

Measurements program group goals for next year

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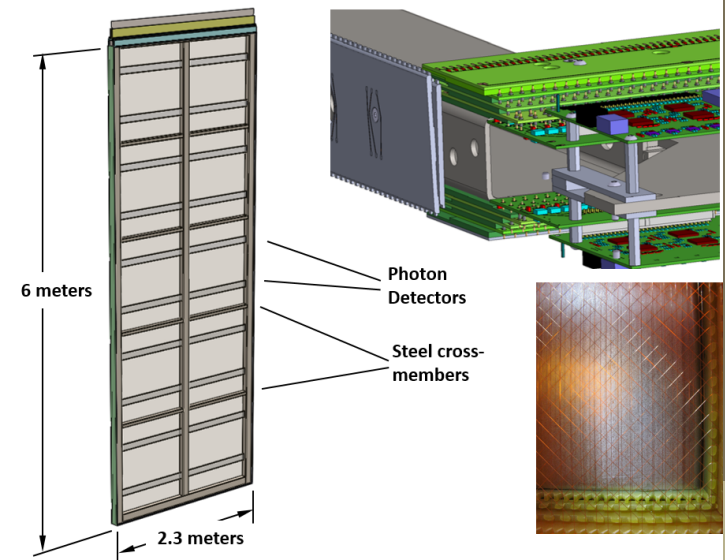
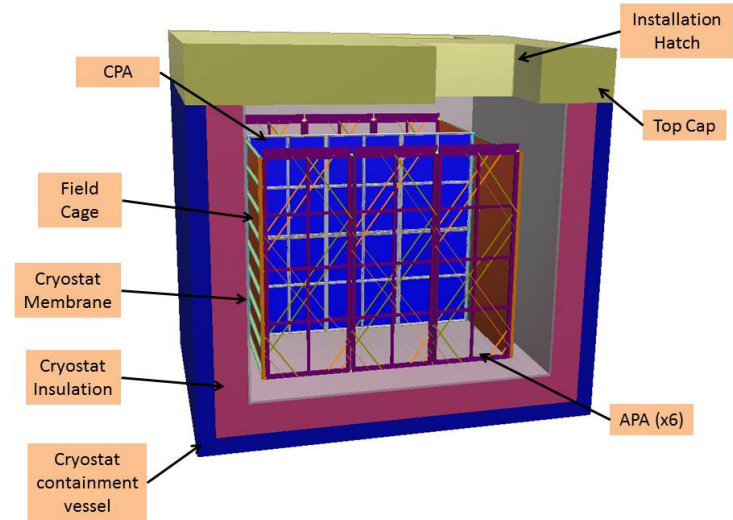
Pittsburg University

Goals of the group

- The goals of this group will change after the proposal is submitted/approved.
- Develop necessary tools for data analysis.
- Train a new generation of experts who will lead the analyses efforts for DUNE in the next decade.
- Get ready for data taking in spring 2018 (2.5 years)

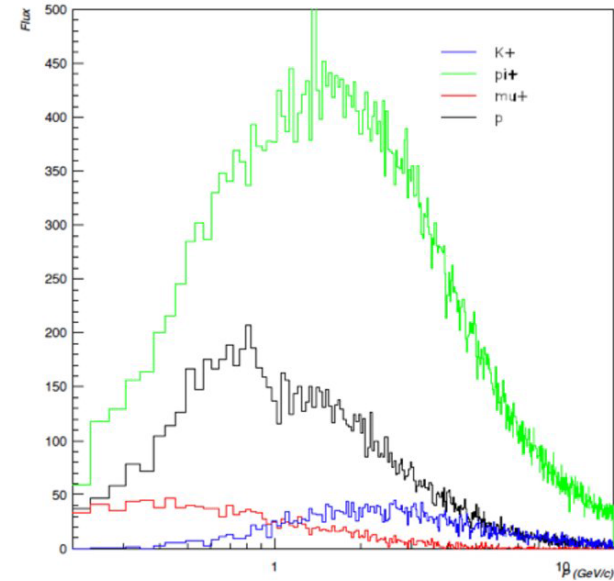
Geometry

- The correct geometry is necessary for
 - precise simulation of beam particles,
 - veto cosmic muons,
 - veto halo particles,
 - reliable reconstruction and analyses.
- Estimated effort
 - 0.5 FTE for 6-9 months with 0.1 FTE to maintain the geometry files and update according to modifications in the design.
- What can we reuse?
 - APA and CPA geometry files already exist.
 - Can we just rescale the 35ton cryostat?
 - CAD->GDML conversion?



Single particle Monte Carlo

- The main type of MC for all analyses.
 - Develop tools to generate MC for various particles, energies and entry angles.
- For the beam we proposed only several energies.
 - MC has to agree with data
 - Gaps between data point will be filled with MC
 - Different behavior for low and high energy particles
- Estimated effort: 0.5 FTE for 6 months, 0.2 FTE to maintain the code and generate MC on regular basis.



Cosmic muons MC

- Lots of cosmic muons
 - about 68 muons within the readout window,
 - Most of the cosmic muons will be easy to veto. We know where the particles enter the detector.

- Overlap with the calibration group effort.

- Estimate time
 - About 0.5 FTE
 - Many of the tools already exist and need to be adapted to the DUNE-PT

Overlays

- Merging the cosmic muons events with the single particle MC for beam events.
- Will help with the de-convolution of the energy deposition from several particles readout at the same time by the wires.
- Some of the overlays code already exists (I know that NOvA has working module).
- It seems possible to do it in a different way, e.g. simulation of several particles with the single particle generator.
- Estimated effort: 0.5 FTE for 6-9 months.

Analysis/reconstruction efforts

- Develop the reconstruction chain:
 - low level variables (hits, timing, photo-detector response) (0.5 FTE)
 - different calibration for different particles and energies. 2 FTEs
 - reconstruction of tracks and showers, 0.5FTE
 - training PIDs, 2 FTE.
 - Cosmic background/signal separation 0.5 FTE
 - Halo particles background/ signal separation 0.5 FTE

Summary

- For the next 6-9 months we want to focus on development of fundamental tools for the data analysis.
- Start development of the PIDs.
- Total effort estimated here: 8 FTEs 😊