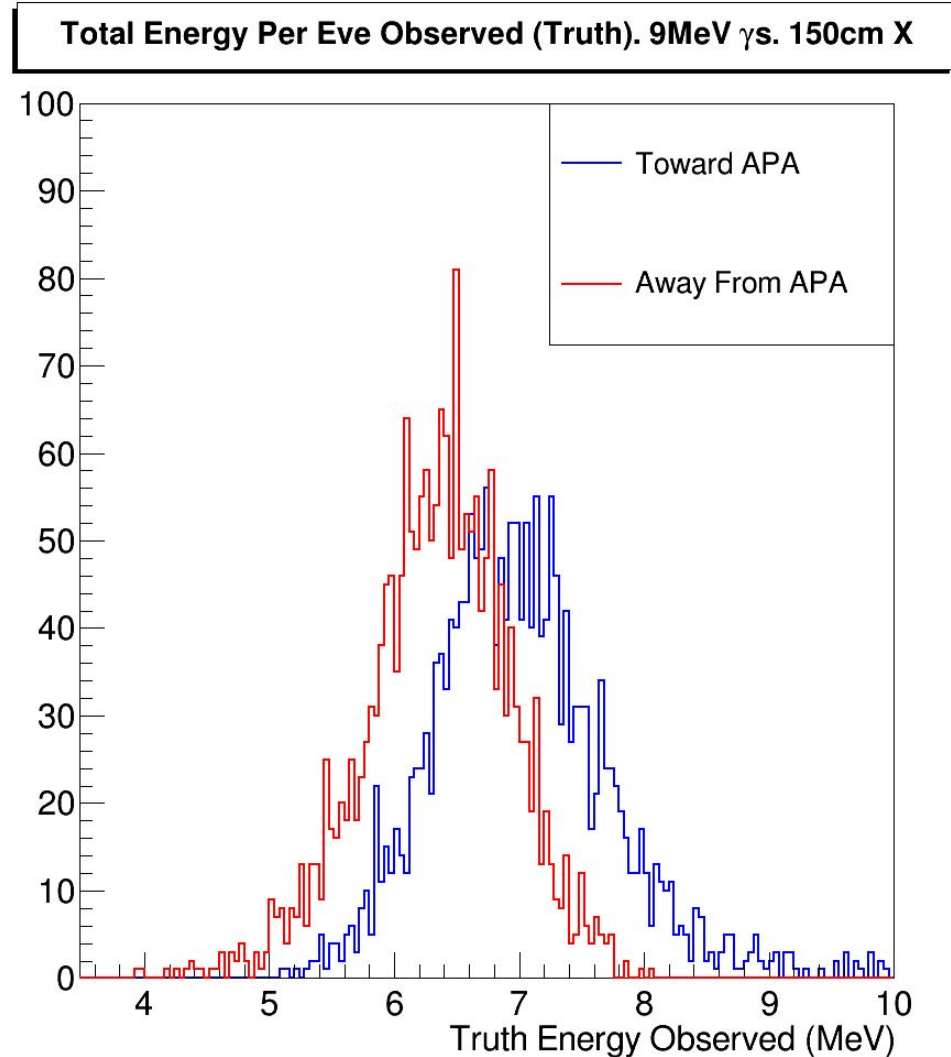# Preliminary studies of 9 MeV Gammas, The CalibrationTree and Charge Light Correlation

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Calibration Task Force Meeting

Sep. 11, 2018

SOUTH DAKOTA

M

SCHOOL OF MINES & TECHNOLOGY

DUNE

DEEP UNDERGROUND NEUTRINO EXPERIMENT

Ni59 Gammas.

- Done with CalibrationTree.
- Selected for Ionization and Scintillation Energy Deposited by particles which produced a hit in the TPC or PDs.
- Gammas fired ~directly towards, or ~directly away from the APAs (with 3 degrees offset)
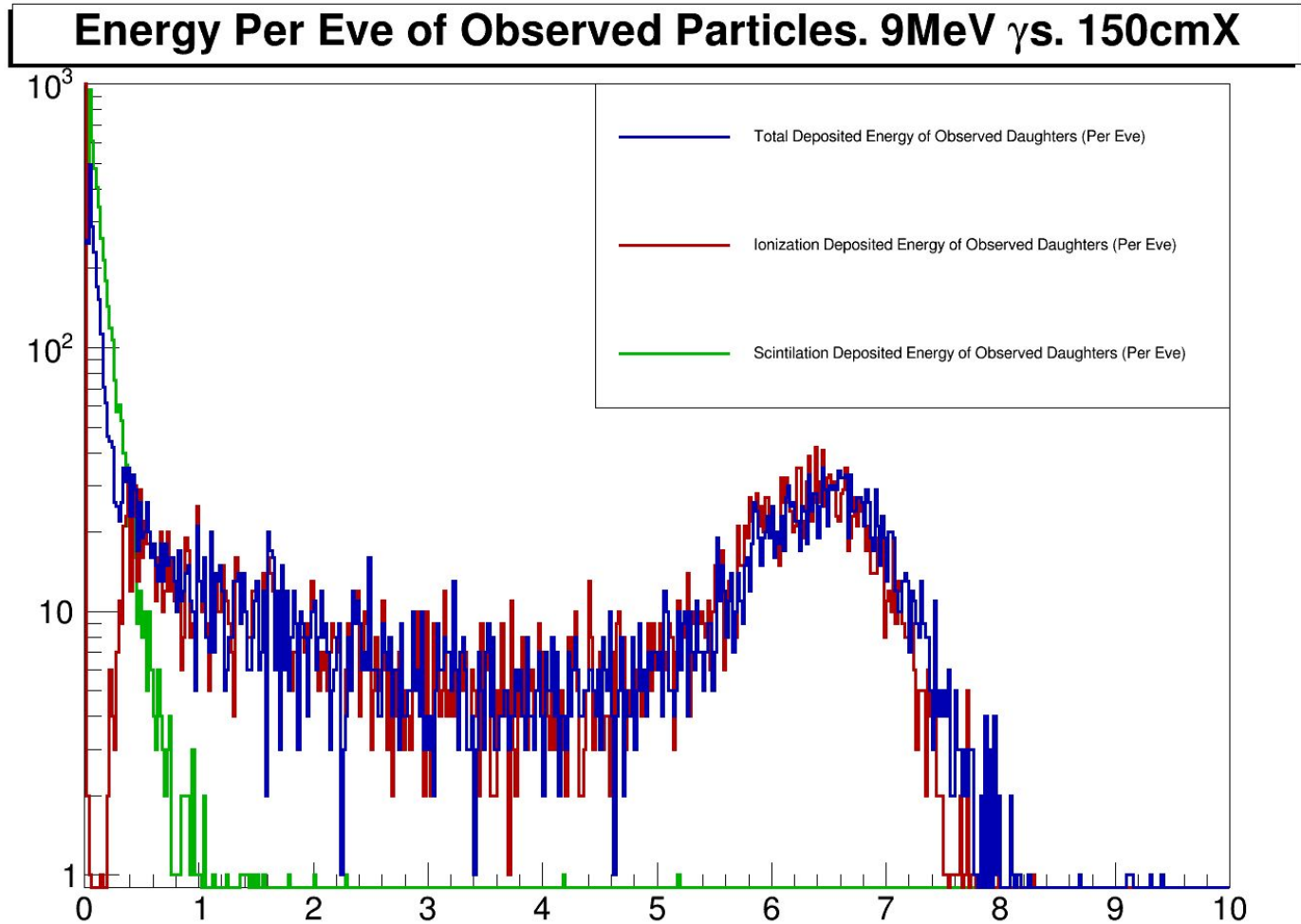
Total Energy Per Eve Observed (Truth). 9MeV γs. 150cm X

Toward APA

Away From APA

Truth Energy Observed (MeV)

Clean 9MeV Ni59 Gamma Study

10,000 BQ

8 Seconds

Clear peak in energy at ~6.7 MeV.

Impact of Scintillation is strong at lower energies.

Energy Per Eve of Observed Particles. 9MeV γs. 150cmX

Legend:
- Total Deposited Energy of Observed Daughters (Per Eve)
- Ionization Deposited Energy of Observed Daughters (Per Eve)
- Scintilation Deposited Energy of Observed Daughters (Per Eve)

Calibration Tree

The output tree is designed to be looped quickly with sub nesting using stl containers. The first tier of the tree is simply the events. There is one entry per event. Each event contains a vector of eve particles. The eves are the particle in the simulation that have no mother, or, more explicitly, the primary particles. The Calibration tree only contains eves that either themselves, or through a daughter, deposited energy that was detected at the hit/ophit level.   -Technical Note. JStock (Pre Print)
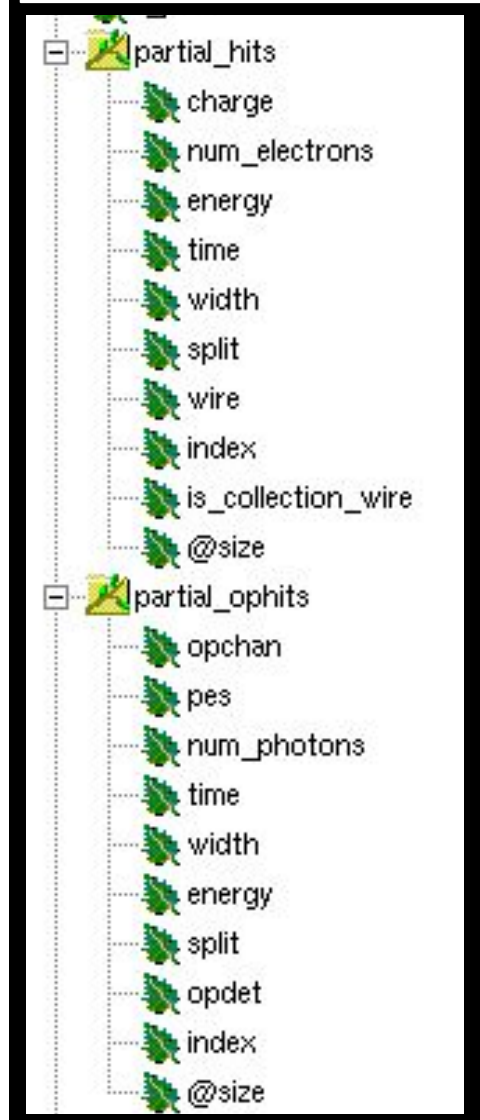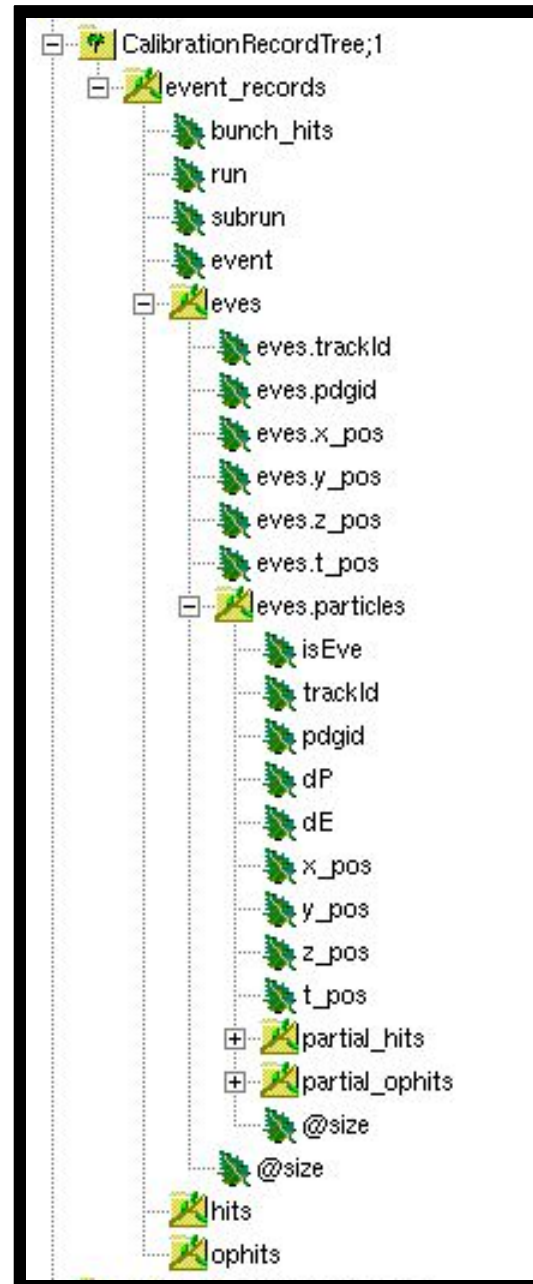
Div Recs

The ability to backtrack to Optical True Energy from an OpHit is a fairly new feature we introduced with the inclusion of a new data product and new PhotonBackTracker methods.

The new data product is the OpDetDivRec, designed to describe how photons on a PD are divided into the channels for the OpDetWaveForms. This is introduced only for DUNE, in OpDetDigitizer_DUNE.

We have also introduced a new unit in dunetpc for DUNE specific data products (analogous to LarDataObj).
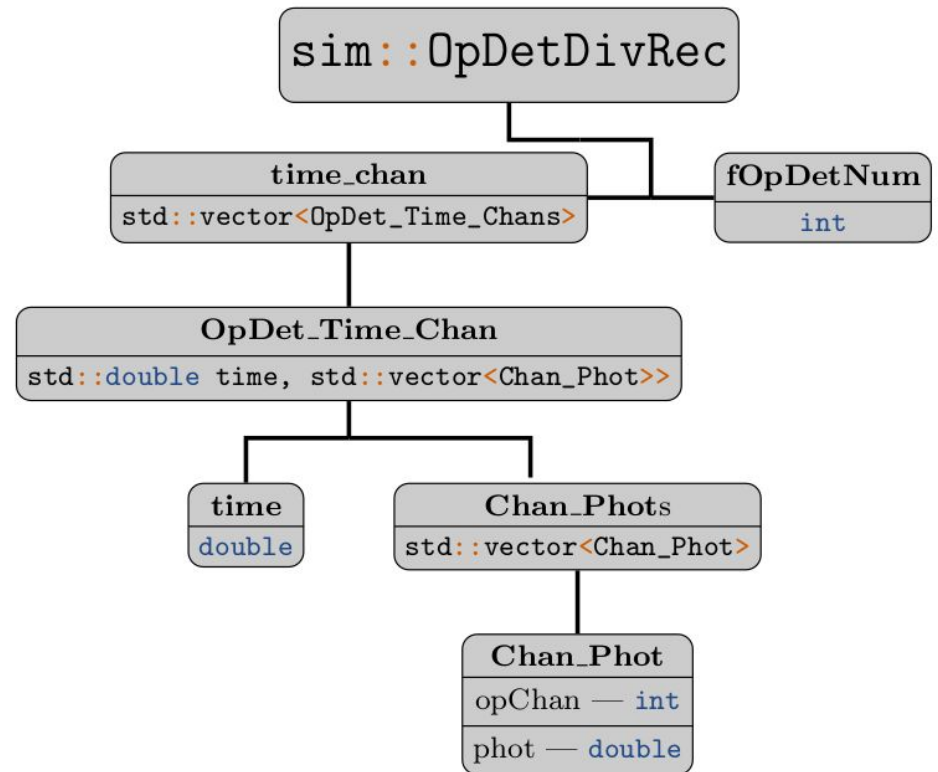
TimeLines

New Data products have been in LArSoft/dunetpc since v06_85_00, and are available in mcc11 files.

CalibTree is available on feature/JStock_Calibration-Tree. (Not in develop due to c2 build issues with internal data products).

Thank You. Questions?