ProtoDUNE
steering group

First Meeting

Dec. 9, 2016

Background/Reminder

Slides from October 2016 ProtoDUNE Measurement meeting

Need well focused effort

- To demonstrate to ourselves and world that LAr, and specifically protoDUNE can produce more than "just pretty pictures"

→identify 1 ,2 or possibly 3 high priority and reasonably achievable studies under realistic conditions

→ Pool resources and carefully coordinate to achieve this more limited set of goals

→ Need discussion/agreement what these studies should be

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Parallel goal

- Report on detector performance soon after detector is commissioned

→requires input and active engagement from detector component groups to provide input feedback into analysis tasks

  – At interface of hardware and software; keep somewhat separate from analysis so as not to distract but still have coordinate effort for relevant input

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Anticipate changes to structure of measurement group

First: Many thanks to Jarek and Donna for coordinating measurement group effort for 2 years in its present form

New format (in broad strokes and still under discussion)

- Analysis leader for each of the ~2 analyses
- Oversight to be provided by small analysis steering group with representatives from
  - ProtoDUNE leadership
  - Calibration group
  - Software/tools group
  - Analysis leaders
  - Maybe external advisors
- Make sure all tools and data preparations are ready, schedules can be met, manpower allocations, etc. (e.g. support logistics of analysis effort)

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Steering group membership

Oversight to be provided by small analysis steering group with representatives from

- ProtoDUNE leadership → Flavio Cavanna, Thomas Kutter
- Calibration group → Josh Klein
- Software/tools group → Dorota Stefan
- Analysis leaders → TBD
- "External" advisors
  - LArIAT → Jonathan Asaadi
  - 35t → Mark Convery

First Meeting

- Present/discuss analysis roadmap and status
- Identify Key challenges
- Welcome your feedback

- Thoughts on “parallel” goal
- AOB

ProtoDUNE Analysis Roadmap

- DRAFT -

List of Stage 1 Analyses

- Pion interaction cross section on Argon
  - Total inclusive cross section measurement
    - Positive and negative pion samples

- Electron-gamma separation
- Recovery of missing energy (neutrons)
- …

Pion-Ar Cross Section Analysis Tasks

1. Select and characterize pion sample entering detector using beam monitors [Leigh Whitehead, Nikos]

   Deliverable:

   - positive and negative pion sample for relevant energy range
   - Expected sample size per spill as function of energy
   - Sample purity(E) and type of backgrounds
   - Momentum resolution and bias
   - …

   A) Generate combined beam + cosmics + beam halo MC data samples in ProtoDUNE detector [D.Stefan, E. Worcester, Nikos, M.Tzanov]

   →foresee dedicated MC production/data processing leader (address needs of all ProtoDUNE analyses)

   B) The following assumes calibrated detector data/MC [calibration group]

   C) TPC Event/Track/Sower Reconstruction + PID [ProtoDUNE reco group]

   Deliverable:

   - Comparison of various reconstruction tools and recommendation of tool set to identify all relevant topologies
   - Full characterization of recommended tools

2. Beam to TPC particle matching/selection algorithm [S. Bordoni, Leigh Whitehead]

   Deliverable:

   - Show effect of matching on
   - efficiency(E), purity(E), backgrounds, momentum resolution and bias, …

3. Signal event selection and background identification/rejection [S. Bordoni]

   Deliverable:

   - Show effect of selection on:
   - efficiency(E), purity(E), backgrounds, momentum resolution and bias, …

4. Analysis approach to extract cross section [all → discussions]

   Deliverable:

   - Analysis algorithm and supporting validation
   - Treatment of systematic uncertainties in analysis

5. Systematic uncertainties [???]

   Deliverable:

   - List of all relevant systematic uncertainties and correlations
     - Separated into dominant and second order
   - Clear plan/procedure how to estimate listed syst. Uncertainties

6. Documentation of above efforts [all]

   Deliverable: Technical Note

Pion-Ar Cross Section Analysis Task Timeline

1/2017 (version 1)

1. Select and characterize pion sample entering detector using beam monitors [Leigh Whitehead, Nikos]

1/2017

Generate combined beam + cosmics + beam halo MC data samples in ProtoDUNE detector [D.Stefan, E. Worcester, Nikos, M.Tzanov]

XX/2017

The following assumes calibrated detector data/MC [calibration group]

1/2017 (version 1)

2. TPC Event/Track/Sower Reconstruction + PID [ProtoDUNE reco group]

??/2017

3. Beam to TPC particle matching/selection algorithm [S.Bordoni, Leigh Whitehead]

??/2017

4. Signal event selection and background identification/rejection [S. Bordoni]

01/2017 (version 1)

5. Analysis approach to extract cross section [all → discussions]

YY/2017

6. Systematic uncertainties [???]

1/2017 (version 1)

7. Documentation of above efforts [all]

Next steps + Plans

LAriAT Pion Discussion/Workshop

- phone workshop with LArIAT experts on
  pion cross section analysis

→ gain from existing experience, take advantage of lessons learned and avoid mistakes, …

Date: Monday Dec. 12 at 8:30 am CST
Readytalk: phone 1-866-740-1260; ID: 6266104

Agenda:
Talk by Jonathan Asaadi covering:
1) The simulation tools needed for the pion analysis
2) The reconstruction tools needed for the pion analysis
3) The challenges and tricks used in the pion analysis
Discussion

- Plan for a working discussion during/prior to collaboration meeting at CERN
- Assemble team around tasks: please let me know your interests and available effort level
- Possibly have workshop/hack-days in spring (together with calibration group)