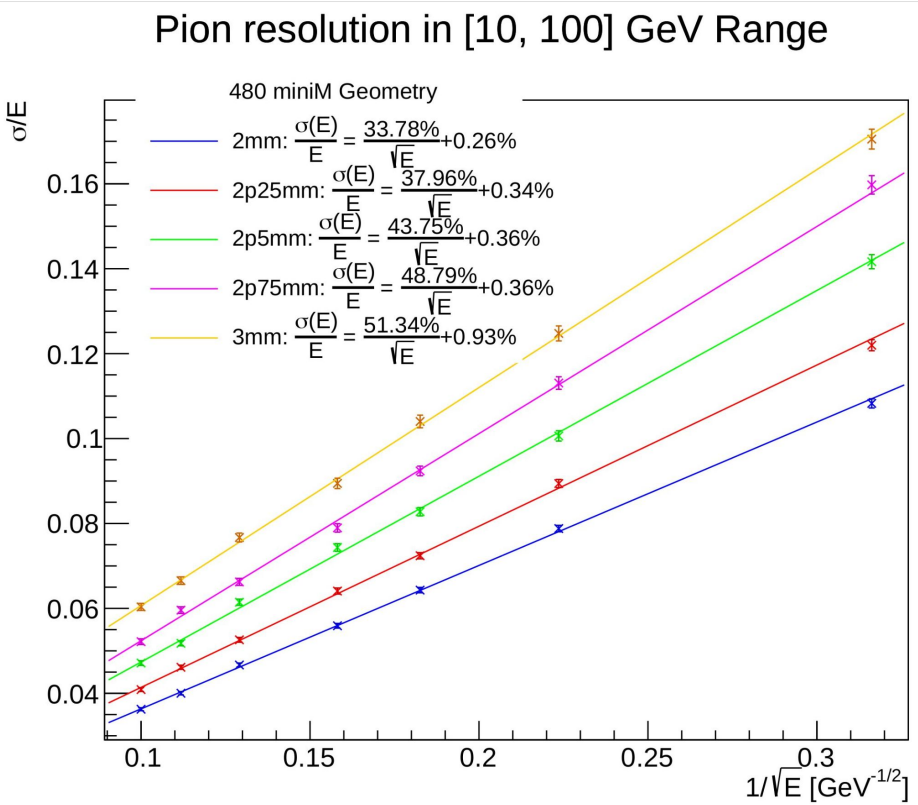
HiDRa Sim&Analysis

Andrea Pareti - 08/11/2023

Fibre Diameter

Where did we leave off:
Fix inner capillary diameter (1mm), increase outer one

[Link to Gsheets with phe/GeV ratios, chi values, ecc. for geometries that I've tried]

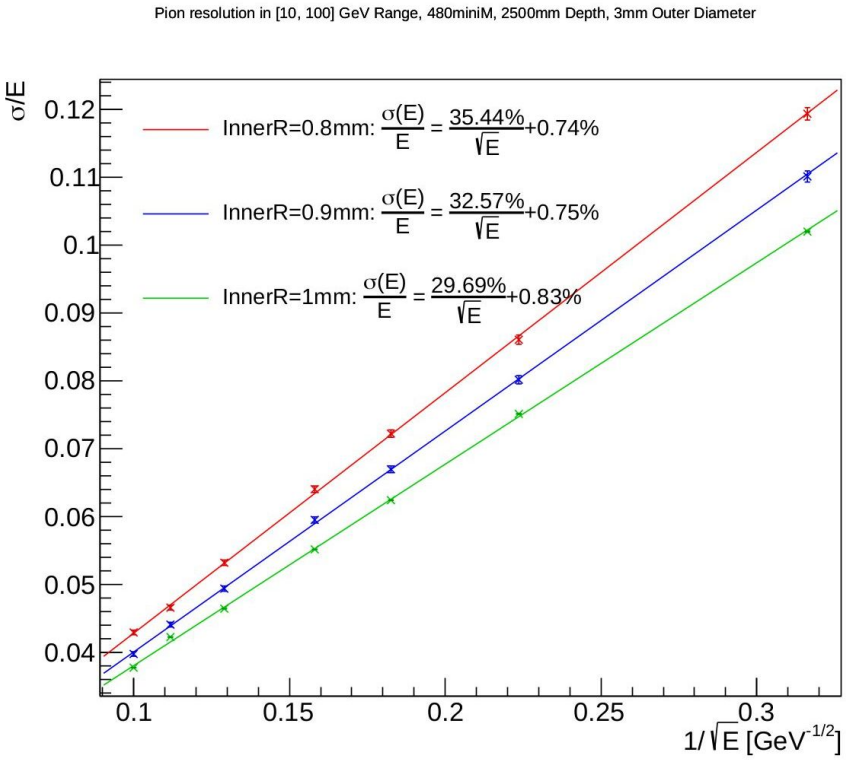


Fibre Diameter

[Link to Gsheets with phe/GeV ratios, chi values, ecc. for geometries that I've tried]

Where did we leave off:
Fix inner capillary diameter (1mm), increase outer one

Tried to go in the opposite direction:
Fix outer diameter (3mm)
Increase inner diameter [1.6, 1.8, 2] mm

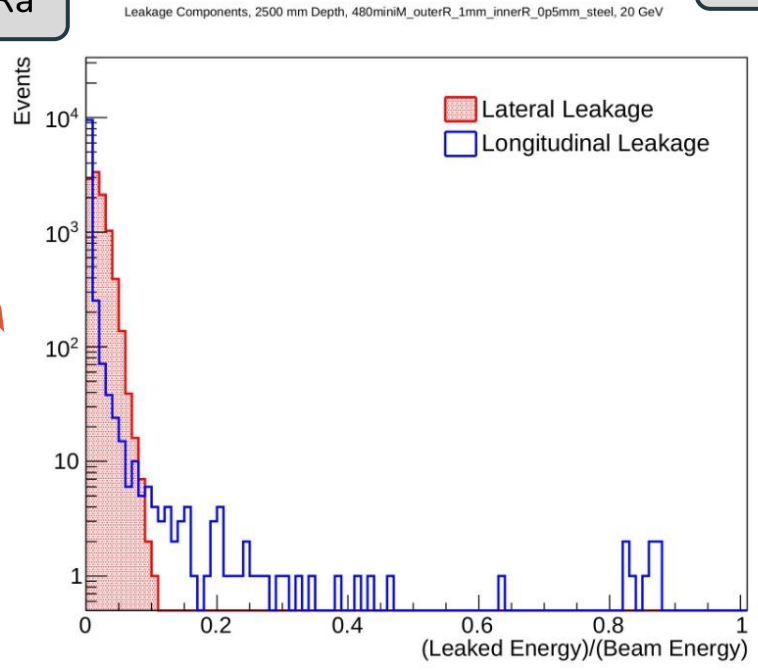


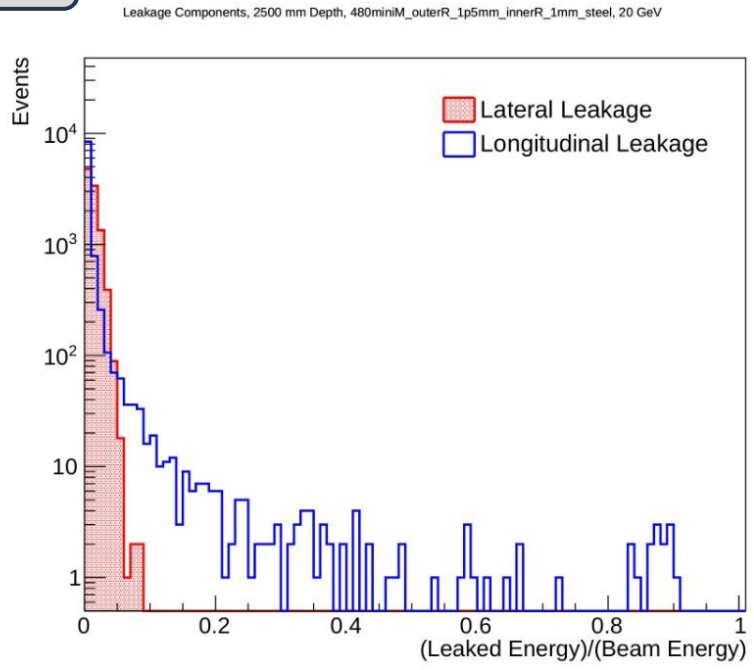
Fibre Diameter

Compare leakage of the geometry with 2mm inner diameter with the HiDRa-like one (all prototypes have 480mini-modules)

HiDRa

20 GeV



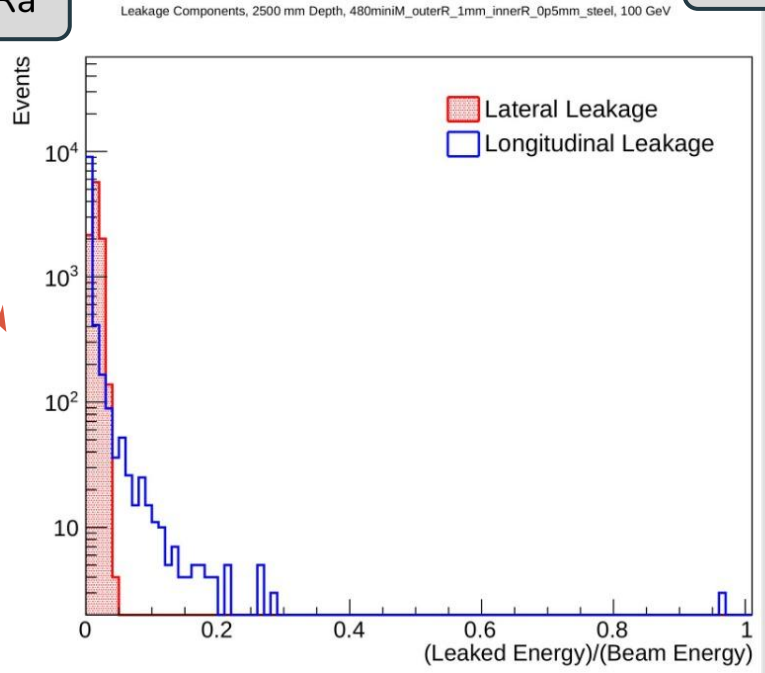


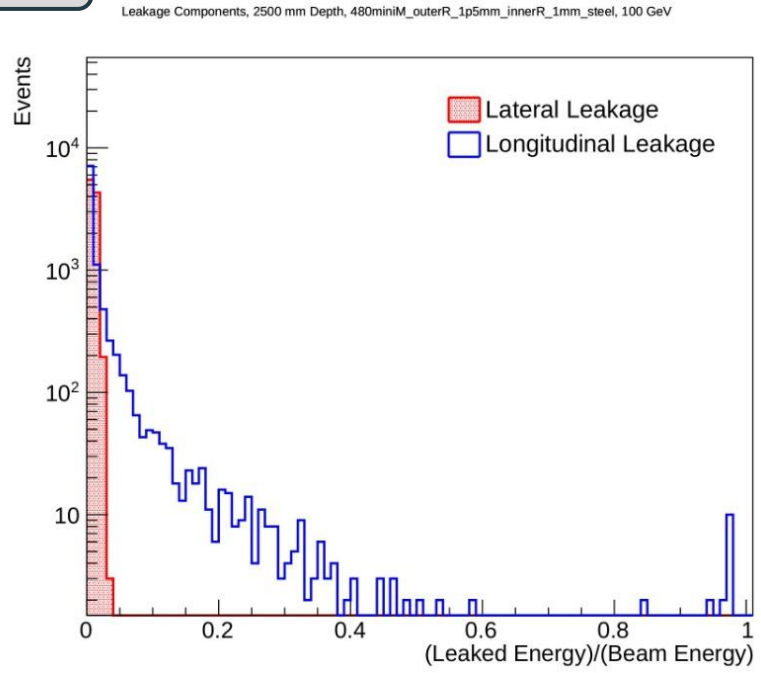
Fibre Diameter

Compare leakage of the geometry with 2mm inner diameter with the HiDRa-like one (all prototypes have 480mini-modules)

HiDRa

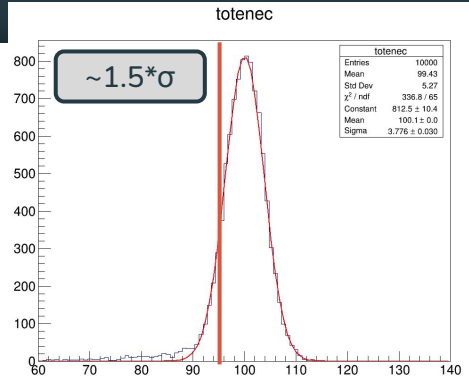
100 GeV

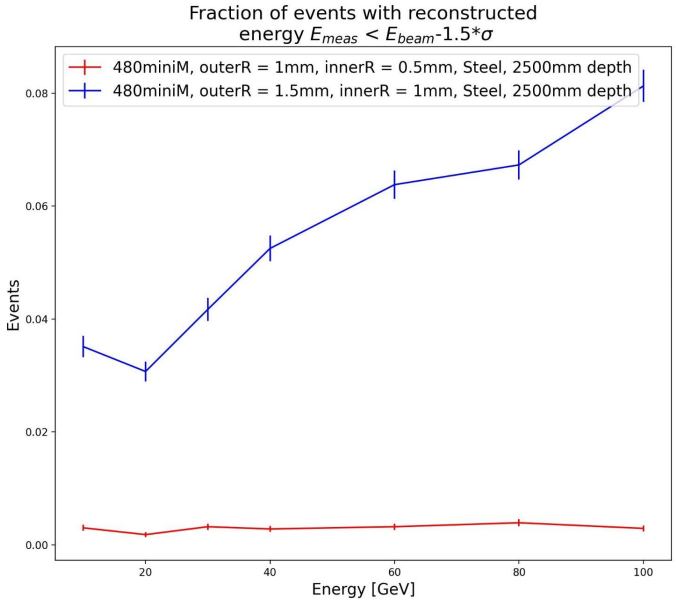


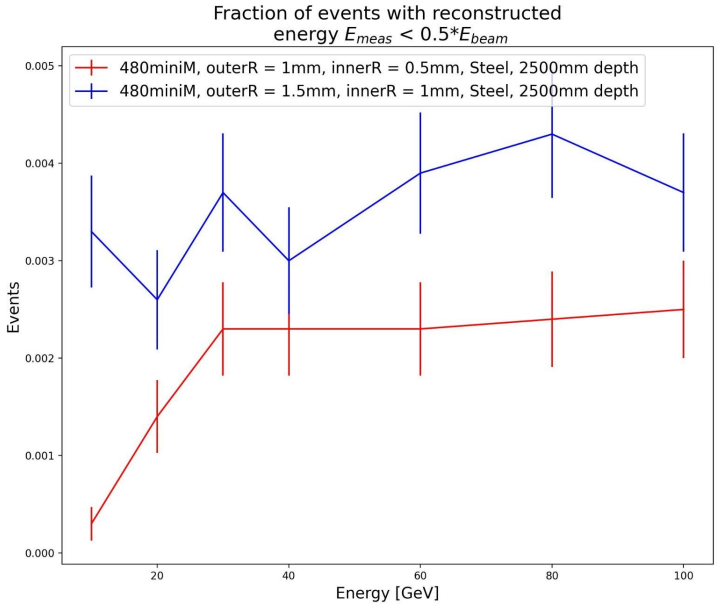


Fibre Diameter

Comparison of the low-reconstructed energy tails
Longitudinal leakage from the back of the calorimeter leads to a more populated tail

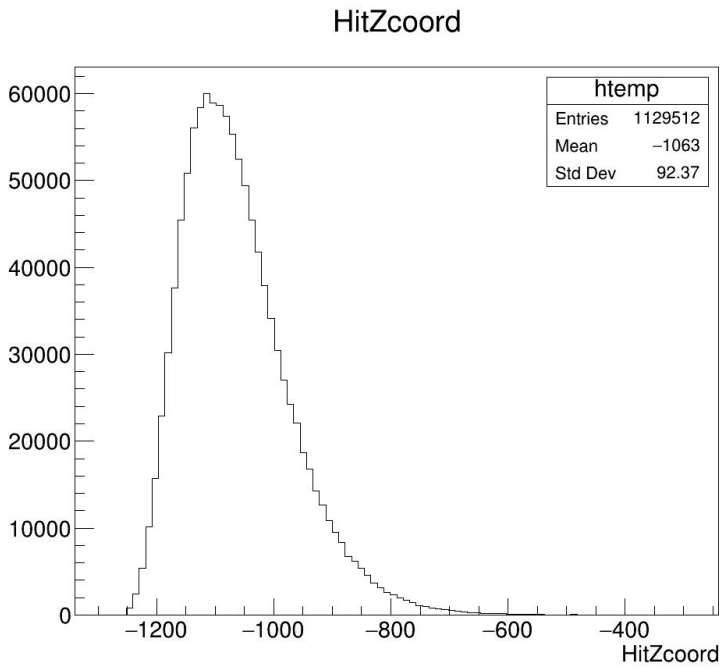


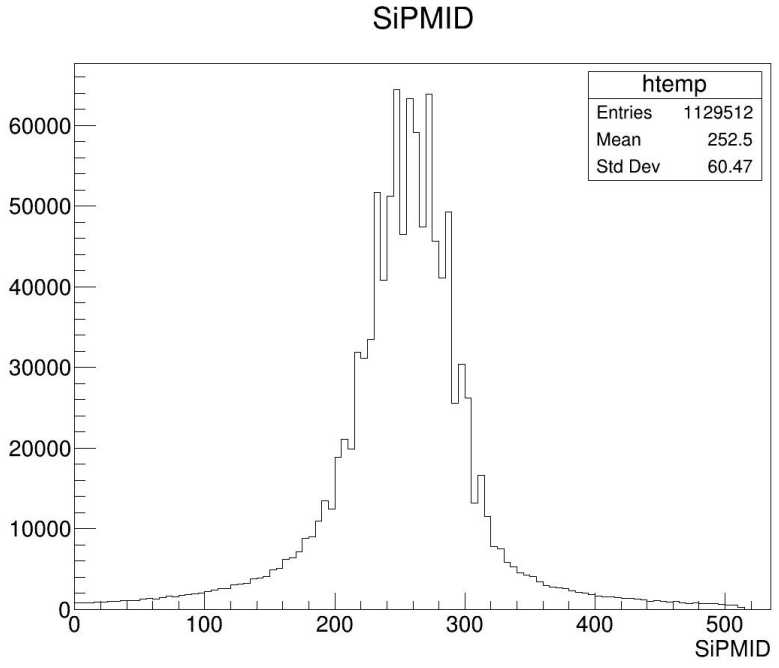




Individual hits updates

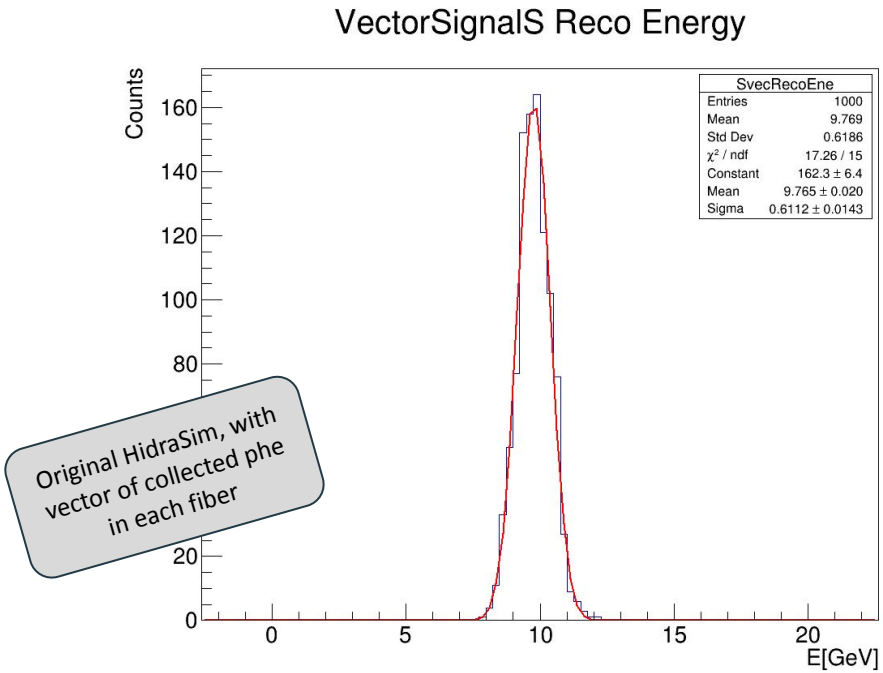
Recover information of each energy deposit (phe emission coordinates) in the SiPM towers:
Tried to make the physics processes as similar as possible to the already existing ones (in Geant4 SteppingAction)
Shown are the Z coordinates of each hit (HiDRa is 2500mm long, from -1250mm to +1250mm) and the related SiPM

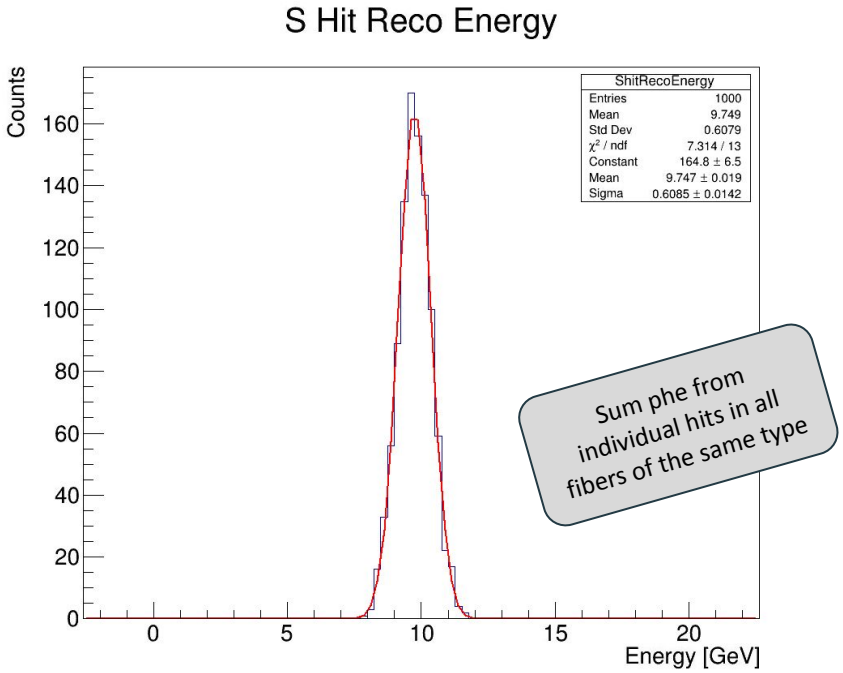




Individual hits updates

Agreement between “original” sim and new one seems good, but not perfect I think it should be possible to have exactly the same behaviour, will do some checks





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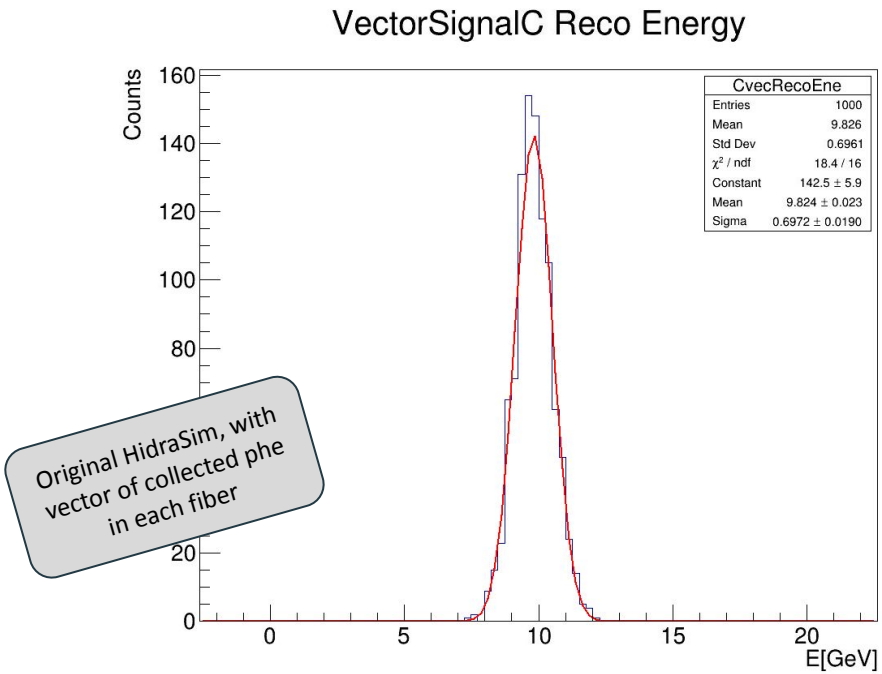

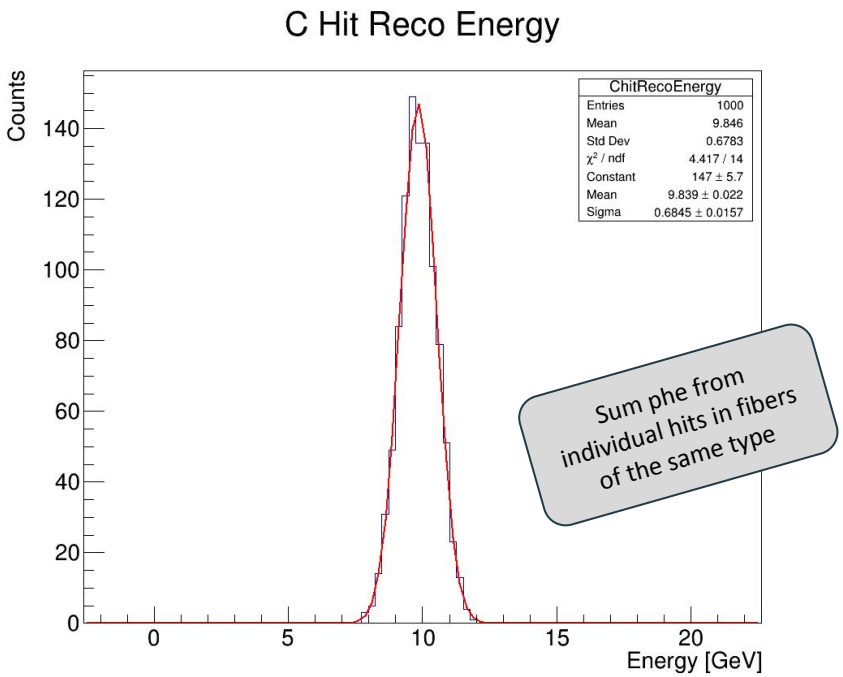

Individual hits updates

Considerations:

- By now, hits have to be saved in different nuple with respect to original sim one
- EventID info printed in each hit to synchronize hits to DREMTubesout output
- Simulation time seems a little longer but not drastically, analysis way longer (need to loop over all hits to associate them to the correct event entry in DREMTubesout) □ no numbers yet
- Geant4 HitsCollection in each fiber already implemented, but couldn't find a smart way to simultaneously store global event info, array of all SiPMs and array of hits per each SiPM in only one ntuple (advice is welcome)