Protodune-SP Run Summaries

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Run Summary processing

- Ran larsoft jobs analyzing over 200 runs

- Determined peak pulse height of all external trigger data runs

- Collected histograms of data for easy analysis in root file for each run

- Produced ntuples in same root file of all triggers above

  - Contains: run#, event#, channel#, timestamp, peak pulse height

- Wealth of data can be used for many more investigations without running on the raw data files

  - Cosmic Rates

  - Single PE rates

  - Crude Module Comparisons using beam data

Collection of representative runs:

- https://home.fnal.gov/~mualem/protodunesp/runsummaries/
- 200 Runs currently from throughout running
- PDF file for each run contains 2-D plot of Peak-Pedestal for all channels at 3 zoom levels
  - Wide 16000 ADC Max
  - Medium 1750ADC Max
  - Tight 70 ADC Max
- Pulse height Distribution for each channel, arranged geographically APA vs. Slot
  - Plotted on Log-Log to allow for full range, pedestal, and peaks for avalanche numbers and still see distribution for larger signals from cosmics or DCM runs
- Pulse height distribution as above, but corrected by relative gain numbers from Chris Macias analysis for SensL in APAs 1,2,3 and Dante Totani's analysis for ARAPUCA
  - More corrections are easy to add as they come, and are updated
- Pulse height Distribution as above, but on Log-linear to show low pulse height
- Persistence trace plots for all channels (to look into any oddities)

Run Summary Page

Representative Runs

- Early beam trigger ~3GeV

  - https://home.fnal.gov/~mualem/protodunesp/runsummaries/Run4116summary.pdf

- SensL Bias Scans

  - https://home.fnal.gov/~mualem/protodunesp/runsummaries/Run4535summary.pdf

- 6GeV Beam

  - https://home.fnal.gov/~mualem/protodunesp/runsummaries/Run4606summary.pdf

- Cosmics

  - https://home.fnal.gov/~mualem/protodunesp/runsummaries/Run4600summary.pdf

- DAQ side DCM

  - https://home.fnal.gov/~mualem/protodunesp/runsummaries/Run5887summary.pdf

Future

- Summaries essentially complete
- Plots all based on Peak Pulse height
    - Need to add integrated pulse height for physics runs
- Use summaries to determine pulser parameters for better calibrations
- Use histograms to calculate rates (single PE +cosmic)
- Use ntuple for calculating cosmic rates (coincidences)
- Use calibration msmts for module comparison for beam events (easiest)
- Ntuple could be used offline with a beam ntuple, or CRT, but would be better to use integrals

- Work relied heavily on Run descriptions and module maps from Chris Macias