Muon Counts in the Calorimeter:

Analysis of the data acquired by SLAC of cosmic rays through the mini tower:

- Setup is:
  - Minitower set vertically
  - Sandwiched by 2 plastic scintillators
  - 50 cm of lead in between minitower and bottom scintillator.

- Trigger is:
  - + both scintillators hit: signal at ~3 Hz

- Data acquisition is:
  - 4 ranges:
    - Low energy diode, amplified to 1: LEX1
    - Low energy diode, amplified to 8: LEX8
    - High energy diode, amplified to 1: HEX1
    - High energy diode, amplified to 8: HEX8

Pol d'Avezac
LLR, Ecole polytechnique
Muon Counts:

For each diode individually: 2 methods for finding the pedestals peak position and width, using histograms of ADC pulse counts without cuts:

- **Zooming 4 times in a row on the x axis around**: Mean $\pm$ 5*RMS. Method done by Sasha.

- **After zooming, fitting the histograms with a gaussian.**

Pol d'Avezac
LLR, Ecole polytechnique
Pol d'Avezac
LLR, Ecole polytechnique
POS vs NEG:

Mean LEX:
- Mean POS LEX8: Entries 96, Mean 259, RMS 66.76
- Mean NEG LEX8: Entries 96, Mean 259.3, RMS 78.41
- Mean LEX1: Entries 96, Mean 182.1, RMS 9.345
- Mean NEG LEX1: Entries 96, Mean 191.4, RMS 10.96

Mean HEX:
- Mean POS HEX8: Entries 96, Mean 221.5, RMS 82.66
- Mean NEG HEX8: Entries 96, Mean 229.7, RMS 92.2
- Mean POS HEX1: Entries 96, Mean 180.2, RMS 9.899
- Mean NEG HEX1: Entries 96, Mean 179.6, RMS 9.9

Gauss Peak:
- Gauss peak POS LEX8: Entries 96, Mean 259, RMS 66.76
- Gauss peak NEG LEX8: Entries 96, Mean 259.2, RMS 78.4
- Gauss peak POS HEX8: Entries 96, Mean 221.4, RMS 82.63
- Gauss peak NEG HEX8: Entries 96, Mean 229.6, RMS 92.2
- Gauss peak POS HEX1: Entries 96, Mean 180.1, RMS 8.949
- Gauss peak NEG HEX1: Entries 96, Mean 179.6, RMS 9.9
Peak Position: Difference between methods.

Pol d'Avezac
LLR, Ecole polytechnique
No meaningful difference

Pol d'Avezac
LLR, Ecole polytechnique
Pedestal Width: Difference between both methods

Pol d'Avezac
LLR, Ecole polytechnique
The difference is of the order of 10 to 20% of the RMS
RMS is greater or equal to gaussian sigma of individual diodes

Pol d'Avezac
LLR, Ecole polytechnique
Good agreement as a hole, taking ADC bin size into account.
RMS is higher because of the histogram asymmetry

Pol d'Avezac
LLR, Ecole polytechnique
Correlation between gaussian sigma and peak position:

Pol d'Avezac
LLR, Ecole polytechnique
Conclusion:

- Both methods give the same peak position.
- Gaussian sigma is different from RMS:
  - RMS has higher values due to asymmetry of the histograms.
  - RMS measures have a greater dispersion as well.
- No obvious difference between positive and negative sides.
- Small correlation between gaussian sigma and peak position.