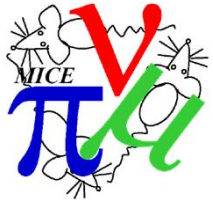

MICE Collaboration

Energy loss in MICE absorbers

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MICE collaboration meeting 43, 29th of October 2015.

Outline

- MC simulation details
- Energy loss in LH2, and empty LH2 target using MC
- Energy loss with LiH target using MC
- Conclusion/Outlook

MC simulations

- MAUS version 1.2.0 .
- using datacard: datacard_200MeV_mu_plus.py

LiH target MC sample produced :

- **50k** single muons
- keep_only_muon_tracks = False
- **geometry id 57**
- problem with MAUS 1.2.0. solved with replacement of Ckov detector description files from newest geometry 70.
- Another problem solved: datacard had hardcoded number of steps, which were clarly not enough in new MAUS MC setup.

LH2 target MC sample produced :

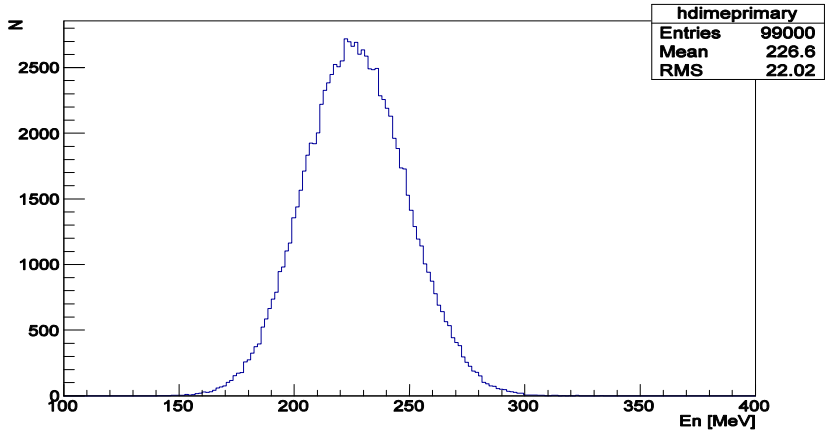
- **99k** single muons
- modified **geometry id 57 (replaced LiH target with LH2 one)**

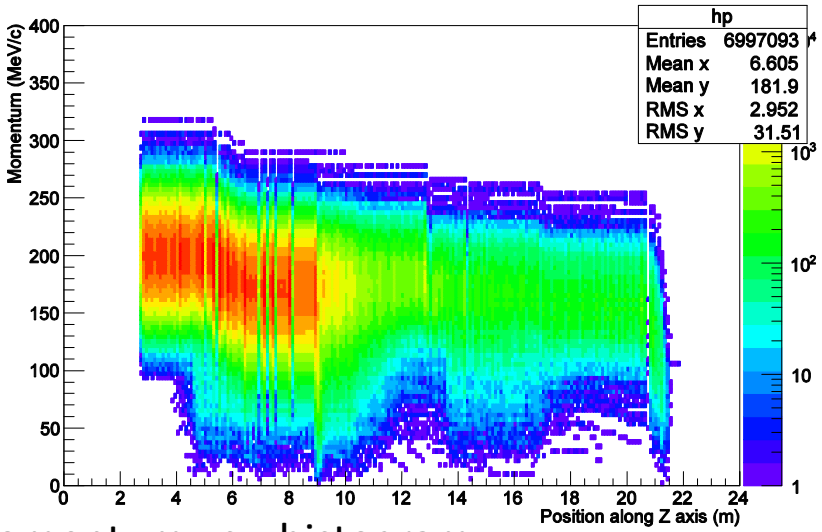
Empty LH2 target (LH2->AIR) MC sample produced:

- **99k** single muon spill events
- modified **geometry id 57**

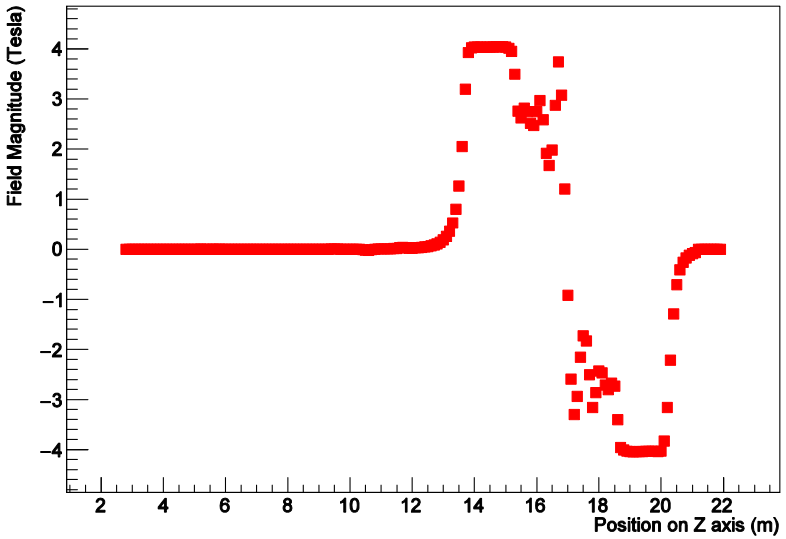
MC simulation details

- *Virtual planes analysis gives, among other information:*
  - Energy distribution of primary particles, momentum and field magntude vs Z



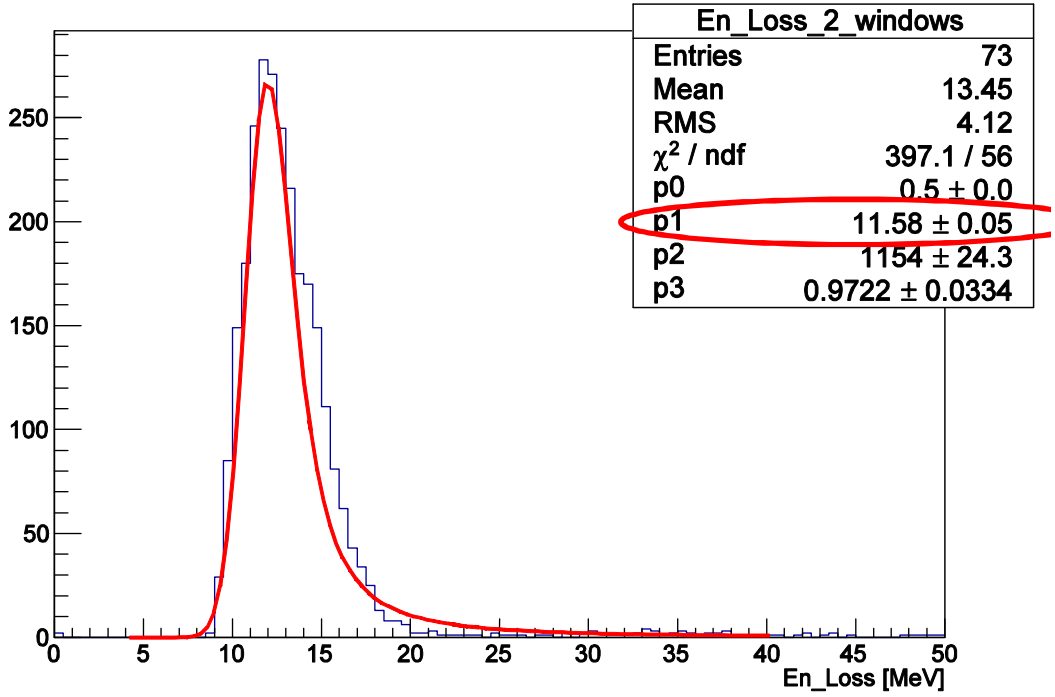


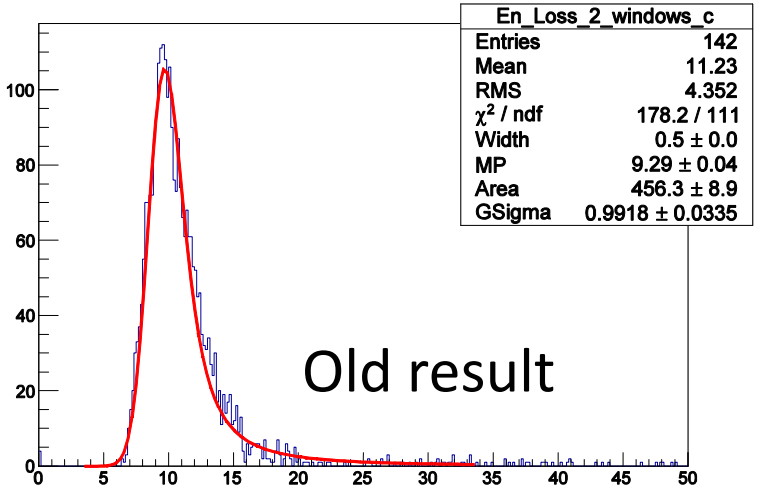
Momentum vs z histogram



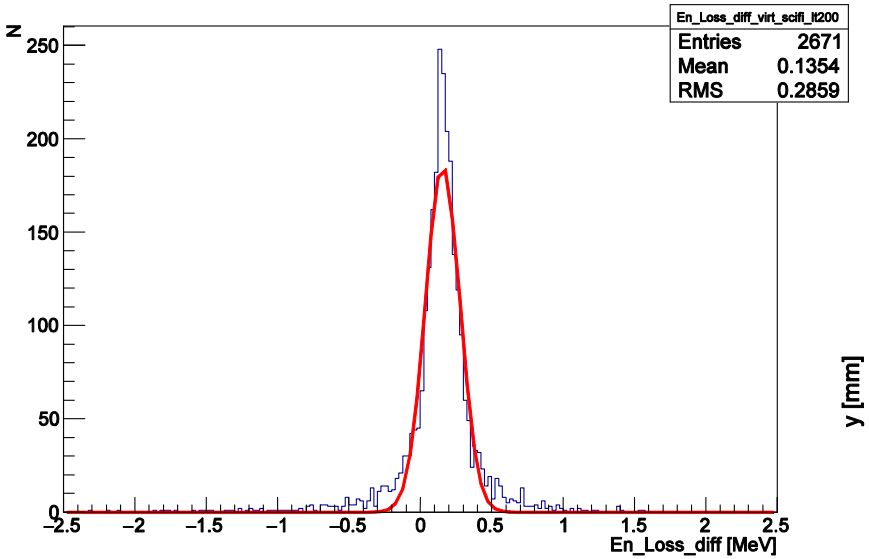
LH2 target

- The two reference virtual plains z coordinate are placed near tracker planes closest to absorber. The virtual plains are changed from old simulation 154 -> 141 and 191 -> 199.





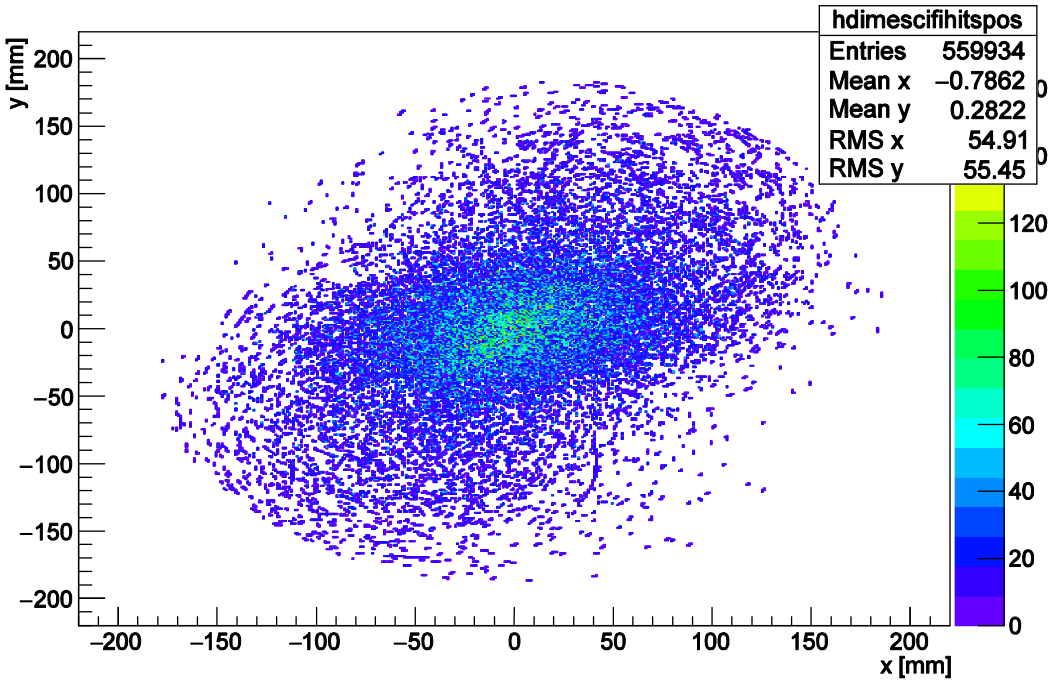
Sci Fi points in MC used



Difference between MC virtual plane analysis results and MC Sci Fi information.

Shift to positive side comes from difference of Z for Tracker plane and virtual plane in the analysis. Additional material gives difference in results.

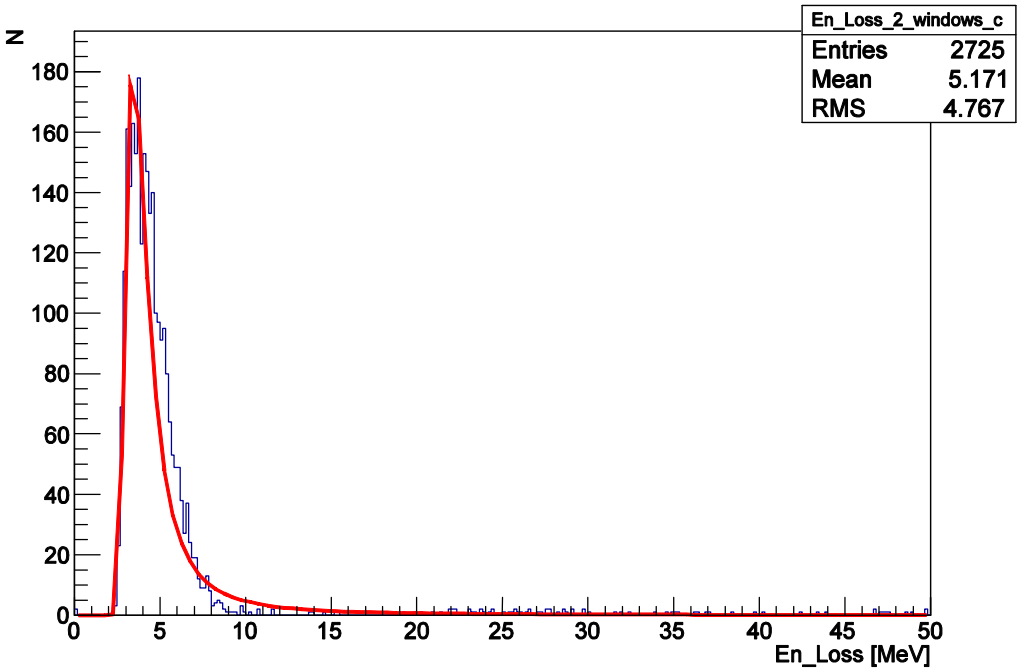
Simple MC method. The MC information about the Energy of the particle which produced a hit on Sci Fi closest to absorber is used.

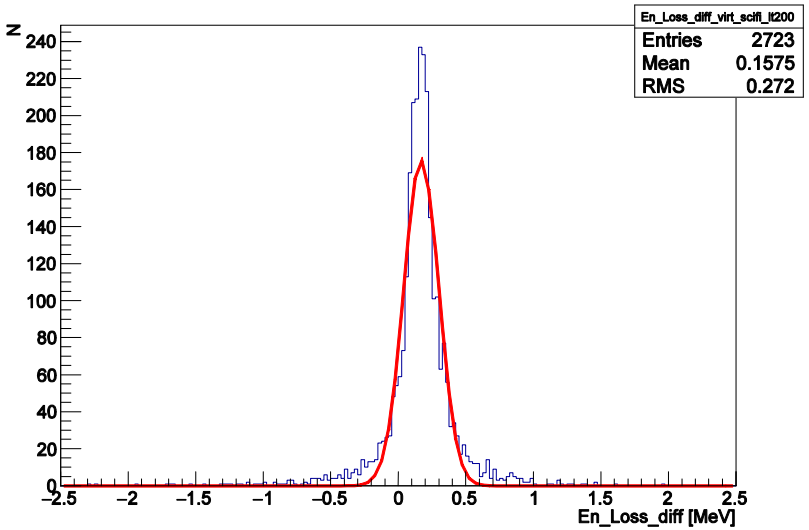


Sci Fi hits in Tracker 1. XY plane.

Empty LH2 target

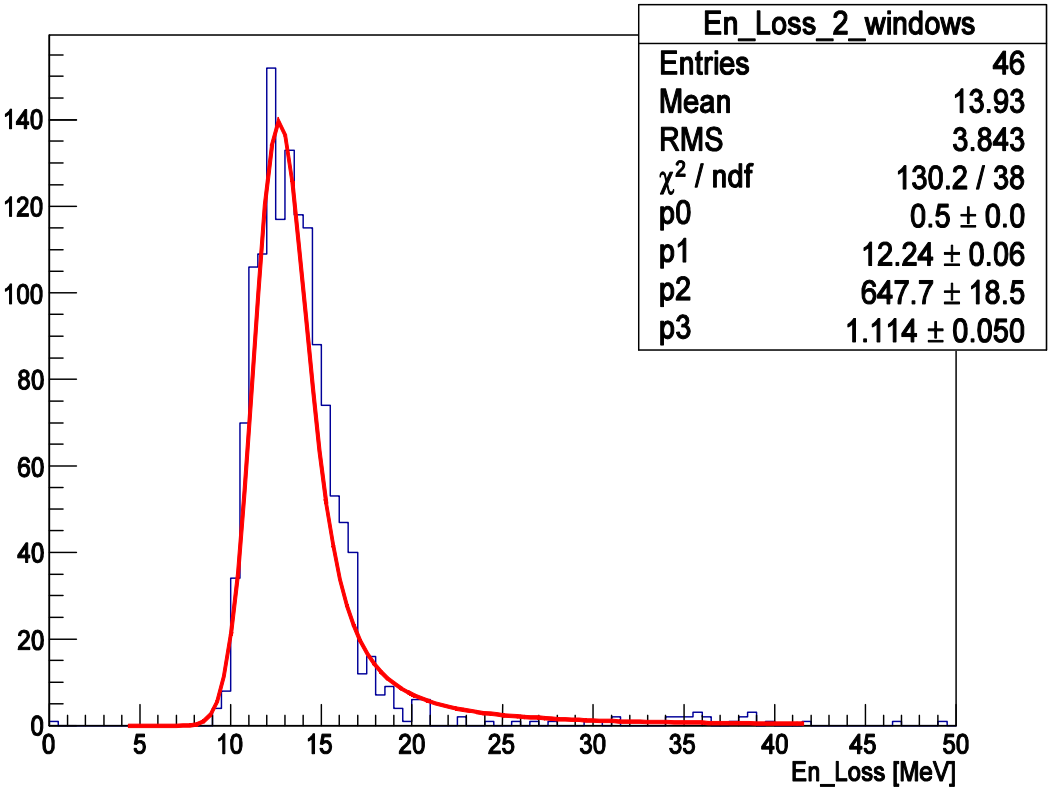
- When comparing the results from last CM for empty LH2 target, the increased value of Energy Loss (because of moved reference virtual planes) can be noticed.
- Full and Empty target practically have the same from virtual planes - Sci Fi analysis differences (RMS).

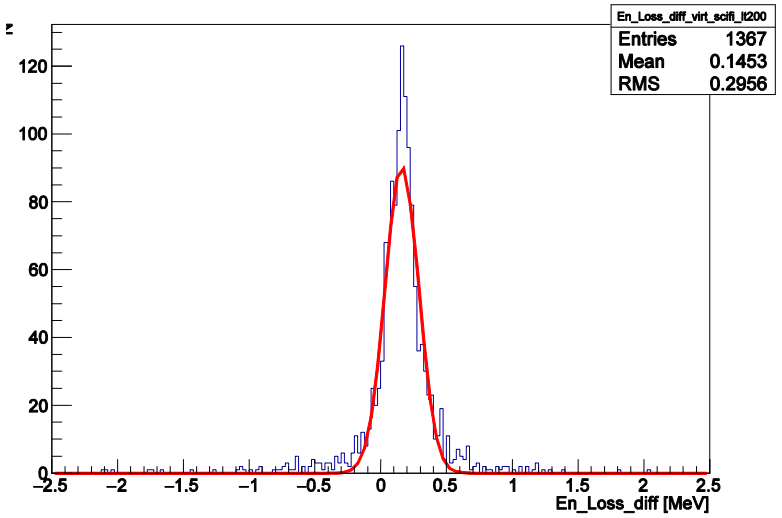




Difference between MC virtual plane analysis results and MC Sci Fi information.

LiH result in MAUS 1.2.0





Difference between MC virtual plane analysis results and MC Sci Fi information.

Conclusion/Outlook

- The result of Energy loss virtual plane analysis is updated for MAUS 1.2.0.
  - There were problems with running analysis with the new software and older geometry description.
    I solved them, but it took me longer than I liked.
- The very simple analysis using MC information from SciFi hits was presented.
  Look more into reconstructed (sci-fi) tracks.
- I was made aware that the additions to the reconstruction software for some detectors are expected to be implemented soon, and this will improve possibilities for progress in the analysis.

- The division of tracks by incident angle on the target could improve Energy loss resolution, if the statistics allows.
- The possible improvement could come from checking of Kalman fitter's results and possibility of it's iteratively use with Energy loss measurements updates.