# A Look at the Space from Various Angles

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# Introduction

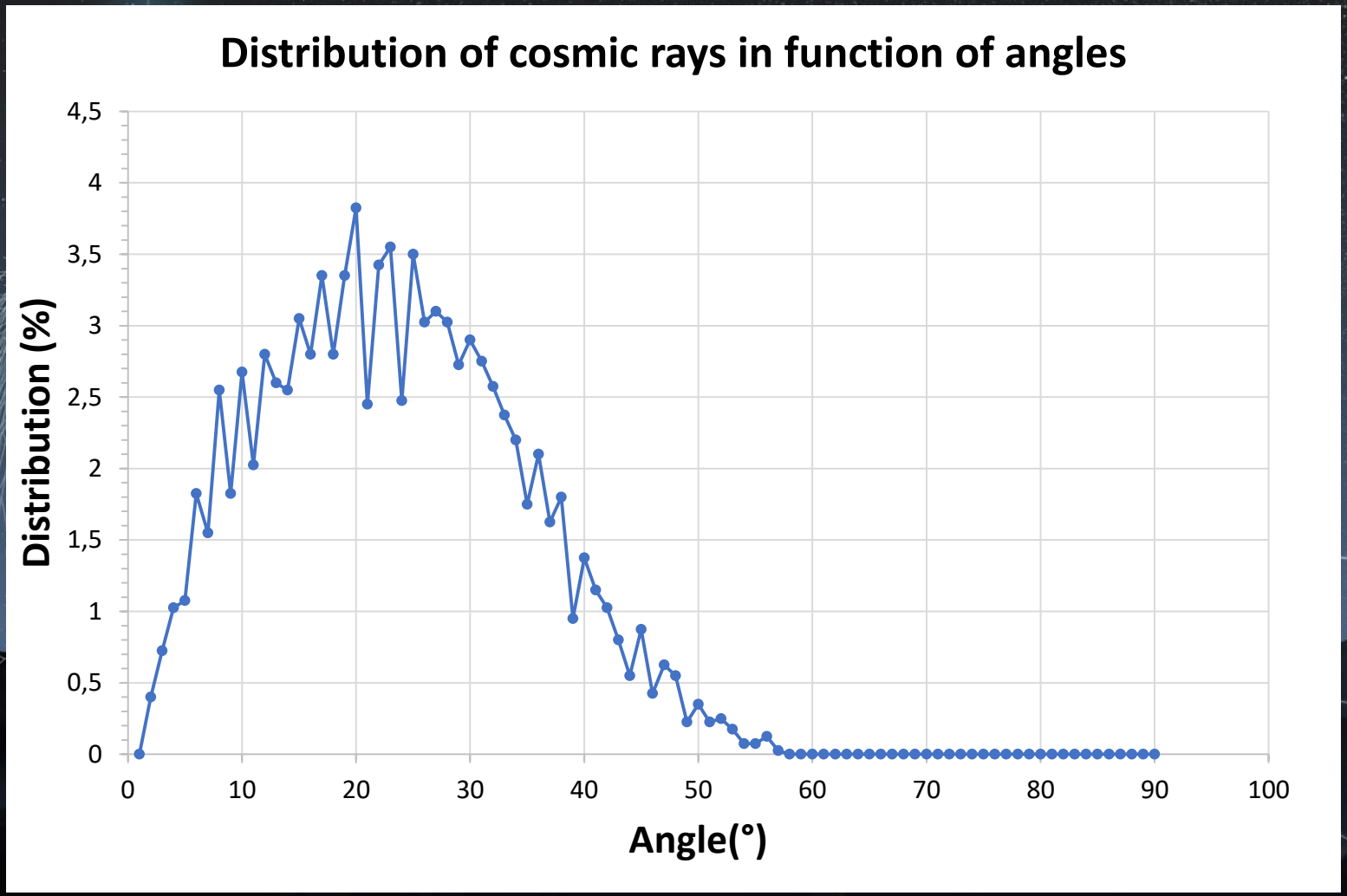
For the first experience with Centro Fermi we have focused our analysis activity on the angular distribution of secondary cosmic radiation: in particular on swarms of muons.

# Experimental Setup

The collection of data is based on two detectors which are situated in two locations in Veneto, one is Treviso (*TREV-01from2018-11-21to2018-11-21*) and the other one is Vicenza (*VICE-01from2018-11-21to2018-11-21*). By selecting the data  only regarding the zenithal angle we have eliminated uncertainties due to the instrumentation, such as chi^2 and geometrical limitations.

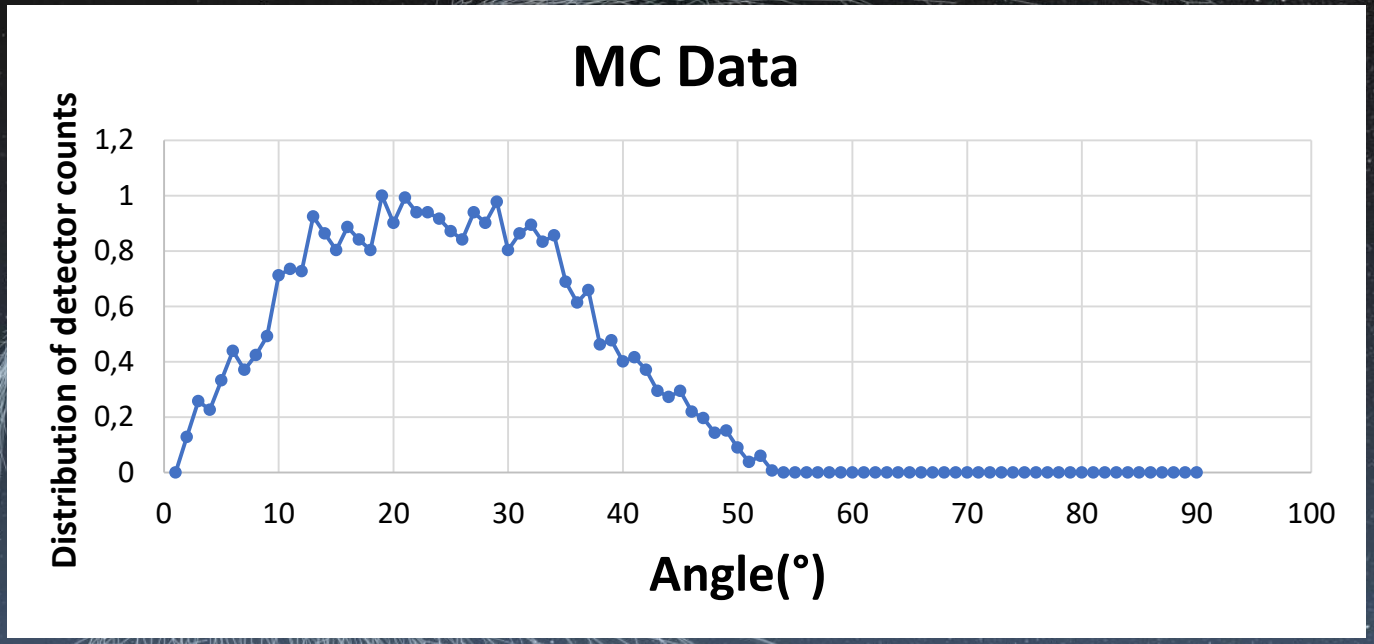
# Analysis 1

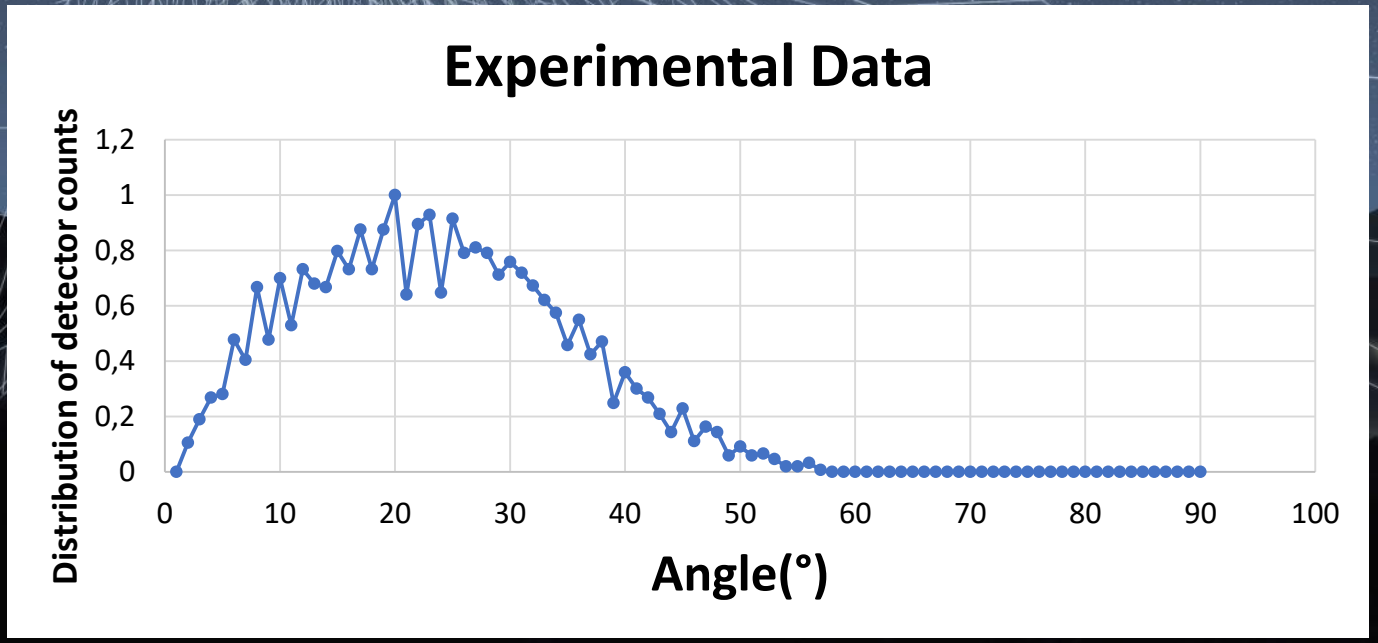
We proceeded with the normalization  of data after it was imported onto Excel spreadsheets. We created two columns, one for the angles and the other one for the frequencies. Graphically representing the results, we compared it to the MonteCarlo simulations (ideal simulations in an isotropic environment based on the geometry of the telescopes).


Distribution of cosmic rays in function of angles
Distribution (%)
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
0
10
20
30
40
50
60
70
80
90
100
Angle(°)

# Analysis 1

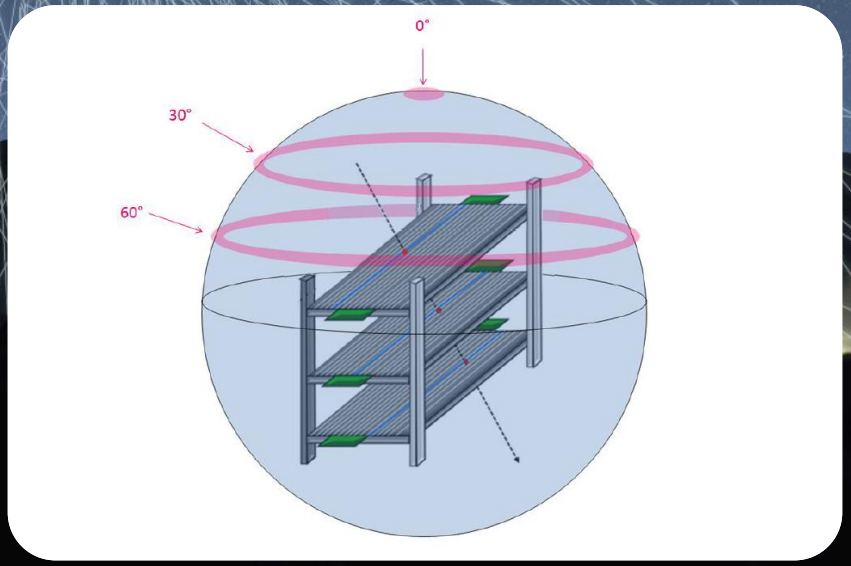
We divided our data for the maximum value of frequencies in order to demonstrate better a relationship between the angle and detector counts avoiding absolute values.


MC Data
Distribution of detector counts
1,2
1
0,8
0,6
0,4
0,2
0
0
10
20
30
40
50
60
70
80
90
100
Angle(°)


Experimental Data
Distribution of detector counts
1,2
1
0,8
0,6
0,4
0,2
0
0
10
20
30
40
50
60
70
80
90
100
Angle(°)

# Results 1

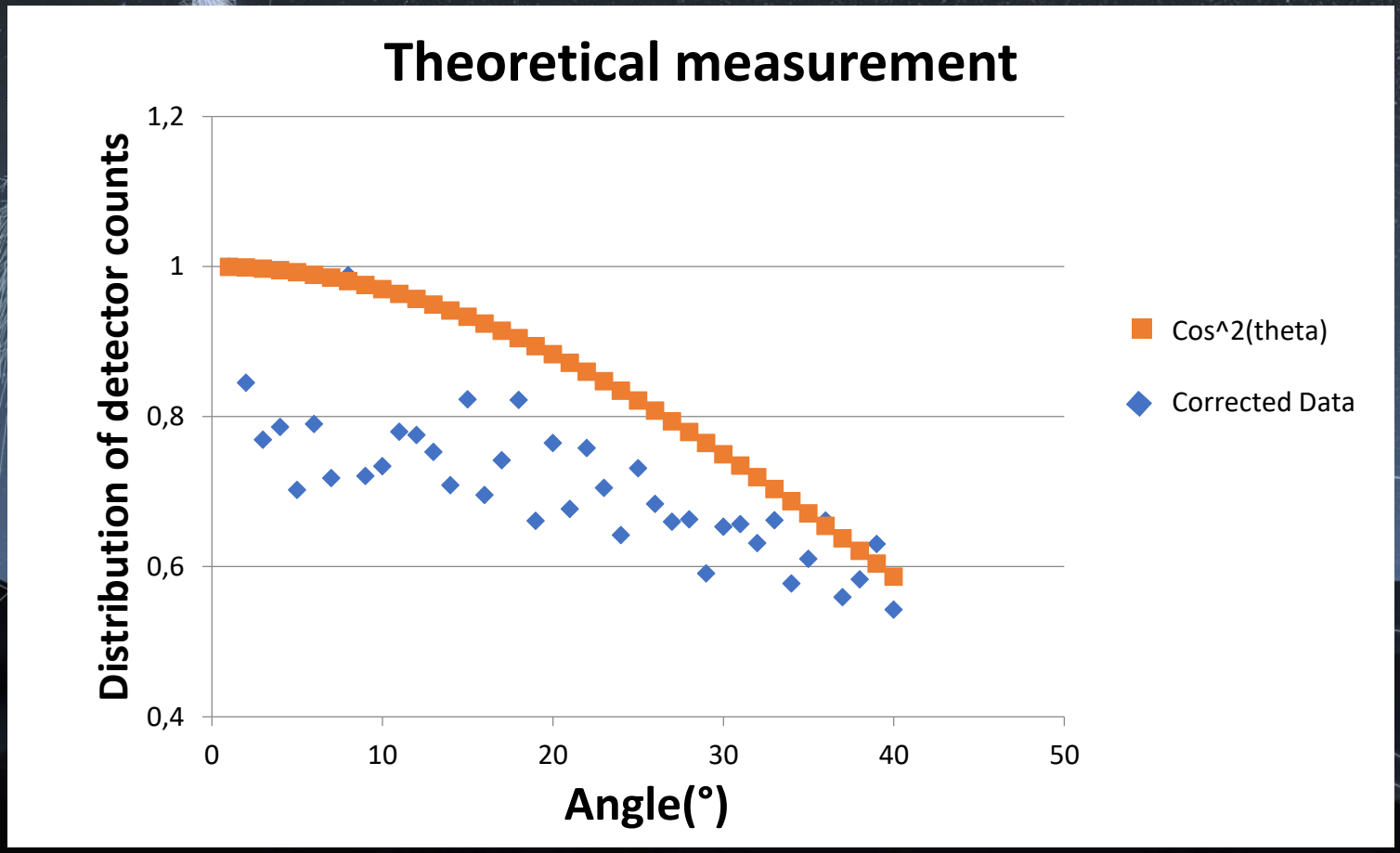
We interpreted the graphics considering that for great angles the telescope is limitaded by its geometry and for slight solid angles we dont’have a lot of counts. This is due to the fact that we have smaller areas of sky at the same distant from the telescope.



# Analysis 2

We went on with our analysis to find an ideal description of the angular distribution of cosmic rays, removing all the problems faced in Analysis 1.

At the end we tried to find a mathematical function that would fit our graphic.


Theoretical measurement
Distribution of detector counts
1,2
1
0,8
0,6
0,4
0
10
20
30
40
50
Angle(°)
Cos^2(theta)
Corrected Data

# Results 2

The results have shown a few discrepancies from the simulation but they were predictable because of slight measurement uncertainties with the telescope.
One reason could also be the fact that we didn’t use a great number of data.


Thank you for your attention
and we look forward to your
comments and questions