LICEO SCIENTIFICO STATALE
"Arcangelo Scacchi"

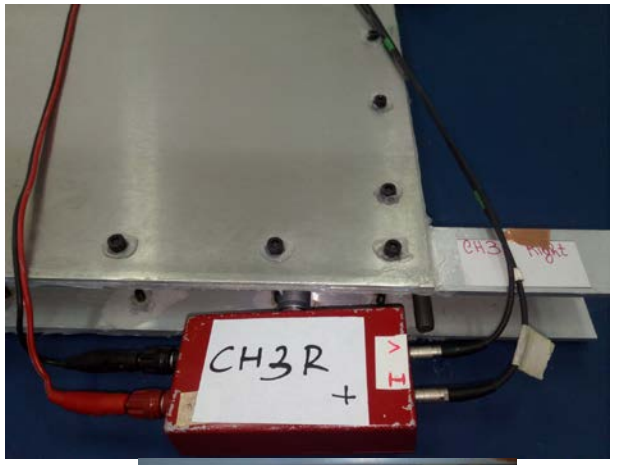
Extreme
Energy
Events
Science inside Schools

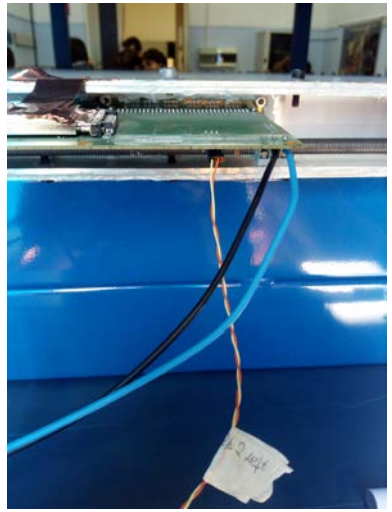
Bari-01 is back!

Alessandra Diretto (4B)
Ruben Scaramuzzi (4E)
Giorgio Cascelli (5G)

The lab was declared out of order in September 2016

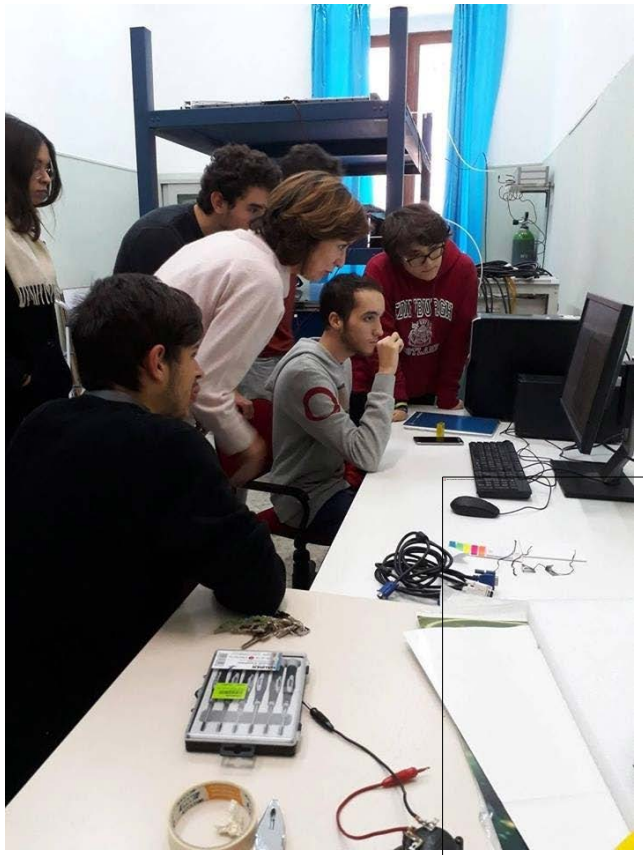
On the 13th of June 2017 we proceeded with the classification and the packaging of the instruments

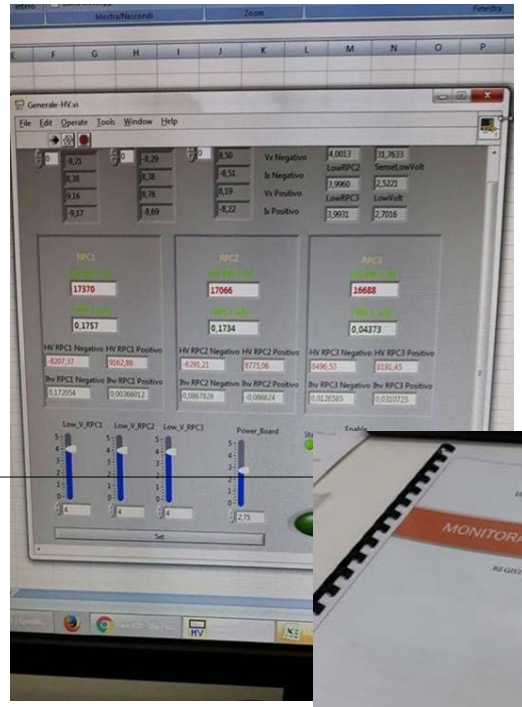




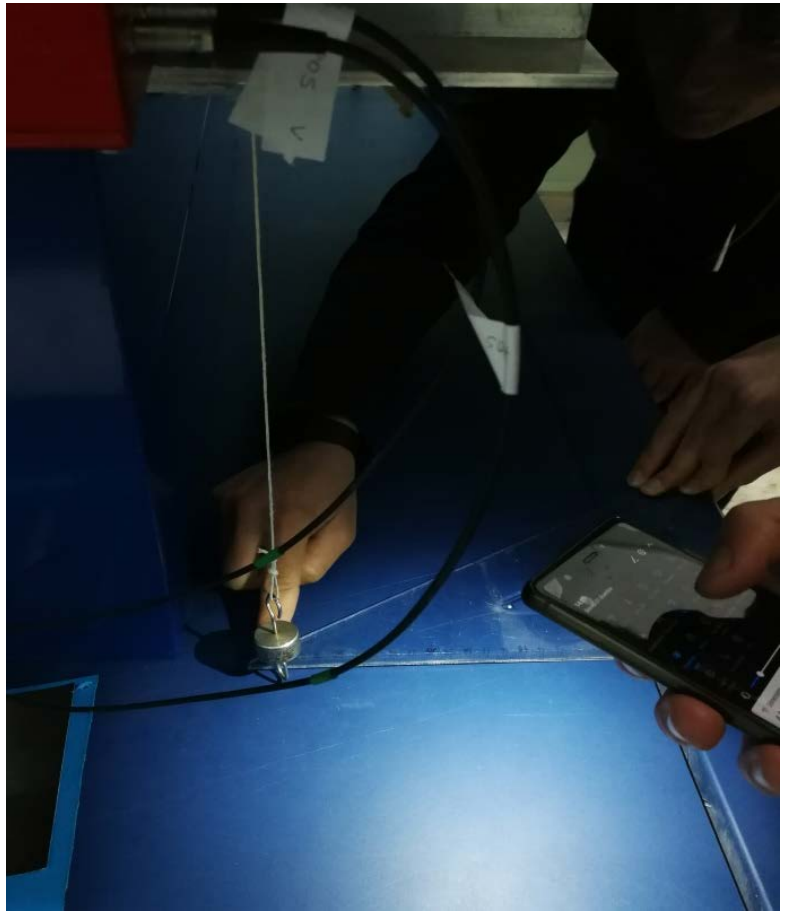
June, 13th 2017

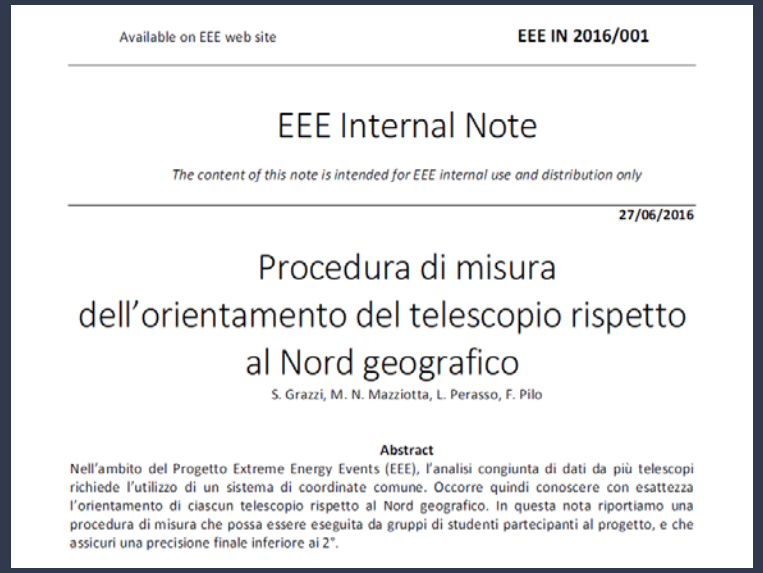
February, 9th 2018: BARI-01 is up and running





First calibration measurements: Orientation with respect to the North





Available on EEE web site **EEE IN 2016/001**

EEE Internal Note

The content of this note is intended for EEE internal use and distribution only

27/06/2016

Procedura di misura dell'orientamento del telescopio rispetto al Nord geografico

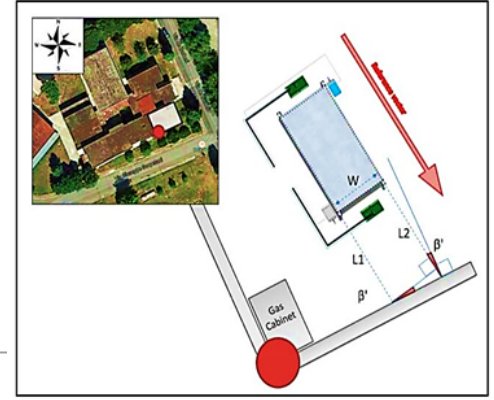
S. Grazzi, M. N. Mazziotta, L. Perasso, F. Pilo

Abstract

Nell'ambito del Progetto Extreme Energy Events (EEE), l'analisi congiunta di dati da più telescopi richiede l'utilizzo di un sistema di coordinate comune. Occorre quindi conoscere con esattezza l'orientamento di ciascun telescopio rispetto al Nord geografico. In questa nota riportiamo una procedura di misura che possa essere eseguita da gruppi di studenti partecipanti al progetto, e che assicuri una precisione finale inferiore ai 2°.

Five teams realized the measures following the recommended method

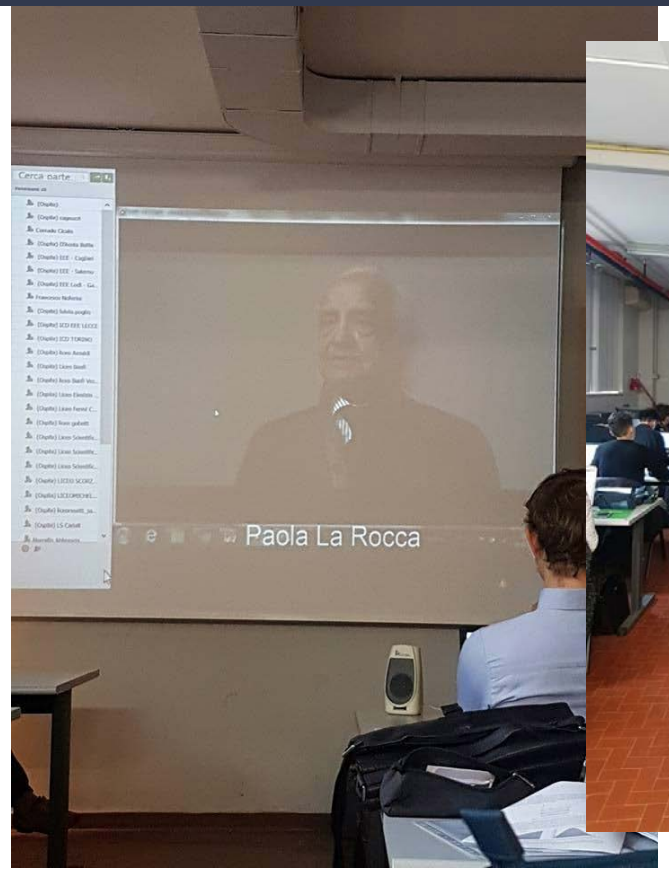
Measurements of the azimuth of a wall and mensuration of the angle of the telescope with respect to the wall gave the most accurated values



TEAM	Angle relative to the NORTH	ERROR
1	80°	< 0.5%
2	84.5°	<0.5 %
3	84.2%	<0.5%
4	85°	<0.5%
5	83°	<0.5%

83,3°

Novembre, 30th 2017- INTERNATIONAL COSMIC DAY



Dipartimento Interateneo di Fisica Bari

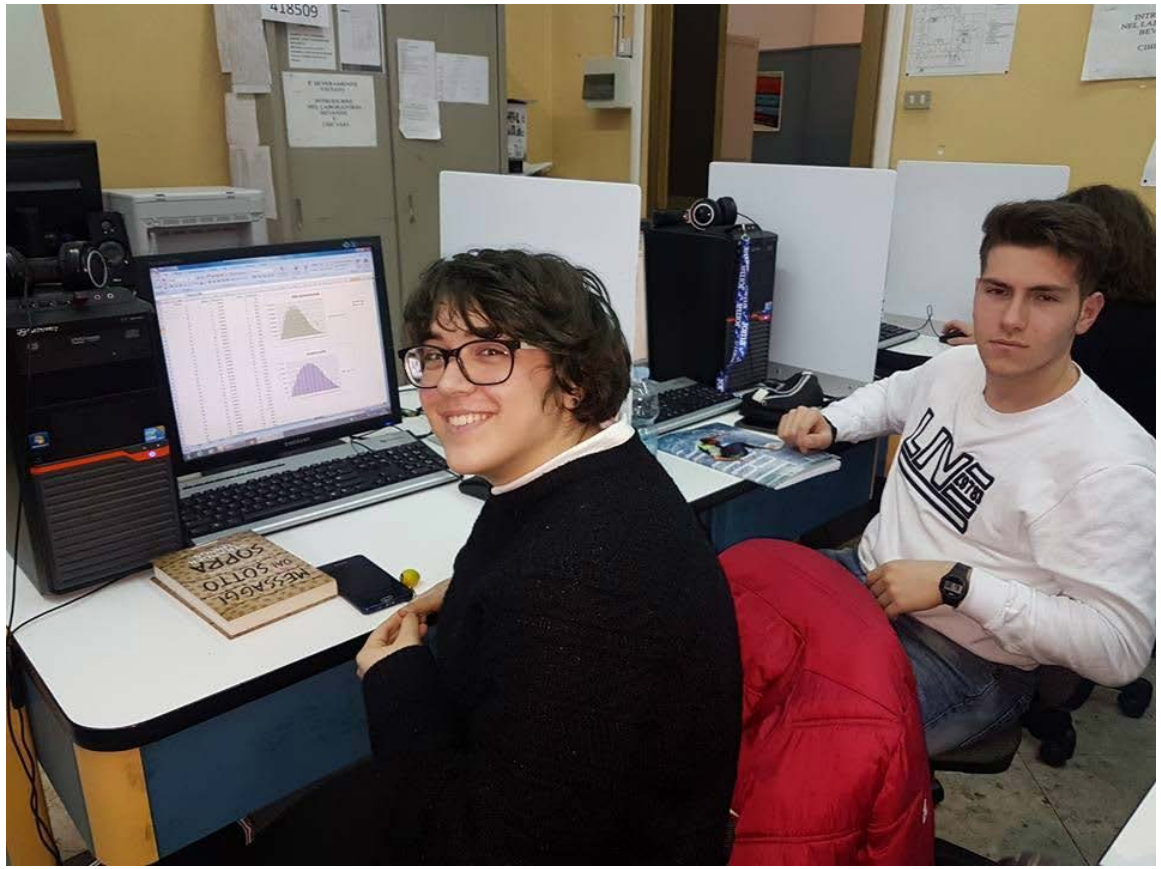
INFN sezione di Bari

Prof. Marcello Abbrescia

Dr. Nicola Mazziotta

Liceo Amaldi - Bitetto, Liceo Cagnazzi - Altamura, ITIS Galileo Galilei - Altamura, Liceo Marconi - Foggia, Liceo Scacchi - Bari, IISS Staffa - Trinitapoli (BAT)

Later, at school, we repeated the analysis with data of BARI-01 telescope



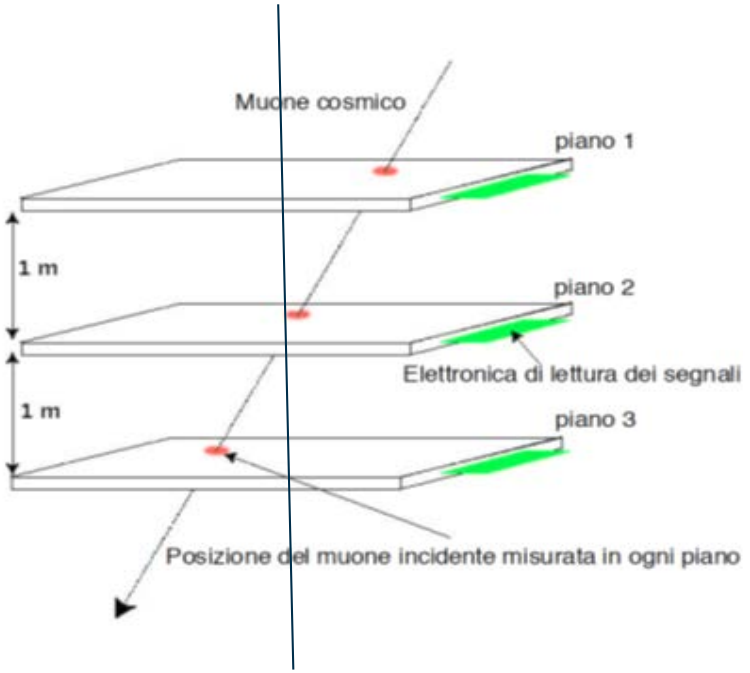
Aim of this analysis

Our aim is to investigate the distribution of the zenithal angle (θ), which is the angle between the zenith and the direction of the particles measured, in this case, secondary cosmic muons, from experimental data acquired by EEE telescopes. We compared data of telescope BARI-01 with data of the telescope TRIN-01 in order to check the performance of our telescope after the assembly occurred between October 2017 and January 2018.

Experimental setup

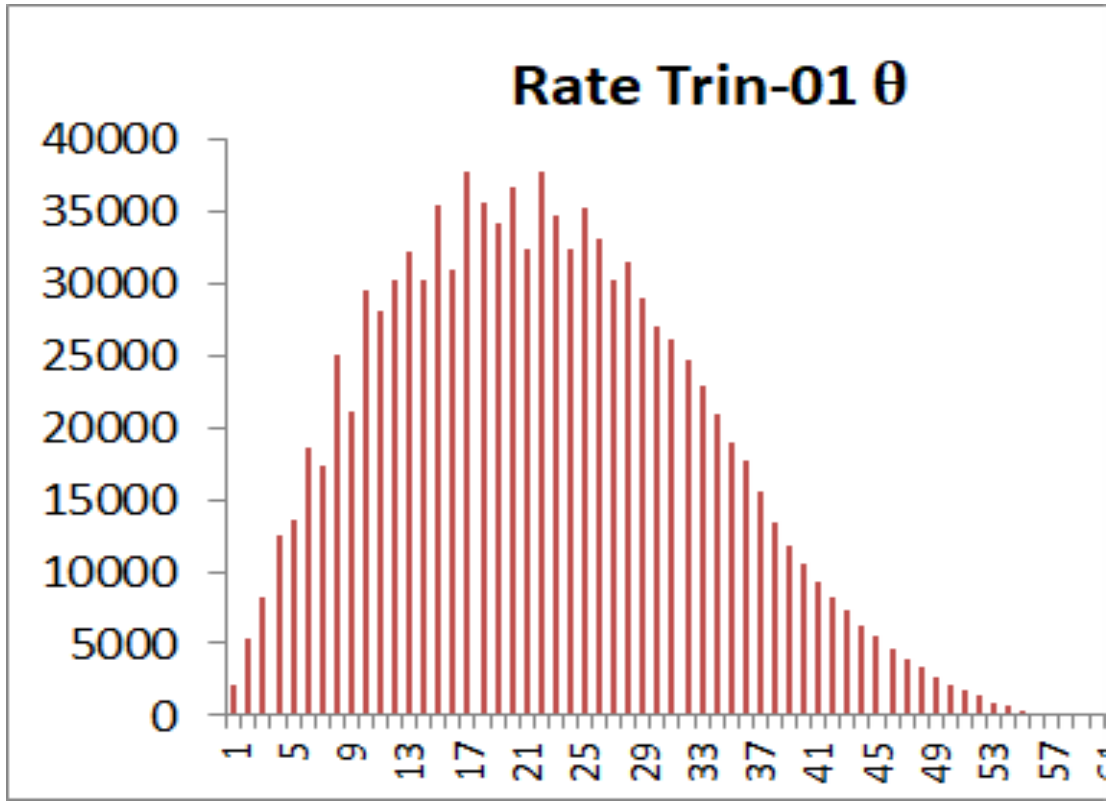
The experimental setup consists of an array of muon telescopes, based on position-sensitive multigap resistive plate chambers (mrpcs), which make up the entire eee project. The basic tracking telescope of the eee project is composed of three (mrpcs) spaced by 1 m.

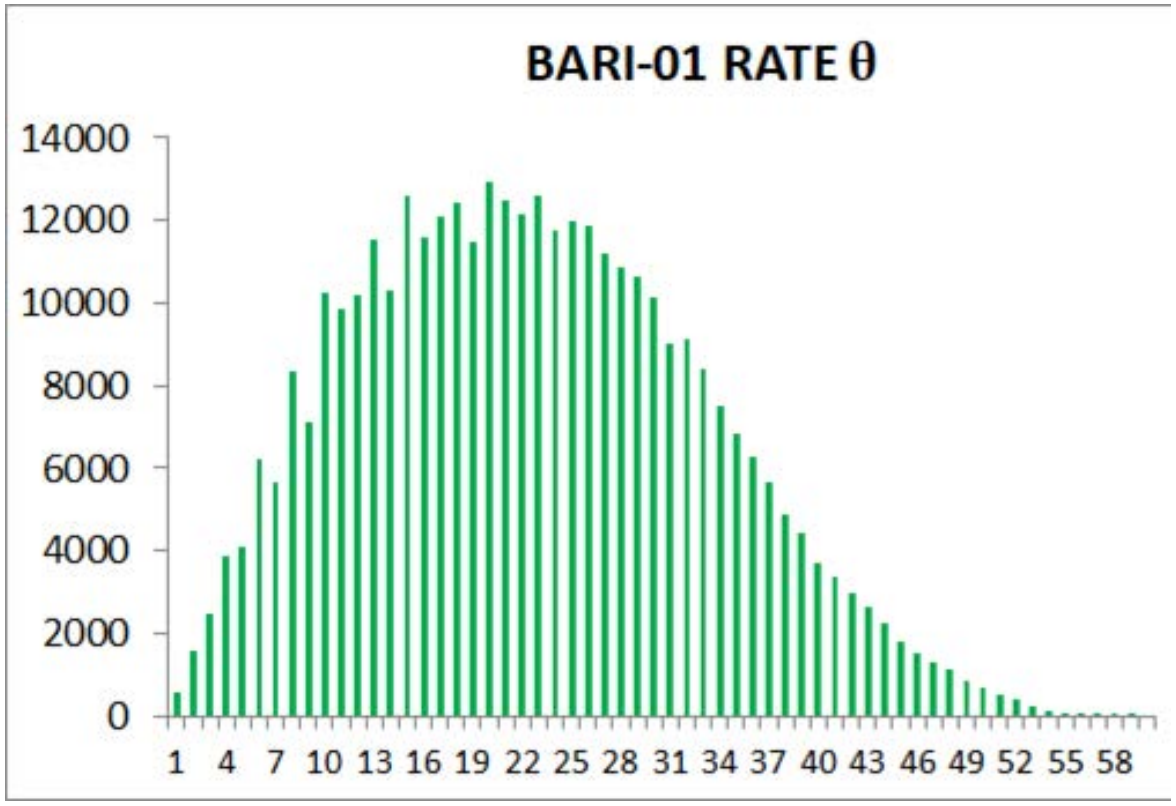
The track is the result of the crossing of muons through the three chambers. Using three impact points (one on each mrpc of the telescope) it is possible to reconstruct the direction of the crossing muon, obtaining then the ZENITHAL ANGLE.



Data analysis

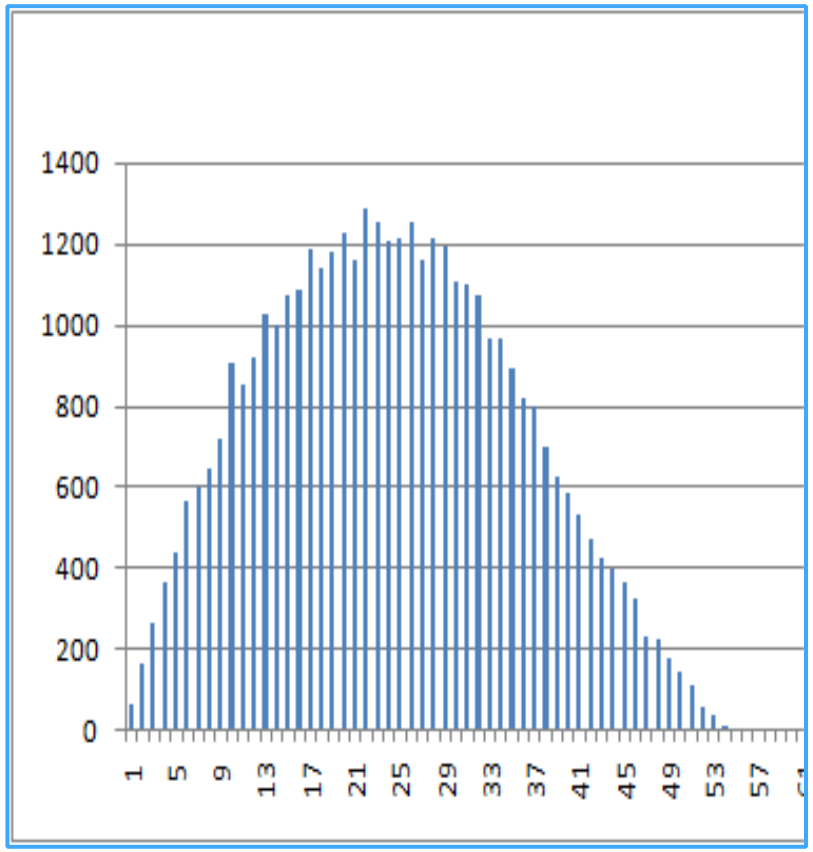
The muons flux is expeted to decreasing with increasing zenith angle $\cos^2(\theta)$. Real data follow the $\sin(\theta)\cos^2(\theta)$ function, due to the acceptance of the telescope



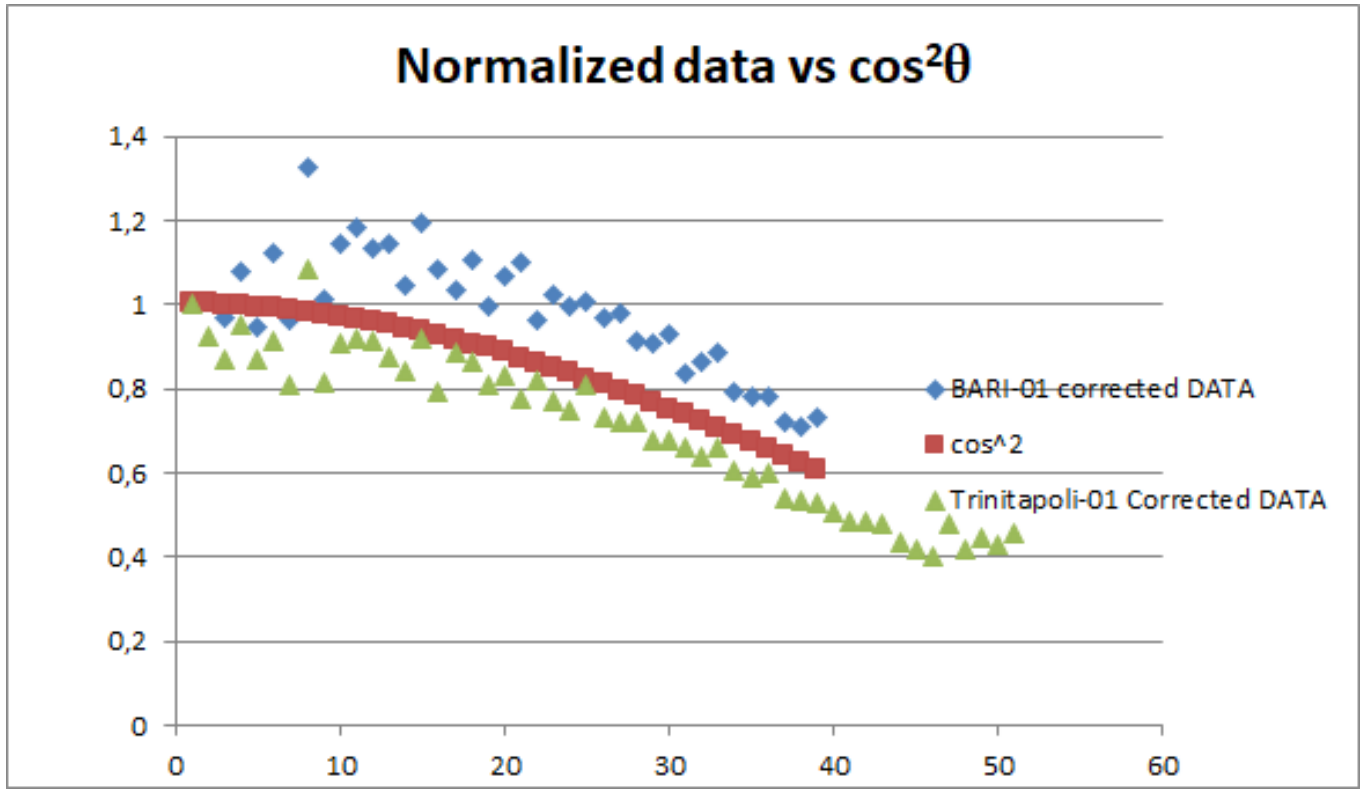


Data analysis

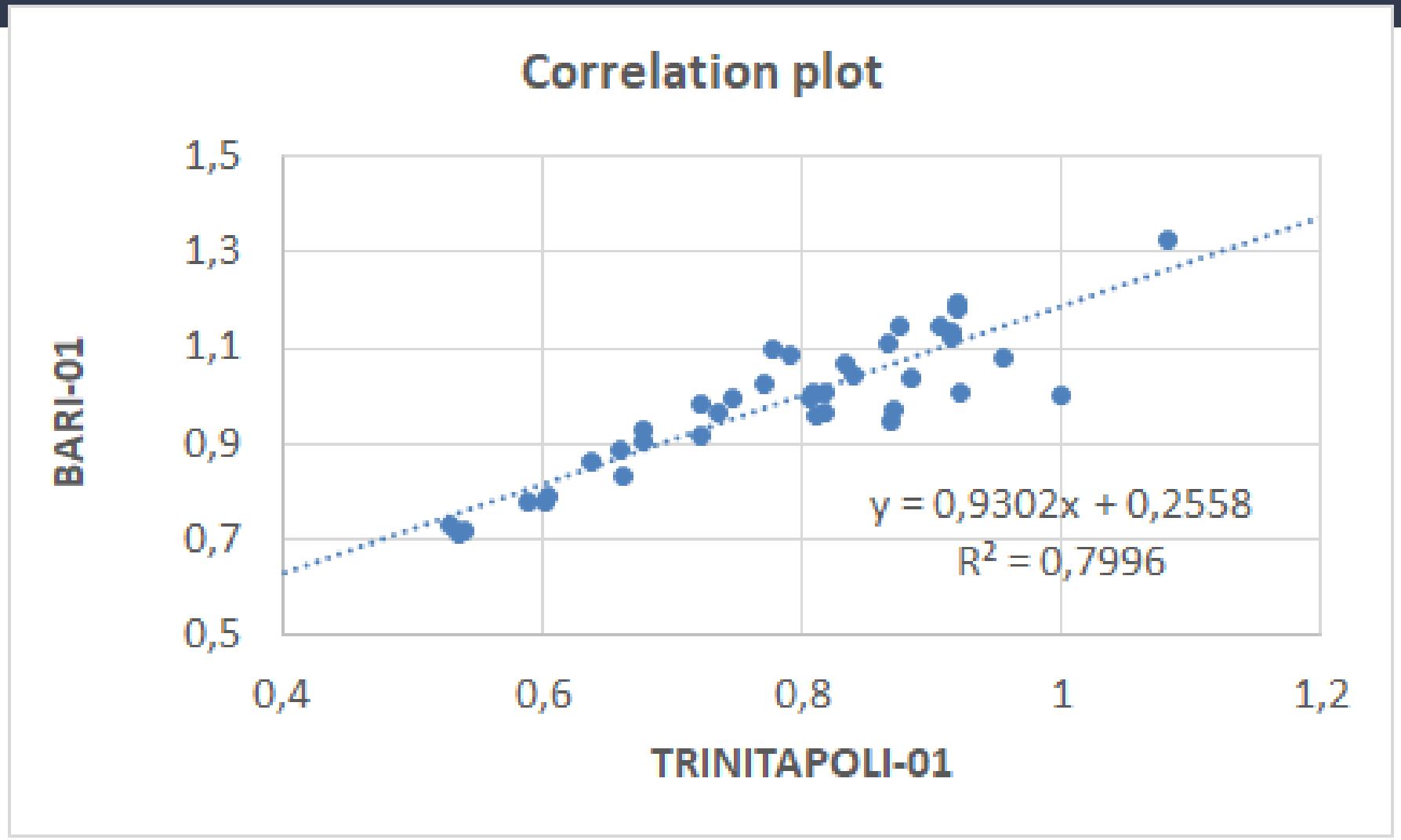
MONTECARLO SIMULATED DATA FOLLOW SIN(Θ) FUNCTION



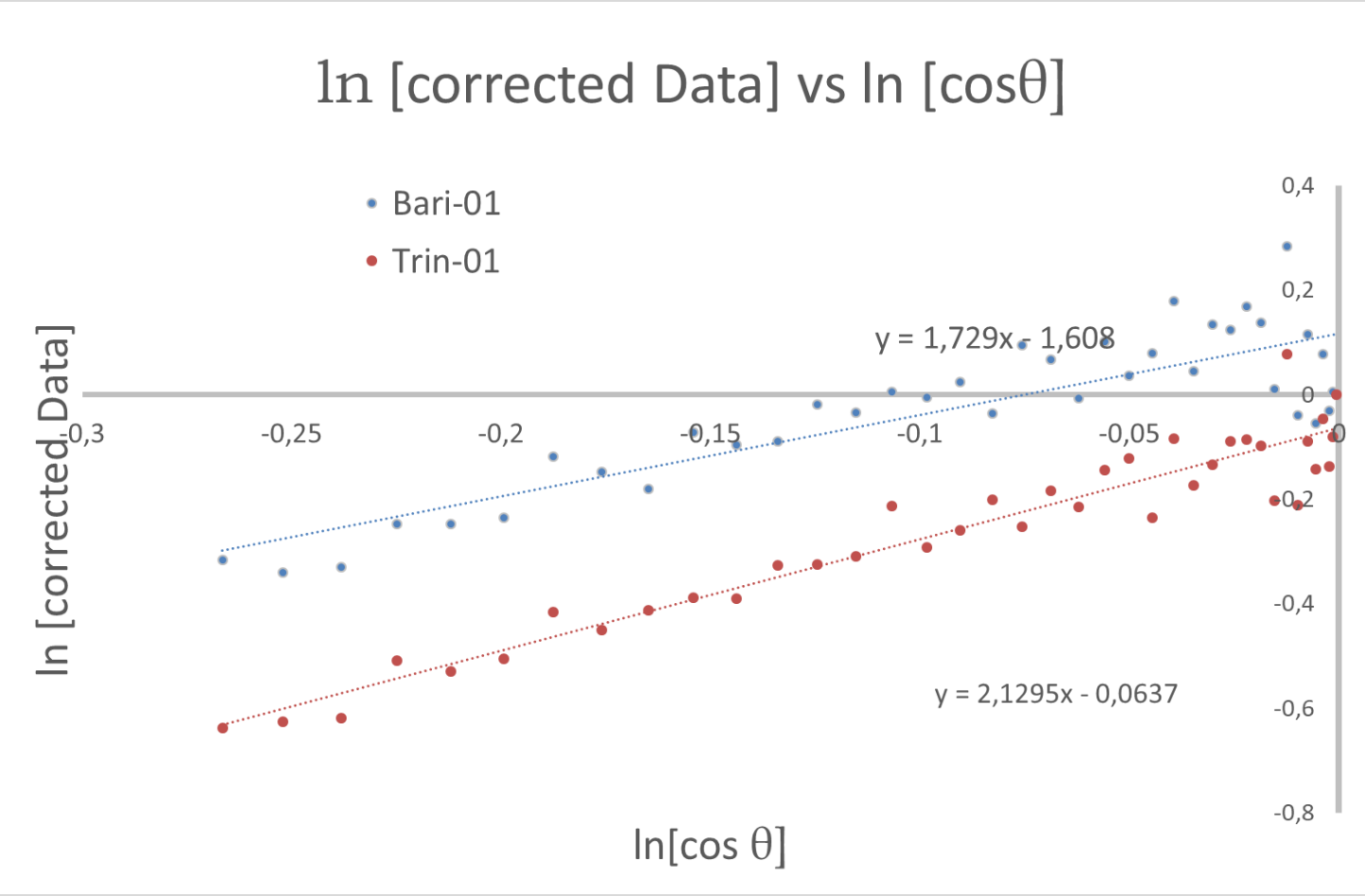
WE DIVIDED THE FIRST SET OVER THE SECOND ONE, GETTING THE “CORRECT OUTCOMES”.



Correlation



Finding the power law



We plot the logarithm of corrected data vs cos θ in order to check the corrected power law.

We find that Bari-01 corrected data follow a trend given by $\cos^{1,7}\theta$, while Trin-01 find a trend given by $\cos^{2,1}\theta$.

This difference is not so clear in previous $\cos^{2}\theta$ graph.

Conclusions

- Bari-01 is up and runnig from February, 9th 2018,
- We performed some calibration measurements to check the status of the telescope:
  - We find the angle of the telescope with respect to the North
  - We check the distribution in θ comparing with the measure on a similar telescope in Trinitapoli.
- Next step: measurements of the efficiency.

THANK YOU FOR THE ATTENTION

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