ProtoDUNE
1st Performance Paper

PDS Contribution

PDS Performance Task Force

Premise:

- Two "companion-Papers" were agreed to be made ~ by the end of the yr:
  - 1) **protoDUNE-SP Technical Paper**
  - 2) **protoDUNE-SP 1st Performance Paper**

- The writing of the **Tech Paper** (largely based on the protoDUNE TDR publish on arXiv in 2017) is late

- The writing of the **1st Performance Paper** is progressing quickly (thanks to many DRA contributors)

This makes things a bit complicated: part of the expected contributions in the Tech Paper - *e.g. detector characterization from the Commissioning Phase* - are now considered to be included in the Performance Paper.

- The PDS Contribution into the **1st Performance Paper Draft** is missing.
We are urged to make it available asap

(1) Very brief description of the PDS

i) PhotoSensors (2 types)

ii) PhotoCollectors (3 types) - photoSensitive Area and Coverage

iii) R/O and DAQ - data format and trigger

(2) PhotoSensor(s) Performance

i) Non-responsive/Noisy Channels

ii) Signal extraction (baseline evaluation and subtraction)

iii) Single PE Characterization (effect of ganging different n. of SiPM) - Signal shape and S/N

iv) Timing - intrinsic Time Resolution

v) Calibration Data (Flash Pulser)

vi) Multiple PE/Avalanche plot (Flasher run) - Bias V setting (and break-down V), Gain (ADC—> q), Linearity (*q —> Avalanche),* Stability in Time

vii) Calibration (Poisson Stat. Method): *q —> Detected Ph.*, CrossTalk&AfterPulses

(3) PhotoCollector(s) Performance

i) Beam Data and MC simulation data

ii) Response to **μ**-Beam - Detectors' Efficiency (Detected Ph/Landing Ph)

iii) Time resolution

iv) Single Photon rate (Si angle Ph identification and origin hypothesis)

v) ARAPUCA Light Yield (Detected Ph/MeV) and dep. Energy Resolution from

a) ***e****-Beam data [0.3 - 7 GeV]*

b) ***p****-Beam data [0.6 - 6 GeV]*

(4) PDS Performance

(i) T.b.d. [Cosmic Muon Data, Light Attenuation vs Distance]

Red: mostly to be done
Green: mostly done
Green to Red: partly done

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(4) PDS Performance [T.b.d.]

(i) e.g. Cosmic Muon Data, Light Attenuation vs Distance]

Proposal:

- **PDS Task Force meet again next week on Tue and Fri**
- **Produce Draft-0**
- **Careful reading —> Draft-1**
- **Include PDS Draft-1 into Performance Paper Draft during Coll Mtg Week**