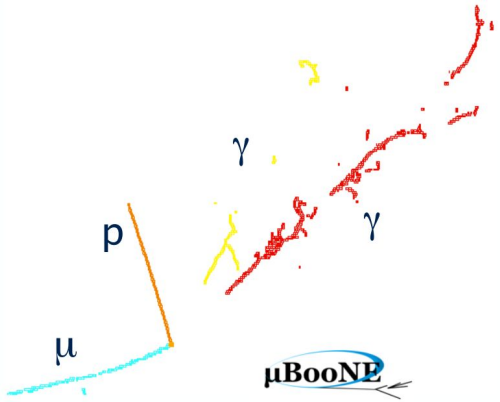


Changes in LArPandoraContent v03_11_00

A. Smith for the Pandora Team

27th March 2018

Overview

- Three main changes in larpandoracontent v03_11_00
  - Main addition: SVM based neutrino identification tool (MicroBooNE 14175)
    - Completes the consolidated reconstruction approach
    - Selects the most likely neutrino candidate in each event
    - Only switched on for MicroBooNE
  - Small change to particle stitching between multiple drift volumes
    - Improves cosmic-ray rejection rate
    - Only affects surface detectors with multiple drift volumes (protoDUNE SP, SBND)
  - Remastering of internal monitoring code
    - Will have no effect on patrec output

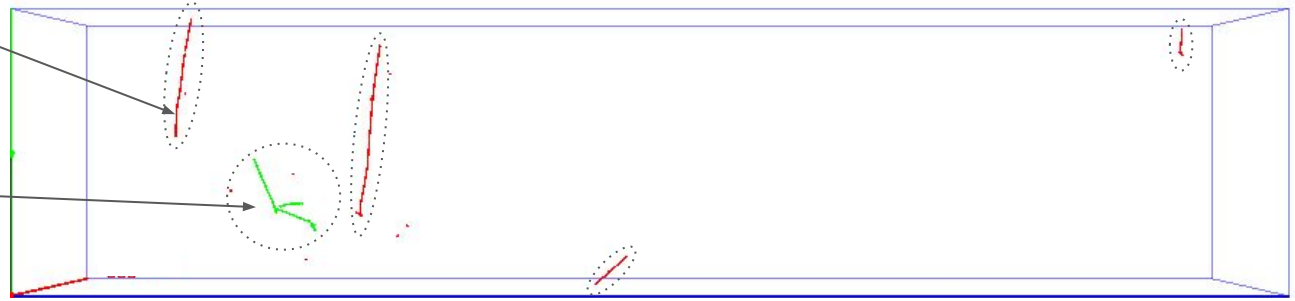
Neutrino ID

Step 1: Unambiguous cosmic-ray tagging

Present reconstruction under cosmic hypothesis

Hits from ambiguous particles are sliced into topologically distinct groups

Step 2: Neutrino ID



Identified slice is presented under neutrino hypothesis

Internal monitoring remaster

- Consider cosmic-rays, test beam particles and neutrinos on the same footing

```
---INTERPRETED-MATCHING-OUTPUT-------------------------------------------------------------------
CCDIS_MU_P_P_P (Nuance 1091, Nu 1, TB 0, CR 0)
IsCorrectNu (NNuMatches: 4)
PrimaryId 1, Nu 1, TB 0, CR 0, MCPDG 2212, Energy 1.31756, Dist. 72.6873, nMCHits 296 (117, 107, 72)
-MatchedPfoId 1, Nu 1 [NuId: 1], CR 0, PDG 13, nMatchedHits 290 (111, 107, 72), nPfoHits 290 (111, 107, 72)
PrimaryId 2, Nu 1, TB 0, CR 0, MCPDG 2212, Energy 1.70702, Dist. 36.8147, nMCHits 262 (84, 55, 123)
-MatchedPfoId 2, Nu 1 [NuId: 1], CR 0, PDG 13, nMatchedHits 250 (84, 53, 113), nPfoHits 262 (84, 56, 122)
PrimaryId 3, Nu 1, TB 0, CR 0, MCPDG 13, Energy 0.192104, Dist. 25.542, nMCHits 154 (28, 49, 77)
-MatchedPfoId 3, Nu 1 [NuId: 1], CR 0, PDG 13, nMatchedHits 145 (28, 45, 72), nPfoHits 156 (28, 46, 82)
PrimaryId 4, Nu 1, TB 0, CR 0, MCPDG 2212, Energy 1.03254, Dist. 7.0389, nMCHits 40 (17, 16, 7)
-MatchedPfoId 4, Nu 1 [NuId: 1], CR 0, PDG 13, nMatchedHits 37 (17, 16, 4), nPfoHits 44 (20, 20, 4)

COSMIC_RAY_MU (Nuance 0, Nu 0, TB 0, CR 1)
IsCorrectCR (NCRMatches: 1)
PrimaryId 5, Nu 0, TB 0, CR 1, MCPDG -13, Energy 1.42999, Dist. 318.21, nMCHits 1671 (594, 598, 479)
-MatchedPfoId 6, Nu 0, CR 1, PDG 13, nMatchedHits 1661 (593, 589, 479), nPfoHits 1877 (806, 591, 480)

...

---SUMMARY---------------------------------------------------------------------------------------
#CorrectNu: 1/1, Fraction: 1
#CorrectCR: 28/29, Fraction: 0.965517
#SplitCR: 1
-------------------------------------------------------------------------------------------------
```

Which repositories are affected (1)?

For each repository please see:
feature/larpandoracontent_v03_11_00

- larpandoracontent
  - Contains the C++ changes described on the previous slide
  - In addition to the new neutrino ID tool, the current version is maintained as the <u>simple</u> neutrino ID tool
- uboonedata
  - Contains the new SVM training data for the neutrino ID
  - The multiple SVM training data files have been consolidated into one
- uboonecode
  - XML-only change
  - Updated the MicroBooNE master settings file to use the new neutrino ID tool
  - Updated the neutrino hypothesis settings file to use the consolidated SVM data file

Which repositories are affected (2)?

For each repository please see:
feature/larpandoracontent_v03_11_00

- larpandora
  - XML-only change
  - Updated the standard master settings file to use the simple neutrino ID tool
- dunetpc
  - XML-only change
  - Updated the DUNE FD master settings file to use the simple neutrino ID tool
- All feature branches have been pushed to redmine and have been tested in LArSoft

Pandora Team

Pandora is an open project and new contributors would be extremely welcome.
We'd love to hear from you and we will always try to answer your questions!

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