FIRST STEP IN ROOT ANALYSIS:THE ANGULAR DISTRIBUTION OF COSMIC RAYS

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Lecce

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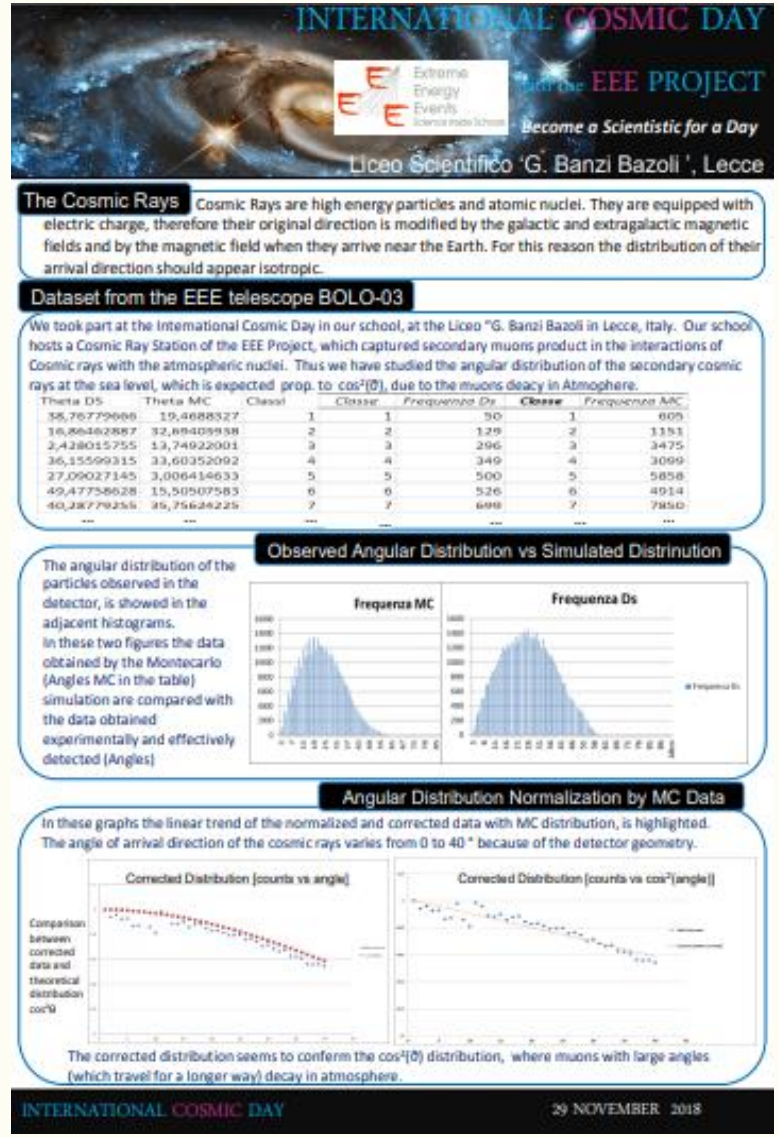
PRESENTATION OF THE SCHOOL

- EEE project in our school
  - LECC-01 Telescope since 2005
  - Elog BOOK
- Activities about EEE project:

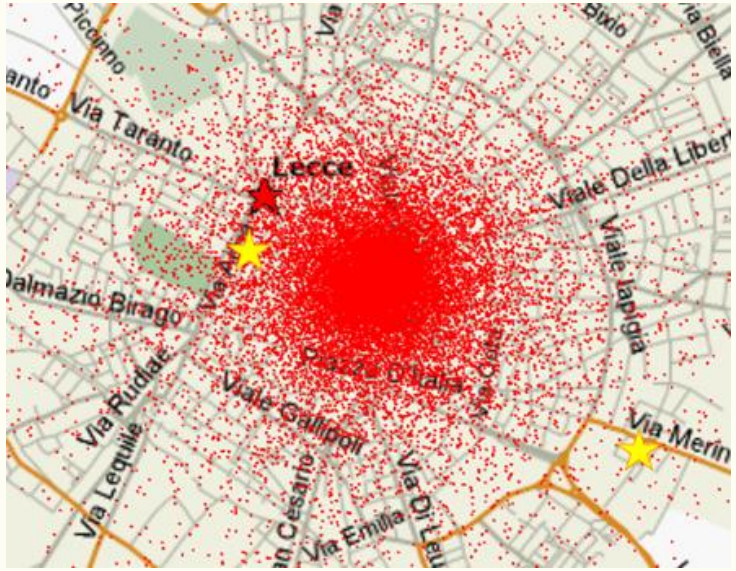
1. International Cosmic Day 2018/19
2. Specialization course of second classes
3. Data analysis didactic project
   - First approach with software
   - Histogram plot
   - Discussion of results

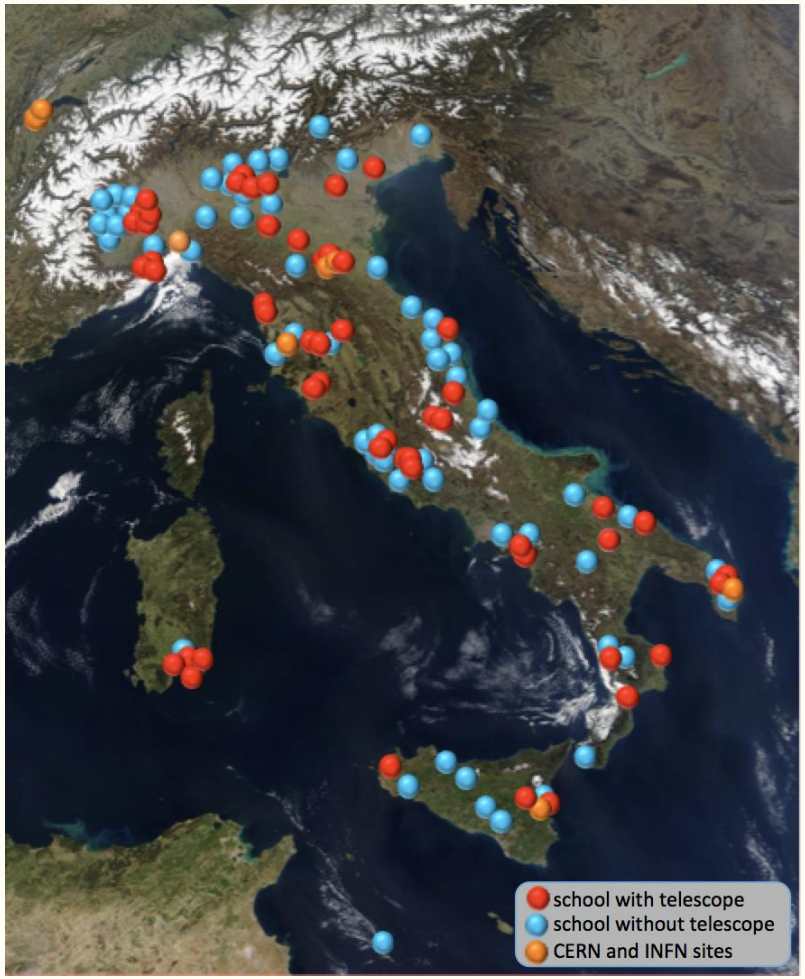


DATA ANALYSIS DIDACTIC PROJECT

The course's targets were:

- Analyze data of telescopes scattered in Italy
- Undestand how energy of the particles affects on THETA and BETA.





FIRST APPROACH WITH SOFTWARE

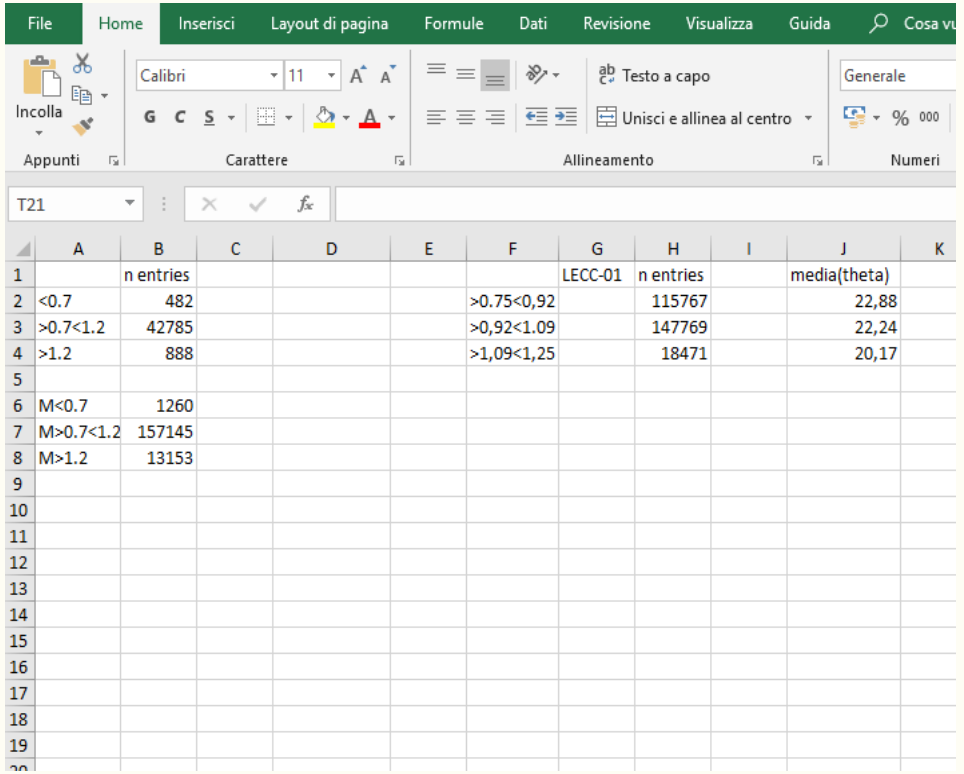
- DATA REQUEST

Request a subset of data

Submit | Preview | Back

Entry time:	Tue Mar 5 16:05:51 2019
Author:	LECC-01
MC:	☐
Output format:	ROOT
Telescope ID:	ALTA-01
Start time:	February 28 Year: 2019
Stop time:	February 28 Year: 2019
RunNumber:	☑
Seconds:	☐
Nanoseconds:	☐
Theta:	☑
Phi:	☐
ChiSquare:	☑
TimeOfFlight:	☑
TrackLength:	☑
DeltaTime:	☐
Pressure:	☐
Cut:	ChiSquare < 10 && RunNumber > 20 && RunNumber< 30

- EXCEL



	A	B	C	D	E	F	G	H	I	J	K
1		n entries					LECC-01	n entries		media(theta)	
2	<0.7	482				>0.75<0,92		115767		22,88	
3	>0.7<1.2	42785				>0,92<1.09		147769		22,24	
4	>1.2	888				>1,09<1,25		18471		20,17	
5											
6	M<0.7	1260									
7	M>0.7<1.2	157145									
8	M>1.2	13153									
9											
10											
11											
12											
13											
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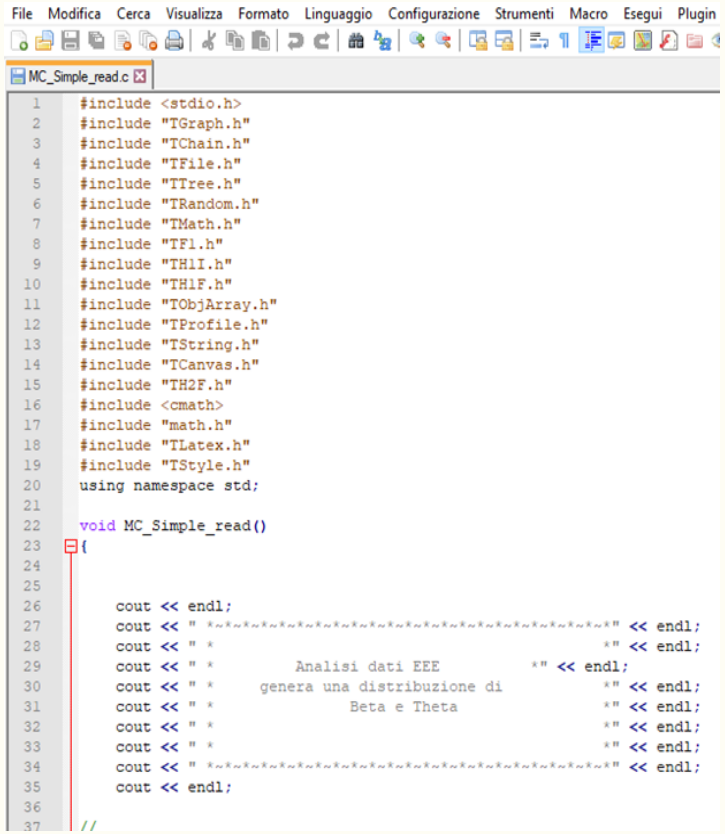
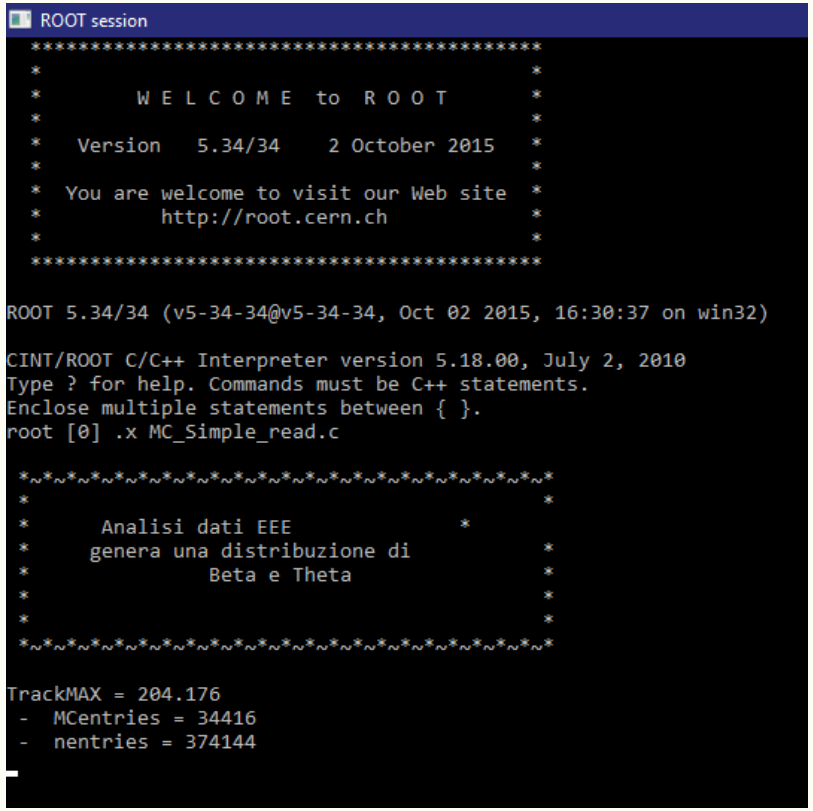
15											
16											
17											
18											
19											

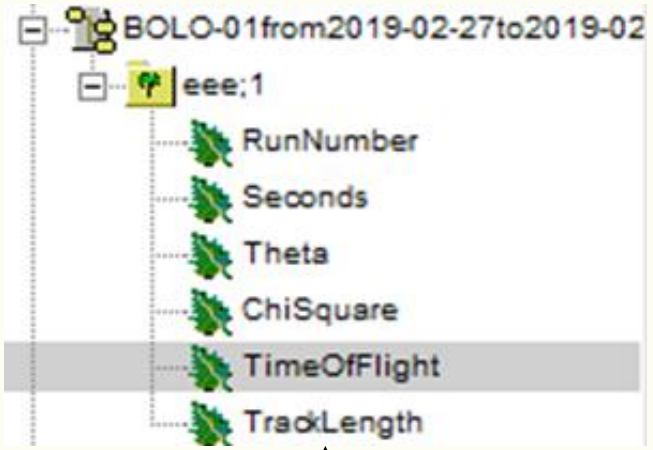
- NOTEPAD ++



- ROOT

It subdivide files in tree diagrams with branches and leaves





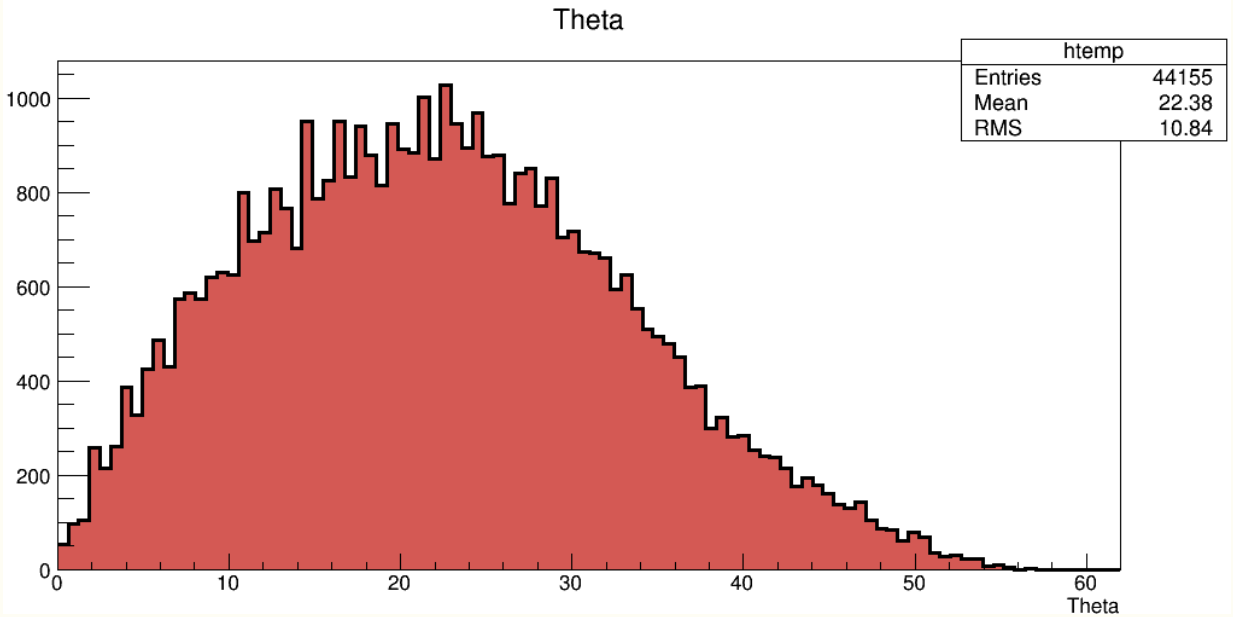
New TBrowser

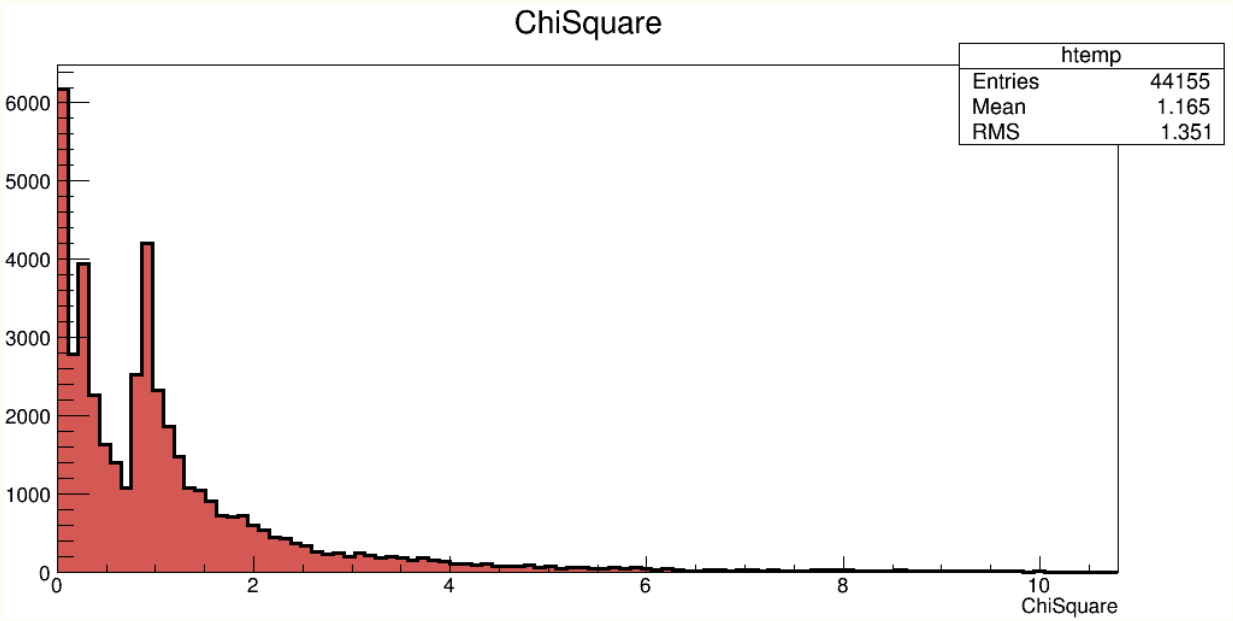
https://notepad-plus-plus.org/download/v7.6.3.html

https://root.cern.ch/download/root_v5.34.34.win32.vc10.debug.exe

ROOT

ROOT is a software created by CERN, which has the target to analyze a very large amount of data.
Before you can create the graphs, you need to write down a macro to analyze the data.





BETA

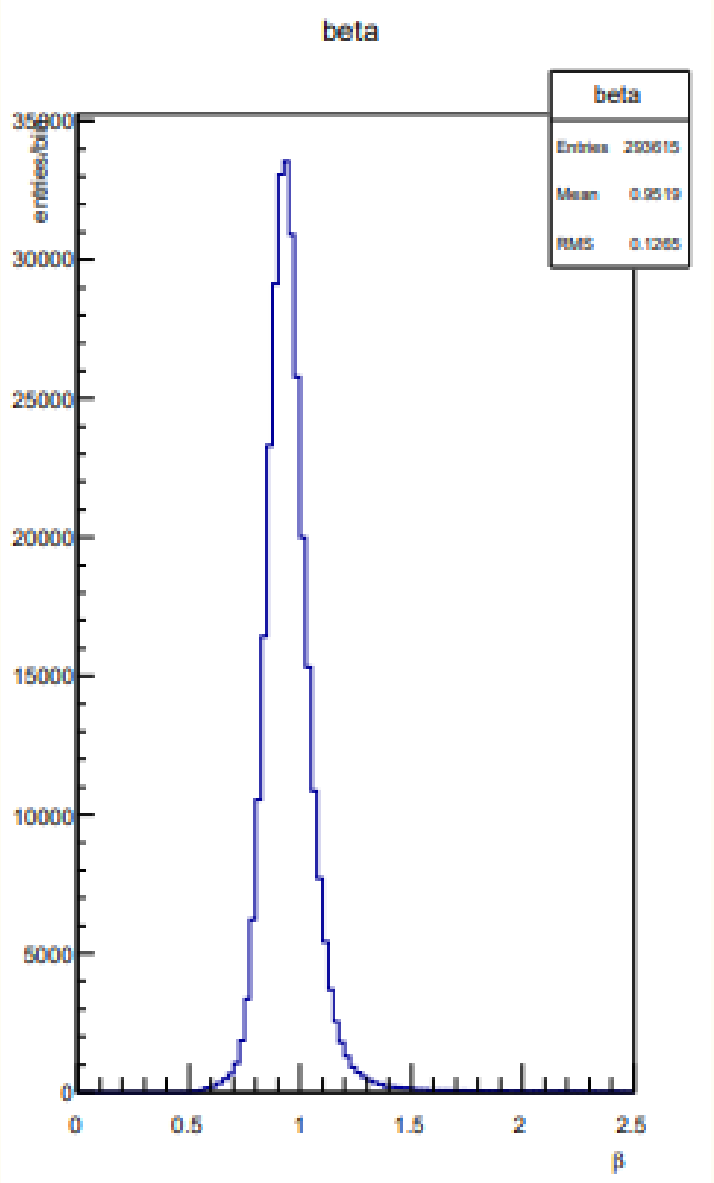
- What is BETA?

  BETA is the report between particle velocity and speed of light.

- How do you calculate?

  (Tl/ToF)/c=Tl/(ToF x c)

- Why sometimes BETA is higher than 1?



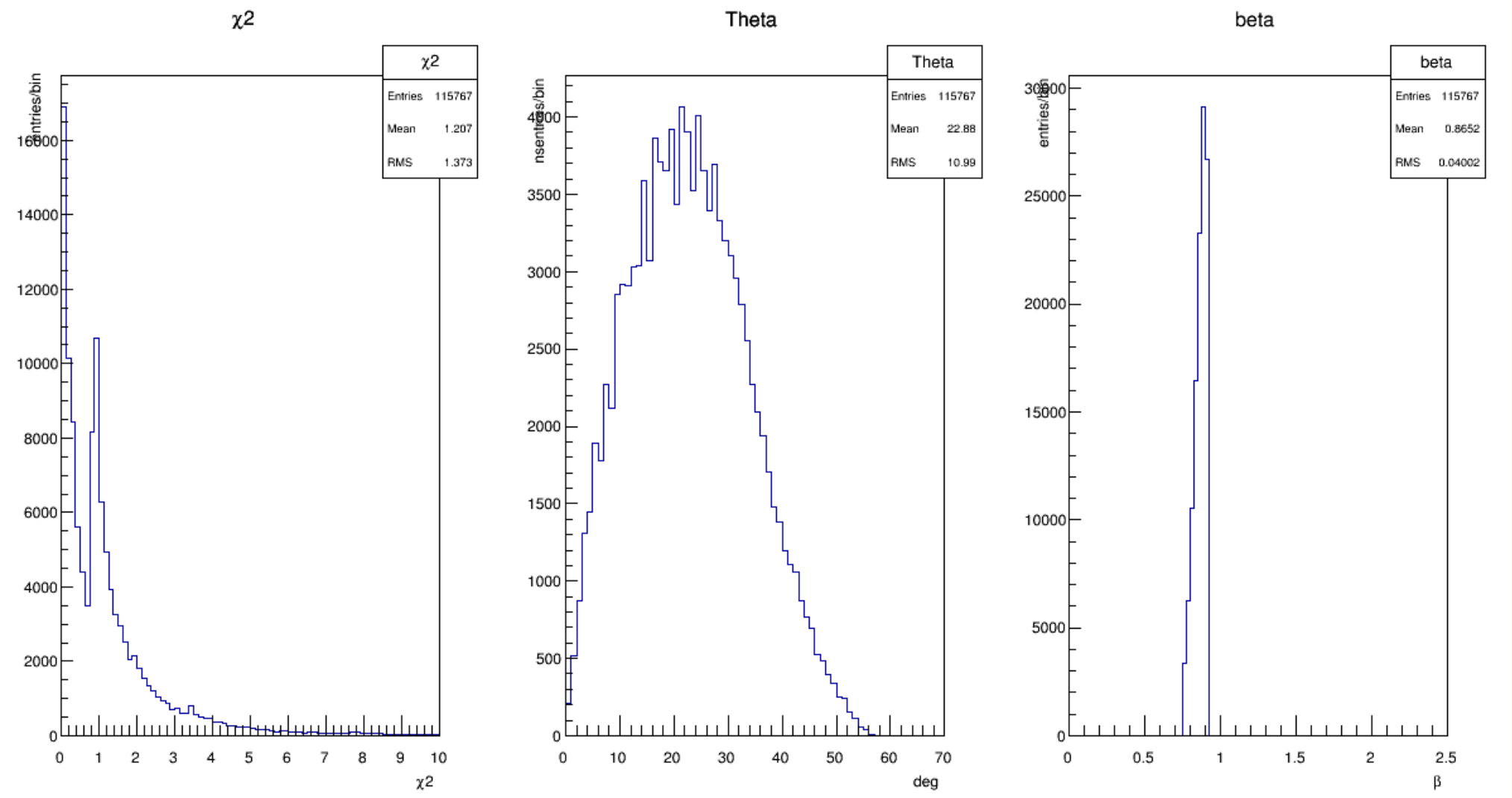
LECC-01

DOWNLOADED AND ANALIZED TELESCOPES

LECC-01

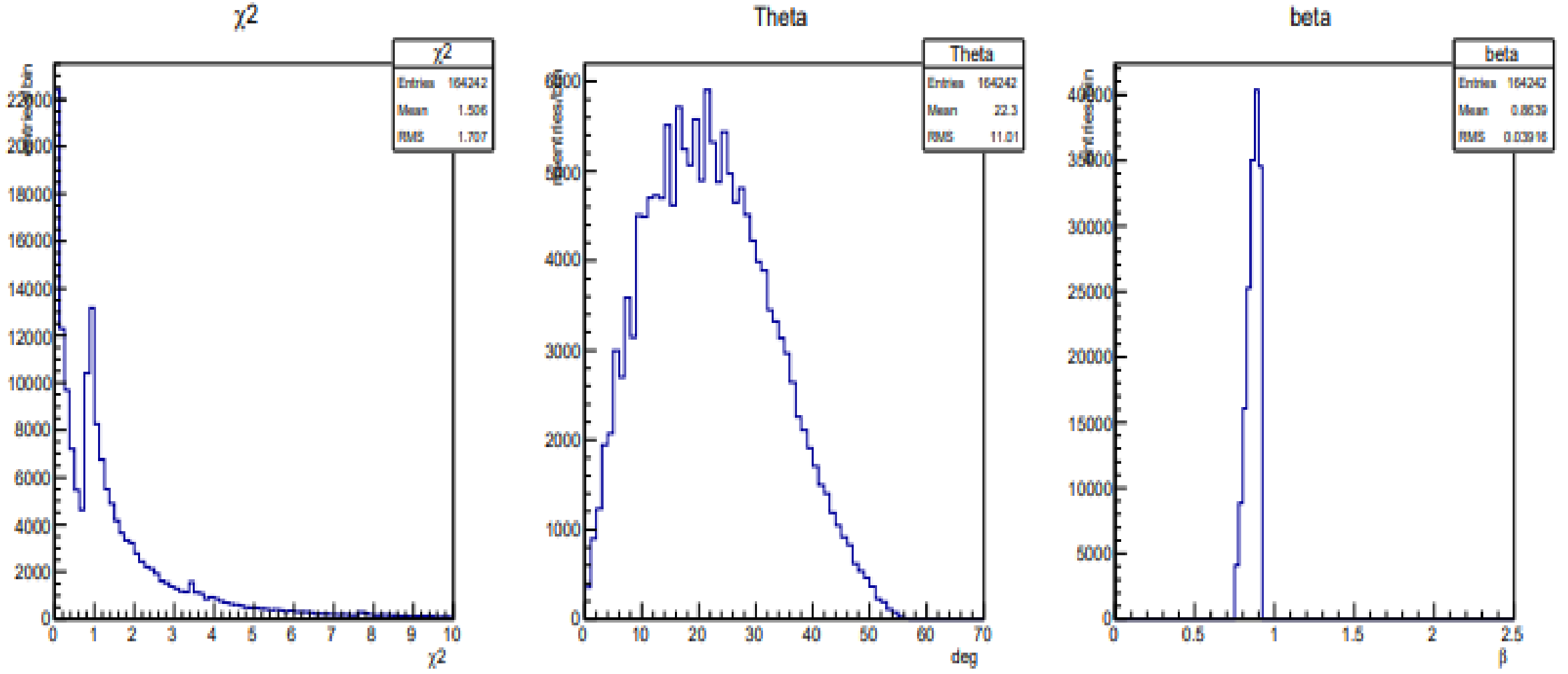
0,75<BETA< 0,92
0,92<BETA<1,09
1,09<BETA<1,25

X^2: PARAMETER THAT INDICATES THE CORRECTNESS OF THE TRACE



MEDIA THETA: 22,88

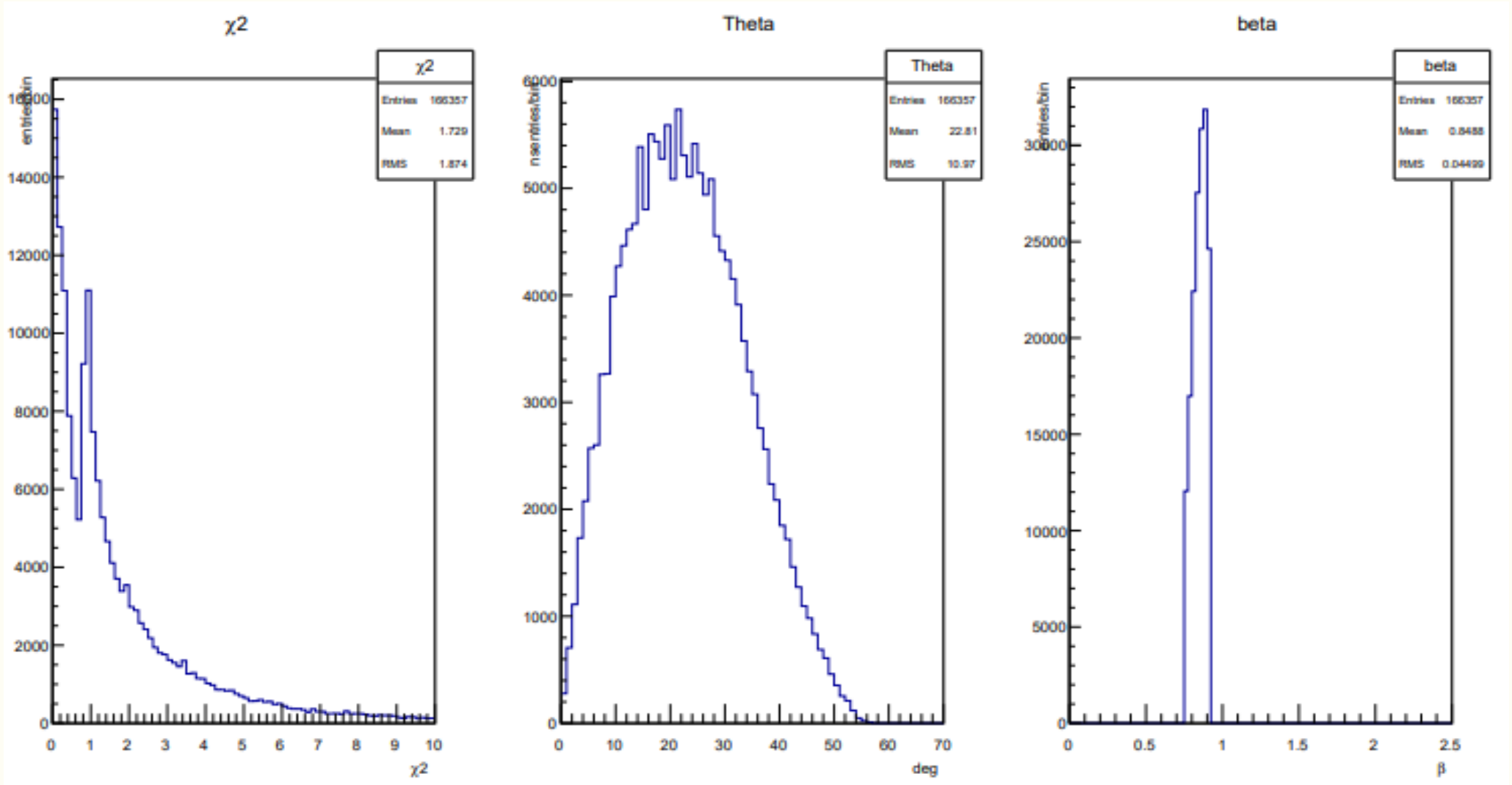
ALTA-01



MEDIA THETA: 22,30

0,75>BETA>0,92

GROS-01



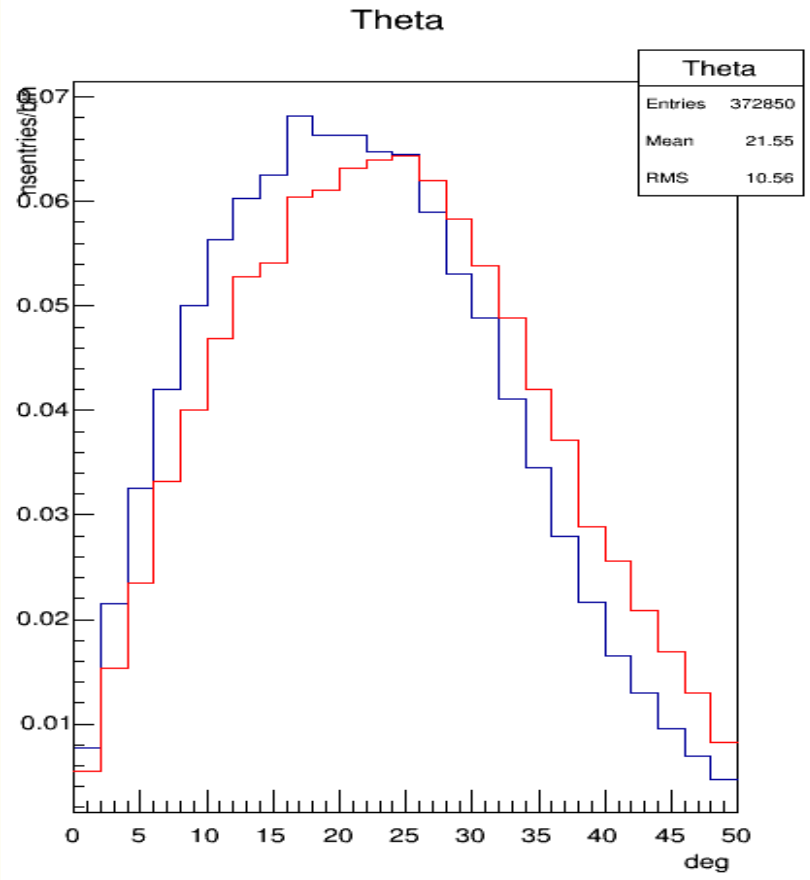
MEDIA THETA: 22,81

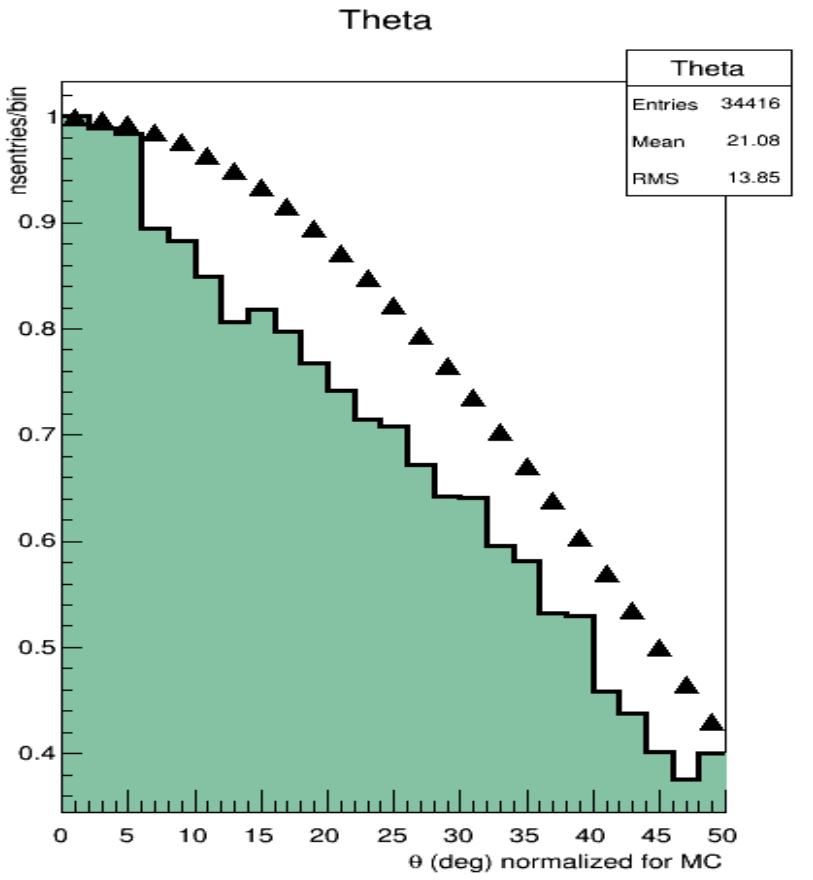
0,75<BETA<0,92

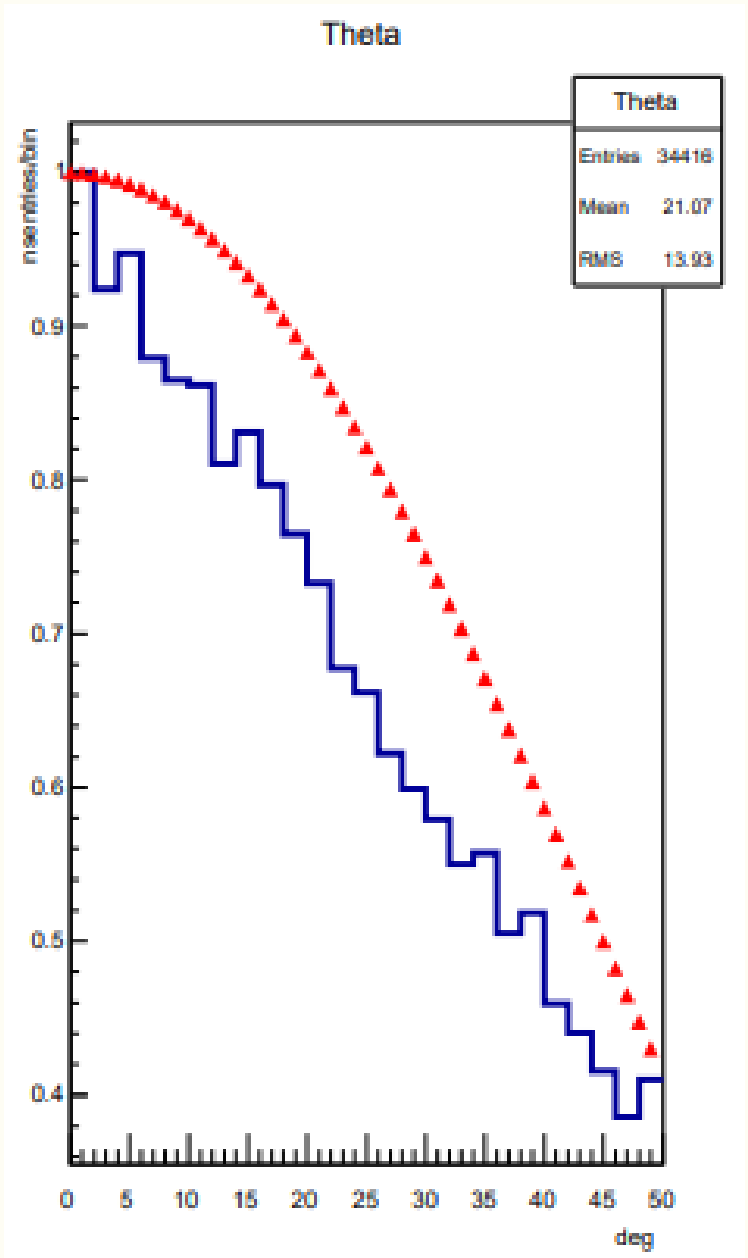
MC DATA AND REAL DATA *ICD 2018*

Montecarlo data are ramdomly generated data.

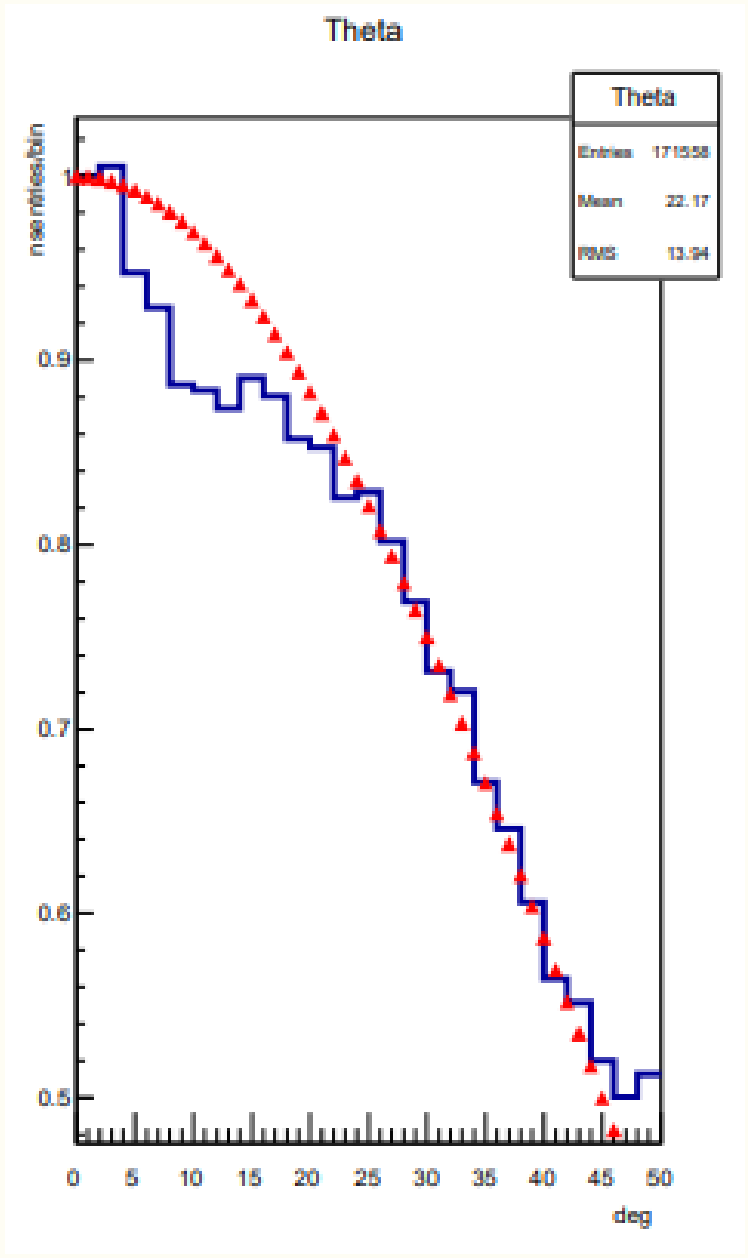
They are used to make the detector geometry indipendent to obtain a graph similar to the function: cos^2θ



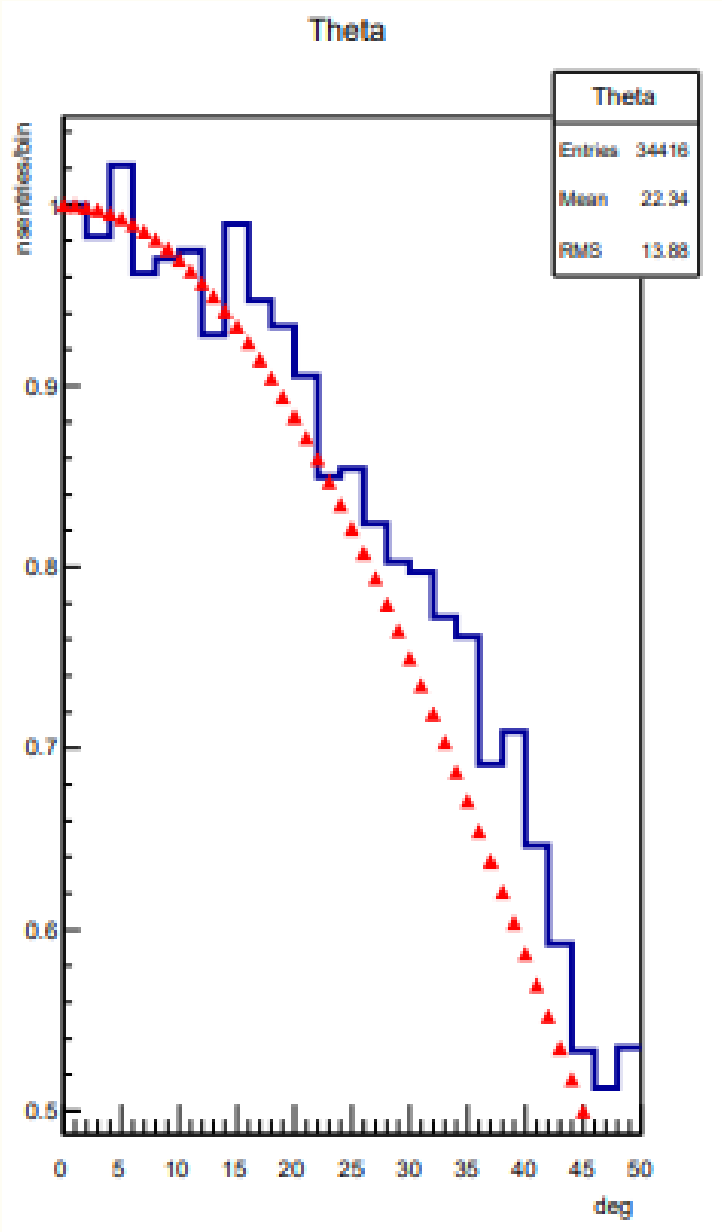




ALTA-01

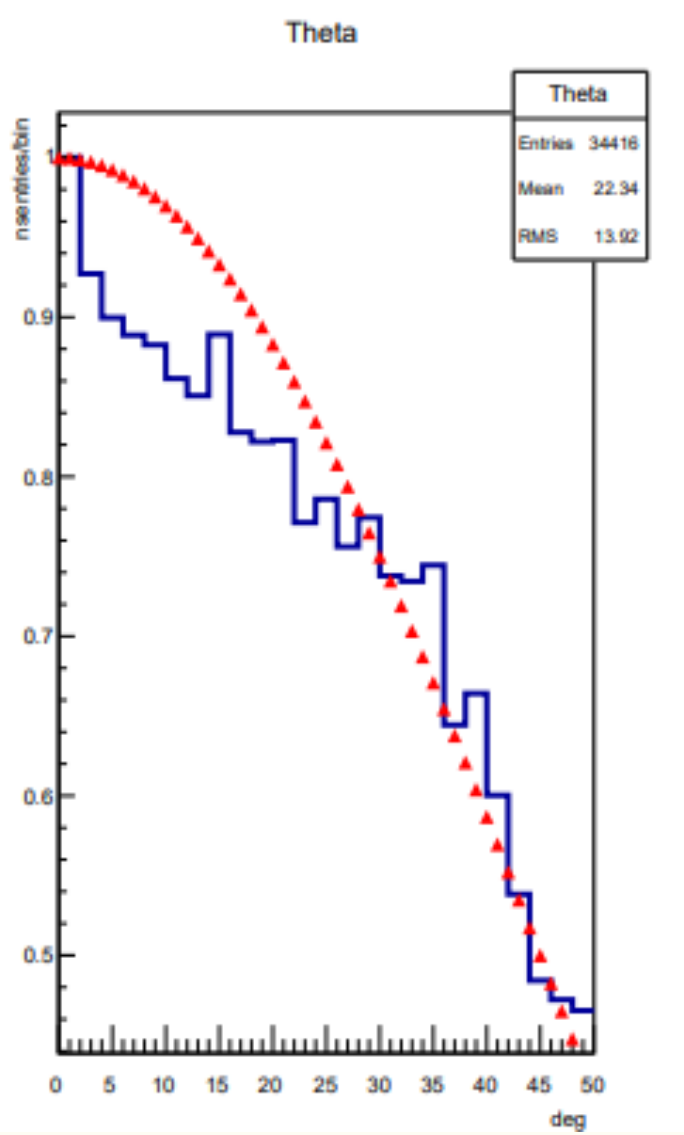


LECC-01

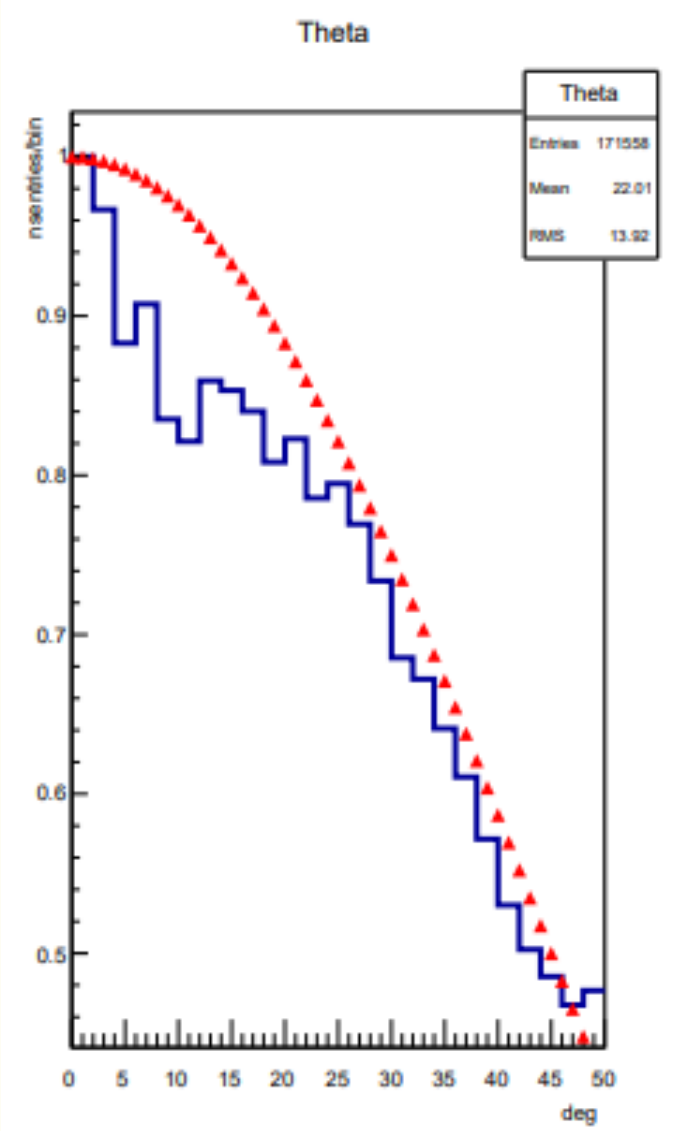


GROSS-02

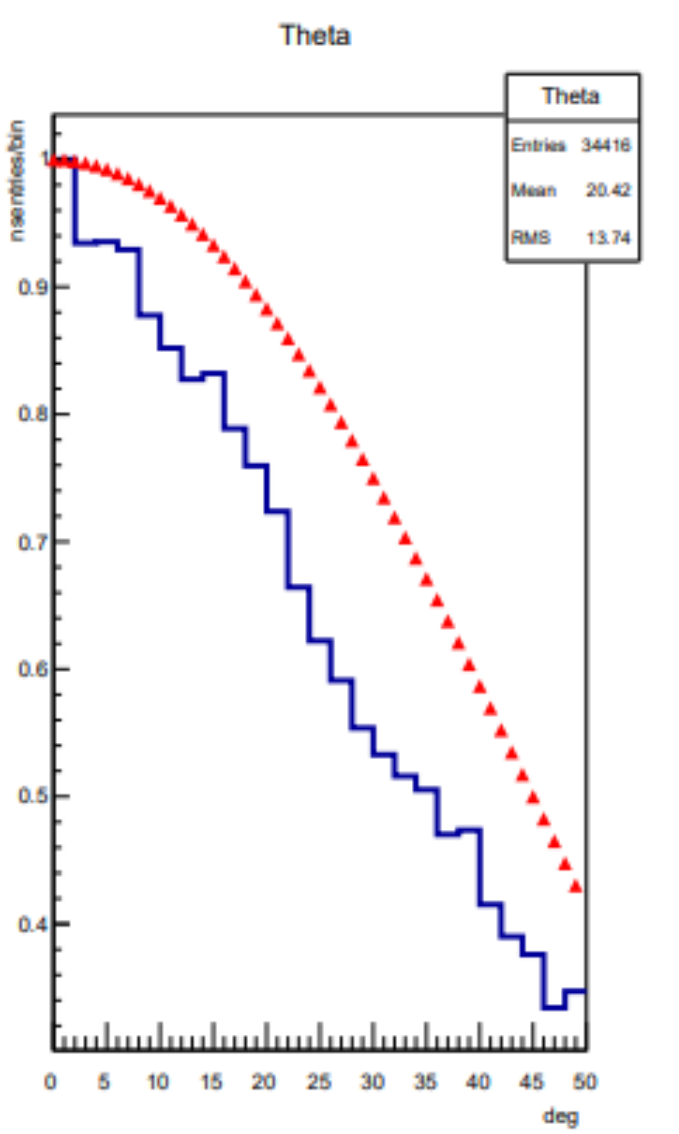
Cut: 0,92< BETA<1,09



LECC-01



GROS-02



ALTA-01

RESULTS

- THETA depends on BETA
- Influence of altitude
- The values are different from cos^2θ due to the absorption of the buildings

FUTURE PROJECT

- Study new telescopes
- Better understand normalization with MC data