




# CRP #6 + PDS processing with LArSoft

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ProtoDUNE-VD

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# Recap from May 3<sup>rd</sup> meeting

- Will approve the current PRs 
- Look into recent CRP light files decoding and reconstruction 
- Then request production of valid BDE runs 

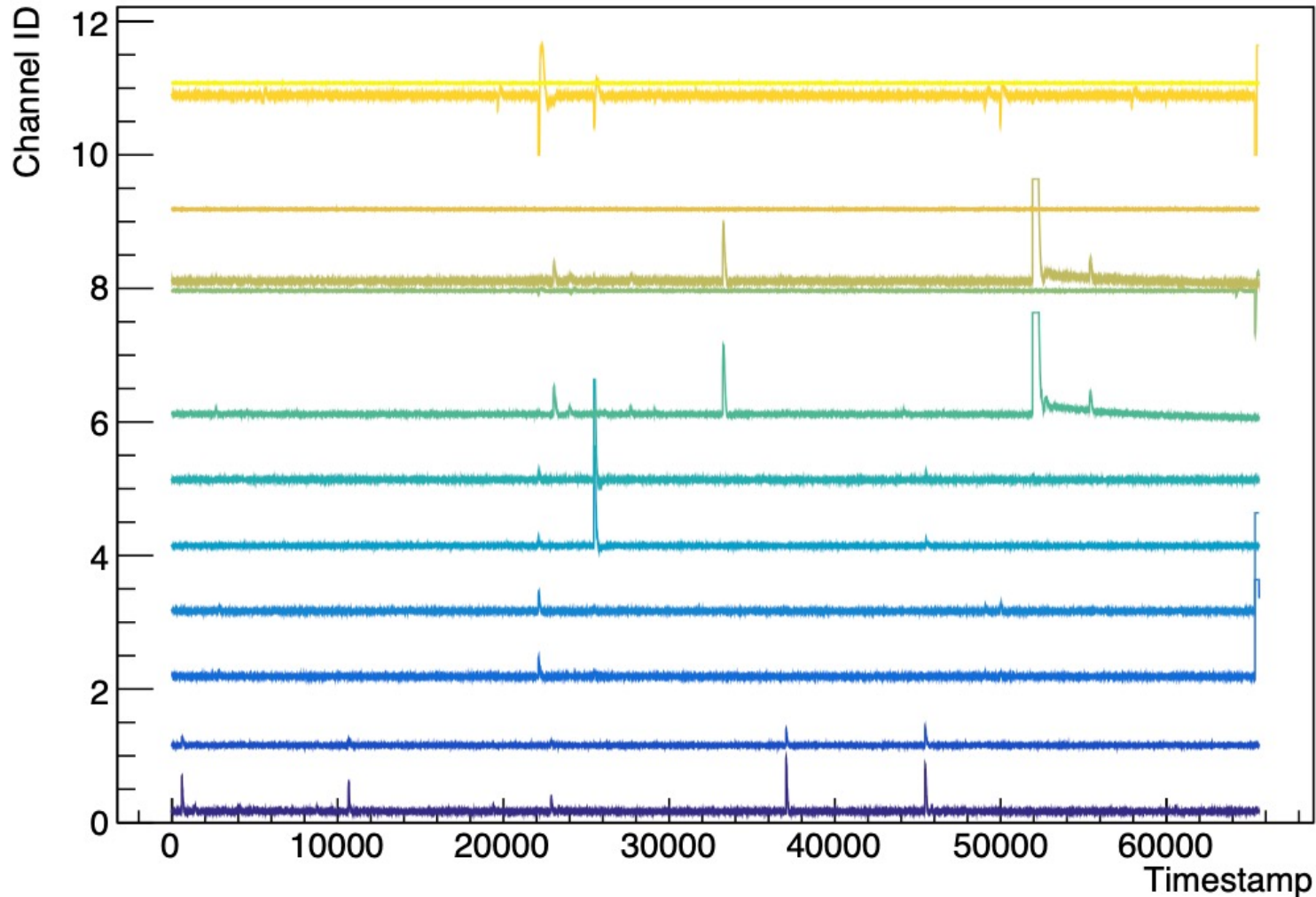
# PDS DAPHNE decoder

- Worked out the latest DAPHNE version data decoder with Jake
- Setup a proper PDS channel with Ajib

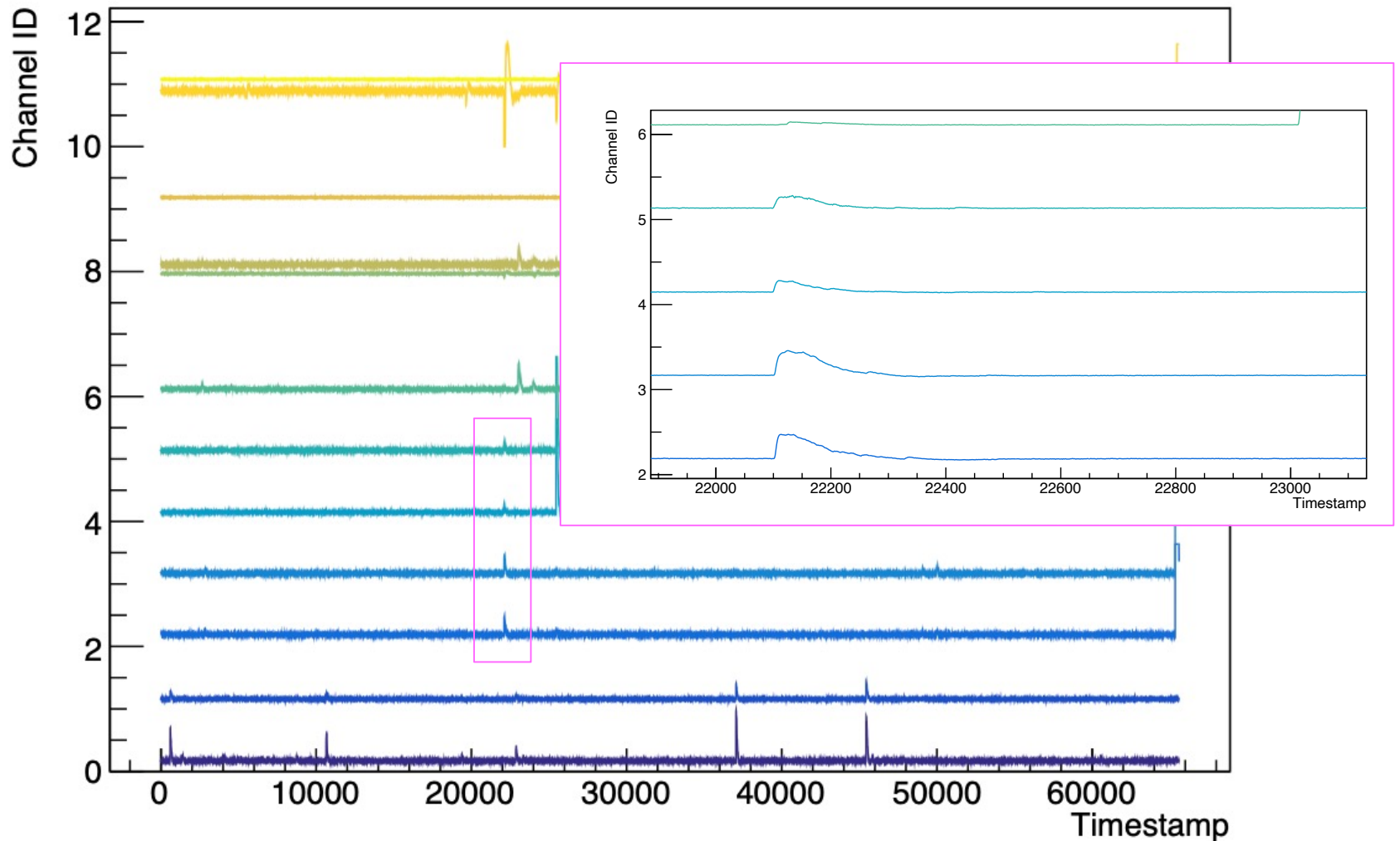
```
DAPHNEChannelMapService: {  
  FileName: "temp_vdcb_channelmap.txt"  
  IgnoreLinks: true  
}
```

```
physics: {  
  producers: {  
    rns: { module_type: "RandomNumberSaver" }  
  }  
  #Decoders  
  tpcrawdecoder: @local::PDHTPCReaderDefaults  
  pdhddaphne: @local::DAPHNereaderPDHD
```

# PDS raw waveforms



# PDS raw waveforms



# PDS deconvolution

- LArSoft PDS pipeline relies on conversion from `raw::OpDetWaveforms` to `recob::OpWaveforms`
- Done by the deconvolution step

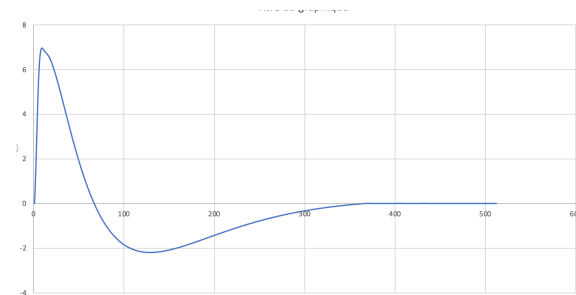
```
physics: {  
  producers: {  
    rns: { module_type: "RandomNumberSaver" }  
    #Decoders  
    tpcrawdecoder: @local::PDHDTPCReaderDefaults  
    pdhddaphne: @local::DAPHNereaderPDHD  
    #PDS reco  
    opdec: @local::dune_deconvolution  
    ophitspe: @local::dune_ophit_finder_deco  
    opflash: @local::protodune_opflash  
    opslicer: @local::protodune_opslicer
```

# PDS deconvolution

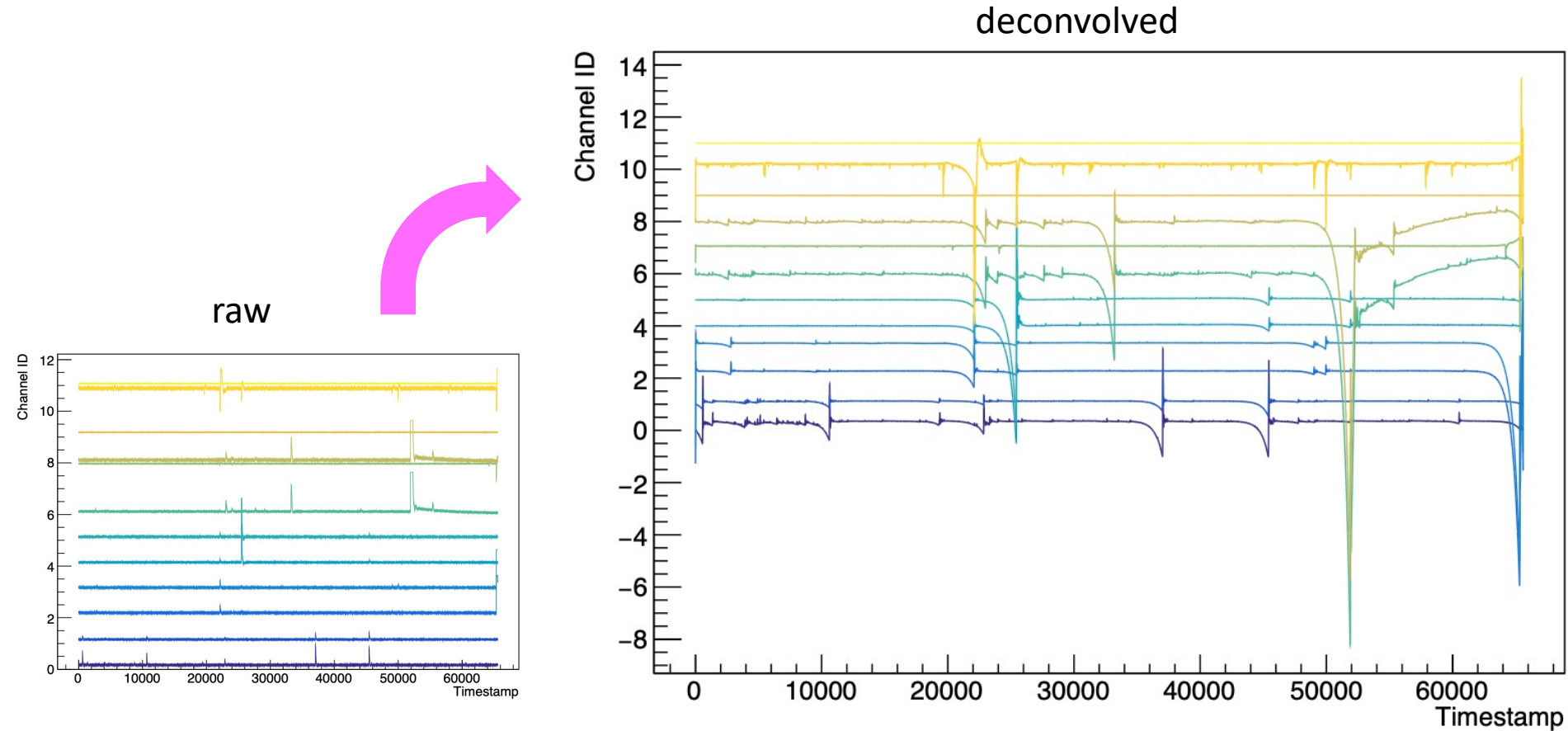
- LArSoft PDS pipeline relies on conversion from `raw::OpDetWaveforms` to `recob::OpWaveforms`
- Done by the deconvolution step

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physics: {
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    rns: { module_type: "RandomNumberSaver" }
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    tpcrawdecoder: @local::PDHDTPCReaderDefaults
    pdhddaphne: @local::DAPHNereaderPDHD
    #PDS reco
    opdec: @local::dune_deconvolution
    ophitspe: @local::dune_ophit_finder_deco
    opflash: @local::protodune_opflash
    opslicer: @local::protodune_opslicer
  }
}
```

- Which makes use of a default template waveform
- Obviously not adequate for the PDS R&D runs in CRP6



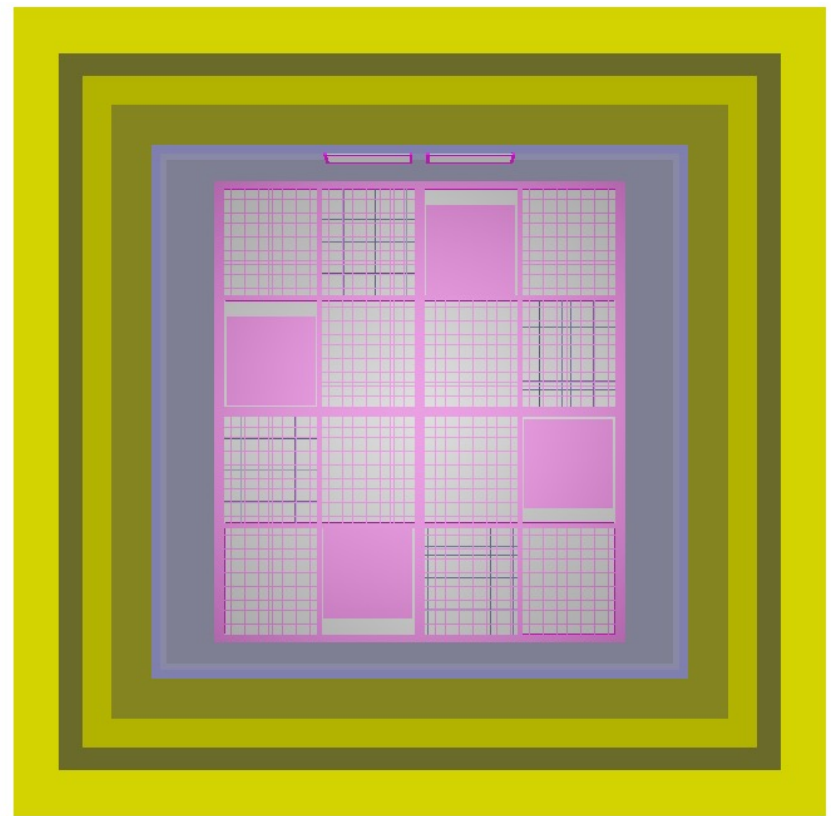
# PDS deconvolution



- Need to by-pass this step and run hit/flash finder on raw Wf



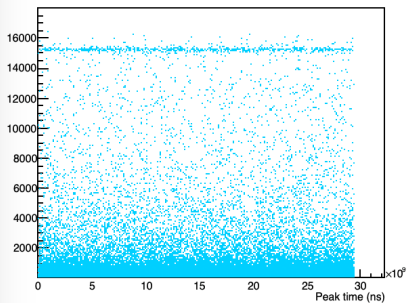
# PDS hit finder



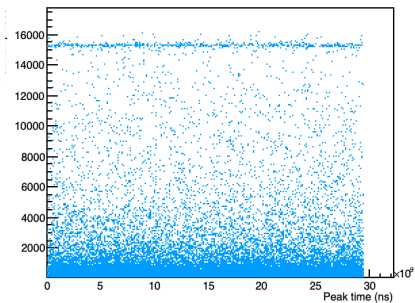
```
physics: {  
  producers: {  
    rns: { module_type: "RandomNumberSaver" }  
    #Decoders  
    tpcrawdecoder: @local::PDHDTPCReaderDefaults  
    pdhddaphne: @local::DAPHNEReaderPDHD  
    #PDS reco  
    opdec: @local::dune_deconvolution  
    ophitspe: @local::dune_ophit_finder_deco  
    ophit: @local::protodune_ophit_data_internal  
    opflash: @local::protodune_opflash_data_internal
```

# PDS hit finder

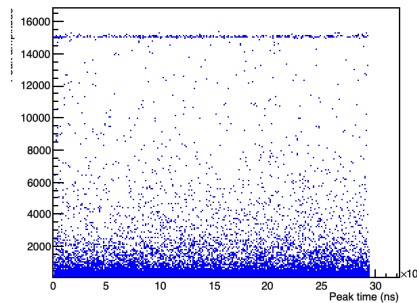
Optical channel 0



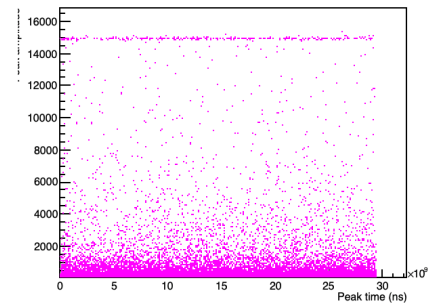
Optical channel 1



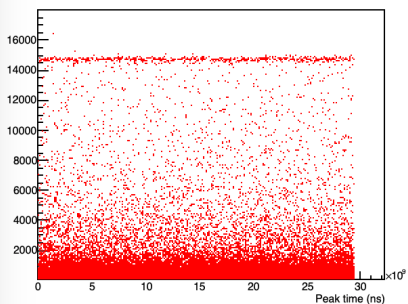
Optical channel 2



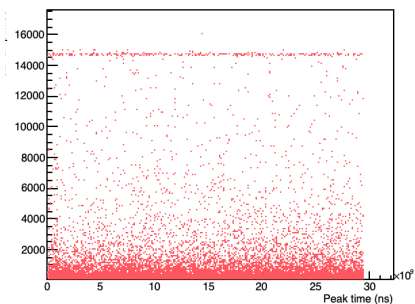
Optical channel 3



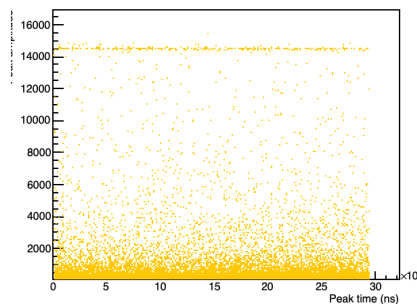
Optical channel 4



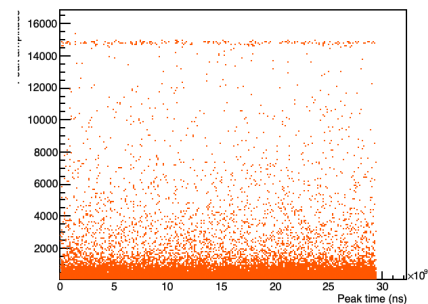
Optical channel 5



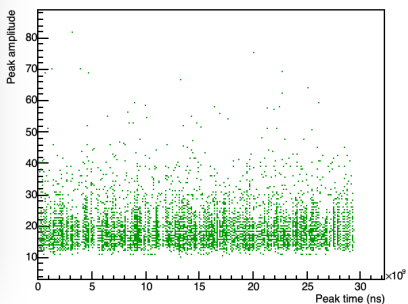
Optical channel 6



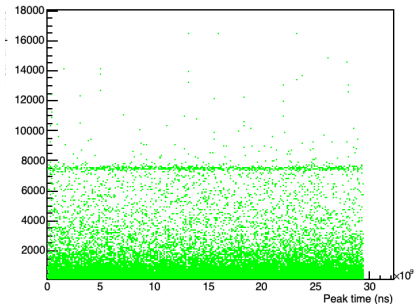
Optical channel 7



Optical channel 8

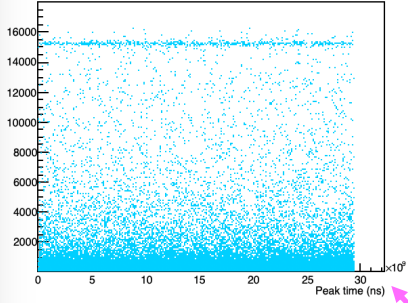


Optical channel 9

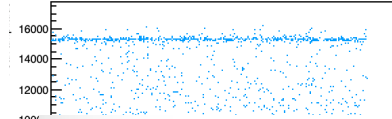


# PDS hit finder

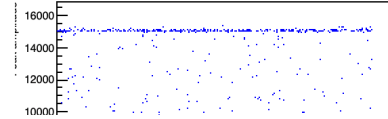
Optical channel 0



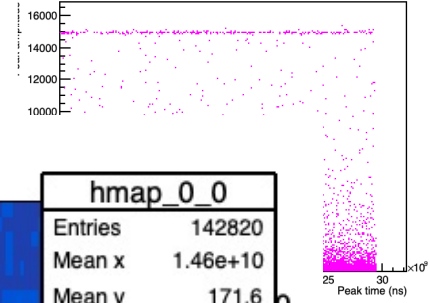
Optical channel 1



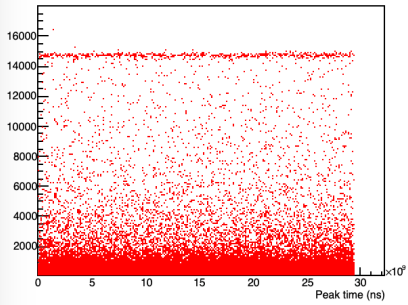
Optical channel 2



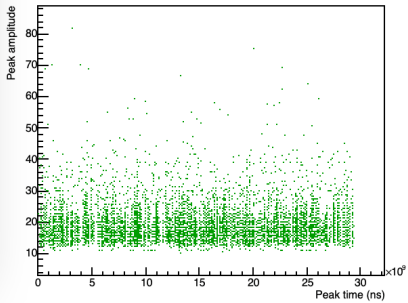
Optical channel 3



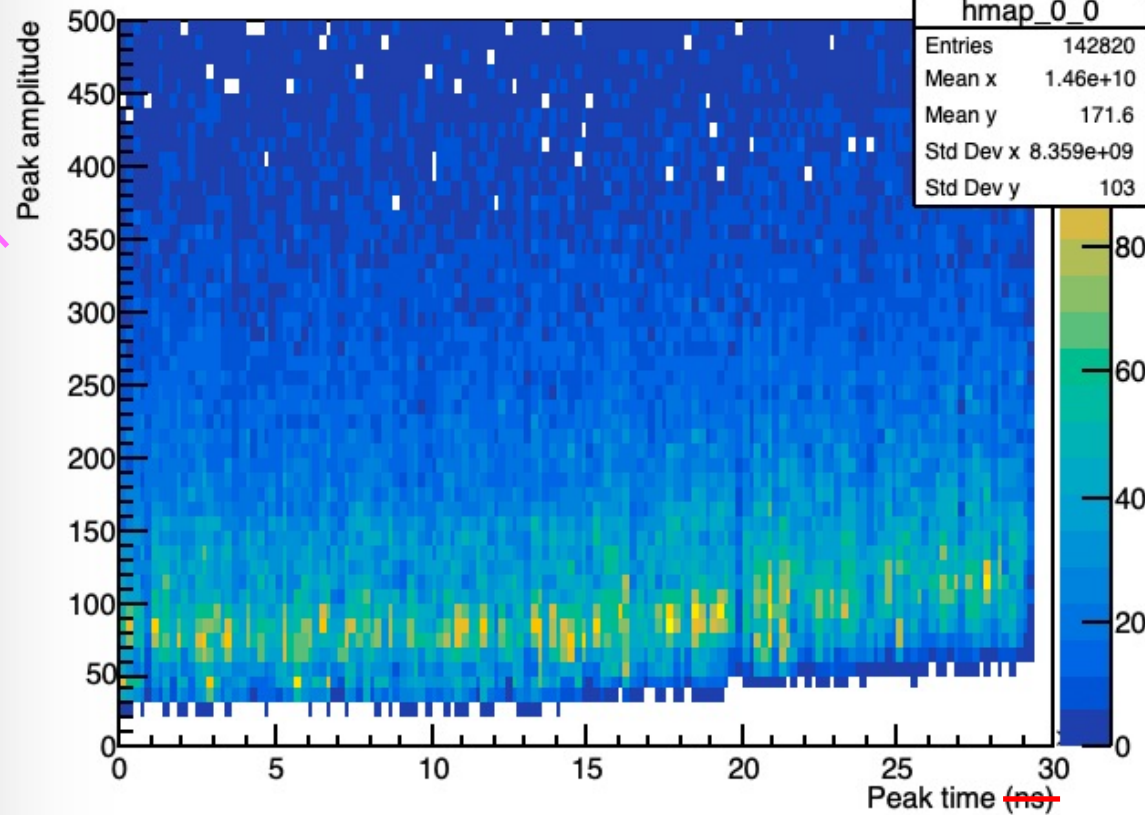
Optical channel 4



Optical channel 8

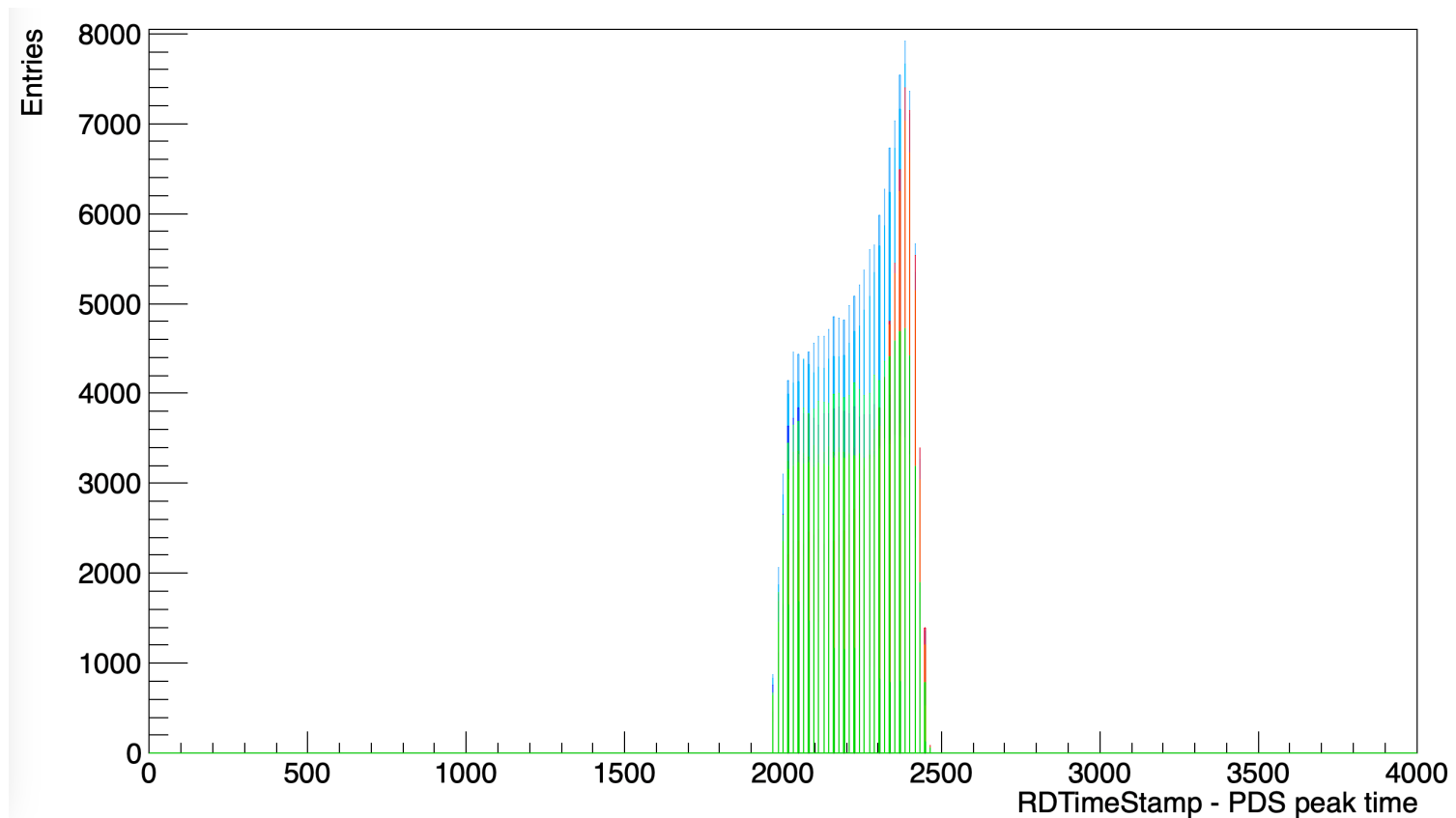


Optical channel 0



# PDS timing

- Figuring out which timestamp correspond to what (and in which units – not easily accessible from outside)



# Outlook

- *First CRP+PDS data reconstruction chain implemented in LArSoft for VD prototypes to my knowledge*
- PDS configuration properly implemented up to flash matching
- Now looking into at charge + light coincidences
  
- Next:
  - Need to plan for a talk at a PDS sim/reco meeting =)
  - ...

# CRP data analysis

- Quick look at ongoing production (run 25086) shows no particular issues in terms of reconstruction pipeline
- More exhaustive studies made by Laura Z. with LARDON

