

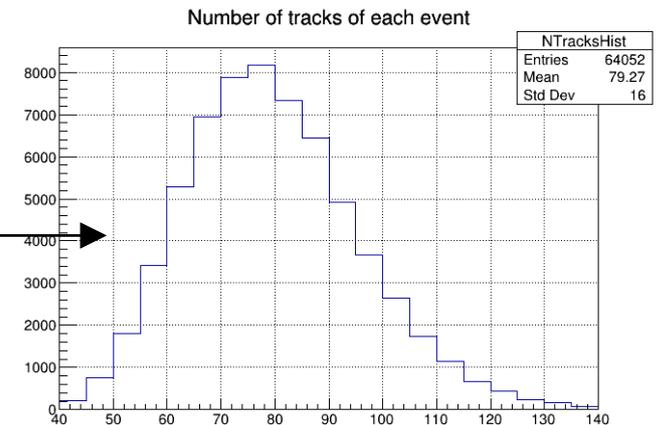
# On $dE/dx$ in multitrack environments

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ILD Meeting  
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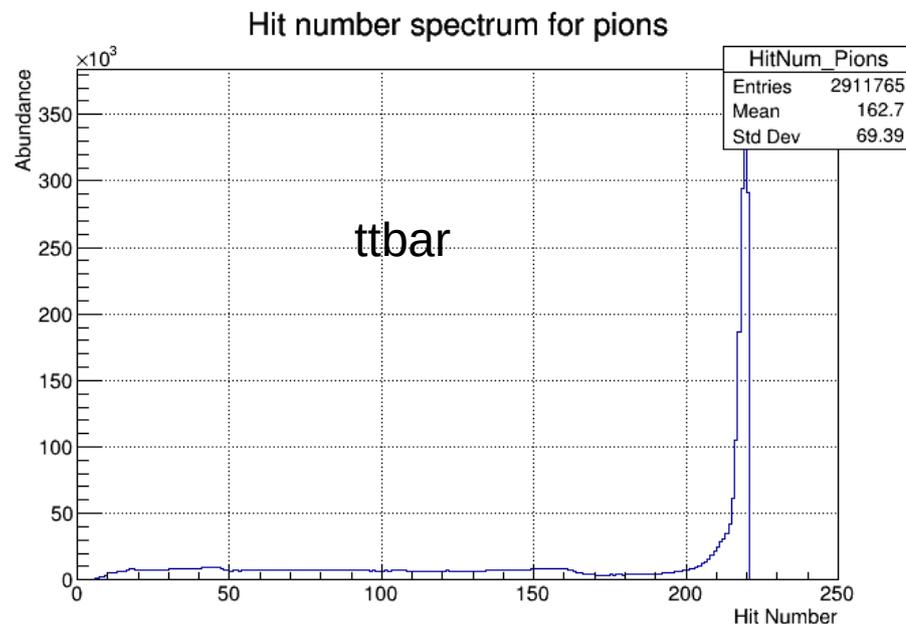
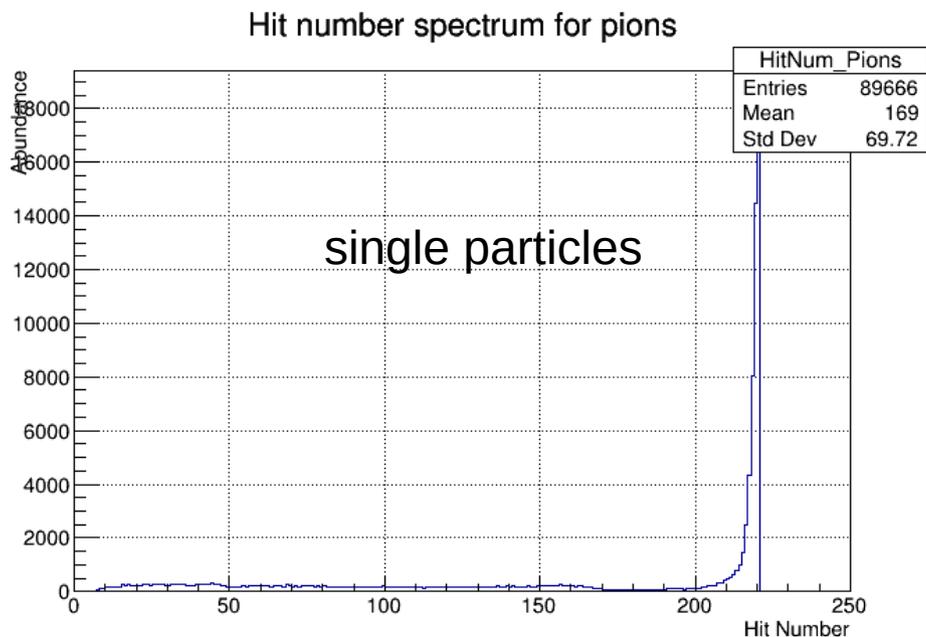
# The issue with multiple tracks

- If tracks are too close to each other, the TPC may not be able to resolve their individual hits and instead merge them to *double hits*.
  - This depends on the available separation in  $r/\phi$  and  $z$ , which in turn depends on granularity (in  $\phi$ ) and readout electronics timing (drift in  $z$ ).
  - In the current reconstruction, merged hits are given to exactly one of the contributing tracks, which lead to fewer hits in the other track and a too large  $dE/dx$  in the receiving one.
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- Here: Compare single tracks from calibration samples with  $t\bar{t}$  samples with about 80 tracks per event
  - At Z pole expect on average tracks from 2 hadronic Zs with about 20 charged particles each at any given time in the TPC (from lumi x electron drift time)



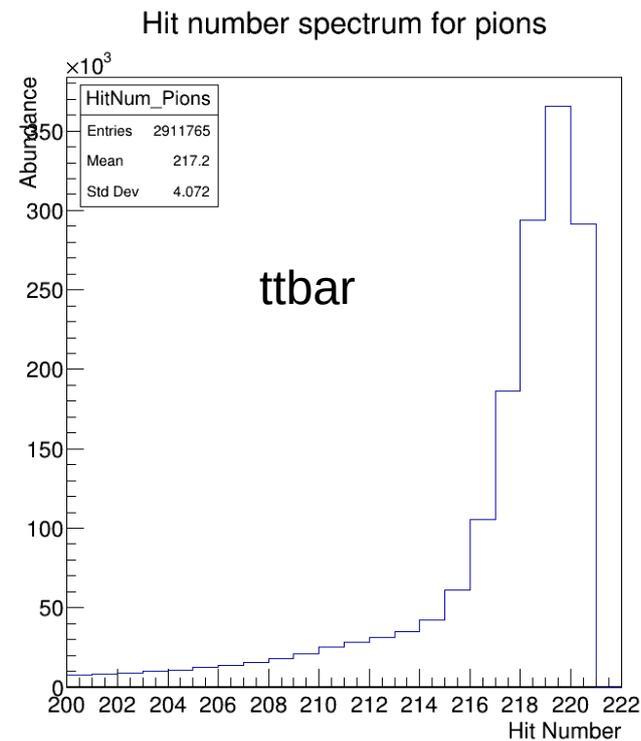
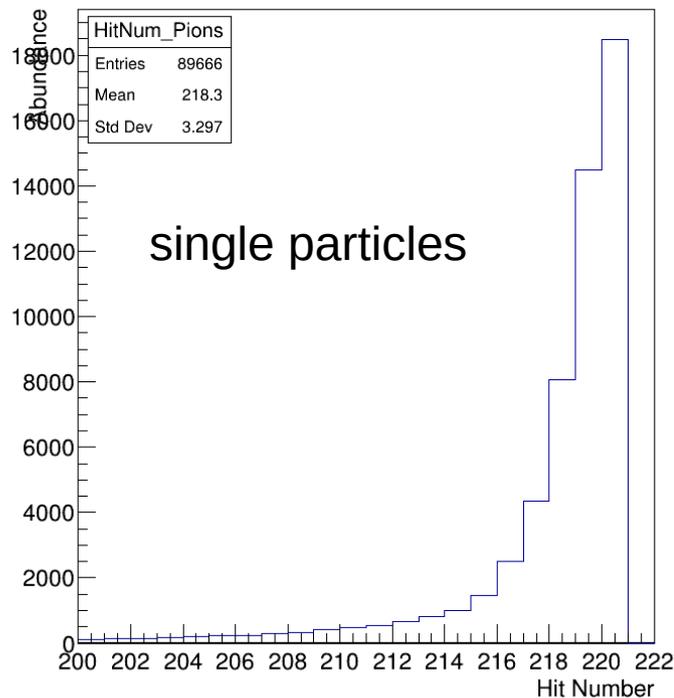
# Single particles vs. ttbar hit number

- TPC (IDR-L) has 220 rows = max. number of hits per track
- ttbar has more tracks with low number of hits and the peak is a bit broader
- Low number of hits can come from very forward tracks, curlers, in-TPC decays, backscatter



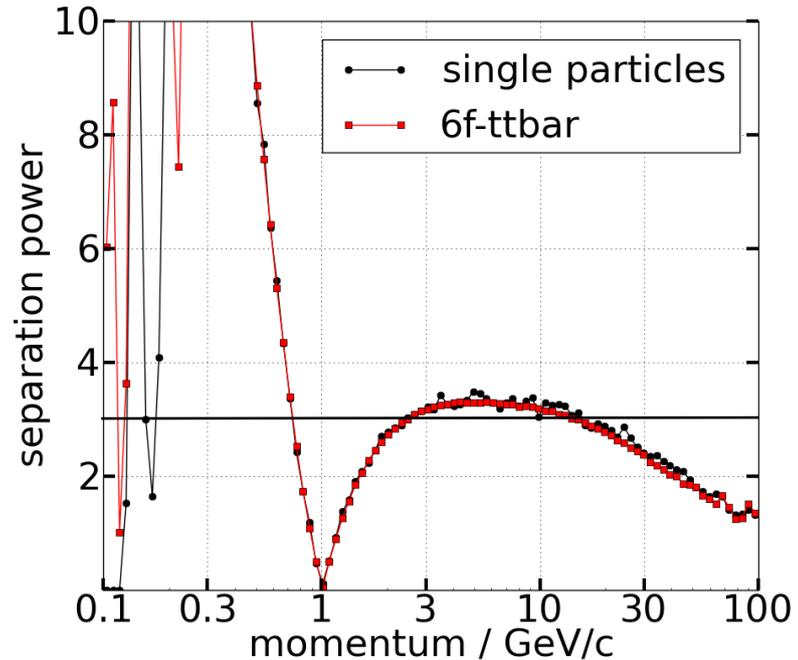
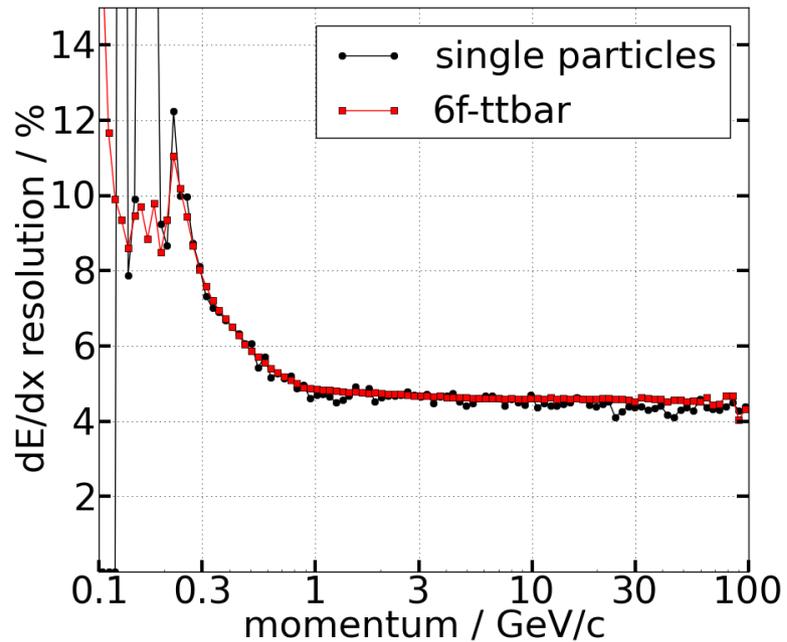
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# Overall resolution & separation power

- The  $dE/dx$  resolution and consequently the separation power is slightly worse in ttbar
- The statistics are much larger



3