Minutes: Taskforce Meeting on CERN Testbeam Data (Feb. 16, 2023)

Time: 14:00 → 16:00 (GMT+8)

indico page (https://indico.ihep.ac.cn/event/18956/)

Participants (16)

- IHEP: Baohua, Dejing, Hengyu, Peng, Yuzhi, Xin, Yong
- SJTU: Siyuan, Zhen, Zixun, Jiyuan
- USTC: Hongbin, Jiaxuan, Yukun
- Tokyo: Ryonosuke, Tatsuki

(Chair and minutes by Yong)

Talks and discussions

Talk: High-Gain and Low Gain Calibration, by Jiaxuan

- General
  - Merged 7 runs of data (in the HG/LG mode): Run222-289
  - Linear fit for ADC values in HG and LG
- Results
  - Per layer: 1-6 dead channels; Layer 28 with 6 dead channels (2.8%)
  - HG-LG intercalibration factor: mean 35.9, StdDev 1.69
    - Smaller spread than cosmic-ray data (mean 34.9, StdDev 4.2)
- Discussions
  - Fit abnormal behaviour seen with TGraph; working well with TH2
  - Pedestal signals (below trigger threshold) in the 2D plots

Talk: AHCAL MIP Calibration, by Yukun

- Muon data for AHCAL alone
- A few channels suffered from light leakage
- On average 10^4 hits per channel (for most channels)
- Selected MIP spectra: a few abnormal NDL-SiPM channels

- MIP fitting at chip level: ongoing

Talk: Preliminary Analysis of MIP Calibration, by Peng

- Muon data for AHCAL alone
  - First focused on the central 9 channels
  - Then merge muon data and evaluate all layers
- MIP fit with Landau+Gauss (+Peak finding algorithm)
- MIP stability within fa few muon runs: generally quite stable (<1%)
  - Confidence for combining several muon data runs -> more statistics
- MIP calibration done for all AHCAL channels
  - MIP MPV values per layer; spread within 10% in general
  - Observed quite a few channels with higher noise level -> not significant enough to distinguish MIP and noise peaks
- Detailed infomration MIP calibration is attached as extra pdf files
  - Landau+Gauss fit for each channel: https://indico.ihep.ac.cn/event/18956/contributions/128813/attachments/66892/79178/AHCAL_Total_Add.pdf (https://indico.ihep.ac.cn/event/18956/contributions/128813/attachments/66892/79178/AHCAL_Total_Add.pdf)
  - 2D plots for MIP MPV per layer: https://indico.ihep.ac.cn/event/18956/contributions/128813/attachments/66892/79179/MIPDistr.pdf (https://indico.ihep.ac.cn/event/18956/contributions/128813/attachments/66892/79179/MIPDistr.pdf)
  - 1D plots for MIP MPV per layer https://indico.ihep.ac.cn/event/18956/contributions/128813/attachments/66892/79180/MIPUni.pdf (https://indico.ihep.ac.cn/event/18956/contributions/128813/attachments/66892/79180/MIPUni.pdf)

Talk: High/Low Gain Study, by Zhen

- Ratio between high gain and low gain
- Saturation threshold of high gain
- Check overall channel quality
- Conclusions
  - Different chips have similar slopes and saturation plataeus
  - DAC calibration showed bad channel ratio ~ 0.15%
  - Beam test muon calibration: bad channel ratio ~0.26% (1.7%)

Talk: Test Beam Raw Data Conversion: Validation & Display, by Yuzhi

- News: Druid now displays Raw & Calib LCIO Data

- Druid updates
  - Public Page:
    - `http://cepcsoft.ihep.ac.cn/guides/EventDisplay/docs/druid/`
  - GitLab link:
    `https://code.ihep.ac.cn/cheyuzhi/druid.git`
  - Compiled on MacOS
  - On Linux with newer LCIO version: ongoing
- Conventions for ID definitions
  - To avoid confusions in further data analysis
  - A first draft proposed
  - Chip ID, channel ID, XY positioning
- Data decoder
  - The current two decoder shows better consistence on the distribution of #.hit per event (Run119 muon)
  - Some strange events are saved by Fran's decoder
  - A trigger ID appears for multiple times: potential event split + periodic cycle
- Discussions
  - Decoder in principle should convert the data only, without any cleaning (e.g. noise-only events from DAQ, events sharing the same trigger ID)
  - Current status
    - Francois' decoder: decoding only
    - Yukun's decoder: decoding and cleaning/trimming

AOB

- Data sets and decoders (information from Mattermost
  - ECAL data set: directories
    - `/cefs/higgs/wangjx/BeamData/ECAL_Filename.txt`
  - ECAL data decoder
    - `/cefs/higgs/wangjx/ScECAL/Diagnose/src`
  - HCAL data set: directories
    - `/cefs/higgs/shiyk/Beam_2022/BeamData/HCAL/Particle/DatList.txt`

- HCAL data decoder
  - `/cefs/higgs/shiyk/Beam_2022/Decode/HBUAna_Cherenkov`
- ECAL slcio files: `/cefs/higgs/wanghengyu/cepc/Root2SLCIO/work/data/fast_lcio/ecal`
  - which are converted from the raw files at, `/cefs/higgs/wangjx/ScECAL/Result_Diagnose/calib`