Status report on

# DNNROI sigproc

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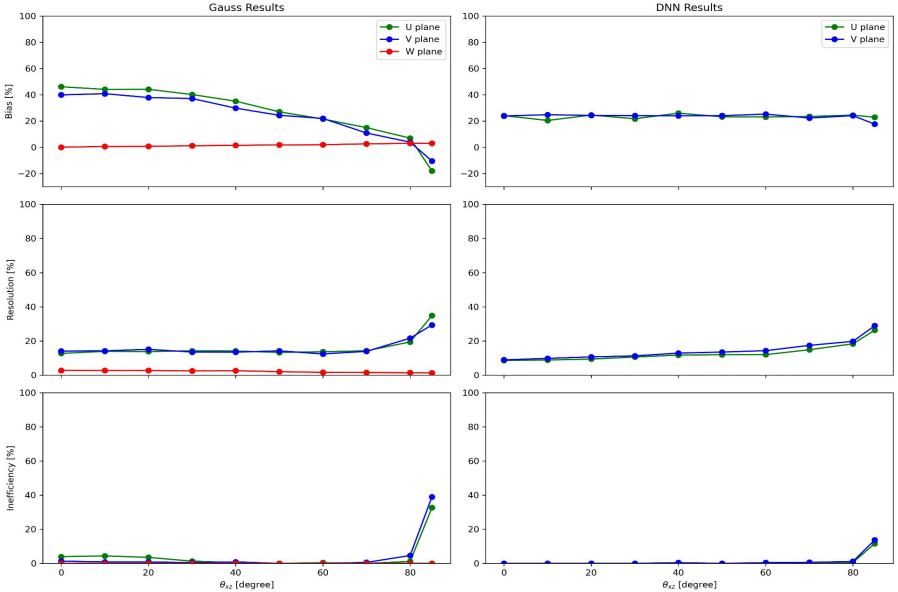
# Outline

- DNN ROI evaluation
- Time offset problem in truth (DepoFluxSplat.cc)
- Memory & Time consumption w/o DNN ROI
- Summary

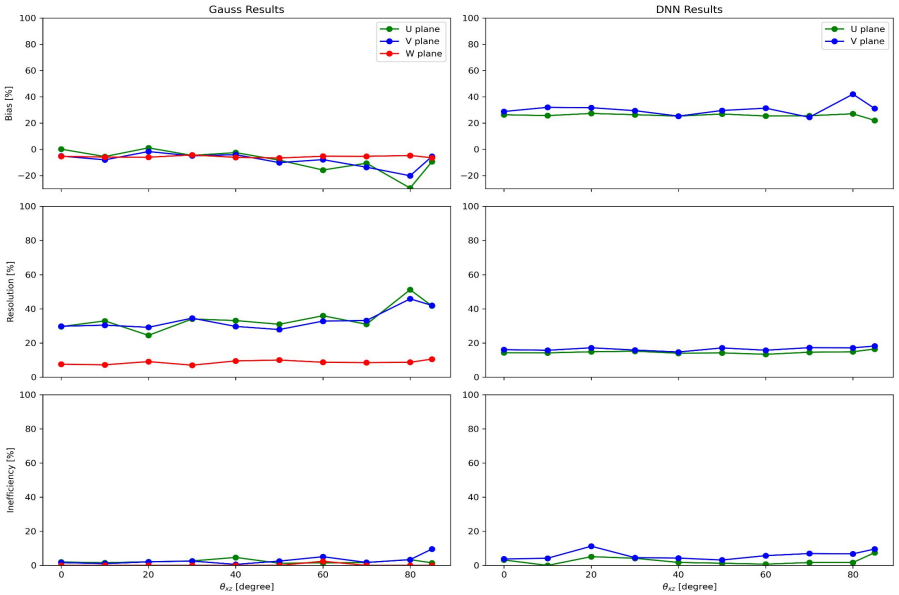
# DNN ROI evaluation – single track event



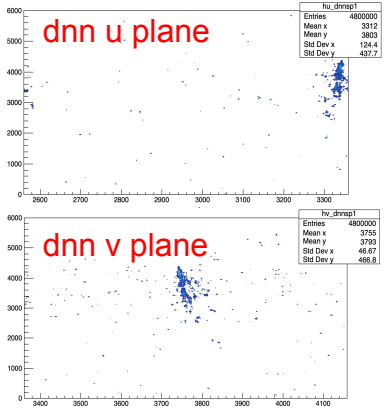

- APA2
- Configuration:
  - time: 0
  - charges: -500
  - ThetaXZ varies in range from 0 to 85

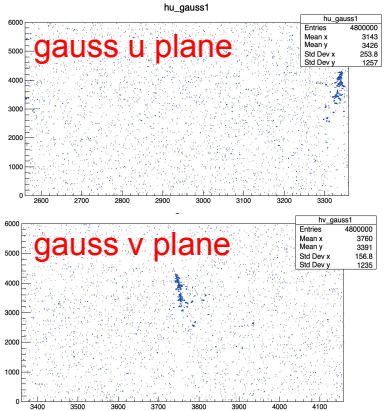
$$\text{Bias} = 100 \times \left( \left\langle \frac{Q_{\text{reco}}}{Q_{\text{truth}}} \right\rangle - 1 \right) \qquad \text{Resolution} = 100 \times \frac{\text{RMS}\left( \frac{Q_{\text{reco}}}{Q_{\text{truth}}} \right)}{\left\langle \frac{Q_{\text{reco}}}{Q_{\text{truth}}} \right\rangle} \qquad \text{Inefficiency} = 100 \times \frac{\text{Number of bad channels}}{\text{Number of valid truth channels}}$$

# DNN ROI evaluation – single shower event




- APA2
- Configuration
  - Mean momentum: 1 GeV
  - ThetaYZ: 0
  - ThetaXZ varies in range from 0 to 85



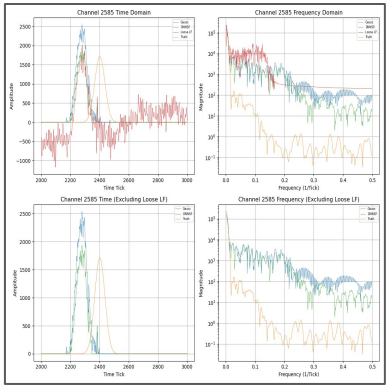



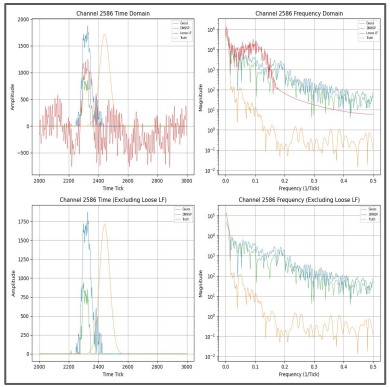

- Possible causes might affect the problem
  - Baseline subtraction seem to be happen in both gauss and dnnsp
  - Time offset observed in truth track (Generated from DepoFluxSplat)

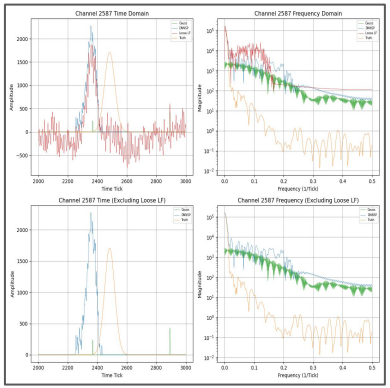
# Truth offset issue – debugging

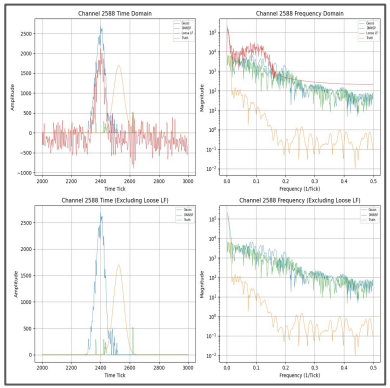
```
214 static intrange_t union_intrange(intrange_t const& r1, intrange_t const& r2)
215 {
216     return std::make_pair(std::min(r1.first, r2.first),
217                           std::max(r1.second, r2.second));
218                           //std::min(r1.second, r2.second));
219 }
```

- Fixed std::min → std::max
- The issue remains as before
- The applied offset might be a constant number



# Truth offset issue – debugging

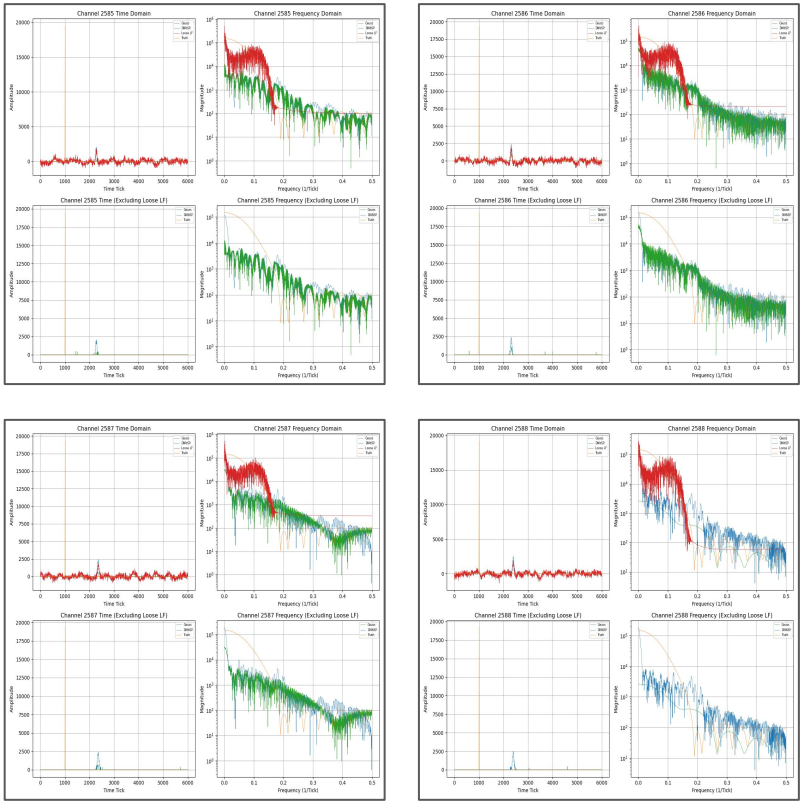
```
// Differing conventions exist for the sign of the charge of
// "number of electrons" in the depo.  Force positive signal.
std::transform(charge.begin(), charge.end(), charge.begin(),
               static_cast<float (*)(float)>(&std::abs));

accum->add(chid, t_range.first + m_tick_offsets[iplane], charge);
```

- The problem is likely the m_tick_offsets[iplane] not working properly

```
accum->add(chid, 1000, charge);
```

- Hard coded the time tick as 1000, and checked it is applied as expected



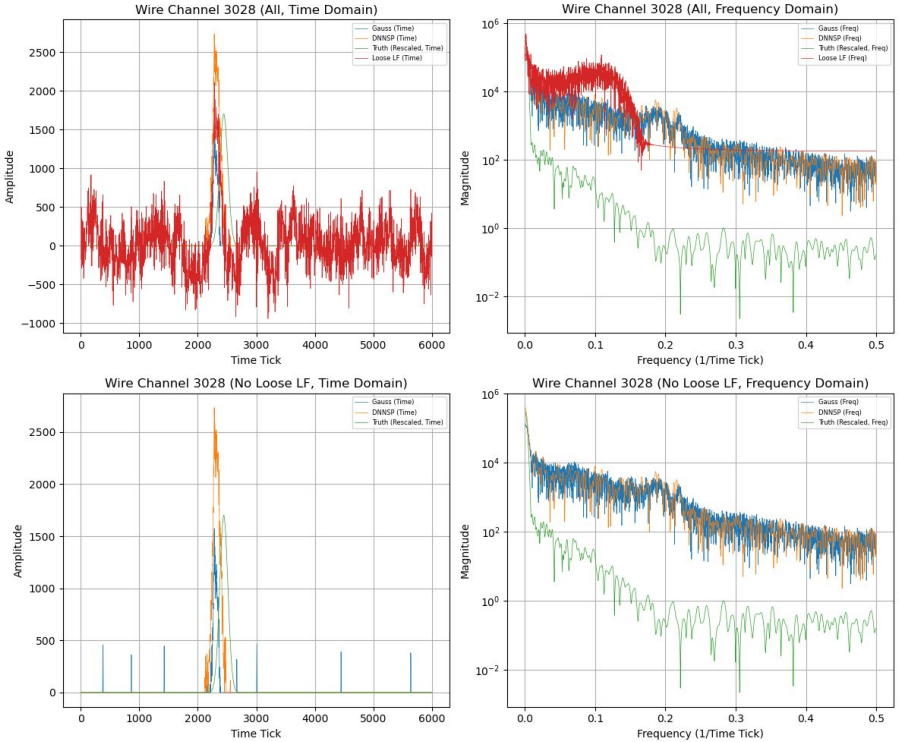
# Memory and Time consumption w/o DNN ROI

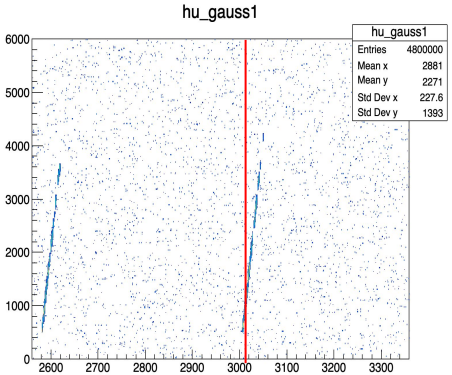
| Data | Config | VmPeak | RSS Peak | Elapsed Time | User + System time |
|---|---|---|---|---|---|
| 0 | SP | 3208.76 | 1778.59 | 67.11 | 59.95 |
| 0 | DNN SP | 9433.15 | 7157.22 | 160.49 | 137.68 |
| 1 | SP | 3209.83 | 1782.54 | 65.29 | 54.19 |
| 1 | DNN SP | 9250.44 | 6981.43 | 147.06 | 128.90 |
| 2 | SP | 3211.65 | 1783.05 | 68.43 | 56.05 |
| 2 | DNN SP | 9321.93 | 7049.58 | 175.65 | 161.75 |
| 3 | SP | 3716.69 | 2287.32 | 77.67 | 63.46 |
| 3 | DNN SP | 11726.60 | 9377.81 | 184.11 | 167.24 |
| 4 | SP | 3193.01 | 1762.64 | 64.48 | 53.50 |
| 4 | DNN SP | 9096.53 | 6380.27 | 131.50 | 121.05 |

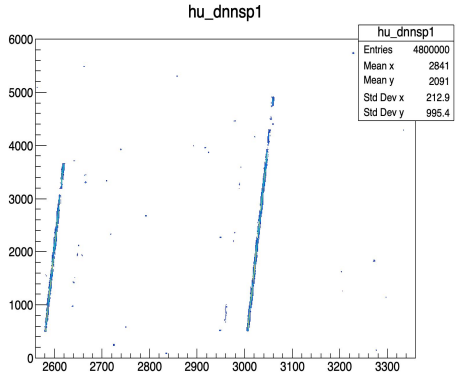
- The average memory consumption: x 4 times
- The average time consumption: x 2.5 times

# Back Up

# Baseline subtraction in DNN ROI processing



# Baseline subtraction in DNN ROI processing