S.BORDONI, F. SANCHEZ

TEST BEAM MEASUREMENTS

AIM OF THE WP

- Understand and define the test beam requirements and needs for the different WPs
- Identify the most appropriate facility/ies to accomodate the requirements (CERN?) and define the time scale for the tests
- Coordinate with the facility and optimise run time and requests

TEST BEAM PRELIMINARY REQUIREMENTS

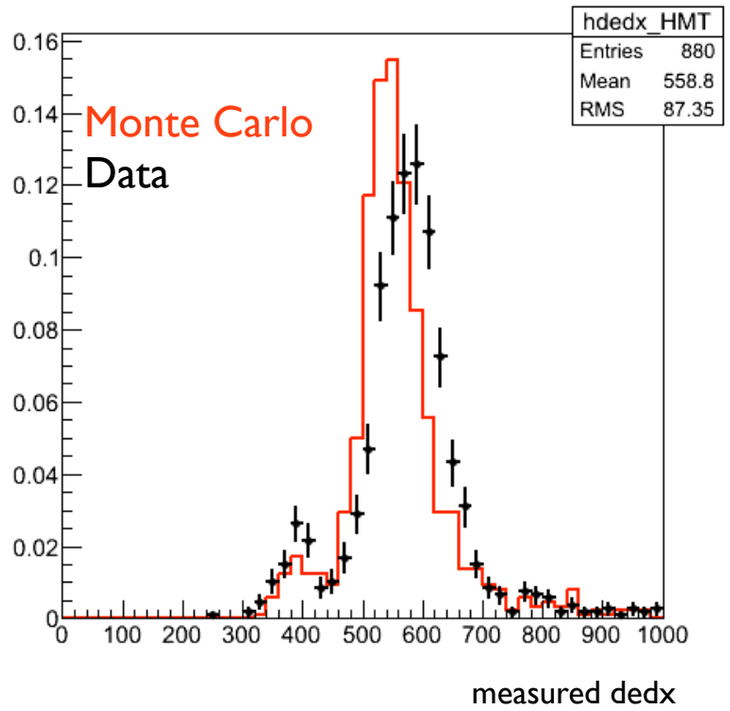
- Detector performances and characterisation
- Physics measurements

In the following slide there is a preliminary and incomplete list focused on "final TPC design"

Intermediate tests might be needed (TOF, target, ..). This workshop is the opportunity to start thinking and compile a list

TPC PERFORMANCES AND CHARACTERISATION (1)

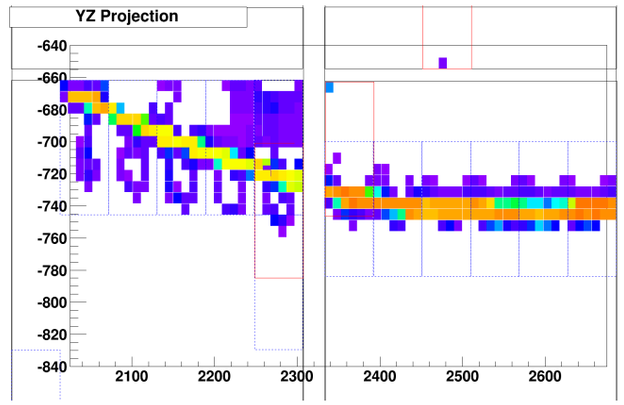
- Point resolution as function of the track angle.
  - Muons of relatively large energy.
  - Is it possible to rotate the TPC ?
- dE/dx resolution and absolute calibration
  - Muons of different energies to scan the relativistic raise.
  - Required good external momentum definition.
- Electron dE/dx to understand mismatch Data-Geant 4
  - Electrons with several energies.



TPC PERFORMANCES AND CHARACTERISATION (2)

- Proton dE/dx
  - Low energy protons.
- Low energy protons to understand dynamic range and hairy tracks.
  - Can this be done with alphas or other heavy nuclei ?
- Global PiD
  - Combined run with ToF and TPC.

Yevgeniy's "chainsaw" events



- Hairy Pip from Pip's data events
- Same features as other Hairy Pips:
  Delayed timing, high and low charge events, ...
- Weird loops not contained into 1 ASIC

PHYSICS MEASUREMENTS

- Proton range for low energy protons (<20 MeV kinetic Energy).

- Pion scattering cross-sections: Elastic, Inelastic, Charge exchange, etc…
  - Range from 100 to 700 MeV/c positive and negative charged pions.
  - Required mainly in C and water (Argon?). It requires external target.

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SOME QUESTIONS

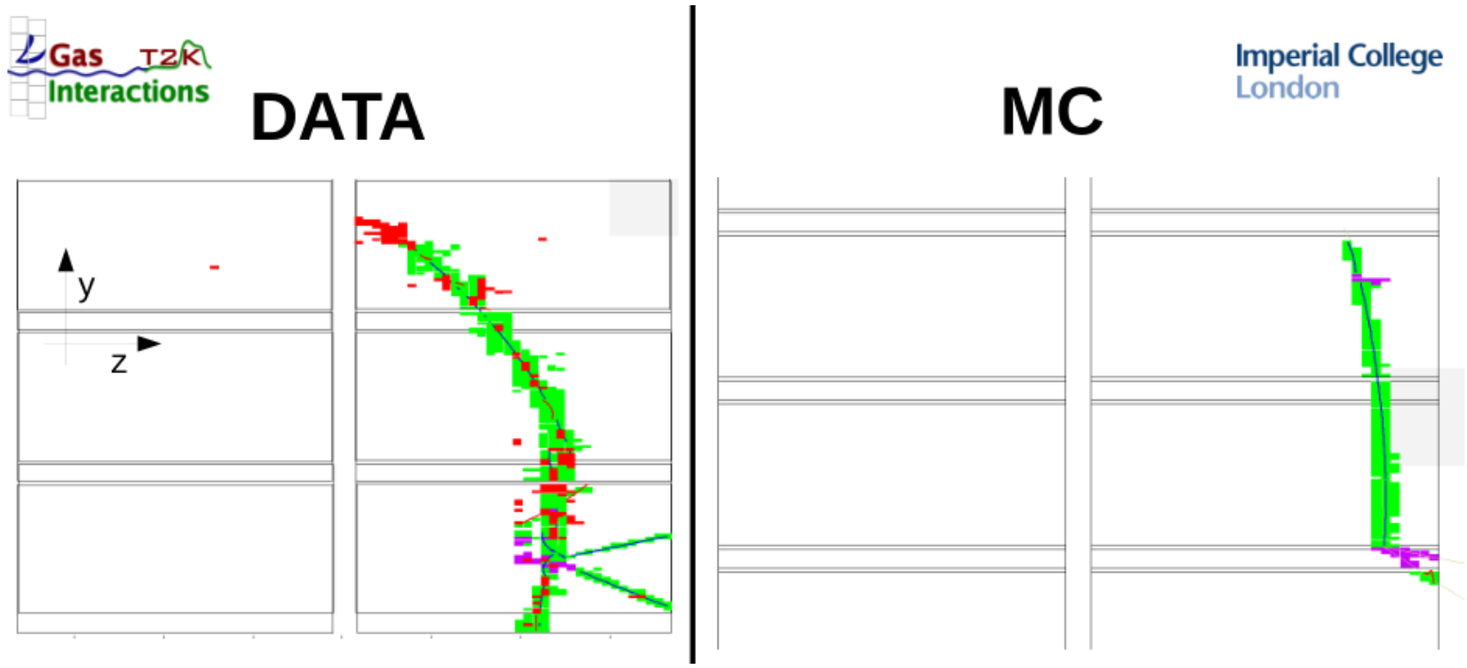
- Can we explore different detector angles? This is even more important for the horizontal TPC's looking into high angle tracks.
- Do we want to include tests with TOF or Target?
- Do we need a magnet ? For which tests?

CONCLUSIONS

- We need to start to define the list of tests we would like to perform
- Requirements and time-scale will set the constraints on the facility
- Collect interests from Institute to this WP to start to share the work

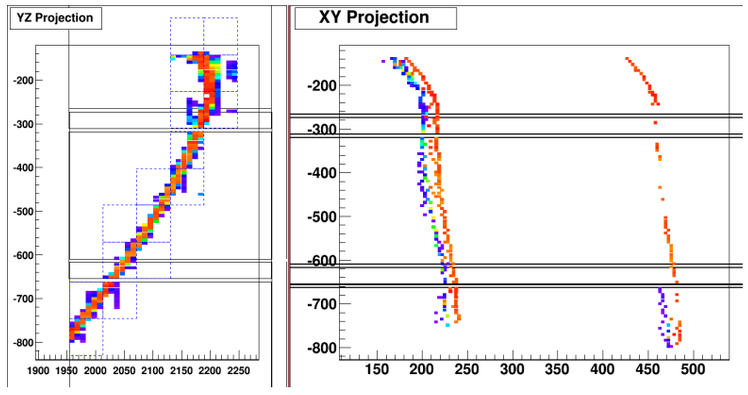
SUPPLEMENTARY

Status of Pip's gas interaction analysis



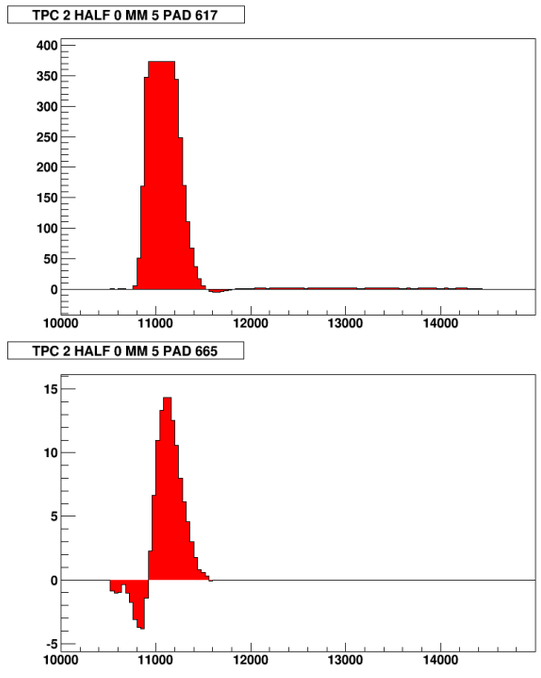
- Hairy tracks spotted by Pip in his TPC gas interactions
  $\Longrightarrow$ Hairy Pips ©
- These create very difficult tracks for TREx
- This could also impact significantly the PID !

Hairy Pip example 1



- Hairy Pip from Lukas proton control sample
- Even if not too bad in YZ projection, big time delay for low charge hits
- Also TREx doesn't pick up all the hits

Hairy Pip waveforms



- From neighboring pads in the previous event
- These waveforms are typical to the Hairy Pips
- High charge generally saturated waveform with a bit of negative before and/or after
- Low charge with negative part before
- Also sometimes ringing on high charge waveforms (after 12000 on this example)