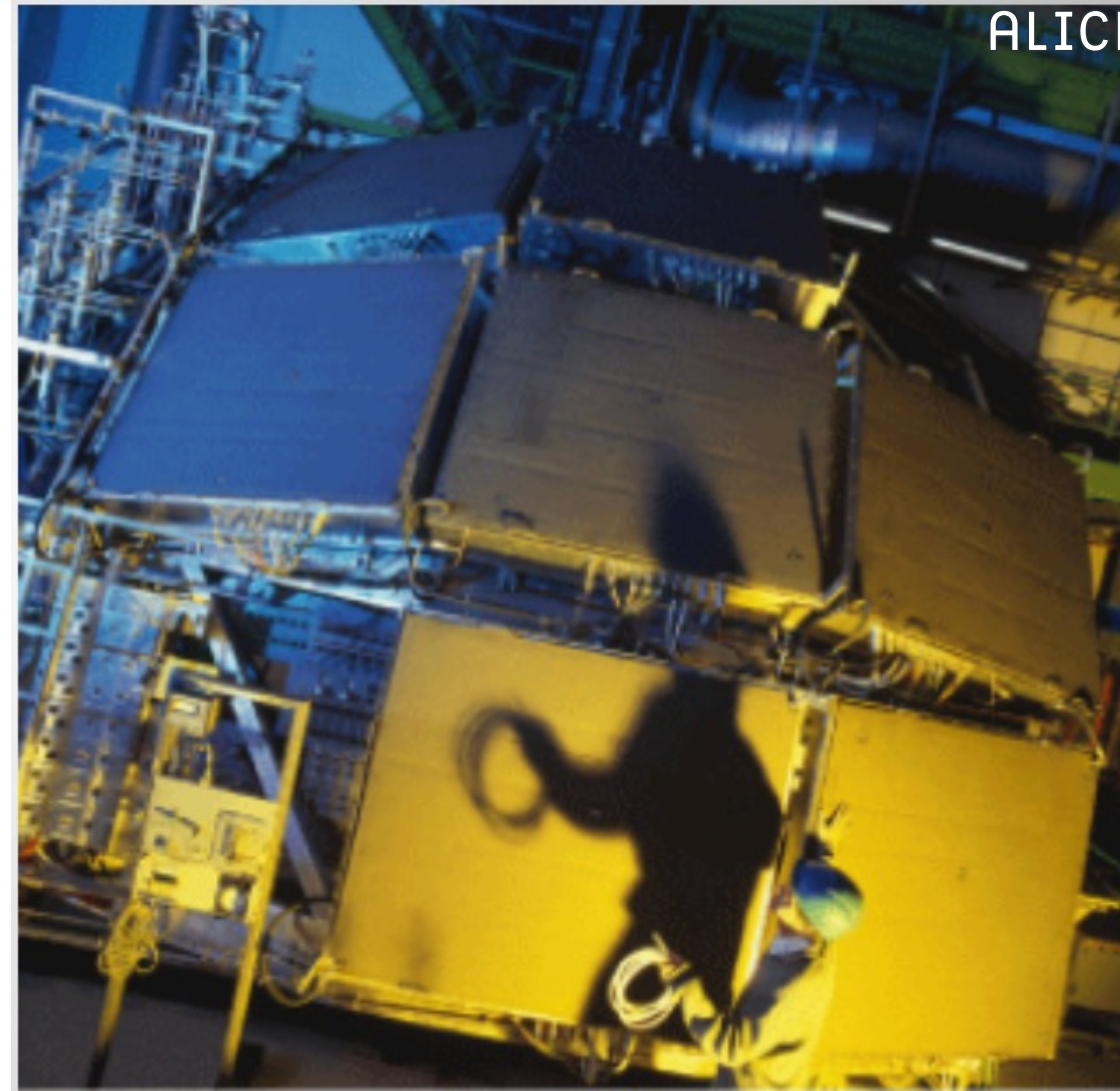
- 80% University & INFN Bari (G. Volpe PL and G. De Cataldo deputy PL)
- 20% CERN team

Participating institutes with in-kind contributions:

- Centro de Aplicaciones Tecnológicas y Desarrollo Nuclear (CEADEN), Havana, Cuba
- Wigner Inst. Budapest, Hungary.
- Dep. of Physics and CIT dept. of the University of Malta, Msida, Malta;

7 RICH (Ring Imaging CHerenkov) modules

- $\sim 1.3 \times 1.3 \text{ m}^2$ for a total CsI active area of $\sim 11 \text{ m}^2$
- (@ 3σ) π/k **identification** in 1-3 GeV/c and protons in 1.5-5 GeV/c momentum intervals;
- $|\eta| < 0.5$



Detector status

At the restarting of the operation this year two radiator vessel broke:

- Chamber 3, radiator vessel 0
- Chamber 4, radiator vessel 0

C₆F₁₄ Radiator vessels

Power

HMPGOSAFE
LOCKED
NOT SAFE
Go SuperSafe

L0 trigger
1003

BUSY MASK SELECTOR

FANIN Status

Busy Mask

RICH 6 READY
POWER
HV: 5, 4, 3, 2, 1, 0
GRID
ROL: 5, 4, 3, 2, 1, 0
FEE: 5, 4, 3, 2, 1, 0
ROR: 5, 4, 3, 2, 1, 0
COOLING: TEU, TFD

RICH 5 READY
POWER
HV: 5, 4, 3, 2, 1, 0
GRID
ROL: 5, 4, 3, 2, 1, 0
FEE: 5, 4, 3, 2, 1, 0
ROR: 5, 4, 3, 2, 1, 0
COOLING: TEU, TFD

RICH 4 READY
POWER
HV: 5, 4, 3, 2, 1, 0
GRID
ROL: 5, 4, 3, 2, 1, 0
FEE: 5, 4, 3, 2, 1, 0
ROR: 5, 4, 3, 2, 1, 0
COOLING: TEU, TFD

RICH 3 READY
POWER
HV: 5, 4, 3, 2, 1, 0
GRID
ROL: 5, 4, 3, 2, 1, 0
FEE: 5, 4, 3, 2, 1, 0
ROR: 5, 4, 3, 2, 1, 0
COOLING: TEU, TFD

RICH 2 READY
POWER
HV: 5, 4, 3, 2, 1, 0
GRID
ROL: 5, 4, 3, 2, 1, 0
FEE: 5, 4, 3, 2, 1, 0
ROR: 5, 4, 3, 2, 1, 0
COOLING: TEU, TFD

RICH 1 READY
POWER
HV: 5, 4, 3, 2, 1, 0
GRID
ROL: 5, 4, 3, 2, 1, 0
FEE: 5, 4, 3, 2, 1, 0
ROR: 5, 4, 3, 2, 1, 0
COOLING: TEU, TFD

RICH 0 READY
POWER
HV: 5, 4, 3, 2, 1, 0
GRID
ROL: 5, 4, 3, 2, 1, 0
FEE: 5, 4, 3, 2, 1, 0
ROR: 5, 4, 3, 2, 1, 0
COOLING: TEU, TFD

C6F14 SYSTEM
STAGNANT
Pump 1: 0.0 mbar
Pump 2: 200.0 mbar
COLD TRAP

Filter unit: MANUAL
2024.06.24 11:00:34.331
Actions: Start SEND

Distribution status: MANUAL
2024.06.24 11:00:34.331
Fatal Error Warn
UPPER TANK INTERM. TANK 1
Actions: Start SEND

Cold Trap unit: RUNNING
2024.06.24 11:00:33.269
Actions: Start SEND

Purify status: MANUAL
2024.06.24 11:00:34.331
Actions: Start SEND

Pump process status: MANUAL
2024.06.24 11:00:34.331
Fatal Error Warn
Pump1: 0 rpm, 19.0 °C
Pump2: 0 rpm, 18.0 °C
INTERM. TANK 2 LOWER TANK
Actions: Start SEND

Mod:6 process status: MANUAL
2024.06.24 11:00:34.331
Fatal Error Warn
RAD 0 RAD 1 RAD 2
Actions: Start SEND

Mod:5 process status: MANUAL
2024.06.24 11:00:34.331
Fatal Error Warn
RAD 0 RAD 1 RAD 2
Actions: Start SEND

Mod:4 process status: MANUAL
2024.06.24 11:00:34.331
Fatal Error Warn
RAD 0 RAD 1 RAD 2
Actions: Start SEND

Mod:3 process status: MANUAL
2024.06.24 11:00:34.331
Fatal Error Warn
RAD 0 RAD 1 RAD 2
Actions: Start SEND

Mod:2 process status: MANUAL
2024.06.24 11:00:34.331
Fatal Error Warn
RAD 0 RAD 1 RAD 2
Actions: Start SEND

Mod:1 process status: MANUAL
2024.06.24 11:00:34.331
Fatal Error Warn
RAD 0 RAD 1 RAD 2
Actions: Start SEND

Mod:0 process status: MANUAL
2024.06.24 11:00:34.331
Fatal Error Warn
RAD 0 RAD 1 RAD 2
Actions: Start SEND

RO firmware update



ALICE

- In presence of back pressure, the processing of the X-ON/XOFF in HMP RO firmware (the line used by FPL to flag the backpressure) needed to be improved.
- From time to time this causes a link to stuck in busy.
- **Firmware has been modified and the problem has been fixed!**
 - **No links busy experienced so far!! Event RO rate up to ≈ 18 KHz!!**



Simulation and reconstruction

- HMPID geometry and hits creation → implemented and committed
 - Implement aluminium absorbers in the detector geometry → implemented and committed
- Digitization from hits → implemented and committed
- Digit from raw data → implemented and committed
- Raw data simulation → implemented and committed
- Clusterization → implemented and committed
- Track matching and Cherenkov angle reconstruction → implemented and committed
- AO2D → implemented and committed
- **Trigger simulation : to be implemented**

Calibration

- calibration procedure for HMPID similar to that used in RUN1 and RUN2
 - Pedestal calculation and CCDB writing workflow: implemented and committed
 - Chamber gain and refractive index calibration and CCDB writing workflow: implemented and committed
 - **Usage of CCDB calibration objects in simulation and reconstruction: to be implemented**
 - **DCS status word usage: to be implemented**

Quality Control

- Sync QC: raw data task → implemented and committed
- Quality raw data checker → implemented → to be deployed
- Async QC: clusters and matching infos → implemented and committed

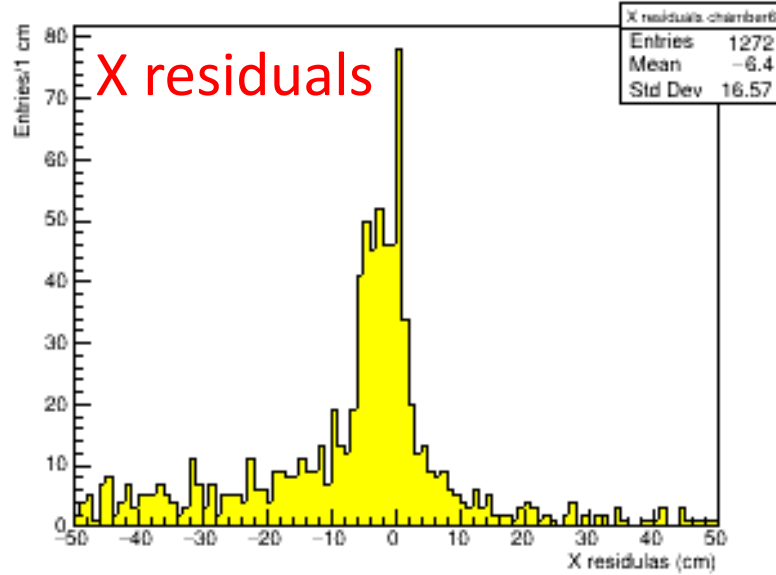
HMPID in O²



ALICE

Some HMPID related physical quantities in real data extracted from AO2D

X residuals chamber6



Y residuals chamber6

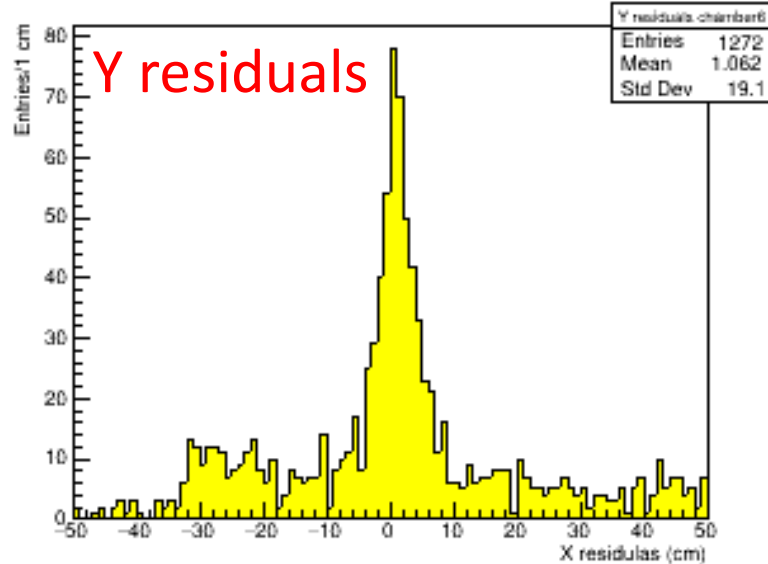
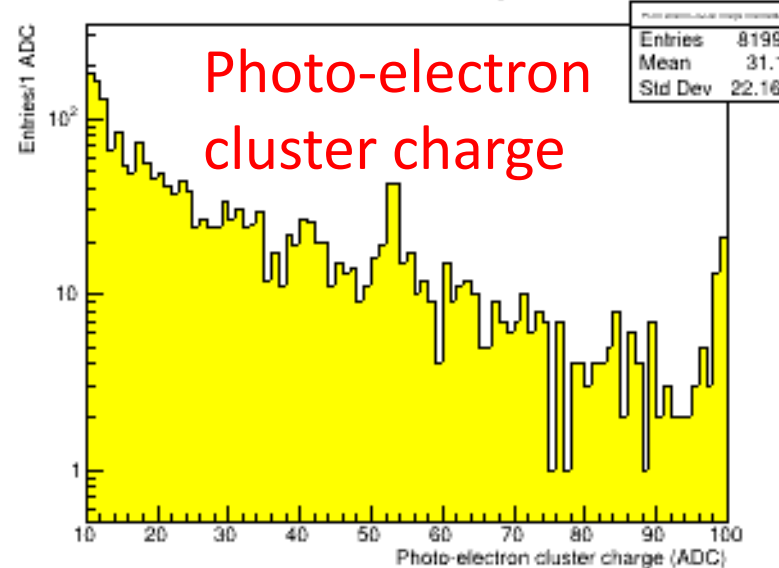
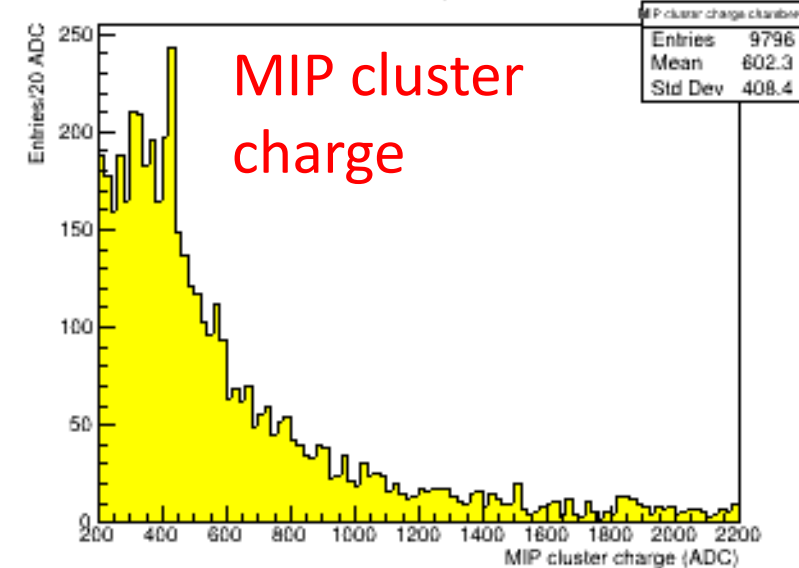


Photo-electron cluster charge chamber6



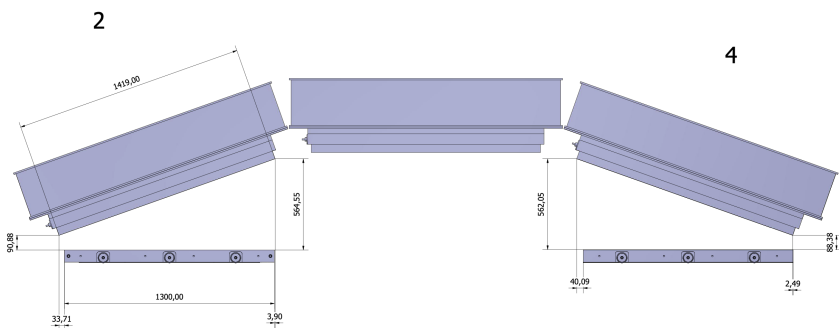
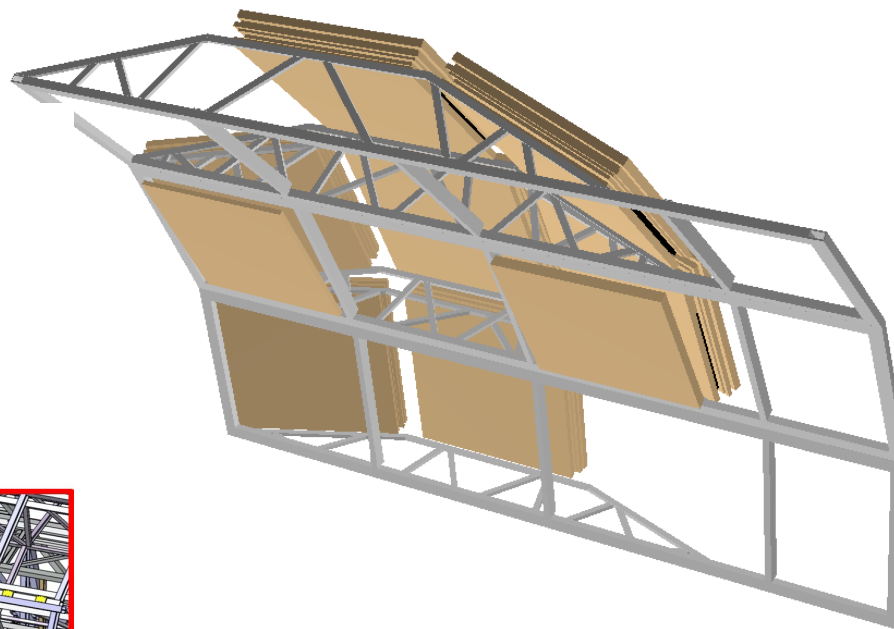
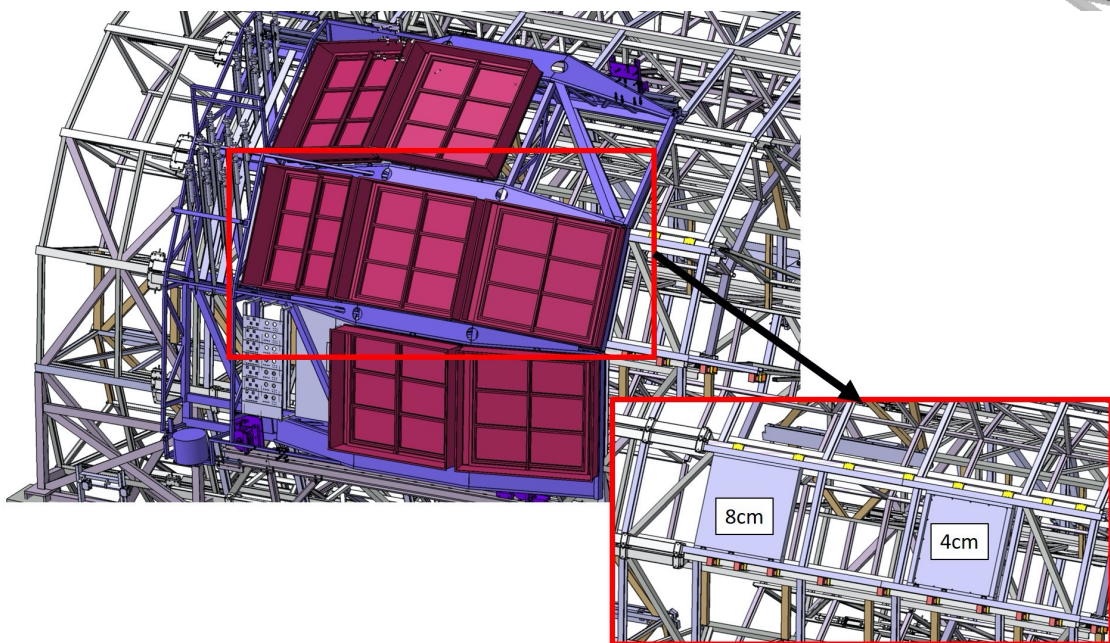
MIP cluster charge chamber6



Absorbtion cross section measurement

Two aluminium absorbers were installed on front to HMPID chamber 2 and 4 for anti-deuteron inelastic absorbtion cross section measurements

- Implemented in the detector geometry in O^2



Development of software tools for analysis of anti-deuteron absorbtion cross section and pions, kaons, protons and light nuclei momentum spectra.

Next: extend the analysis of the absorbtion cross section also to pions, kaons and protons.

