

Attività 2022
Richieste 2023

ALICE-HMPID (High Momentum Particle Identification) detector

G. De Cataldo and G. Volpe

ALICE-HMPID

Contributing institutes:

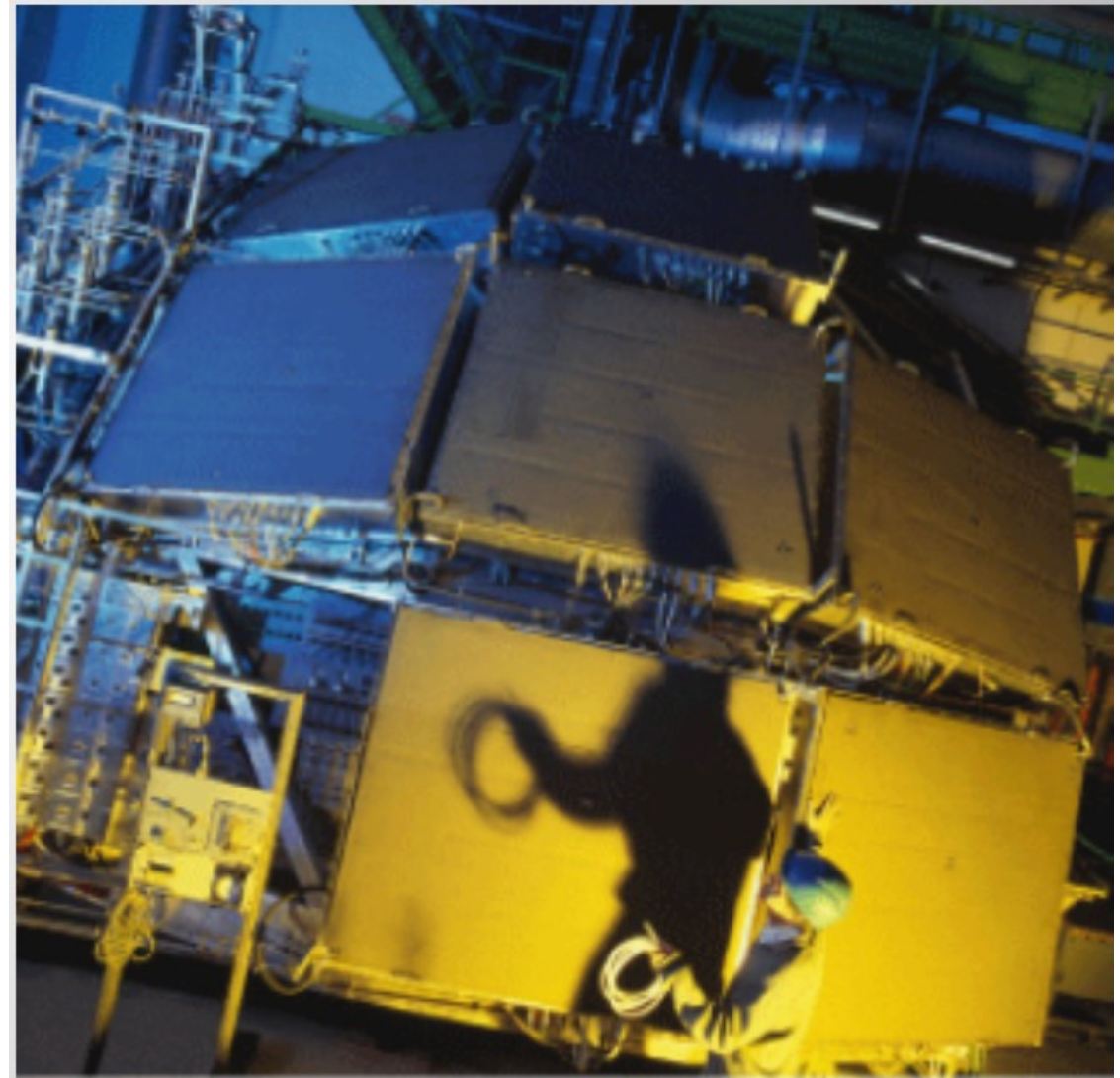
- 80% University & INFN Bari (G. De Cataldo PL and G. Volpe deputy PL)
- 20% CERN team

Participating institutes with in-kind contributions:

- Centro de Aplicaciones Tecnológicas y Desarrollo Nuclear (CEADEN), Lavana, 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;
- $|\eta| < 0.5$



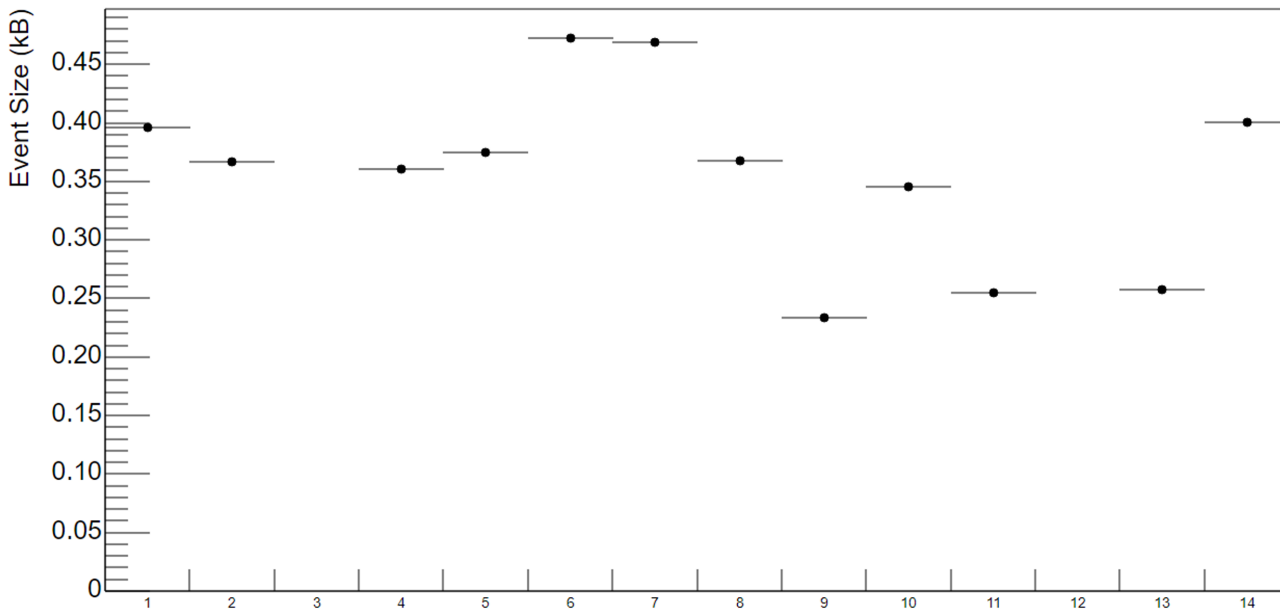
HMPID report

- HMPID successfully took data with pp collisions at 13.6 TeV
- Global run with full configuration
 - Data recording
 - Synchronous workflow enabled
 - QC enabled
- 11 links out of 14 were ON
- MWPC's worked very stably at the operational HV = 2050 V
- Data taking was very stable:
 - event readout rate: $\cong 5$ KHz (as from target luminosity. RO max rate ~ 25 KHz);
 - data size readout rate: $\cong 60$ MB/s;
 - Time frame builder running and archiving data

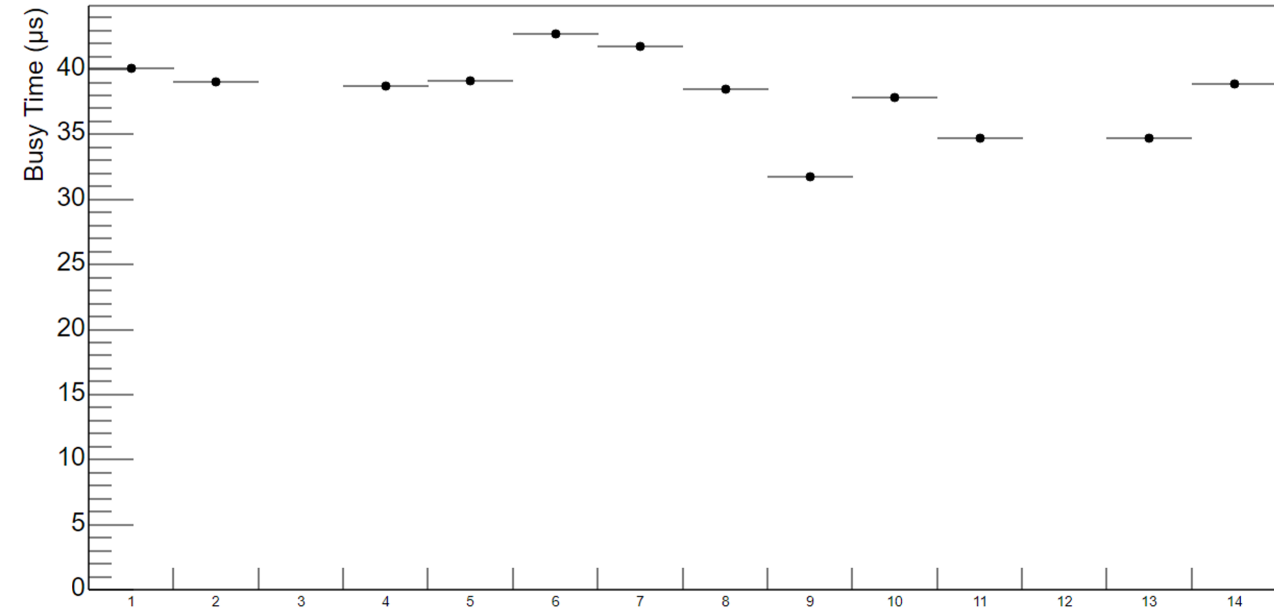
HMPID report

HMP QC plots

HMP Event Size per DDL



HMP Busy Time per DDL





Most recent run n...

520144

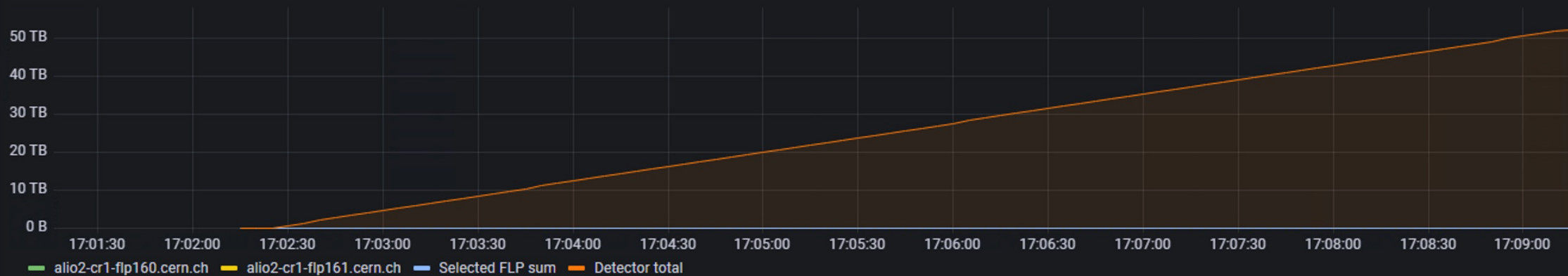
Readout data since SOR

27.6 GB

Readout current data rate

67.2 MB/s

Readout data over time since SOR



Readout data rate since SOR



Readout data rate per equipment

ALICE-HMPID in O²

Simulation and reconstruction in O²

- Detector geometry and hits creation implemented
- Creation of digits from hits implemented
- Creation of digits from raw data implemented
- Creation of raw data from digits implemented
- Cluster creation from digits
- Track matching and Cherenkov angle reconstruction → to be finalized

Calibration

- The calibration procedure for HMPID in RUN3 will be similar to that used in RUN1 and RUN2
 - Average and sigma of the pedestal need to be calculated in dedicated RUN (PEDESTAL RUN), loaded into the RO electronics and stored in the CCDB → code implemented
 - Procedure to be fully automated in the PEDESTAL runs
 - Gas gain and mean refractive index using information from DCS (MWPC gas pressure and temperature, freon transparency) → code implemented, procedure under test

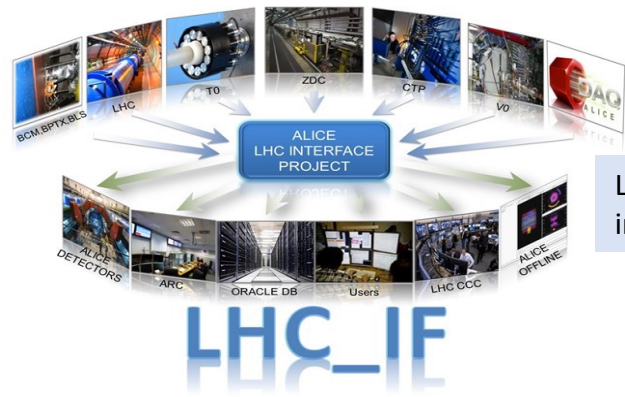
Budget request (M&OB) for 2023

The HMPID will be brought at the surface and dismantled during 2026;
 As from 2023 till 2025, the maintenance and interventions will be reduced at the minimum;
 The total on 2026 is an estimate for the detector removal and dismantling ;
 The expected increase of A08 areas is just an estimate for the infrastructures in the dismantling area.

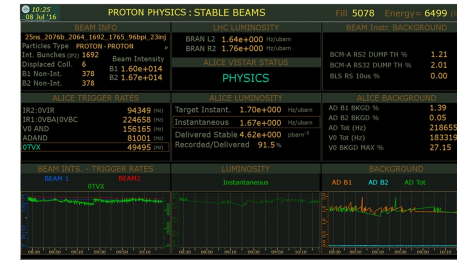
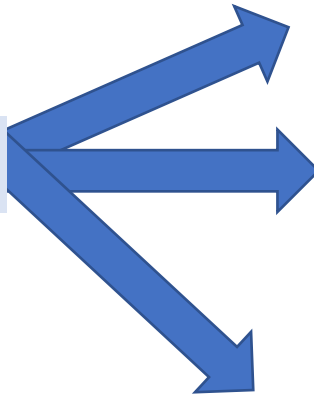
M
2023
5
1
0
0
0
0
5
5
2
25

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Budget	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Comments		
2	A01 Mechanics												5	5	5	0	Comment from A01 till A11.3 : the HMPID will be brought at the surface and dismantled during 2026;		
3	A02 Gas Systems	25	15	10	15	15	15	15	5	5	10	10	5	5	5	0			
4	A03 Cooling Systems	4	4	4	4	4	4	4	2	2	4	4	1	1	1	0			
5	A04 FEE spares	6	1	1	1	1	1	1	1	1	0	0	0	0	0	0			
6	A05.1 Standard Electronics LV/HV PS	8.5	4	4	4	4	4	10	4	4	0	0	0	0	0	0			
7	A05.2 Standard Electronics Crates	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0			
8	A05.3 Standard Electronics R/O modules																		
9	A06 Controls (DCS & DSS)	3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	0	0	0	0	0	0			
10	A07 Sub-Detector spares																		
11	A08 Areas	50	35	30	25	25	25	25	20	15	10	10	5	5	5	10			
12	A09 Communications	8	8	8	8	8	8	8	8	8	8	8	5	5	5	0			
13	A10 Store Items	8	8	8	8	8	8	8	8	8	8	8	5	5	5	5			
14	A11.1 Technical Manpower @ CERN: Industrial Support	10	5	10	5	5	5	5	5	5	5	5	2	2	2	5	Comment from raw 1 to 15: the HMPID will be brought at the surface and dismantled during 2026;		
15	A11.3 Technical Manpower @ CERN from Collaborating Institutes	20	10	15	10	10	10	10	10	10	5	10	2	2	2	5			
16	Total	144.5	92.5	92.5	82.5	82.5	82.5	88.5	65.5	60.5	50	50	25	25	25	25			
17																			
18	A11.2 Technical Manpower @ CERN from Collaborating Institutes (in man-months)																		

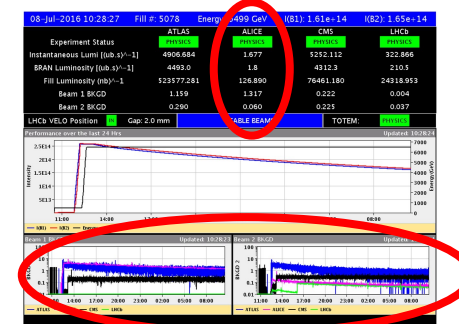
ALICE-LHC Interface



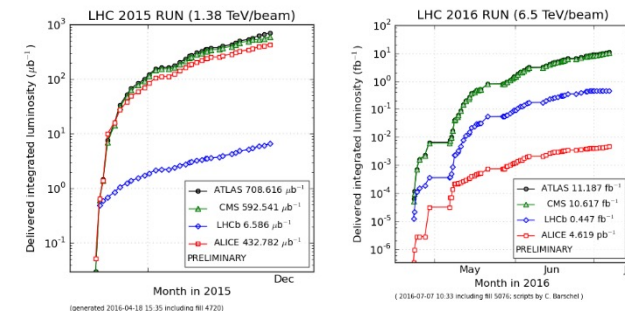
LHC_IF provides information at:



LHC_IF large display in the ALICE RC



Vistar Page 1



Official plots of LPC

Tasks, people and institutions

- PL and DPL: G de Cataldo (INFN Bari, It) and G. Valentino (CIT department , University of Malta);
- LHC_IF Software coordinator engineer: A. Franco (INFN Bari, It),
- Beam instrumentation: resp. A. di Mauro (CERN, CH) ; responsible of BPTX, BLS control software: O. Pinazza (INFN Bologna,It/ALICE DCS),
- BCM hardware and software: di Mauro, De Cataldo, A. Franco
- b-by-b calculations (VdM scan, lumi, bkgd,..): I. Kralick (Slovak Academy of Sciences (SK));
- LHC_IF infrastructures: DCS (P. Chochula, CERN, CH as contact person).

Attività di Upgrading 2021-2022

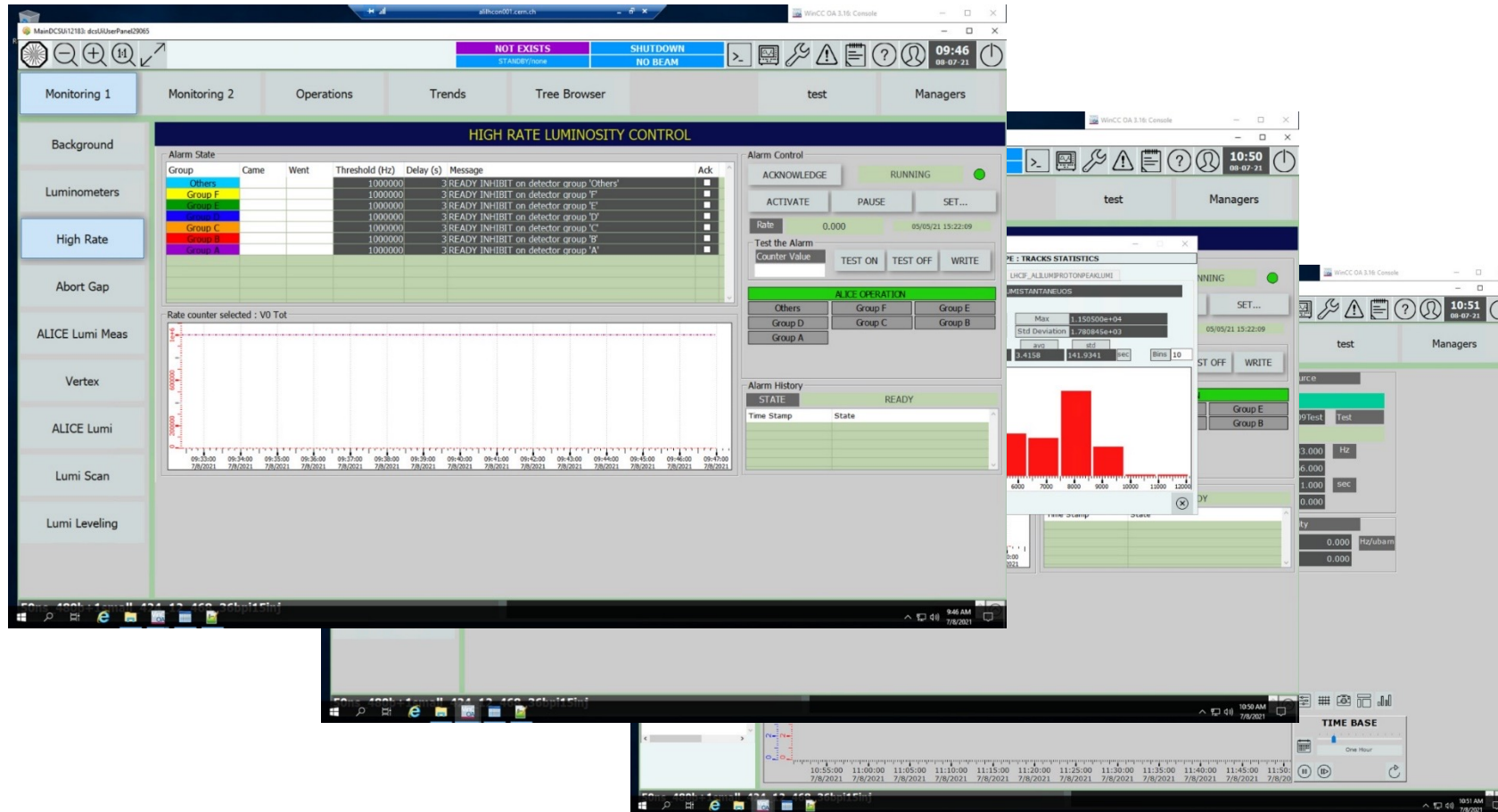
- Successful migration of the project to the new version of the SCADA WinCC OA 3.16 system;
- Some ALICE-LHC Interface Upgrading meetings for Run3 carried out and other programmed;
- Collected requests from detectors and central systems for monitoring brightness and beam background;
- Creation of the LHC dataset in the Global Run Parameters for the Data Processor Layer (DPL);
- GRP data storage in CCDB: LHC_IF → CCDB,...
- Collider integration activities <->ALICE-LHC Interface (Massi files on EOS);
- New shift leader and Run coordination graphical interface for experiment operations;

ALICE-LHC Interface

The image shows a screenshot of the ALICE-LHC interface website overlaid on a photograph of a control room. The website header includes the CERN logo, the text "CERN Accelerating science", and navigation links for "Sign in" and "Directory". The main navigation menu contains "ABOUT", "NEWS", "SCIENCE", "RESOURCES", "SEARCH", and "EN". The "ABOUT" link is highlighted with a red box. The background image shows scientists working at computer workstations in a control room. A text overlay in the center reads "Scientists from around the world come to CERN...". At the bottom of the screenshot, there is a cookie notice: "This website uses cookies to ensure you get the best experience on our website [More info](#)".

ALICE DCS UI

ALICE DCS UI: Programmable graphical interface, component of the central DCS for the experiment and the individual detectors;



Summary

HMPID

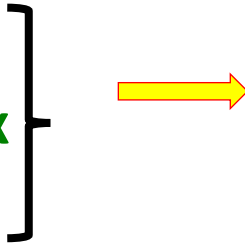
- HMPID integration in O² almost completed
 - Cherenkov angle reconstruction will be soon finalized
 - Pedestals calculation and uploading to be fully integrated in PEDESTAL run
- Excellent HMPID results in preliminary data taking (pilot beam, first pp collisions at 13.6 TeV);
- Financial requests (M&OB)2023 : 25 KCHF.
- Credits to
 - A. Franco INFN Bari for contributions RO, DCS and QC software development;
 - Raul Arteche Diaz CEADEN for RO FW;

For your information

- ALICE-LHC Interface
 - Implementation new SL_UI;
- ALICE DCS UI
 - Programmable UI produced for the central DCS and for the individual detectors.

Backup

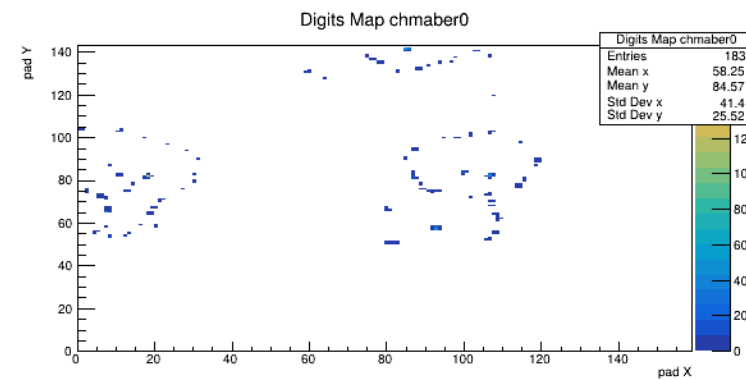
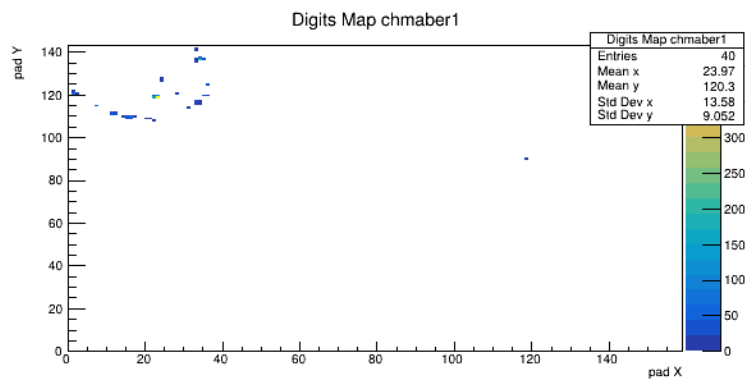
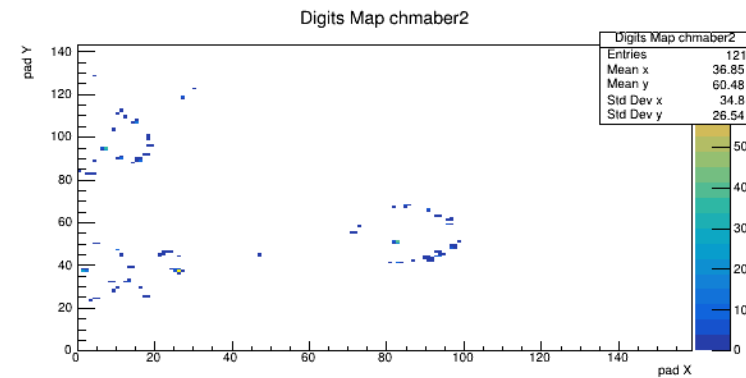
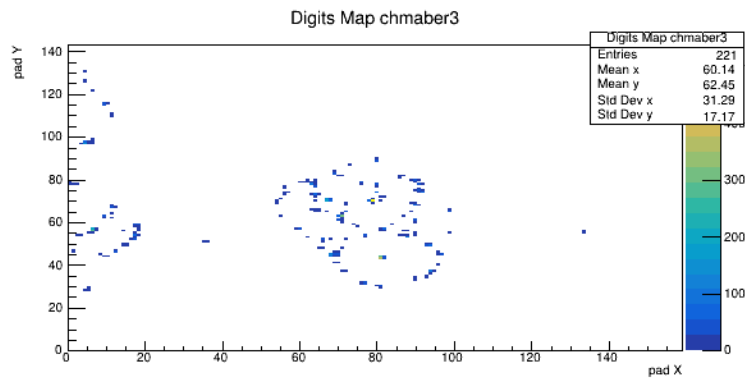
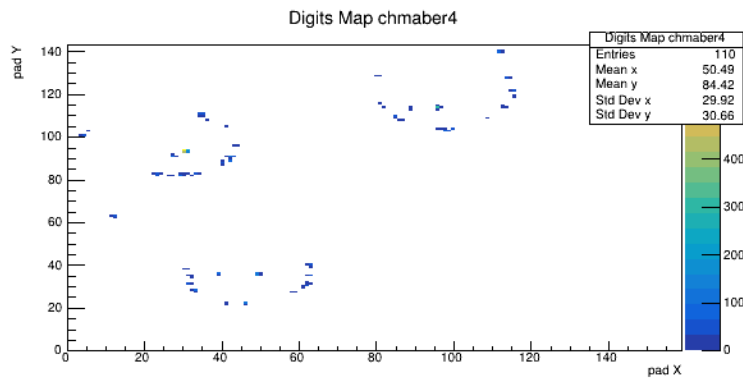
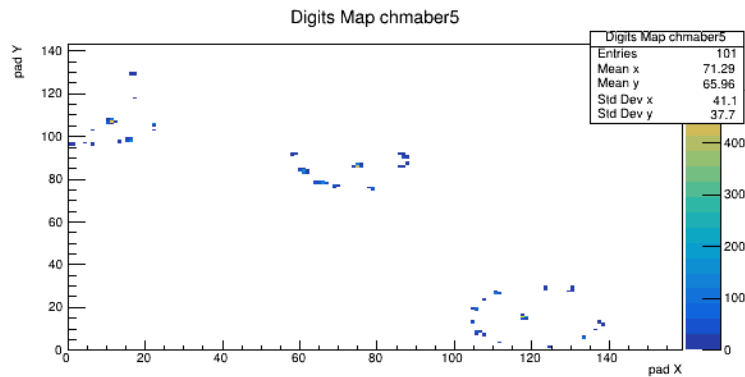
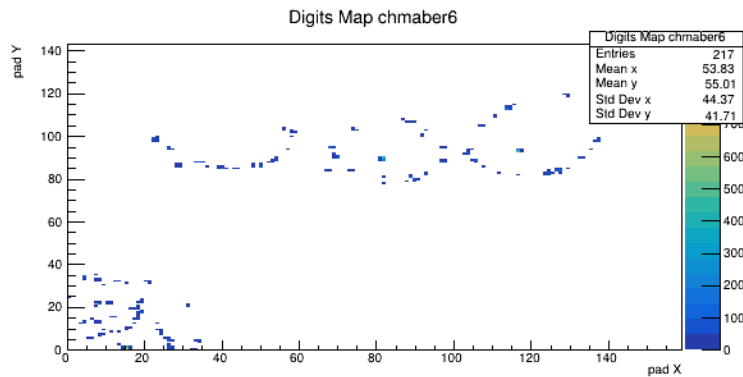
HMPID Reconstruction: clusterization

- **Detectors/HMPID/workflow**
 - **DigitsToClustersSpec.cxx/.h**
 - **Digits-to-clusters-workflow.cxx**

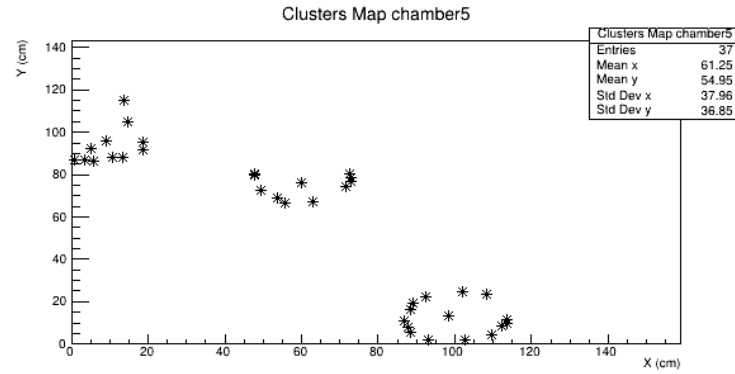
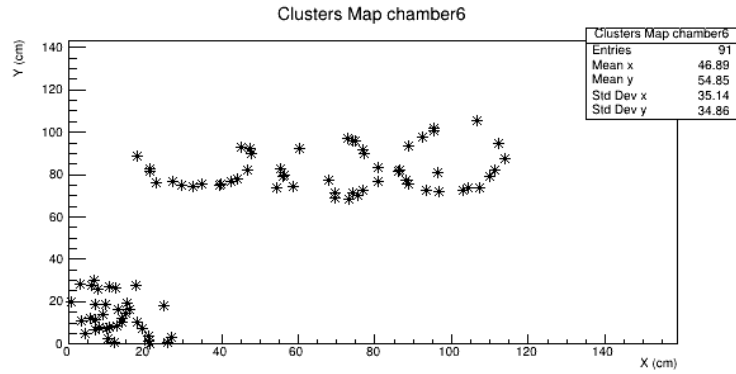
Get the workflow running (DPL); digits reading for cluster creations [**implemented**]
- **DataFormat/Detectors/HMPID**
 - **Cluster.cxx/.h** → cluster implementation: [**implemented**]
- **Detectors/HMPID/reconstruction**
 - **Clusterer.cxx/.h** → HMPID clusterization algorithm: [**implemented**]

Digits map

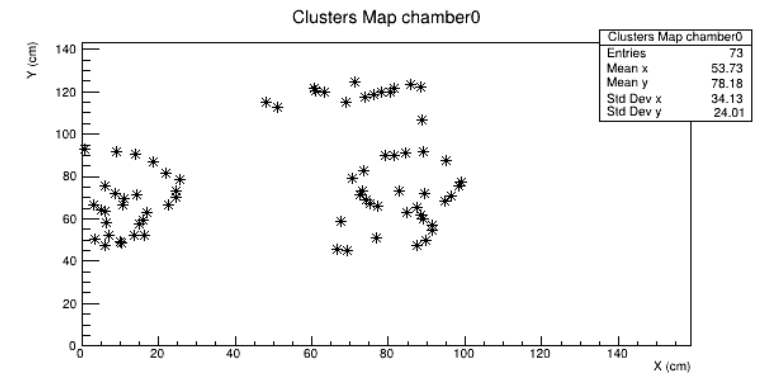
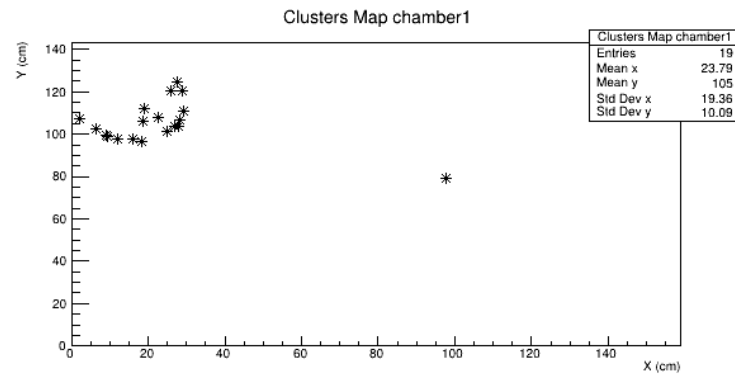
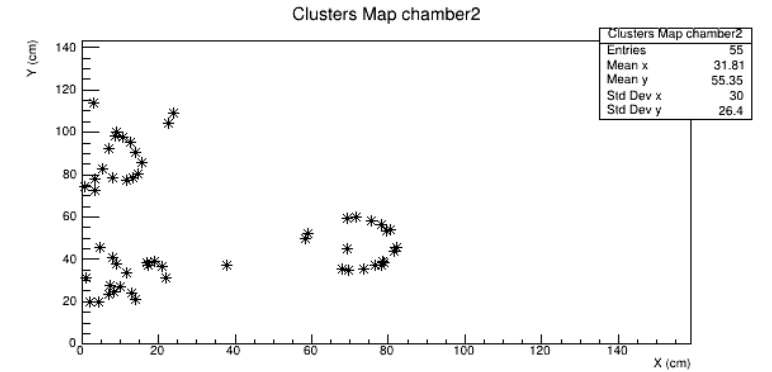
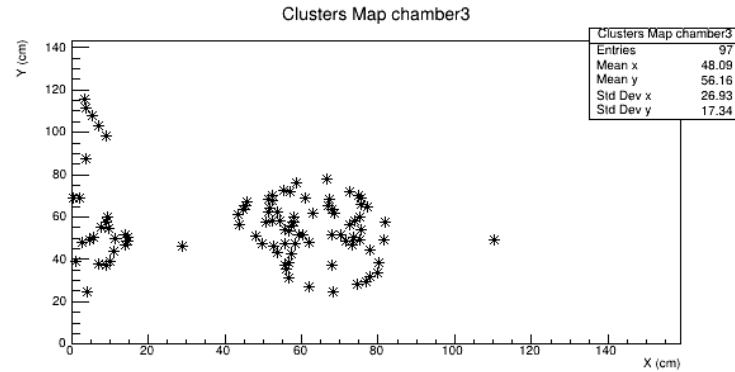
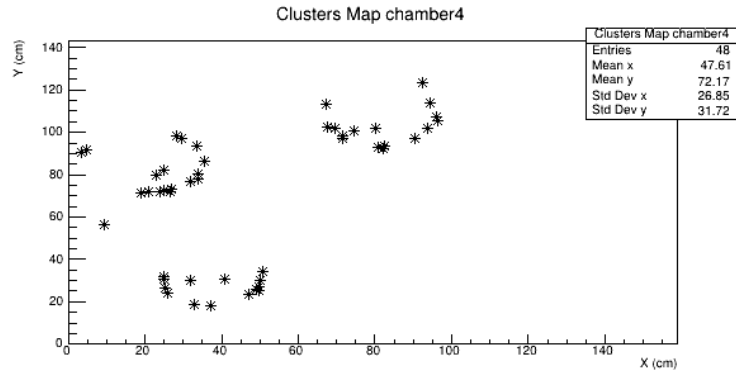
MC SIMULATION



Clusters map

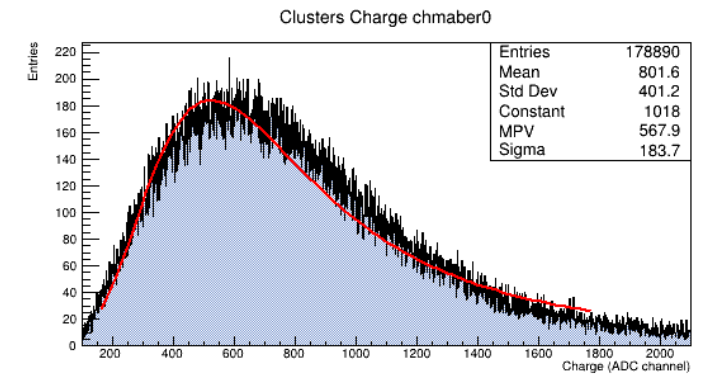
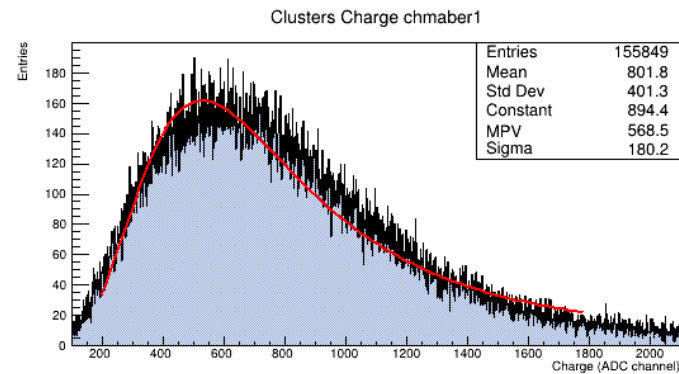
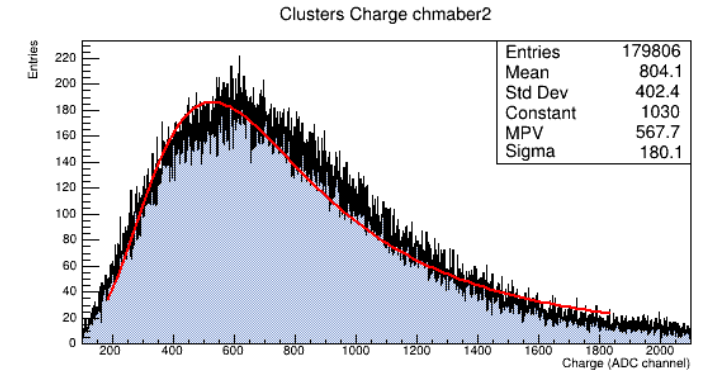
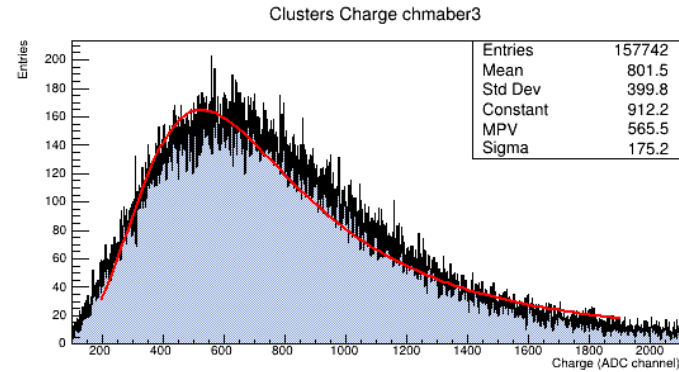
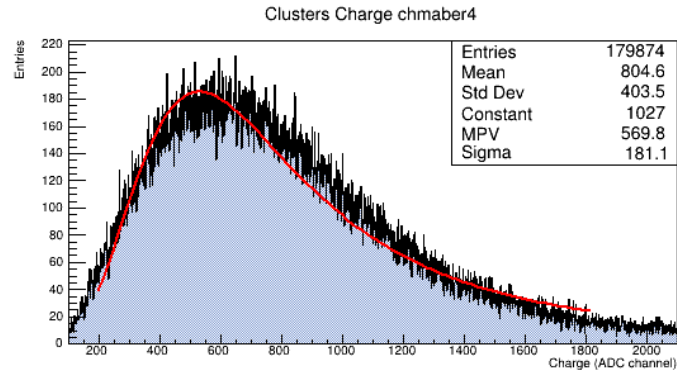
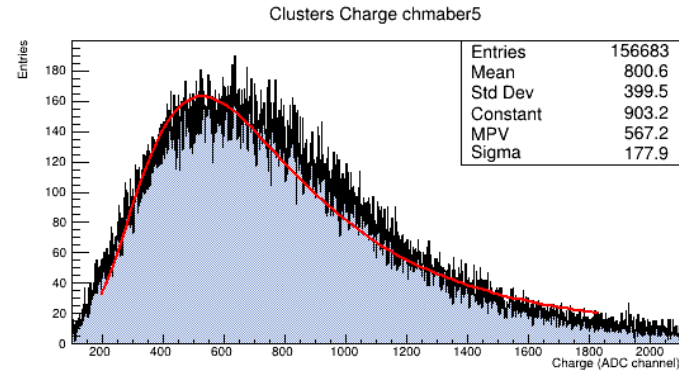
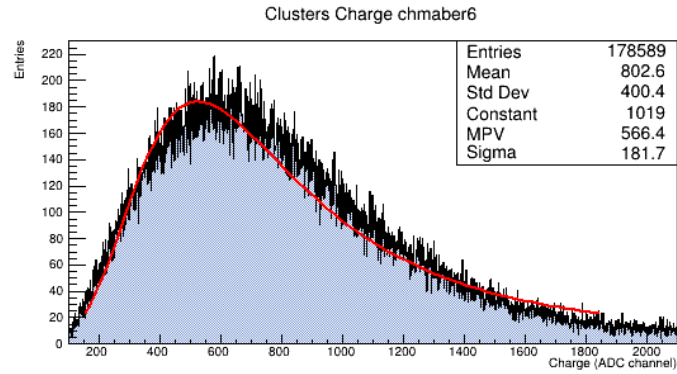


MC SIMULATION

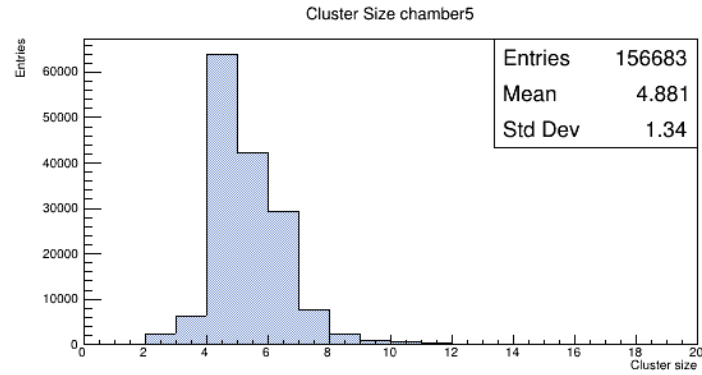
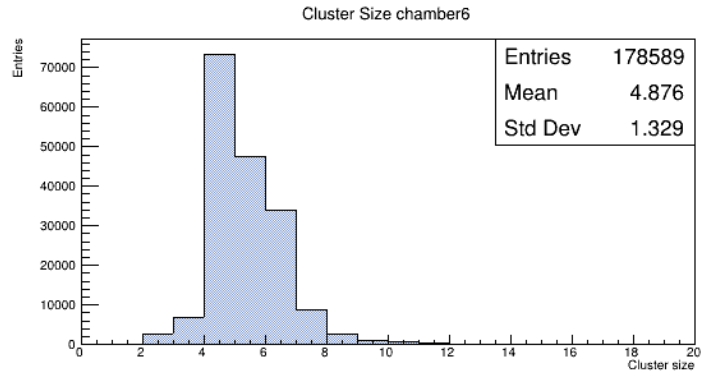


Cluster charge

MC SIMULATION



Cluster size



MC SIMULATION

