Time of Flight
as a function of Track Lenght

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10° Conferenza EEE
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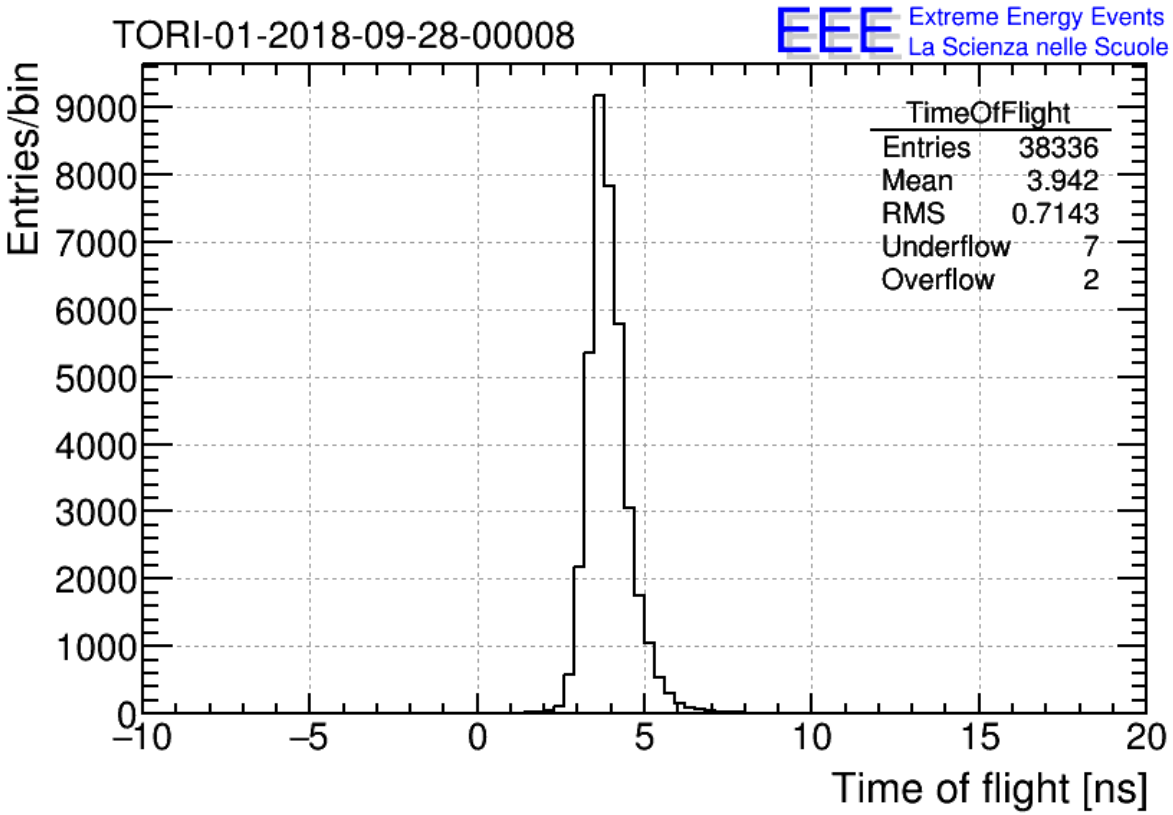
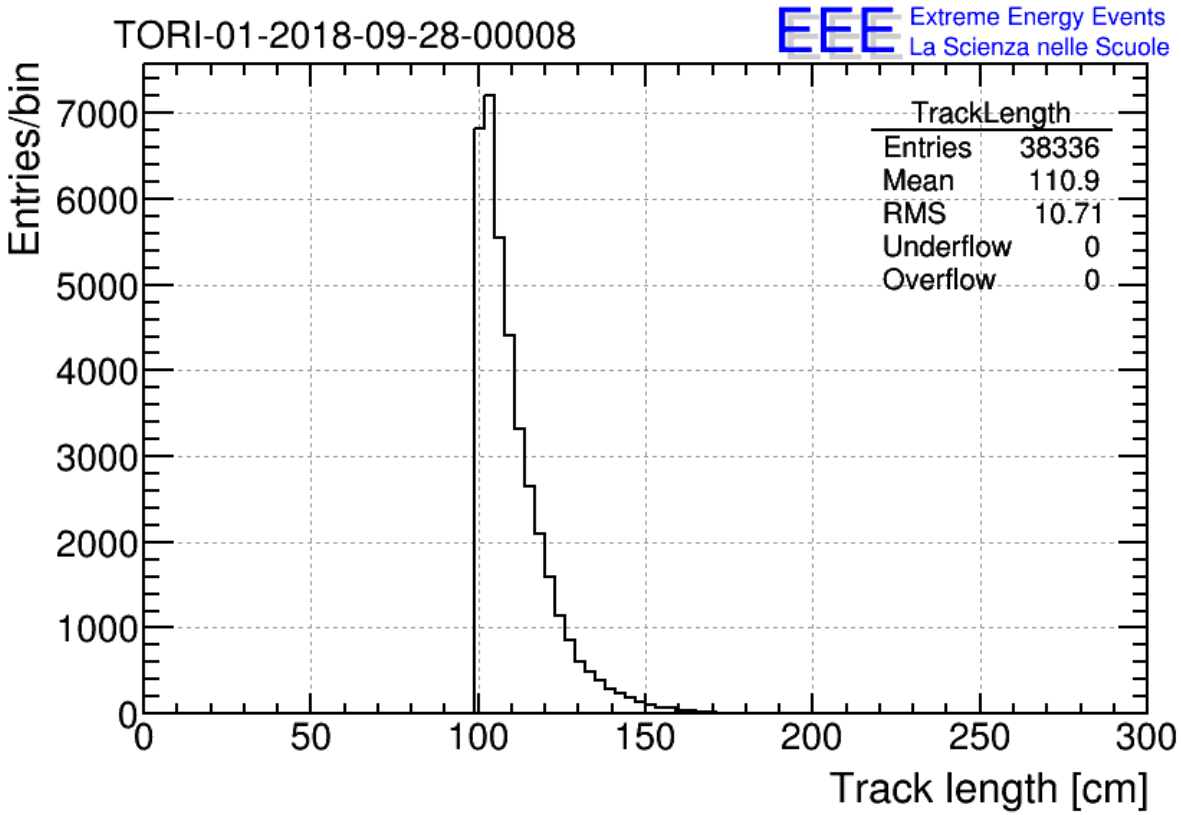
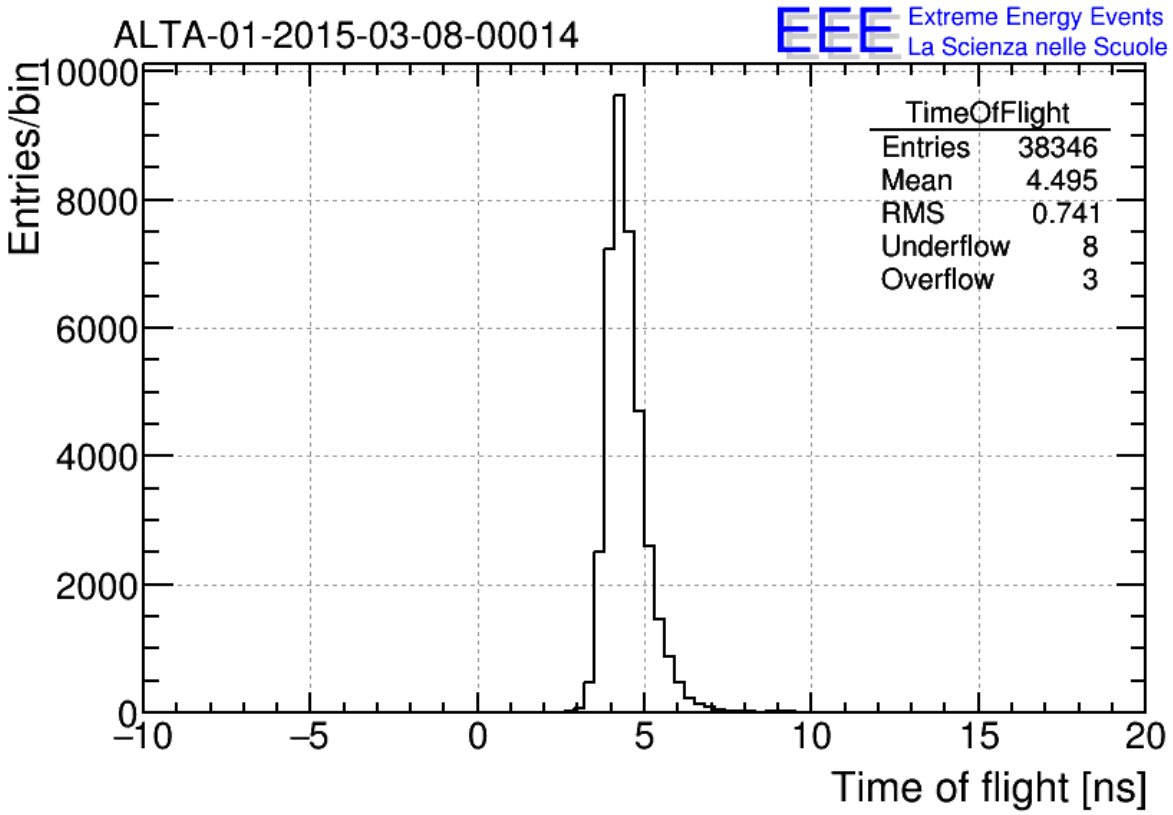
Time of Flight 1/2

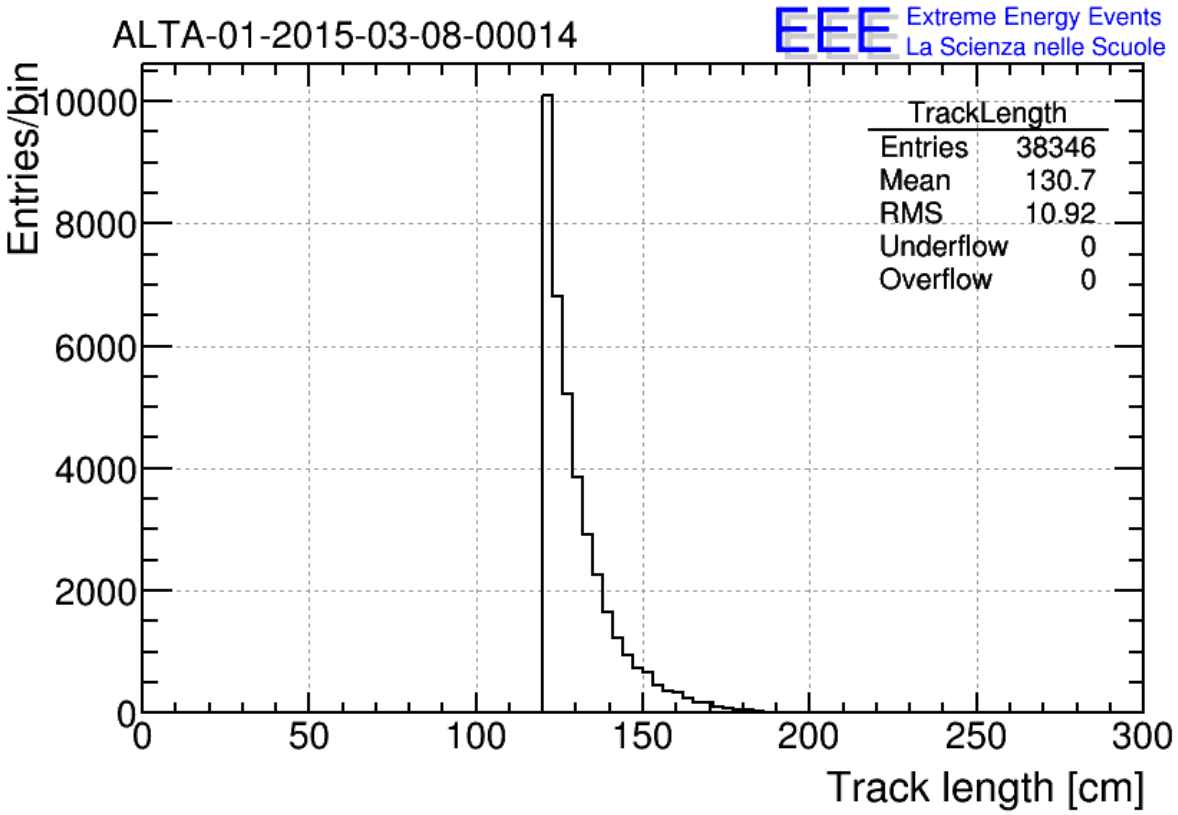




$$V_\mu = \frac{110{,}9\ cm}{3{,}942\ ns} = \frac{110{,}9\ \cdot 10^{-2}\ m}{3{,}942\ \cdot 10^{-9}\ s} = 28{,}13 \cdot 10^{7}\ \frac{m}{s} = 281{,}3 \cdot 10^{6}\ \frac{m}{s} < c = 299{,}8 \cdot 10^{6}\ \frac{m}{s}$$

Time of Flight 2/2

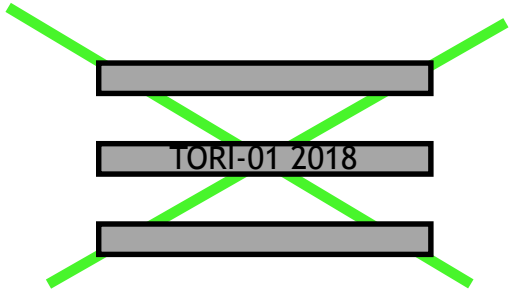


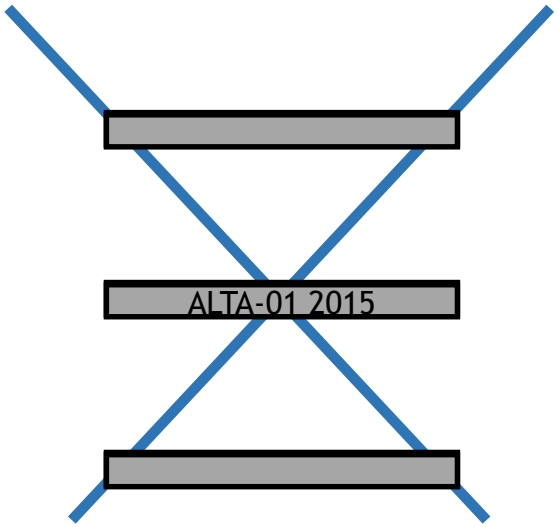


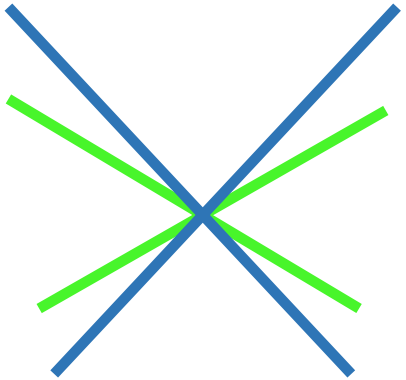
$$V_\mu = \frac{130{,}7\ cm}{4{,}495\ ns} = 290{,}8 \cdot 10^6\ \frac{m}{s} < c = 299{,}8 \cdot 10^6\ \frac{m}{s}$$

$$V_{\mu TORI_01} < V_{\mu ALTA_01} < c$$

Telescopes acceptance







$$\theta_{2018} > \theta_{2015}$$

Idea

- Increasing the distance between the T-B chambers, the muons become more vertical
- Does an higher verticality imply an increase in speed?

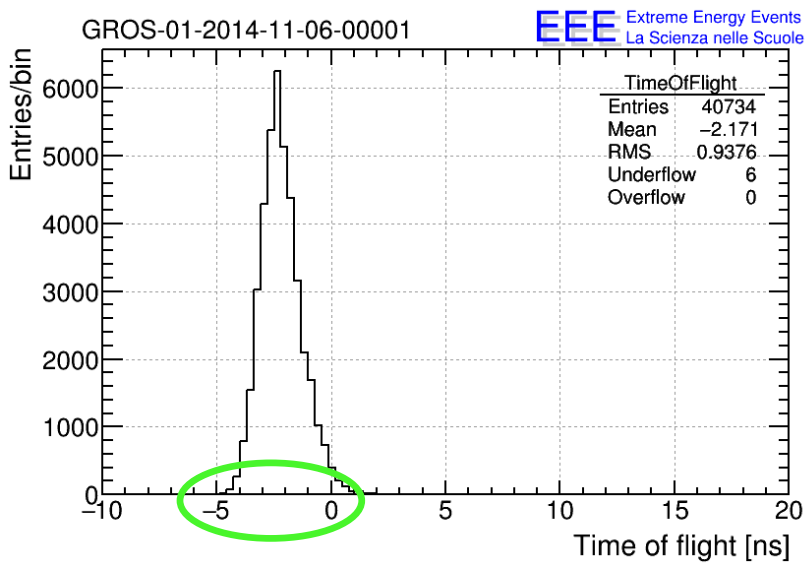
$$V_{\mu TORI_01} < V_{\mu ALTA_01} < c$$

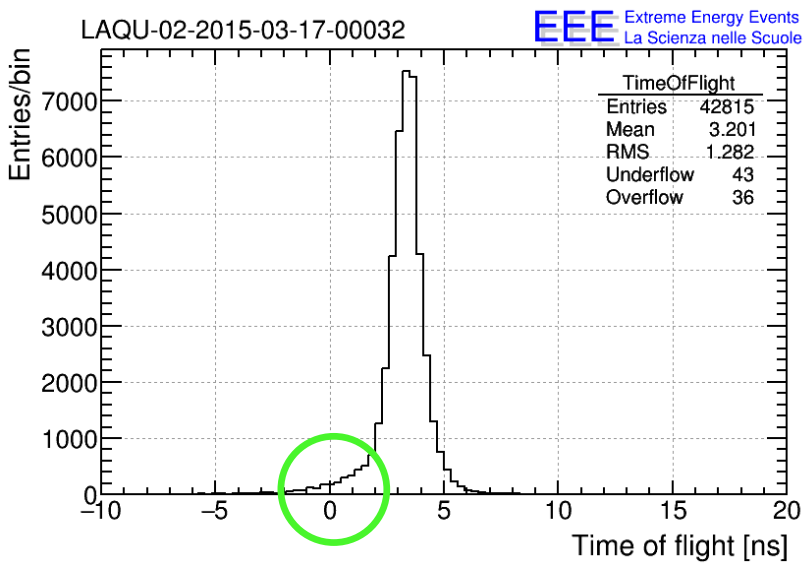
Data analysis

- Choose one telescope
- Select a day from DQM
- Write down 50 mean values indicated in the Track Lenght and their corresponding Time of Flight graphics
- Average the mean values
- Get a pair of data (TrL, ToF)

- Repeat the operation for different telescopes with different Top-Bottom distances
- Draw a cartesian plane with the obtained data (TrL, ToF)

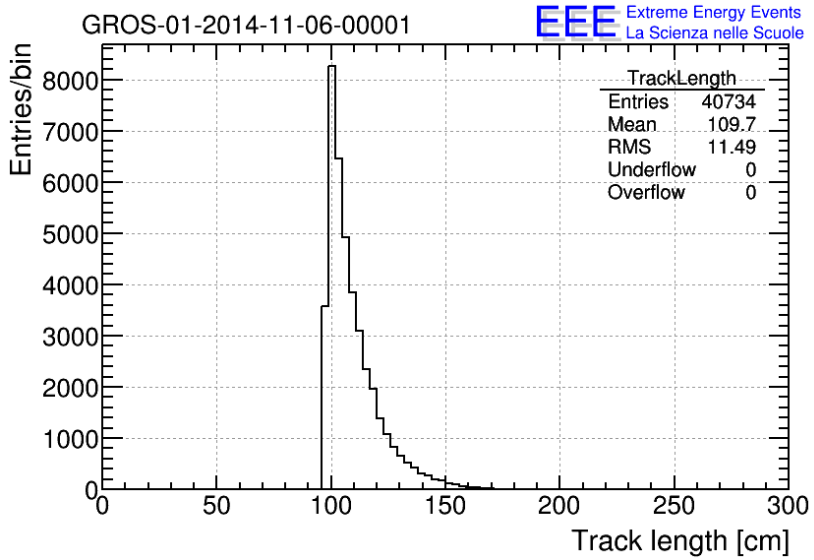
Data selection

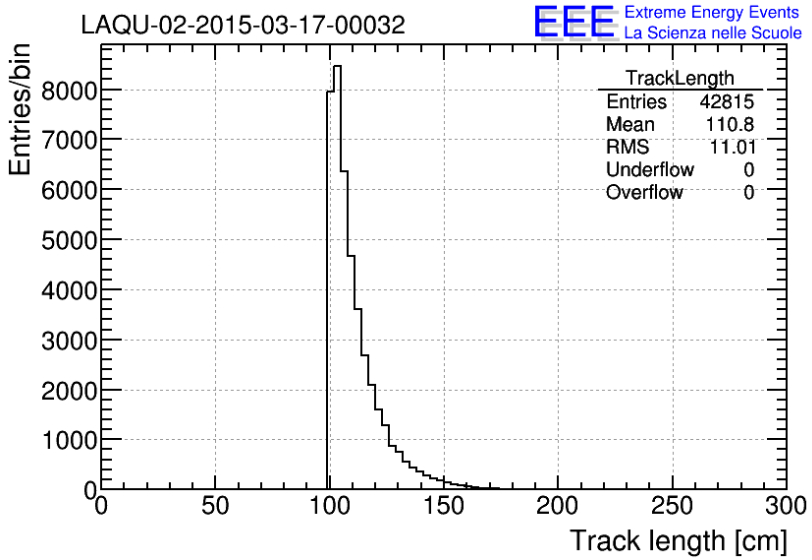


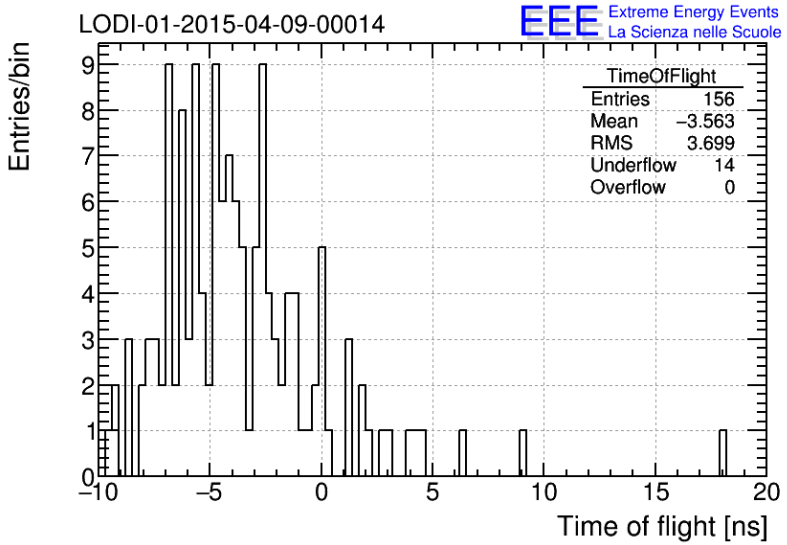


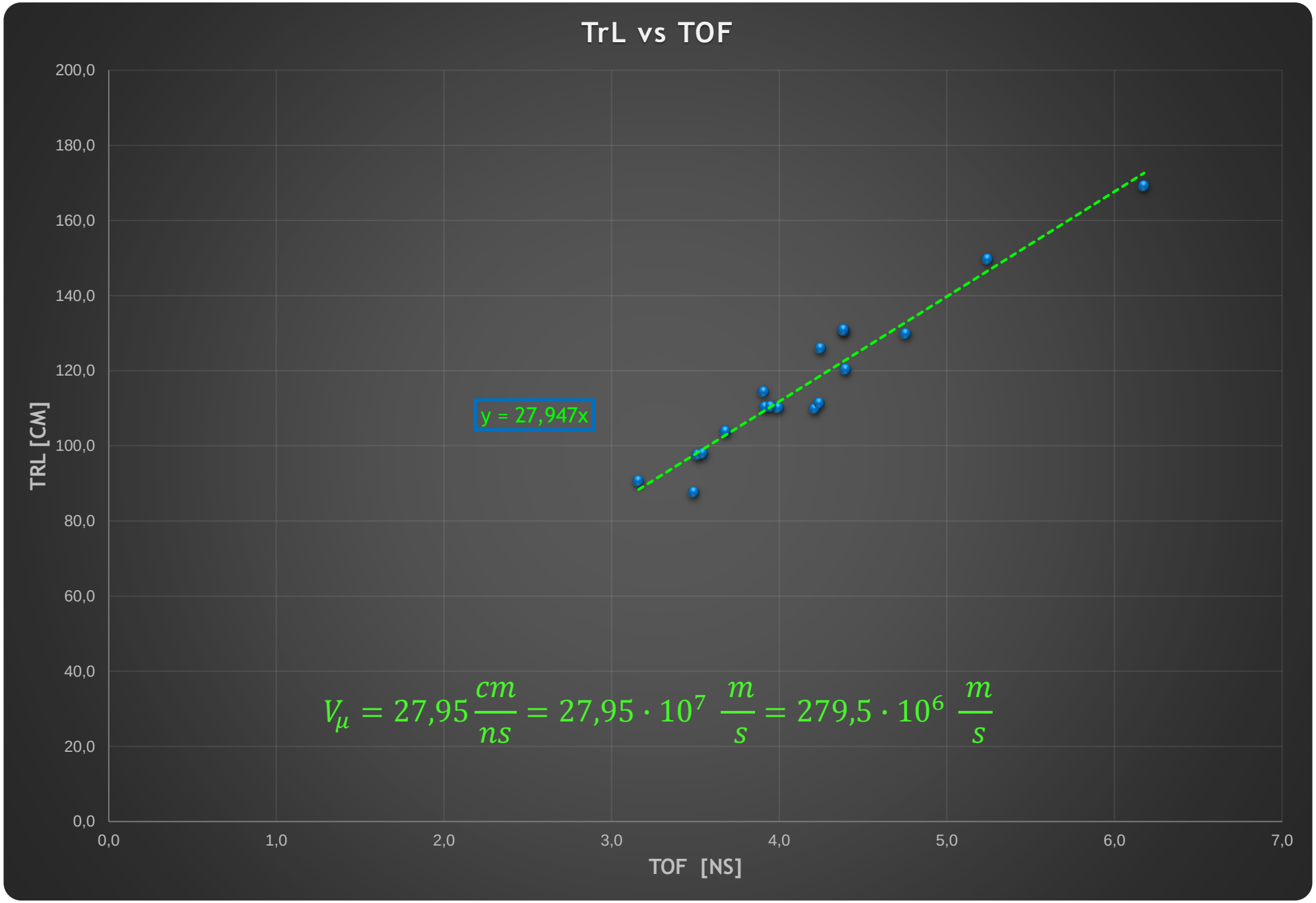
- Inverted cables
- Noisy chambers
- No acquisition (156 entries)
- Speed from average values lower than c

$v<c$

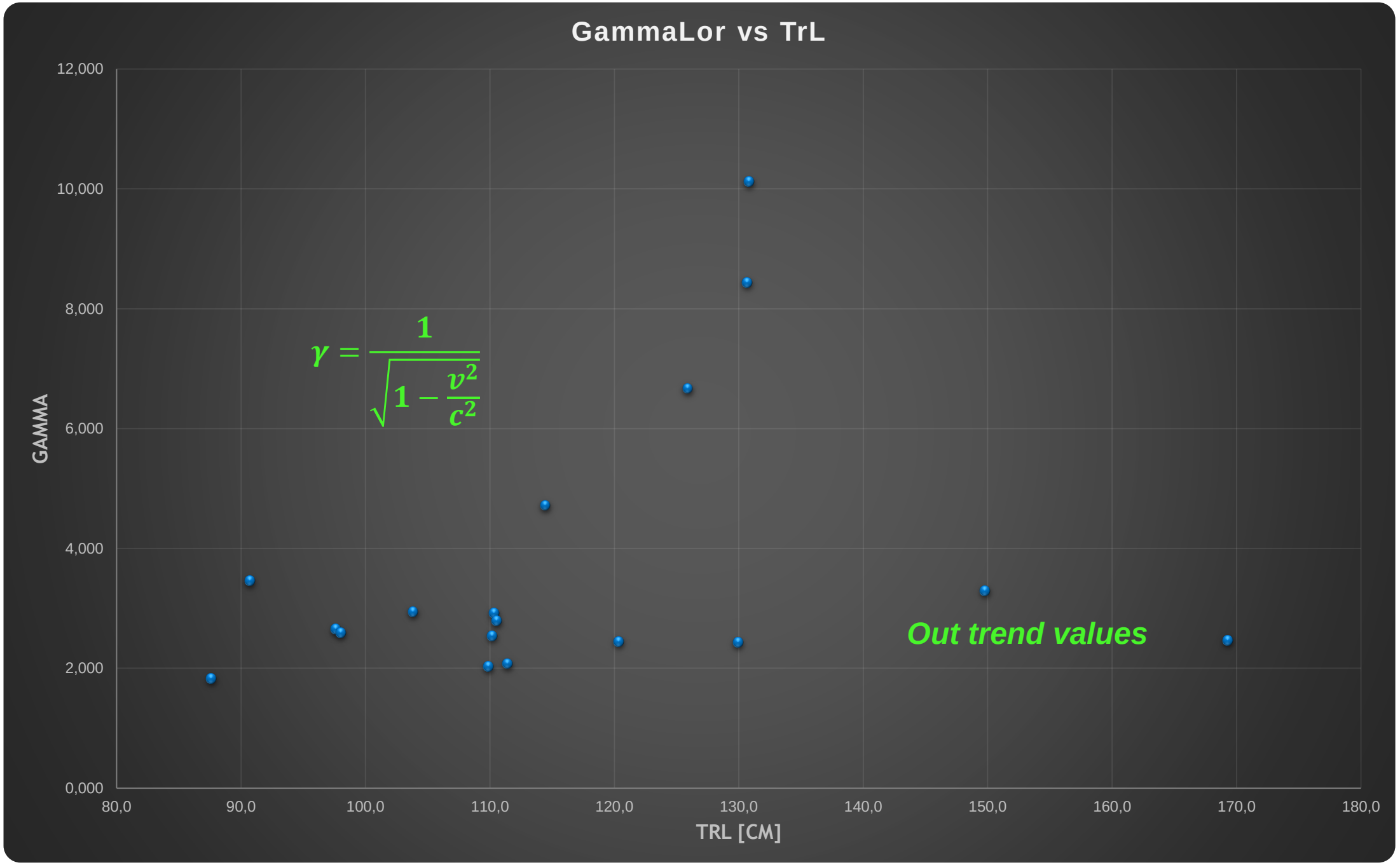




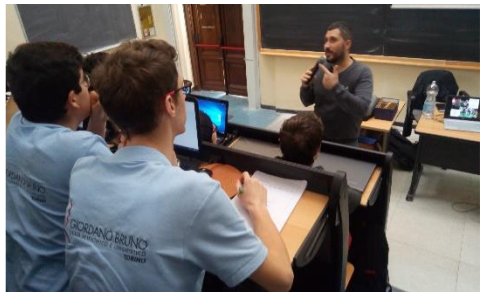


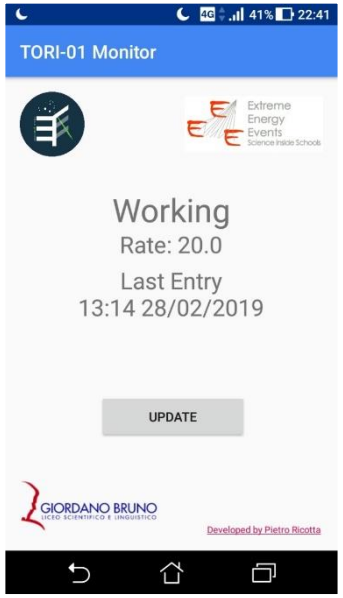


$$V_\mu = 27{,}95\,\frac{cm}{ns} = 27{,}95 \cdot 10^7\ \frac{m}{s} = 279{,}5 \cdot 10^6\ \frac{m}{s}$$


GammaLor vs TrL
12,000
10,000
8,000
6,000
4,000
2,000
0,000
GAMMA
80,0
90,0
100,0
110,0
120,0
130,0
140,0
150,0
160,0
170,0
180,0
TRL [CM]
$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$
Out trend values

2018 - 2019





Thank you for listening!