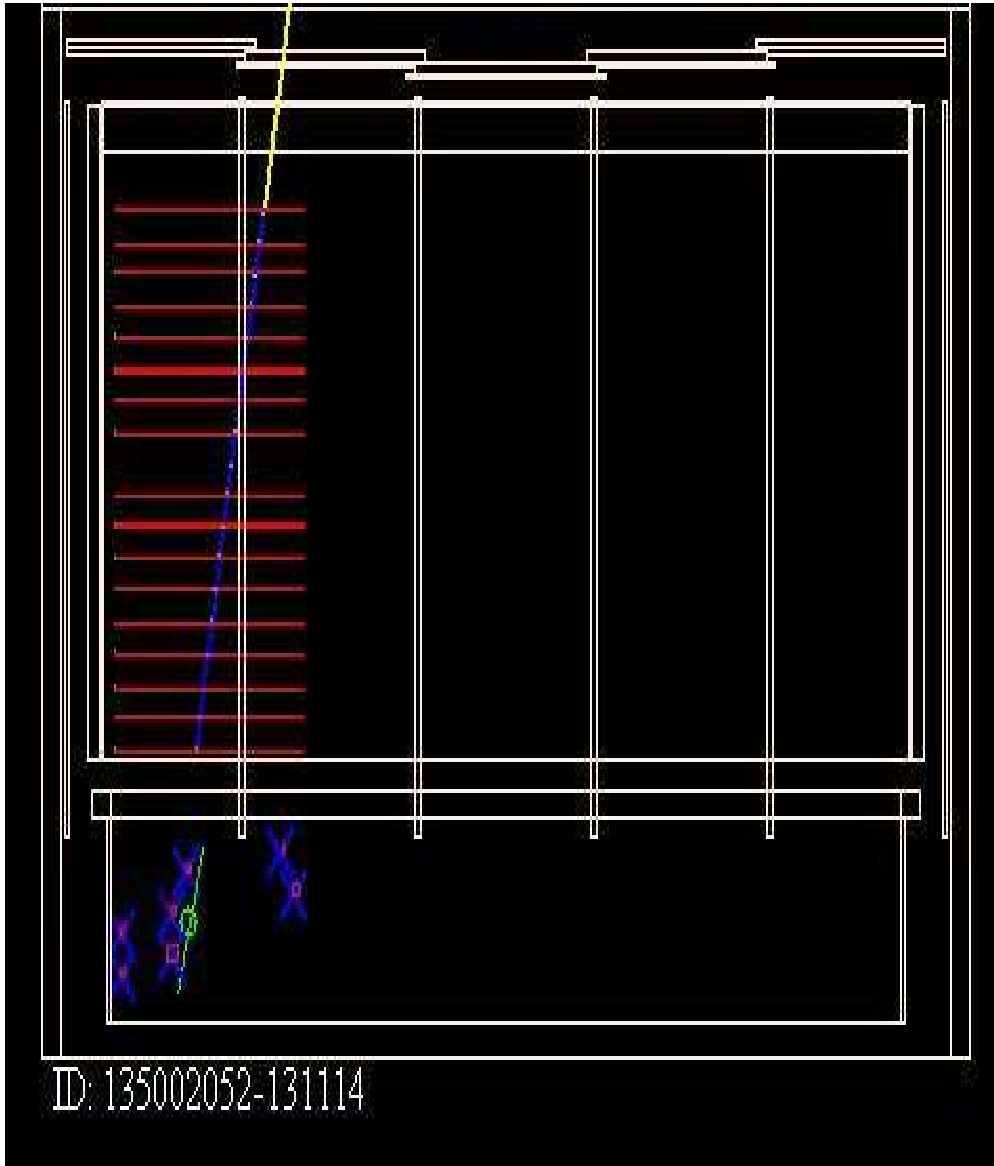
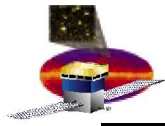


ToT saturated events: a preliminary study



ID: 135002052-131114

N.Giglietto-M. Brigida
F.Giordano

Science
Verification,
Analysis and
Calibrations

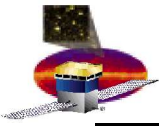


A study on the events saturating ToTs

- Question: **ToT values in saturation are really high energy deposit?**
- Answer: **probably yes, but not easy to demonstrate**

Strategy to understand this simple situation:

- 1) **define** a clean class of event (i.e **muons**)
- 2) **look to the ToT distribution and compare** with the whole distribution
- 3) **event display** to verify



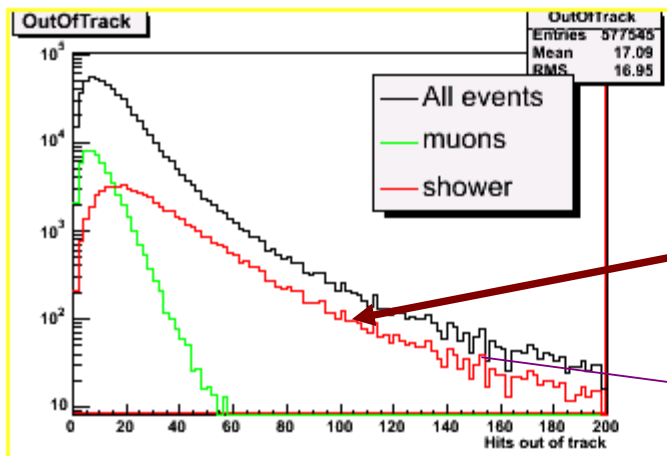
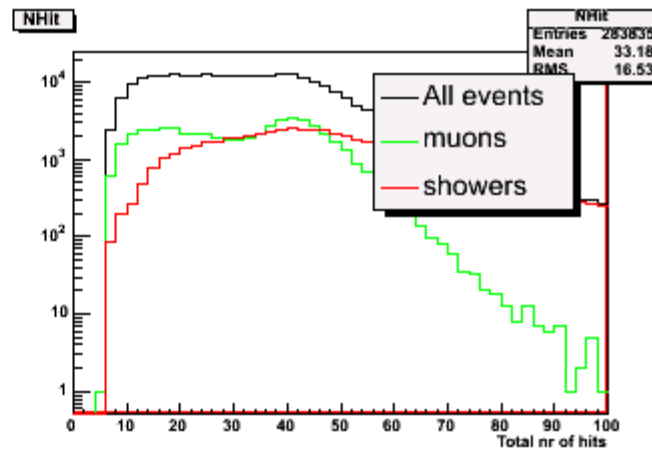
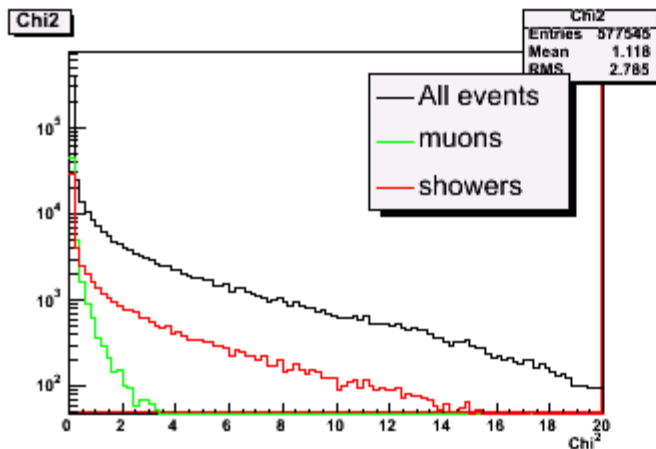
Muon definition

We define as **muon** the event with the following characteristics:

- **Single track**
- **1 Mip** deposit in calorimeter ($0.6 < \text{CALMIP} < 1.3$)
- Moreover we use almost vertical event ($Z_{\text{dir}} < -0.95$)

What are the keys to select shower?

- Showers should be characterized by many hits or many tracks or bad χ^2 in the reconstruction

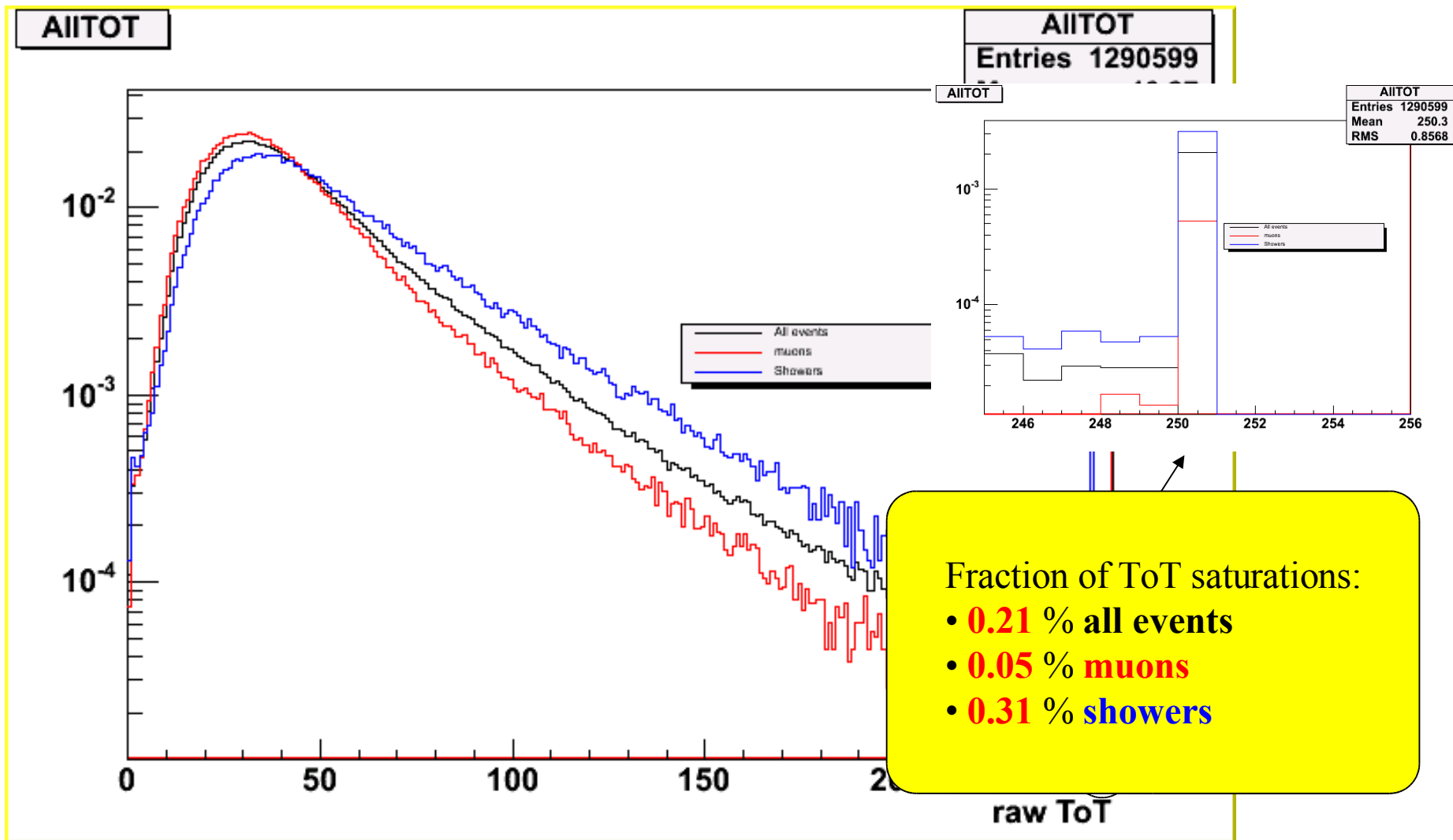


Here shower is defined
as $TRACK > 1$ or event with
 $CALMIP > 1.3$

Showers are characterized by
Many hits out of track ($> 40-60$)
or bad χ^2 in the first track
or many total hits ($> 70?$)

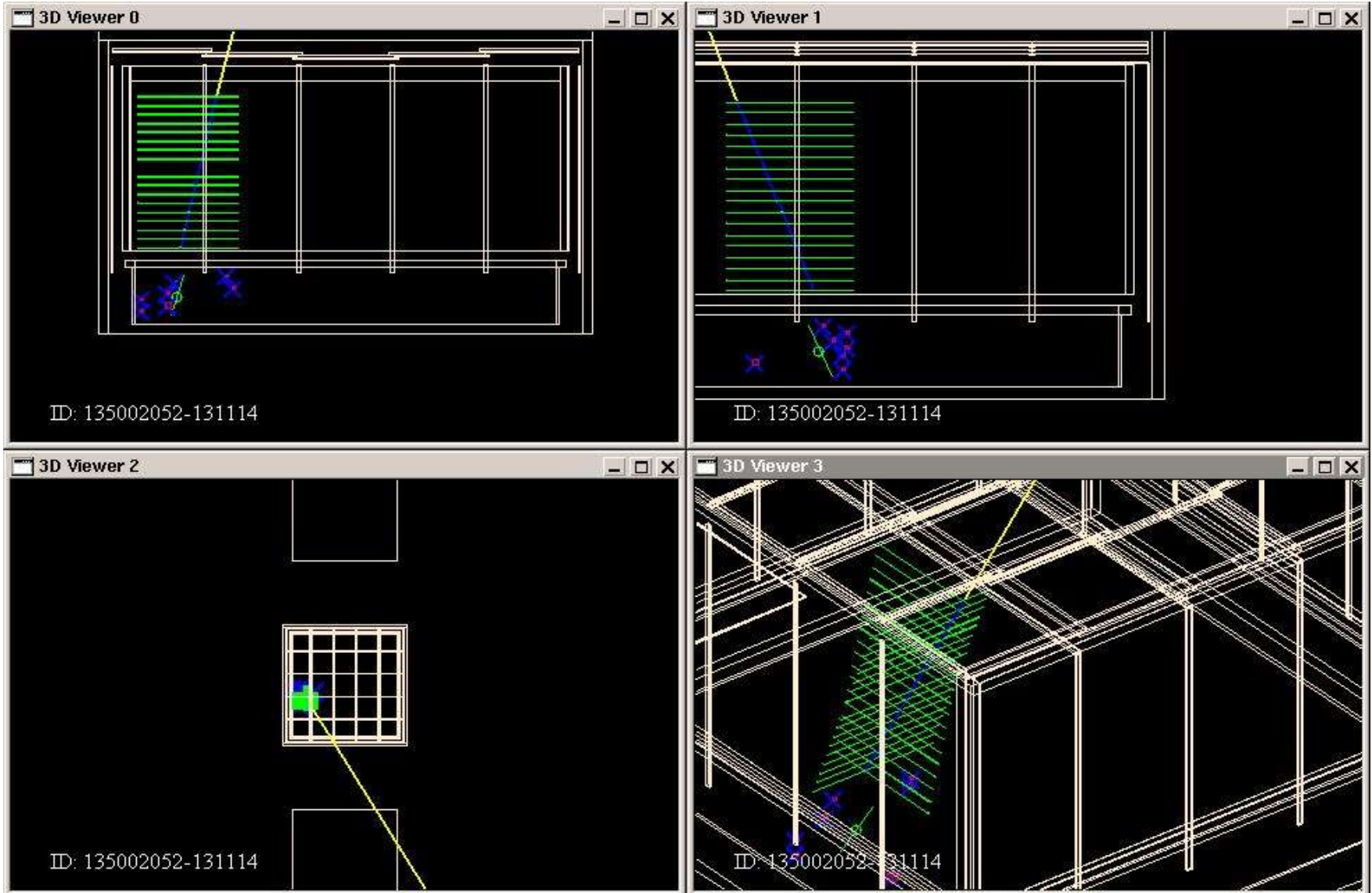
ToTs

All ToTs in all active layers



Examples: good muons

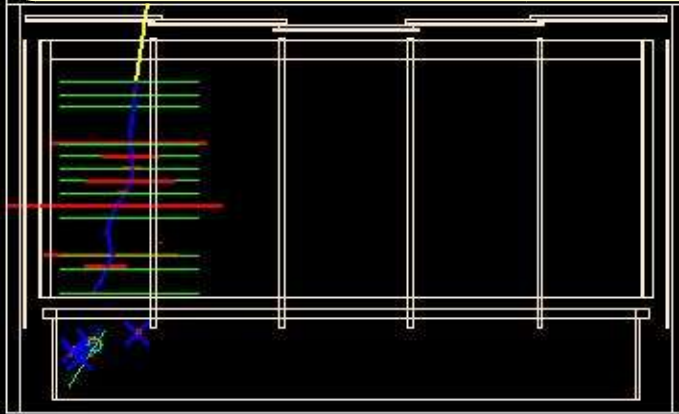
Good muons have few hits outside the track



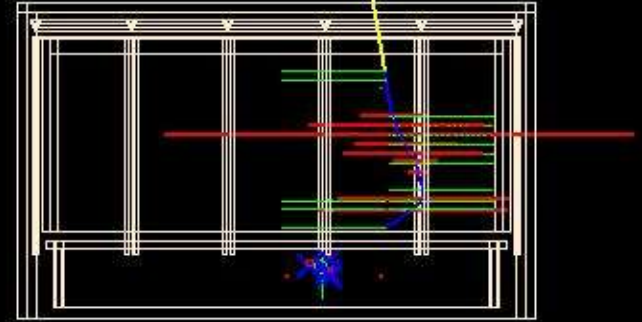
Examples: bad muon

72 total hits, 56 out of track

3D Viewer 0



ID: 135002052-131652



ID: 135002052-131652

3D Viewer 2



ID: 135002052-131652

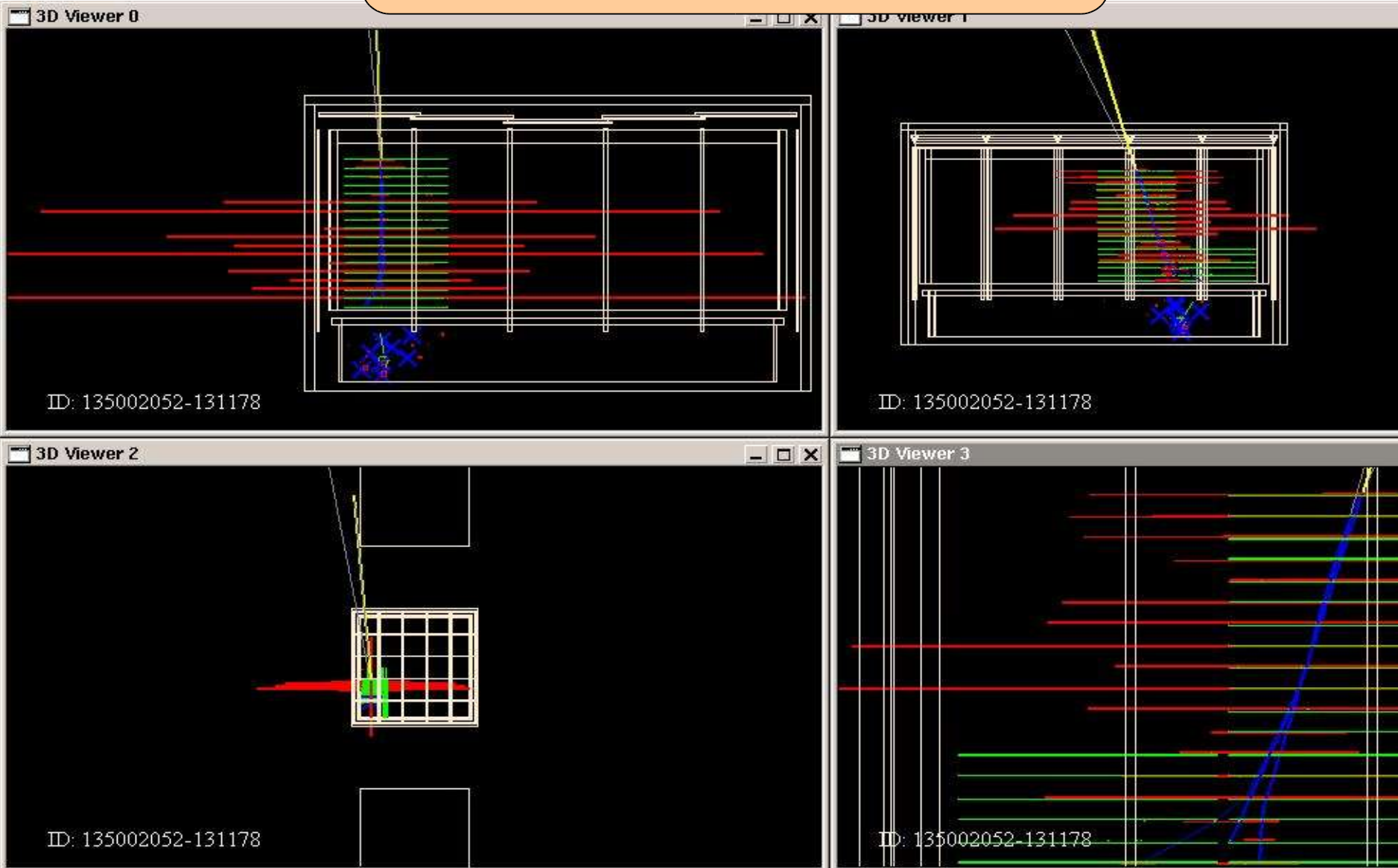
3D Viewer 3



ID: 135002052-131652

Shower

205 total hits/172 out of track



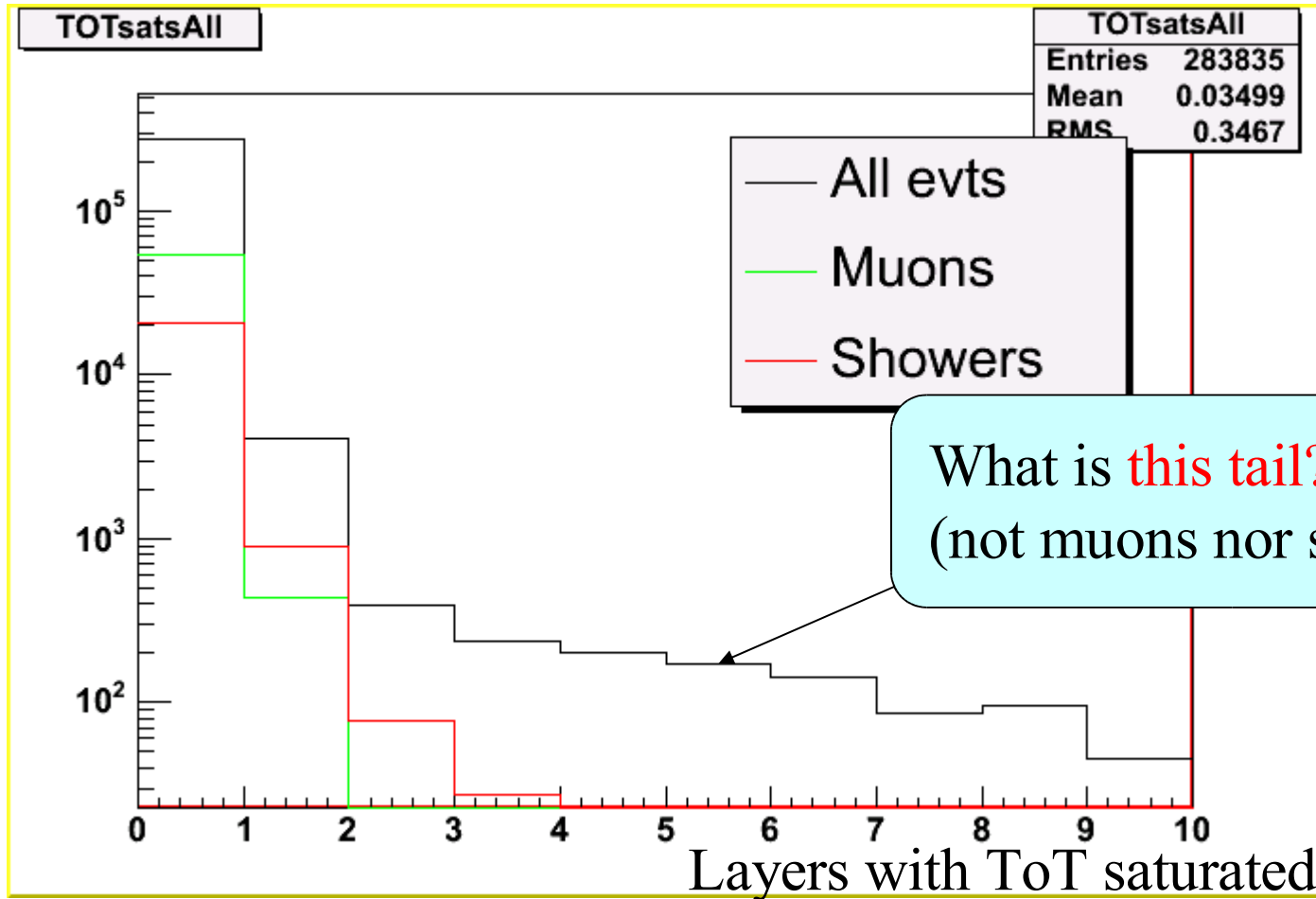
Conclusions-1

- **Muons** have **fewer** fractions of ToT saturations
- **Showers** (defined looking only hits or CAL) have a **larger** fraction of ToT saturations

ToT saturations indicates really
large energy deposits

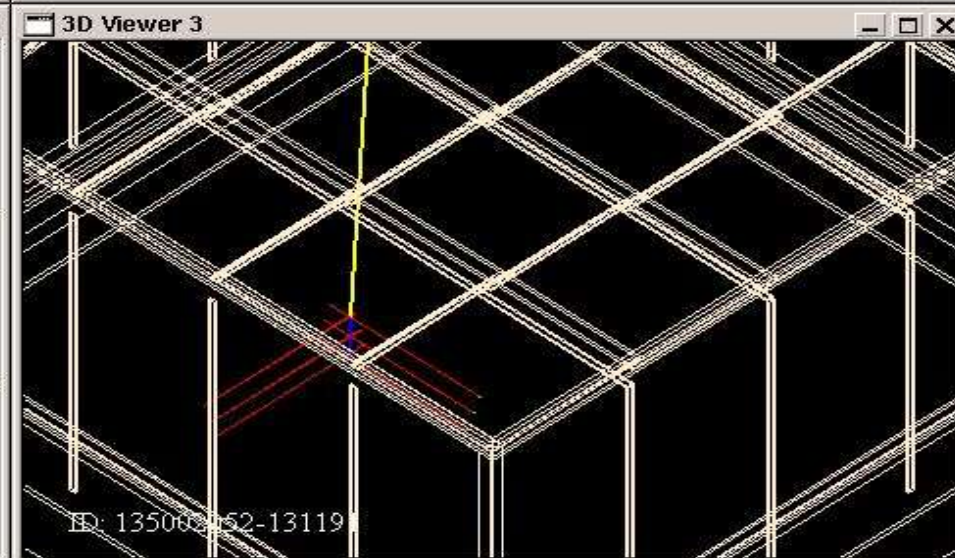
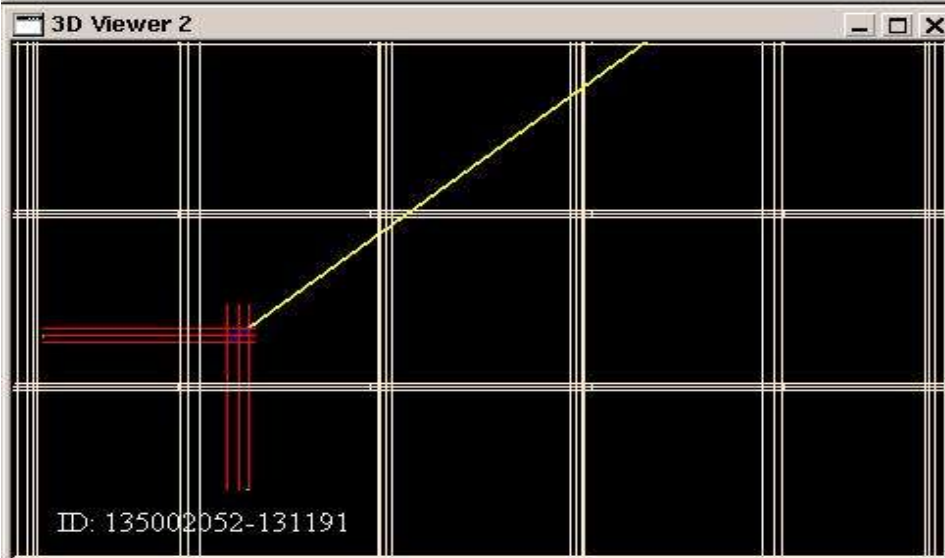
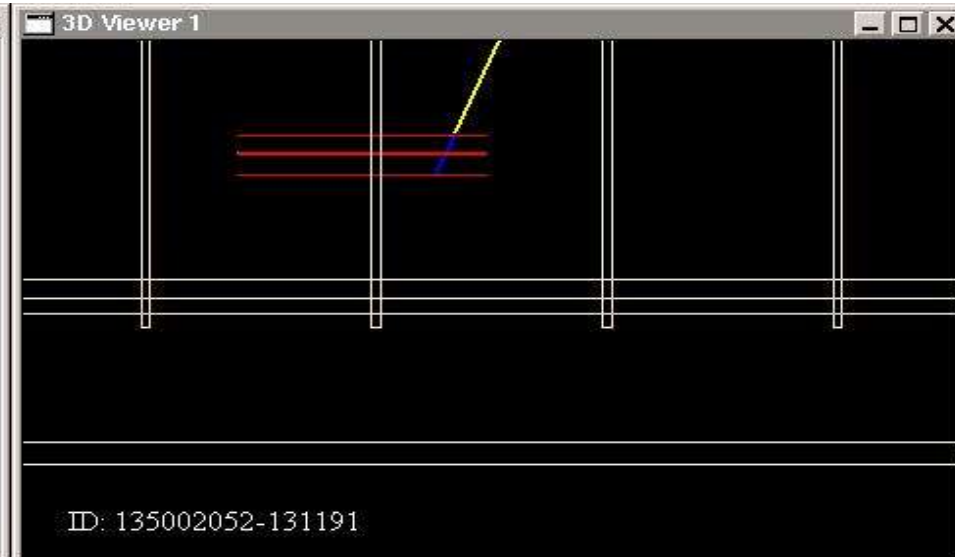
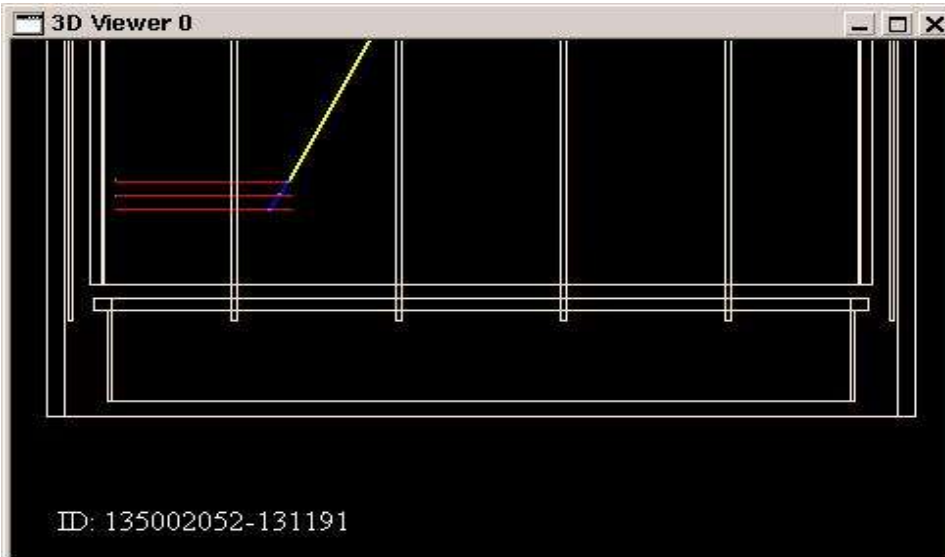
Everything ok?

Damn!



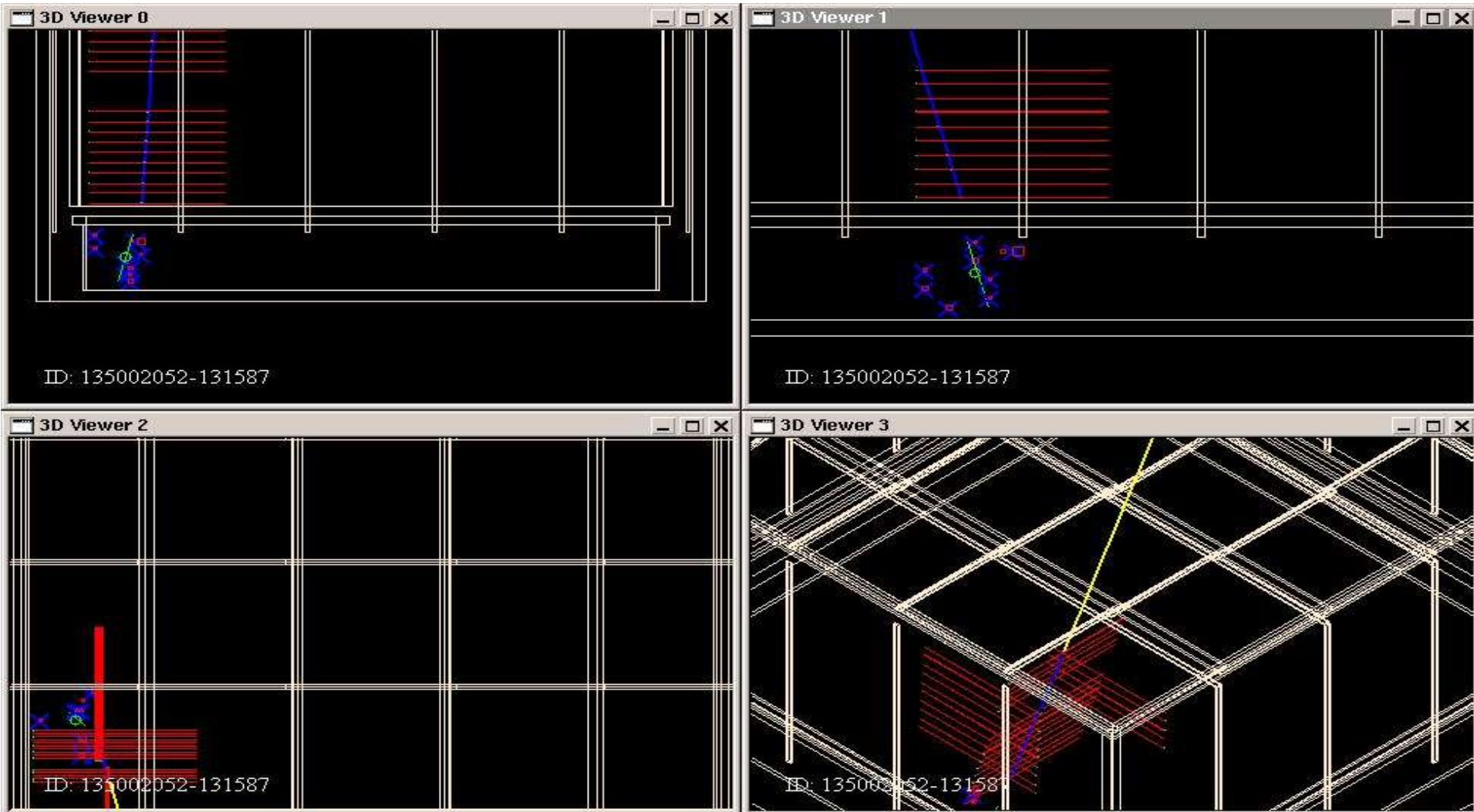
Events with a lot of saturations (>1)

Nothing strange but 11 hits (5 out of track) and 4 arrays in saturation



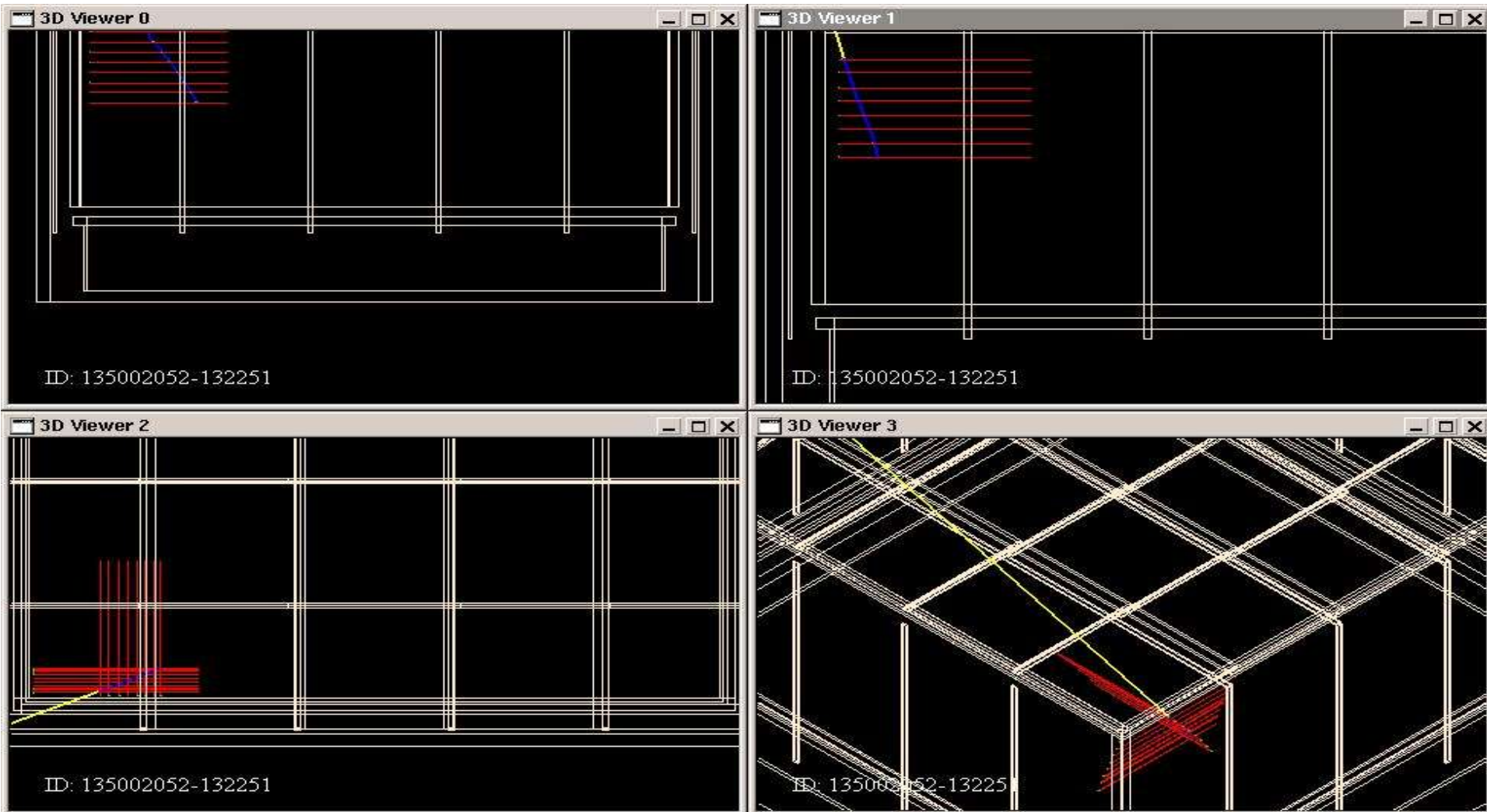
Examples-2

High energy event? 31 hits 5 arrays ToT-saturated

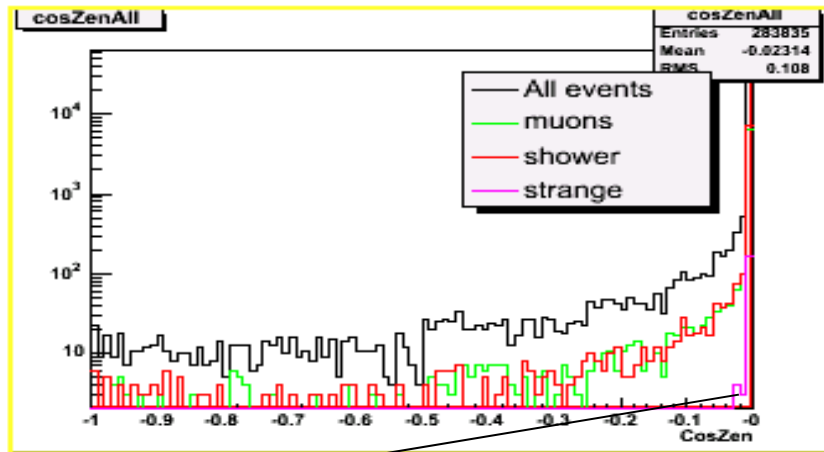
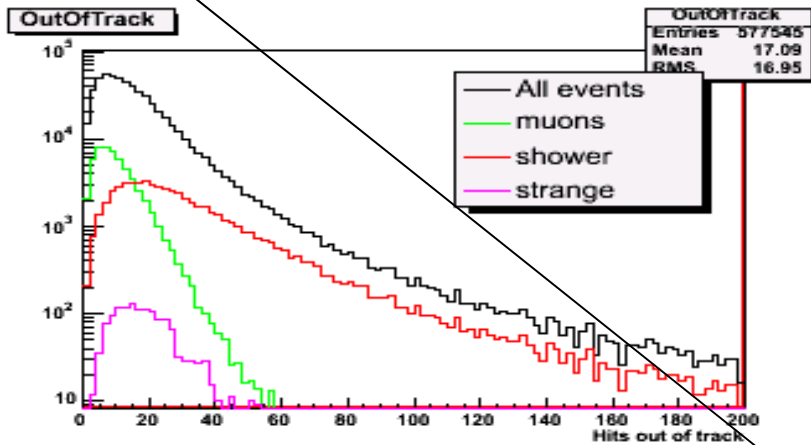
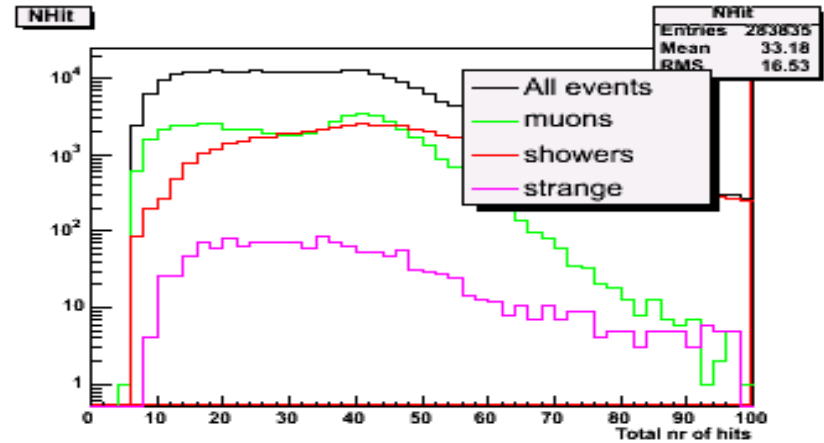
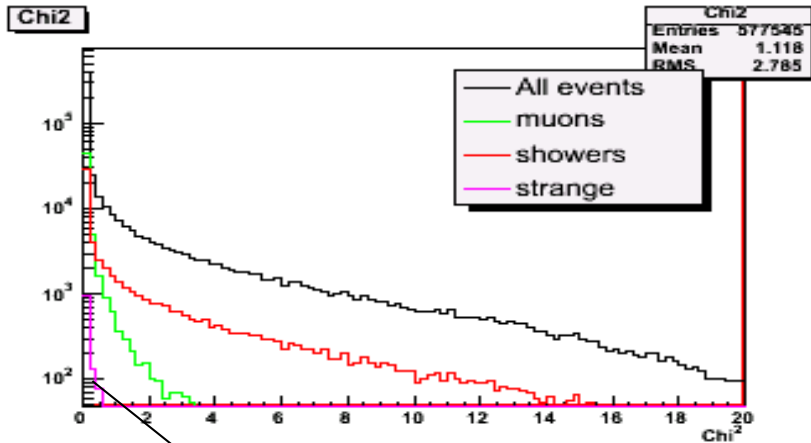


Example-3

Clean muon but 37 hits 21 out of track and 9 arrays in saturation



A look on these events



Probably too short tracks

Conclusions-2

Are these events physical?
Probably **yes**: many short tracks
or large zenith events
(and bad reconstruction)