Status of the 2015 data analysis

Incident angle effect

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GOBIERNO DE ESPAÑA — MINISTERIO DE CIENCIA E INNOVACIÓN

Ciemat — Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas
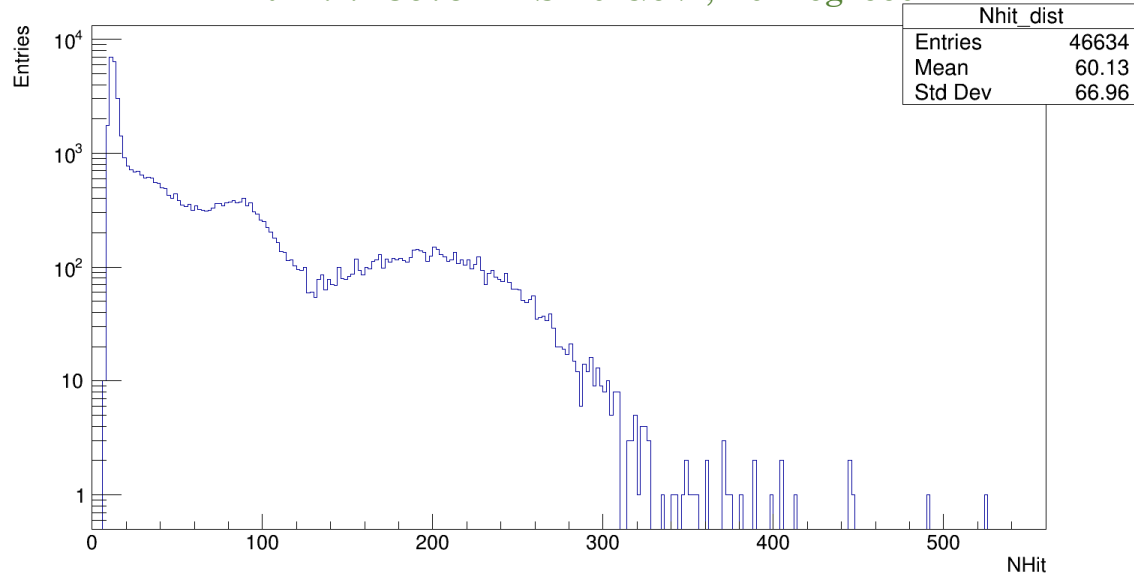
cfp — CIEMAT física de partículas
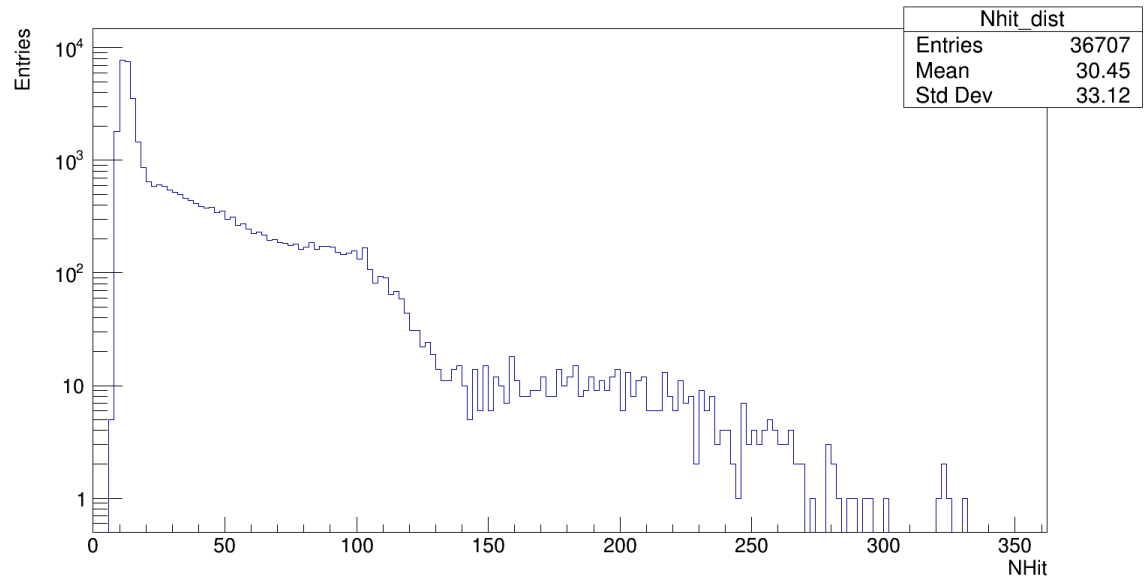
Previous "Next steps"

- Understand the gain correction mode and apply it if necessary ✓

- Take a closer look to the events for different ranges of nHits ✓

- A Marlin processor to create ROOT Files is half done ✓

- Following previous analyses, apply cuts for particle selections

First nHits distributions

Particles selection. Muon selection variables

Density: $\rho = \dfrac{nHit}{nLayers}$

nHit → total number of hits in the detector.

nLayers → number of layers with signal.

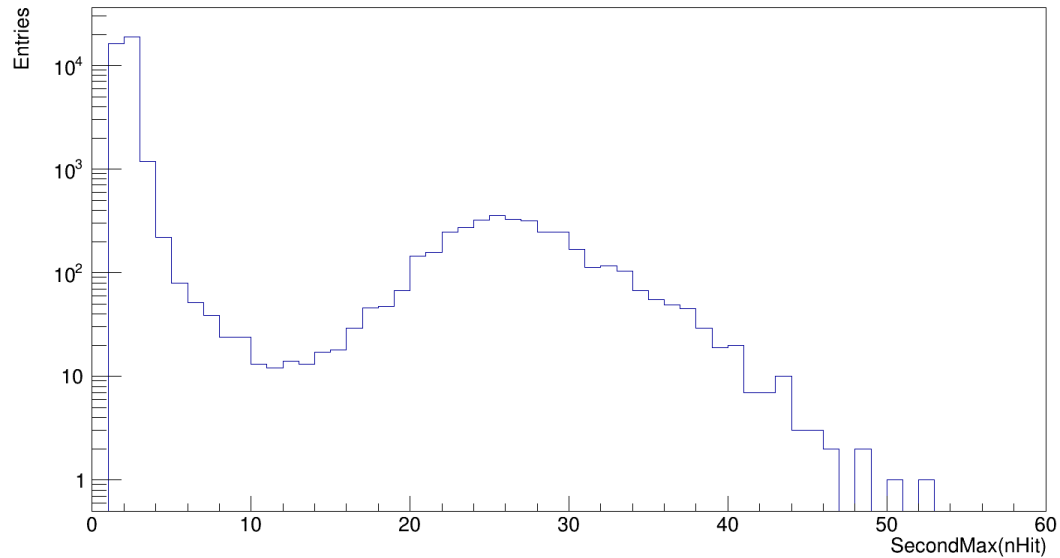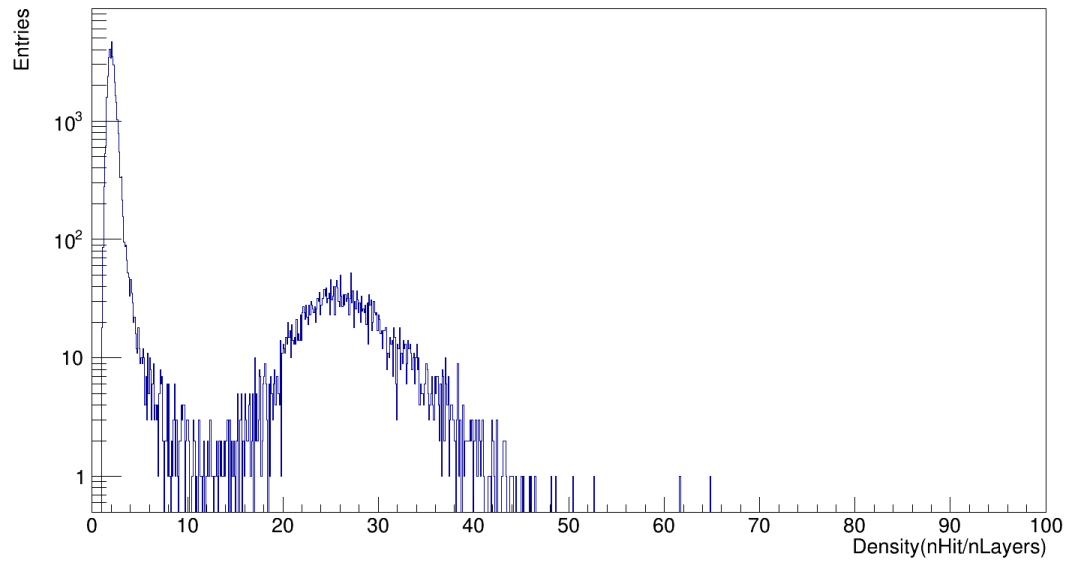**Second maximum of hits in a single layer:** Hit_{Max2}

Penetrability Condition (P.C.):

SDHCal

- Layers 00-11: at least 9 with signal.

- Layers 12-23: at least 9 with signal.

- Layers 24-35: at least 9 with signal.
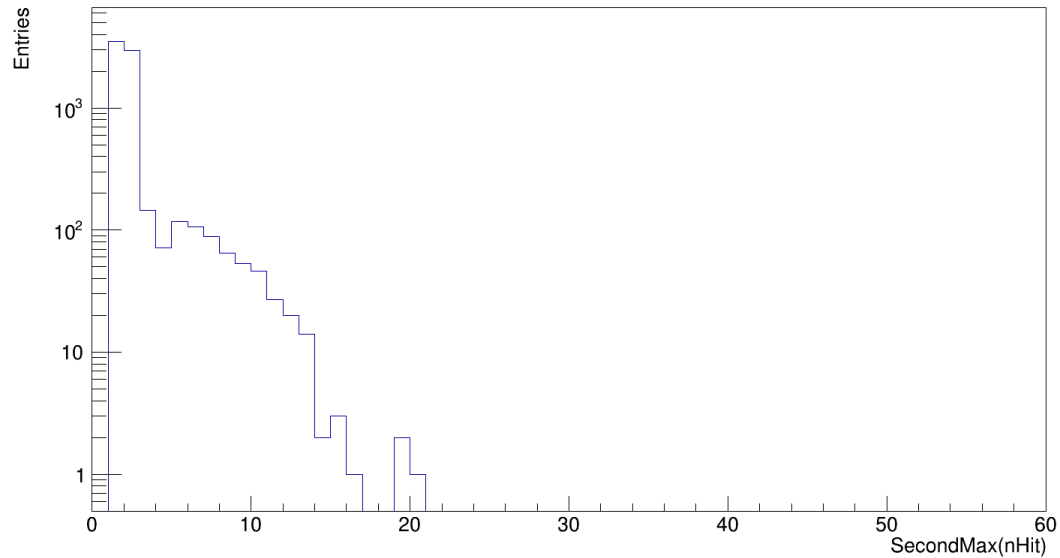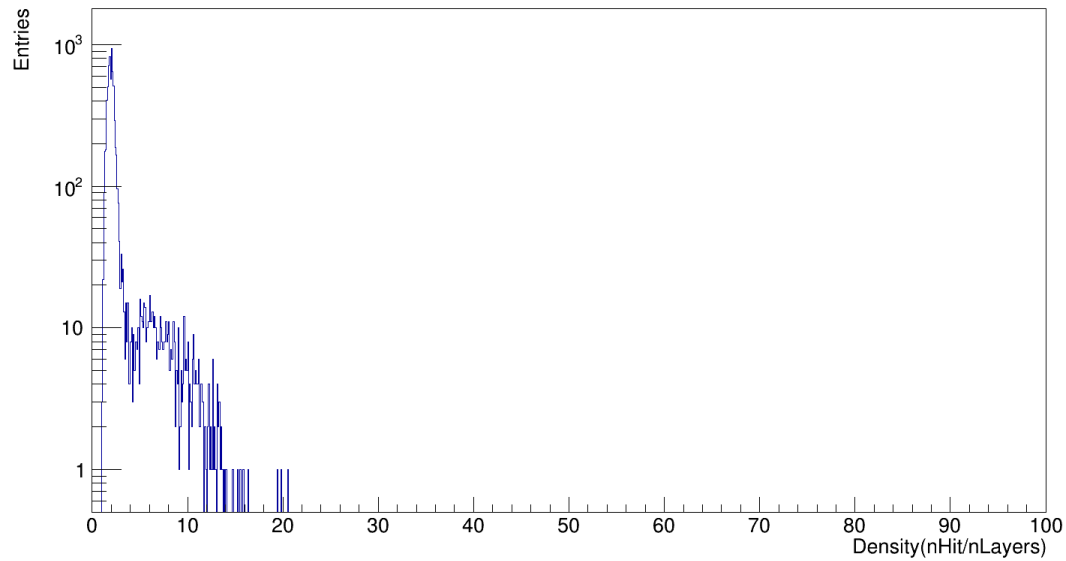
- Layers 36-48: at least 9 with signal.

Density and Hit_{Max2} − 70GeV

Run: 728455 − SPS ; 22.46 Degrees
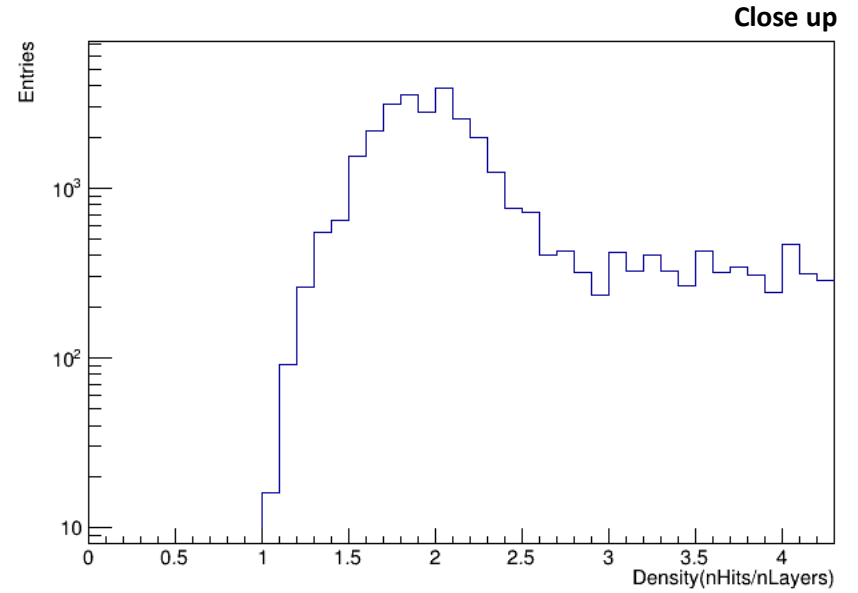
Density and Hit_{Max2} − 10GeV

$Density\ and\ Hit_{Max2}\ -\ 4GeV$
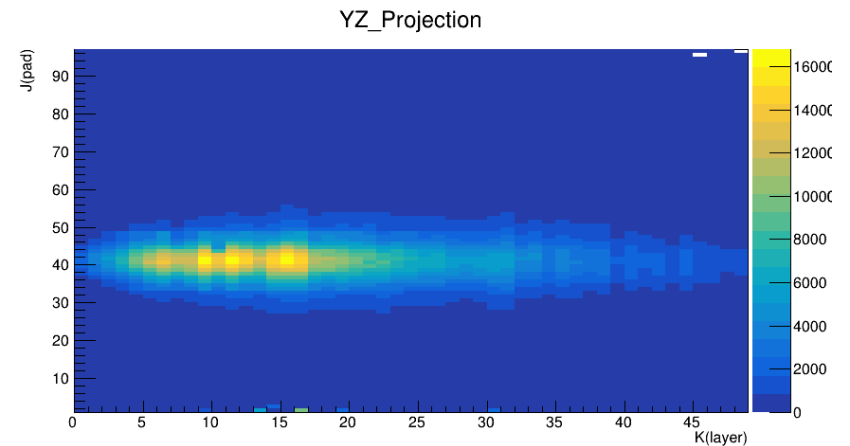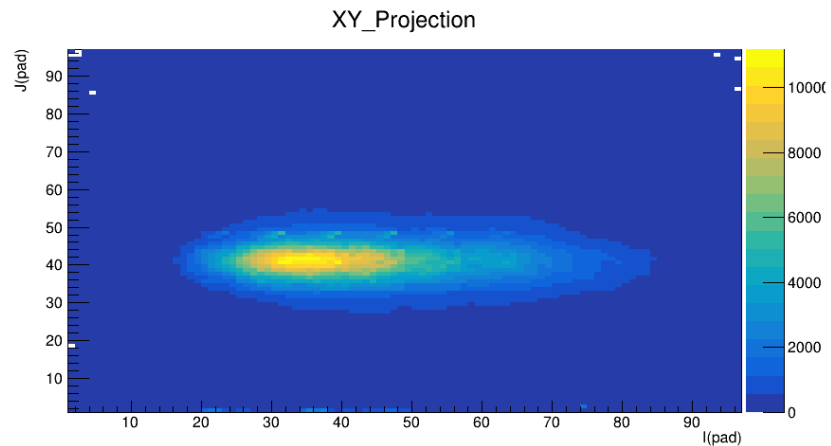

Run: 728661 – PS ; 20 Degrees
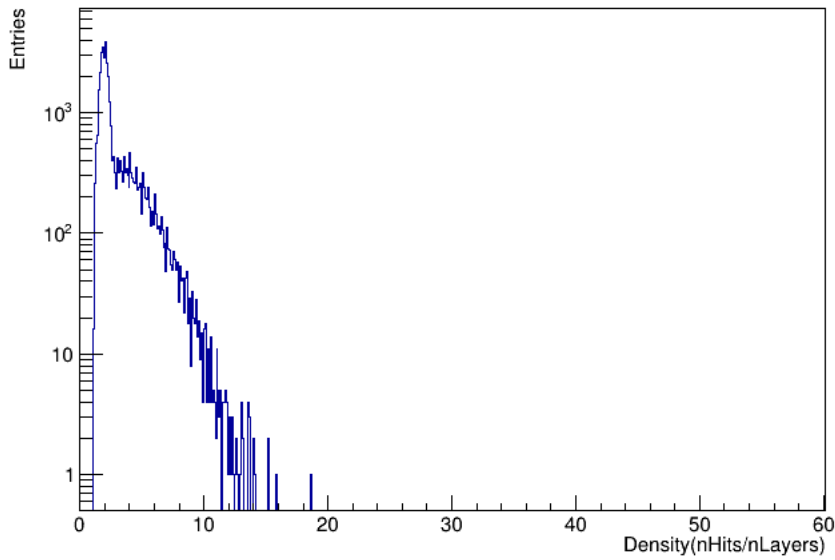
Applying cuts. Showers Profile – 70GeV

Muons/Cosmics $\rightarrow$ $(\rho < 3 \ or \ Hit_{Max2} < 5) + P.C.$ P.C. Separates Muons and Cosmics

Run: 728455 – SPS ; 22.46 Degrees

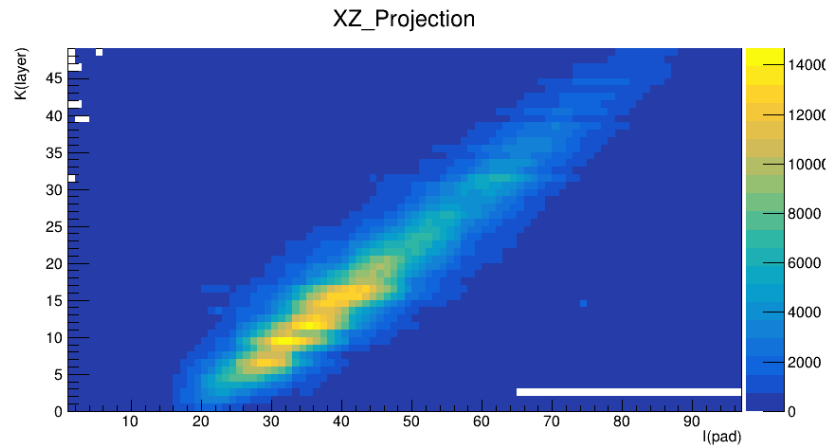# *Applying cuts. Muons Profile – 70GeV*

Muons/Cosmics $\rightarrow$ $(\rho < 3 \ or \ Hit_{Max2} < 5) + P.C.$ P.C. Separates Muons and Cosmics

Run: 728455 – SPS ; 22.46 Degrees
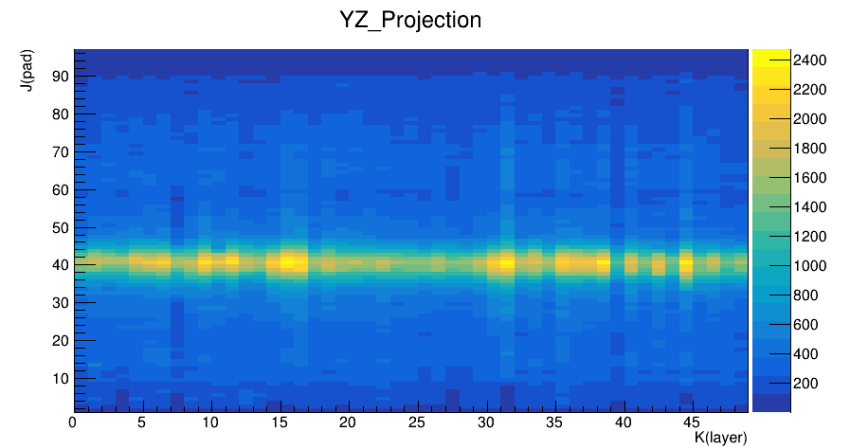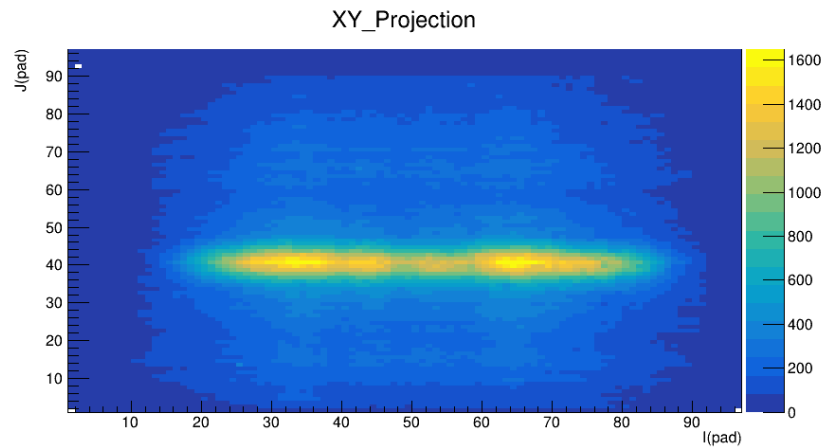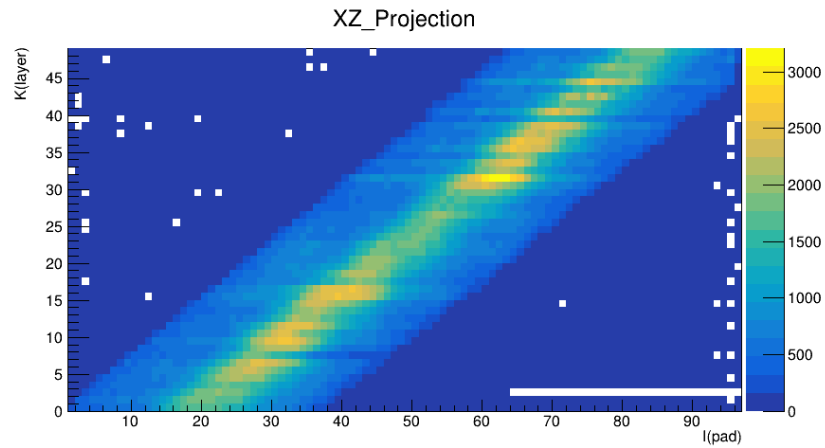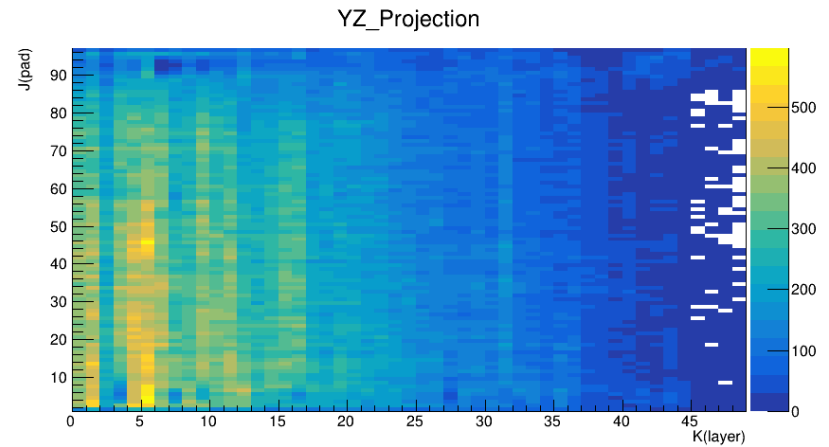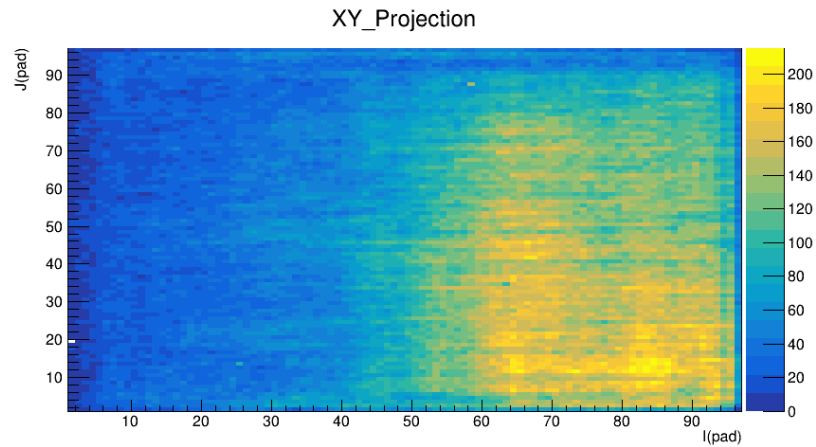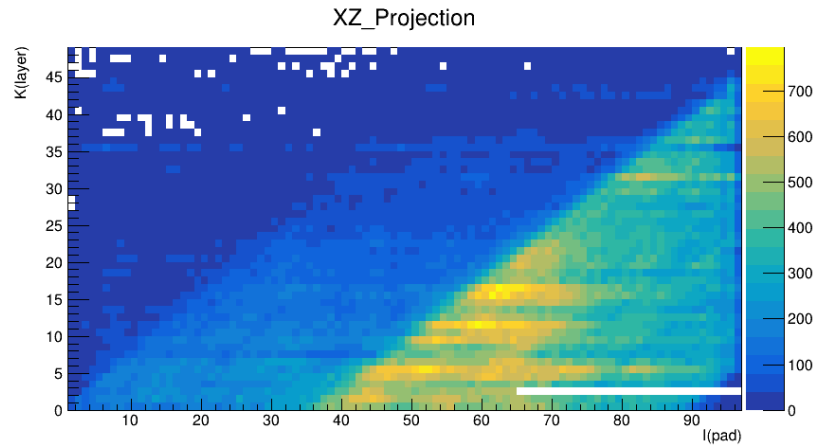
Applying cuts. Cosmics Profile – 70GeV

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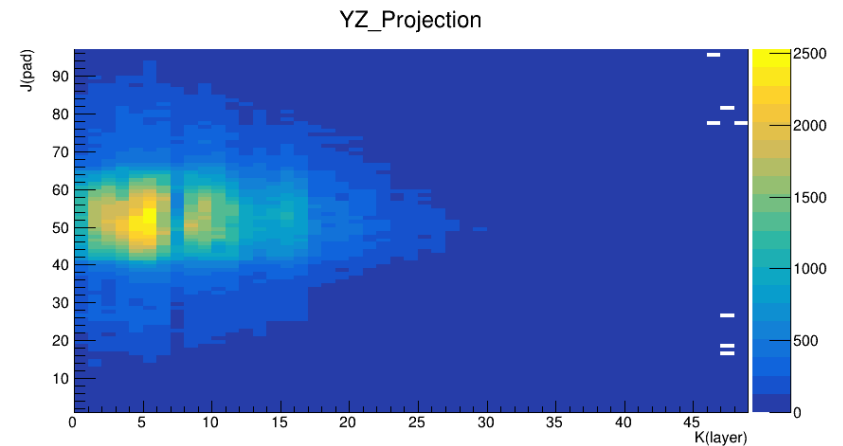Run: 728455 – SPS ; 22.46 Degrees

XZ_Projection

XY_Projection

YZ_Projection

Applying cuts. Showers Profile − 4GeV

Muons/Cosmics $\rightarrow$ $(\rho < 3\ or\ Hit_{Max2} < 5) + P.C.$ P.C. Separates Muons and Cosmics

Run: 728661 − PS ; 20 Degrees

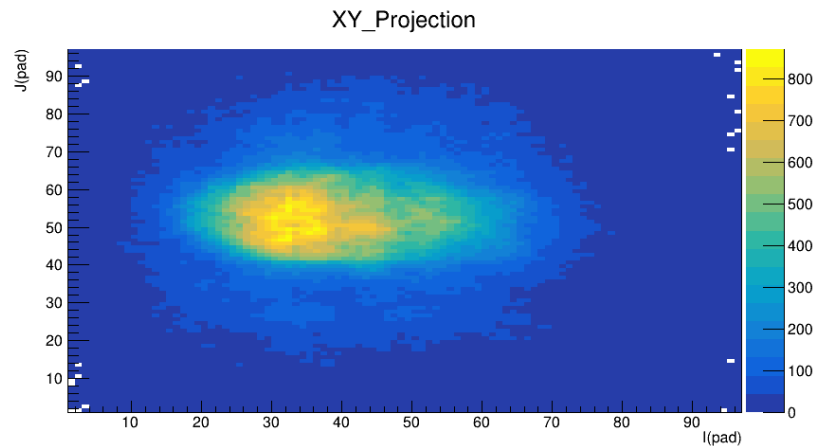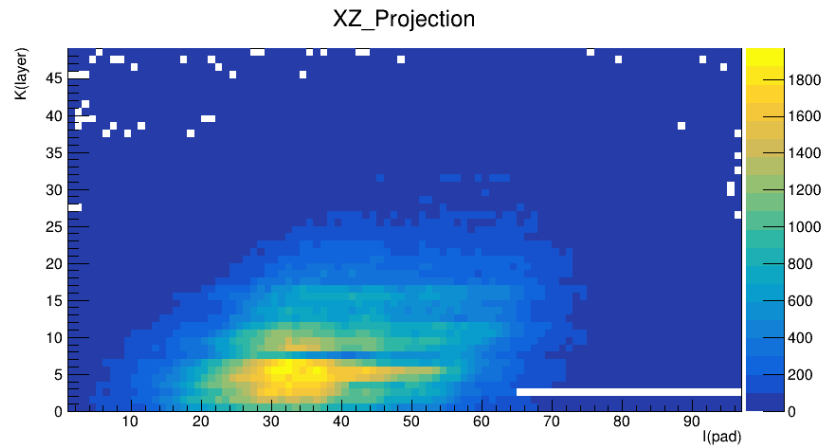# *Applying cuts. Muons Profile – 4GeV*

Muons/Cosmics $\rightarrow$ $(\rho < 3\ or\ Hit_{Max2} < 5) + P.C.$ P.C. Separates Muons and Cosmics

Run: 728661 – PS ; 20 Degrees
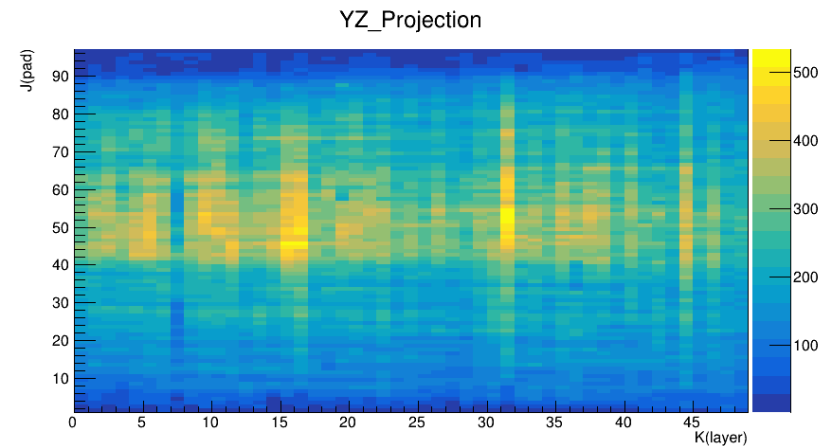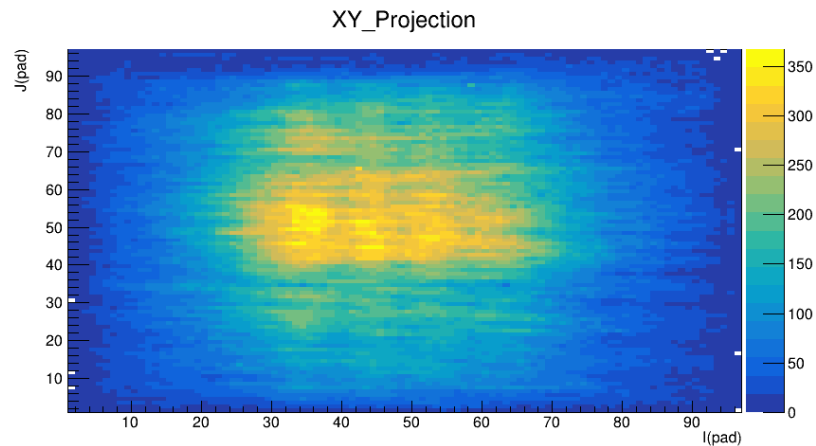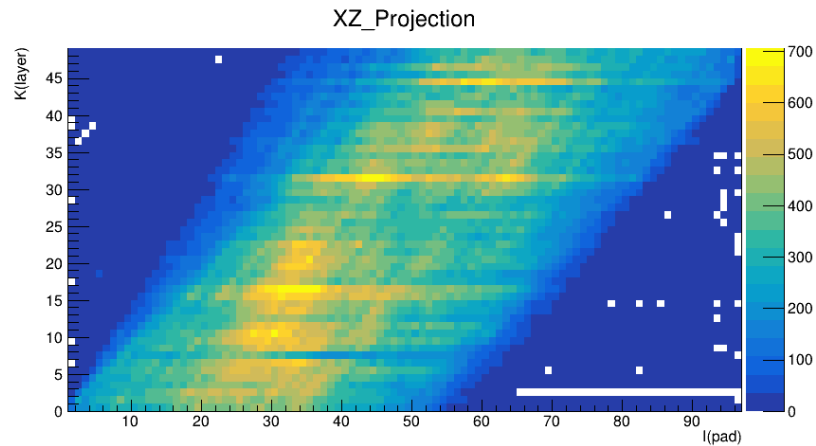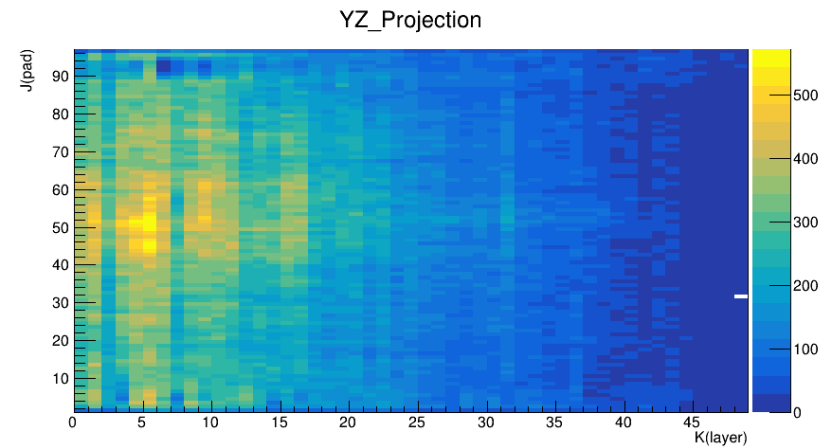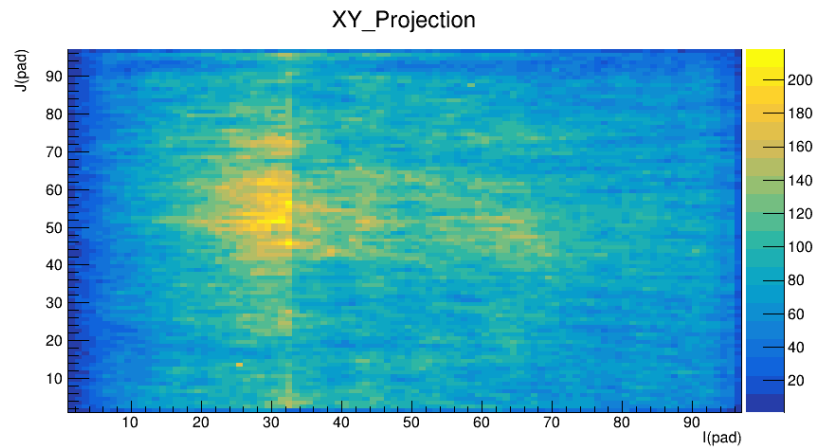
Applying cuts. Cosmics Profile − 4GeV

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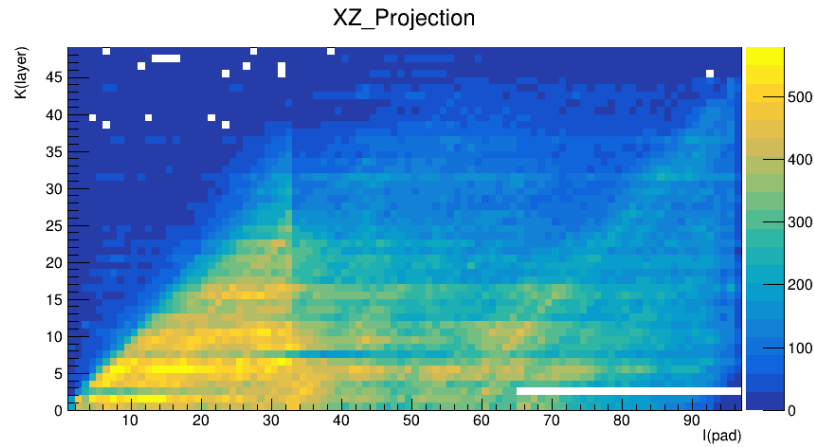
Back-up

Context

The idea of this analysis is to check the effect of the incident angle of the particles in the efficiency, multiplicity, energy reconstruction, etc.

Repository for this analysis:

https://gitlab.cern.ch/hegarcia/sdhcal-angleanalysis

Test Beams: SPS May 2015 and PS June 2015

Wide range of energies: 2 – 70 GeV Pions

Several rotation angles: 22, 20, 10 (Last one only low energies 10GeV max.)

SDHCAL: 49 layers installed in the prototype.

Raw Stream-Out

Raw *.slcio* files from 2015 are byte collections which need to be converted to CalorimeterHits.

Previous data sizes and header shifts are valid except for the DIF header size which is 24 bytes.

ASIC frames with all pads fired (64 hits) were removed at this stage.

Slow Control data (DIF and ASIC Temperature) not extracted.

Trivent v0.3

The CalorimeterHit collections are used to make the time event reconstruction and encoded.

Adapted to accept the current *json* format of the mapping file.

Still unfamiliar with the Gain Correction, turned off.

Cuts:

- Total Nhit in the readout < 200000 (electronic noise cut)
- Nhit > 7 to start the time reconstruction
- Nlayers with signal > 7