HiDRa Simulation & Analysis Updates

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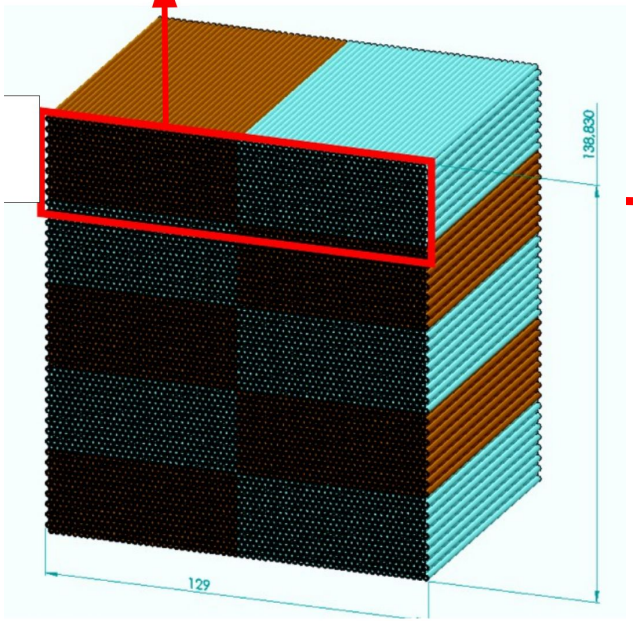
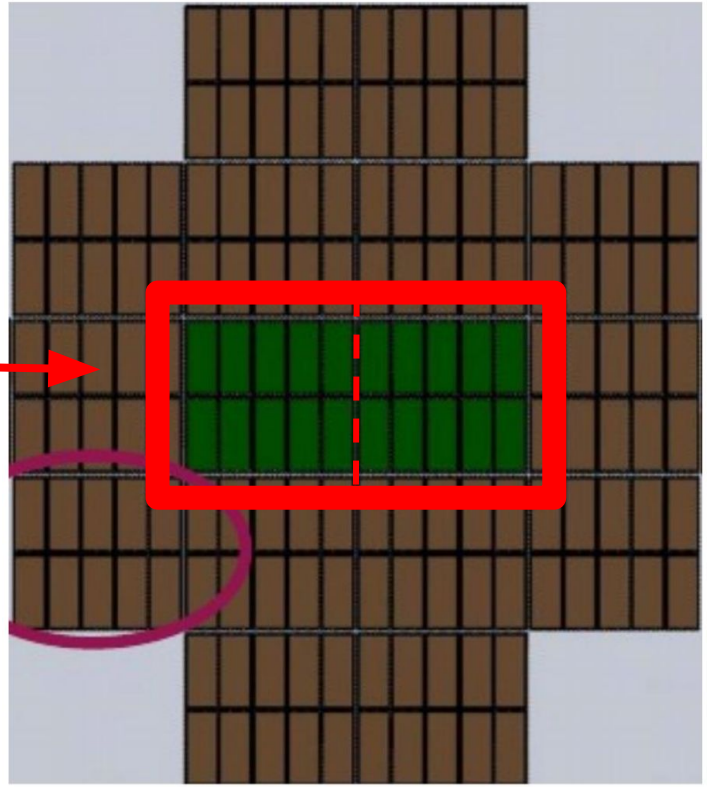
SiPM readout from Simulation

Double Mini-Module (MM):
64× 16 channels (1024 ch)
→ 512 S + 512 Č fibres



x2

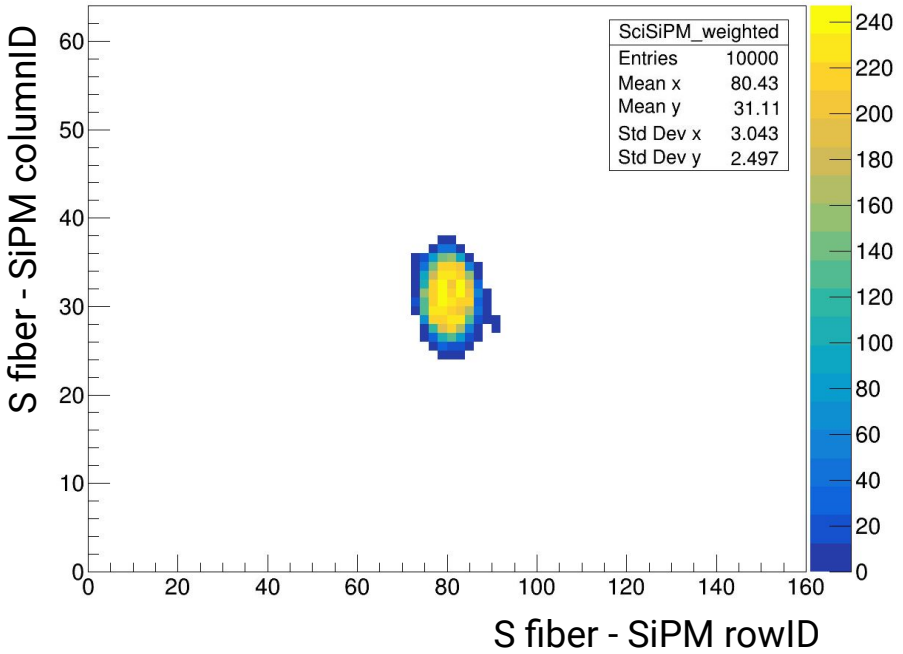


SiPM readout from Simulation

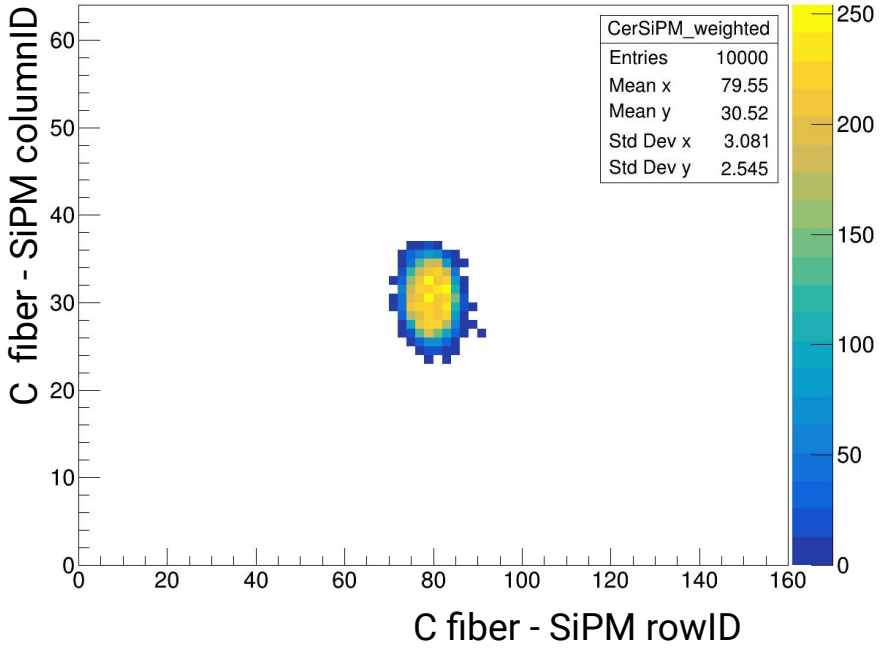
Nicer plots will arrive in the next weeks (sorry)

Electron Shower barycenter position (in SiPM ID coordinates)
E = 10 GeV

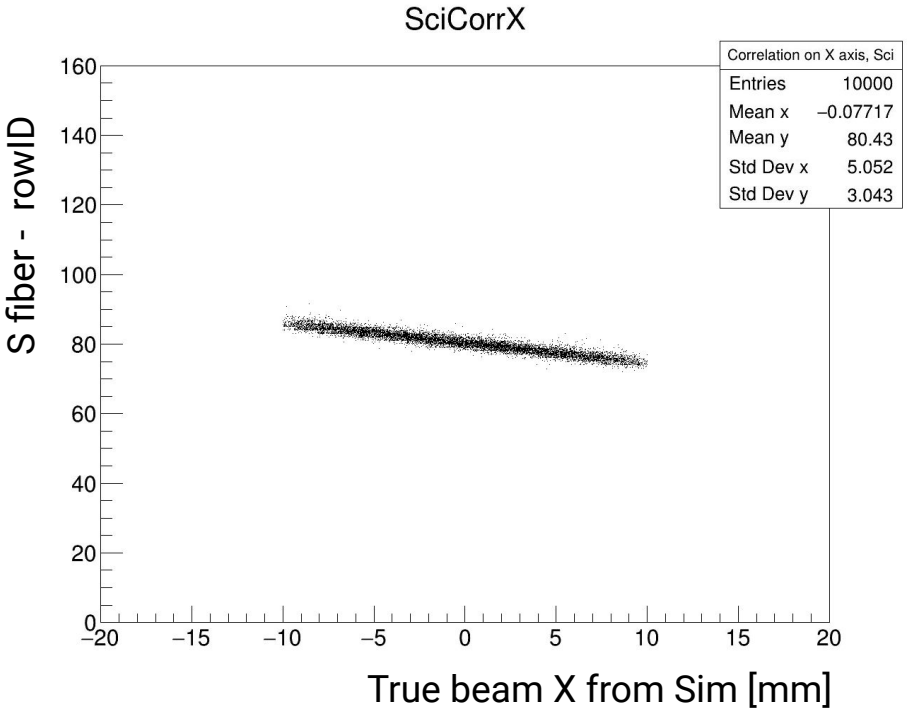
SciSiPM_weighted

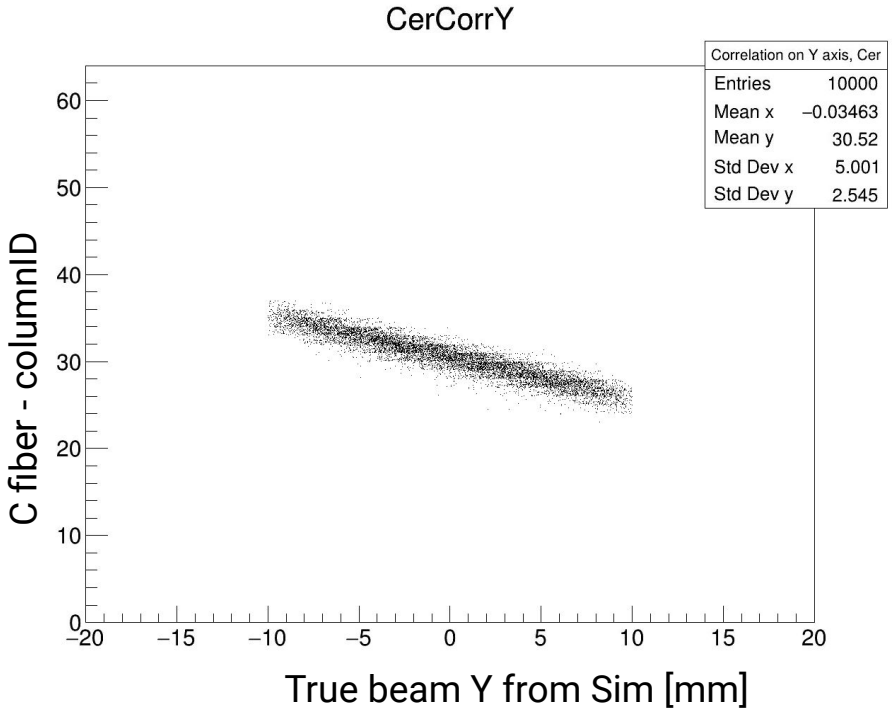


CerSiPM_weighted



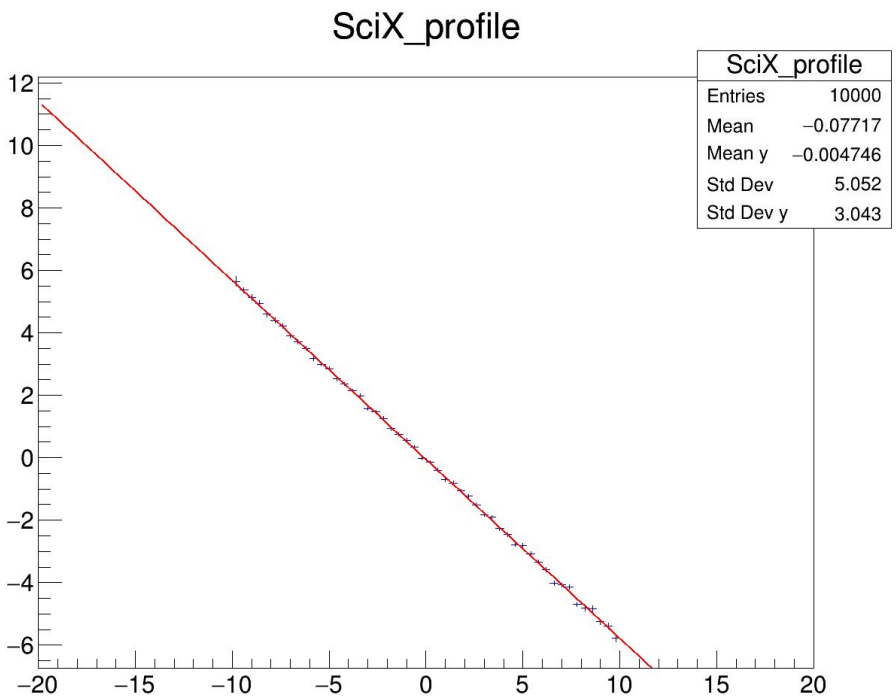
Correlation with beam impact parameter

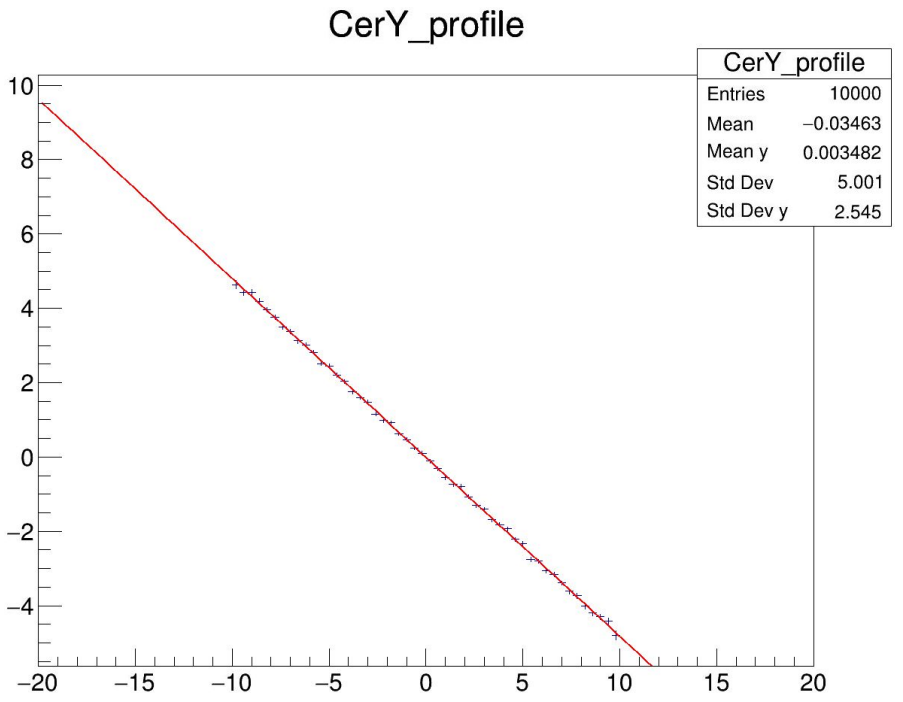




Extracting the resolution

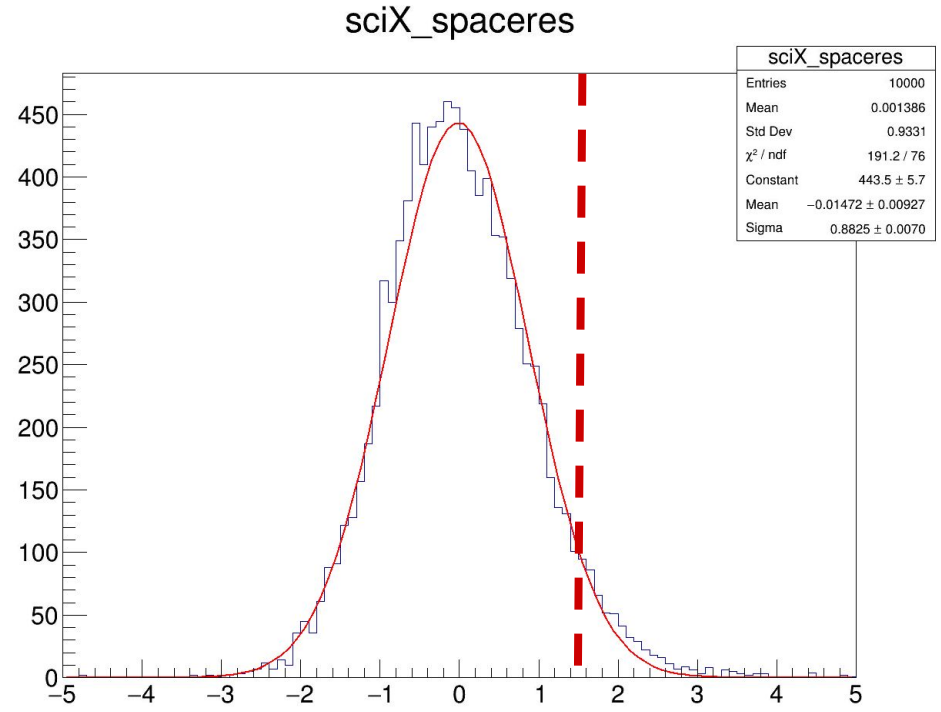
Need to pass from SiPM ID coordinates to millimeters
Profile deviation from mean barycenter (10k events) with true coordinates [mm]

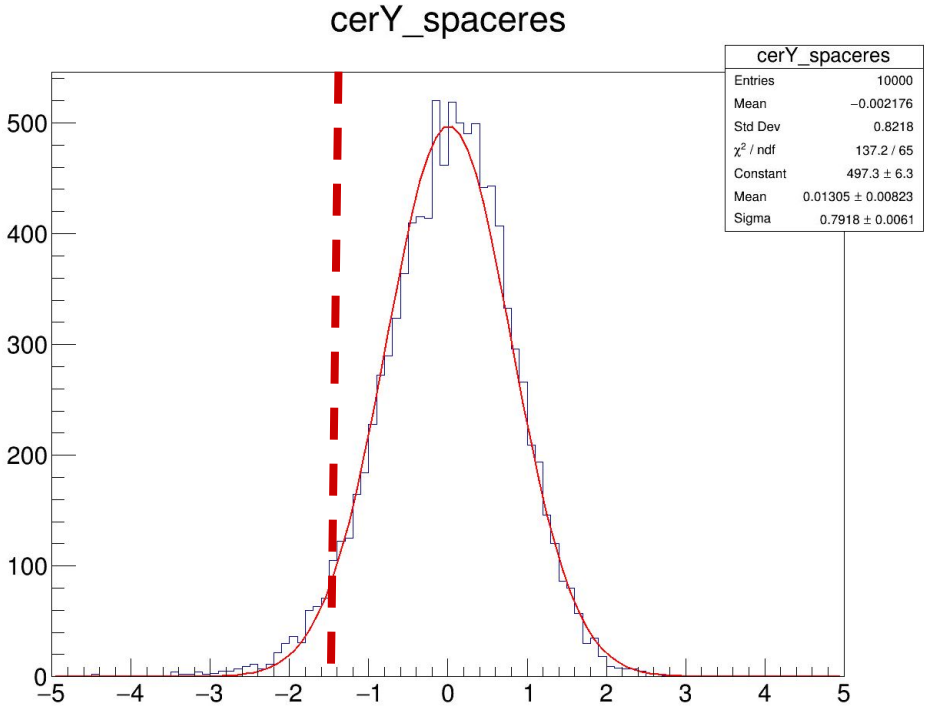




Extracting the resolution

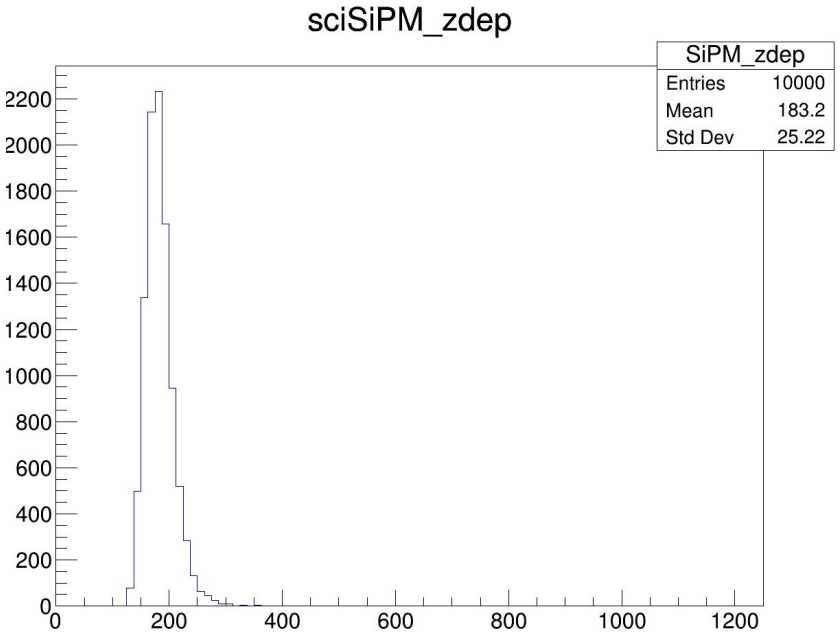
Use linear fit parameters to extract the event per event barycenter deviation from the mean value, corrected by the mean barycenter coordinates

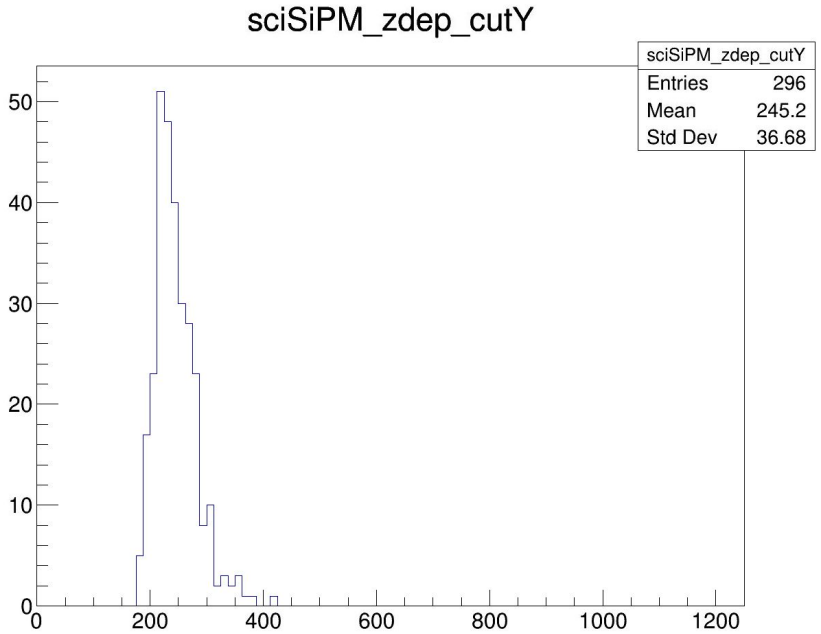




Calorimeter Tilt Effects

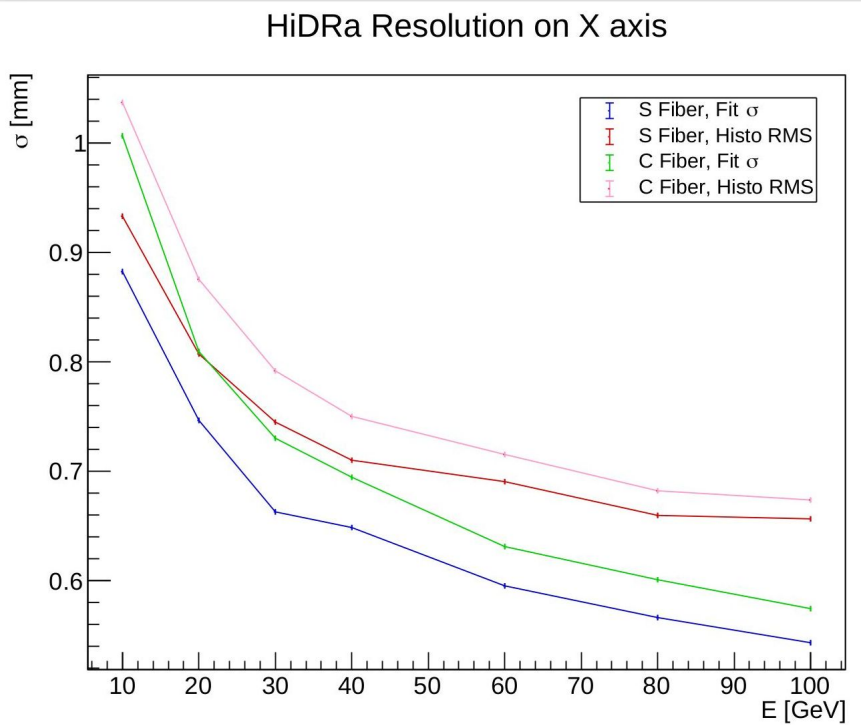
Calorimeter inclination: 2.5 degrees in both X and Y directions to avoid channeling
→ energy deposits at larger depths need to be corrected (despite small effects for electrons)
Save information from the simulation about the depth of the particle when generates a signal in S and C fibers (for each SiPM)
Depth of the shower barycenter along Z axis, with or without the cut on the tail of the resolution distribution

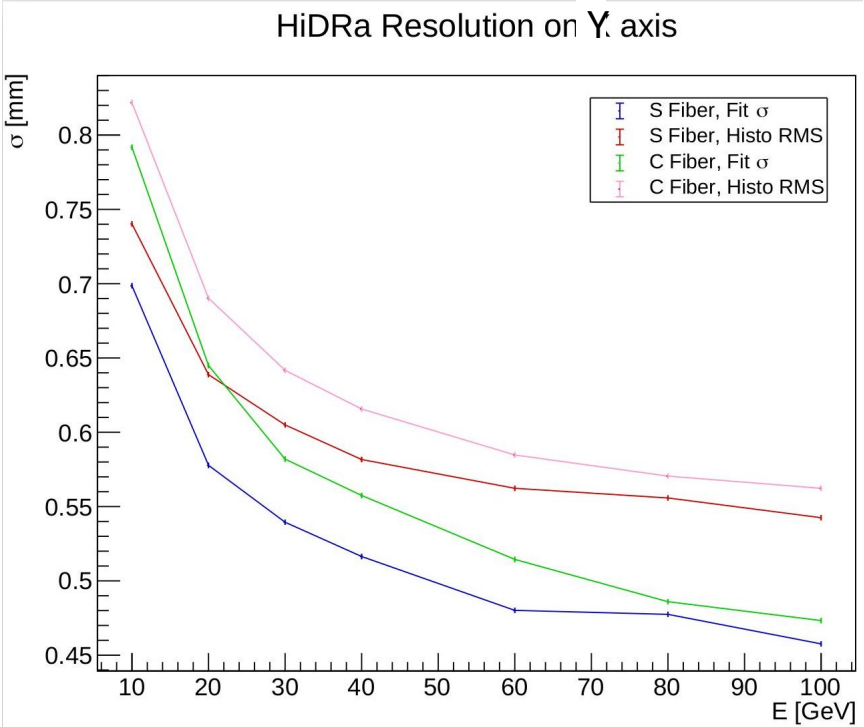




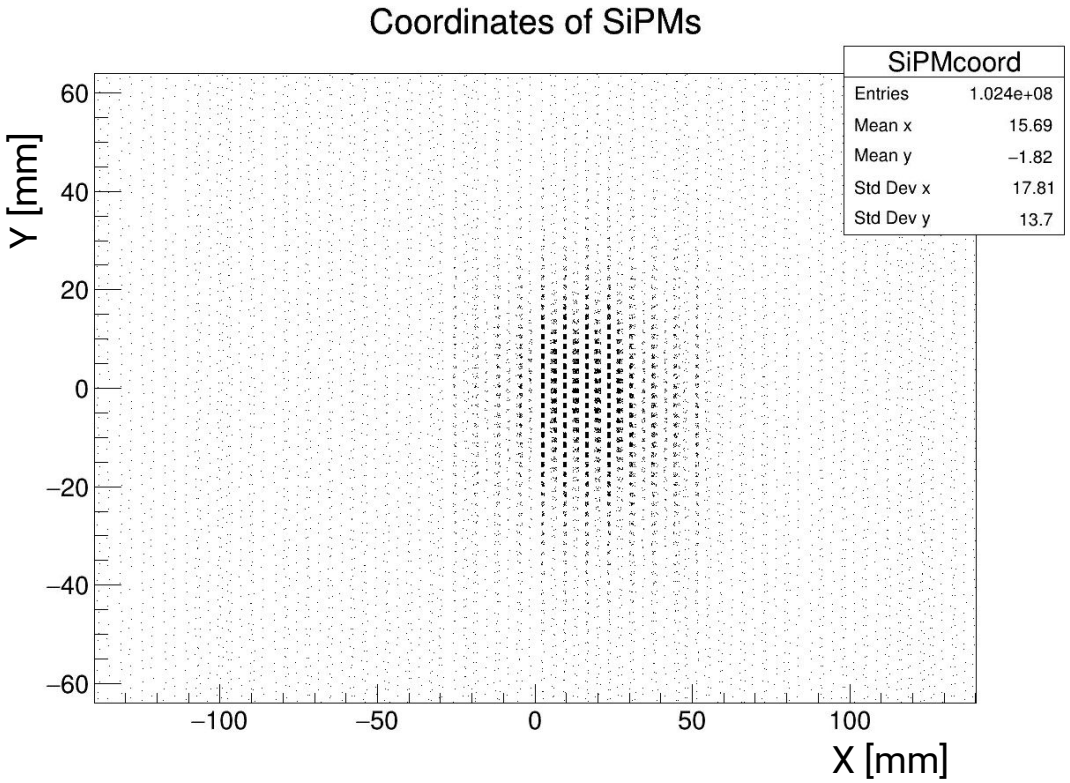
Spatial Resolution

Plot RMS in the range [10, 100] GeV taken from the histogram and from the gaussian fit





SiPM Position Reconstruction



- Associate (x, y) position to each fiber in SiPM-mounted modules
- Extract directly the resolution from these coordinates and compare with the results presented here
- A lot of work to be done :)