

LAr-trigger development

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<https://indico.fnal.gov/event/66040/>

Technicalities

- Started from github.com/wesketchum/dunetrigger.git@develop
- **Input raw data:**
np04hd_raw_run028508_0000_dataflow0_datawriter_0_20240730T160245.hdf5
- Decoded using `example/run_pdhd_tpc_decoder.fcl` from hamza/docs branch
- **ADCSimpleWindow algorithm**
 - Fill a TP window with TPs for a given `widow_length` (default is 10k det-time ticks)
 - Construct a TA if `adc_integral > adc_threshold`
- **New code (branch [schhibra/ADCSimpleAlgorithm_TAMaker](#)) :**
 - `dunetrigger/TriggerSim/TAAlgTools/TPWindow.hh`
 - `dunetrigger/TriggerSim/TAAlgTools/TAAlgTPCADCSimpleWindow.hh`
 - `dunetrigger/TriggerSim/TAAlgTools/TAAlgTPCADCSimpleWindow_tool.cc`
 - `dunetrigger/TriggerSim/TAAlgTools/CMakeLists.txt`
 - `dunetrigger/TriggerSim/TAAlgTools/TAAlgTPCTool.hh`
 - `example/run_tpalg_taalg_tcalg.fcl`

Technicalities

- **Testing code:** `example/run_tpalg_taalg_tcalg.fcl`

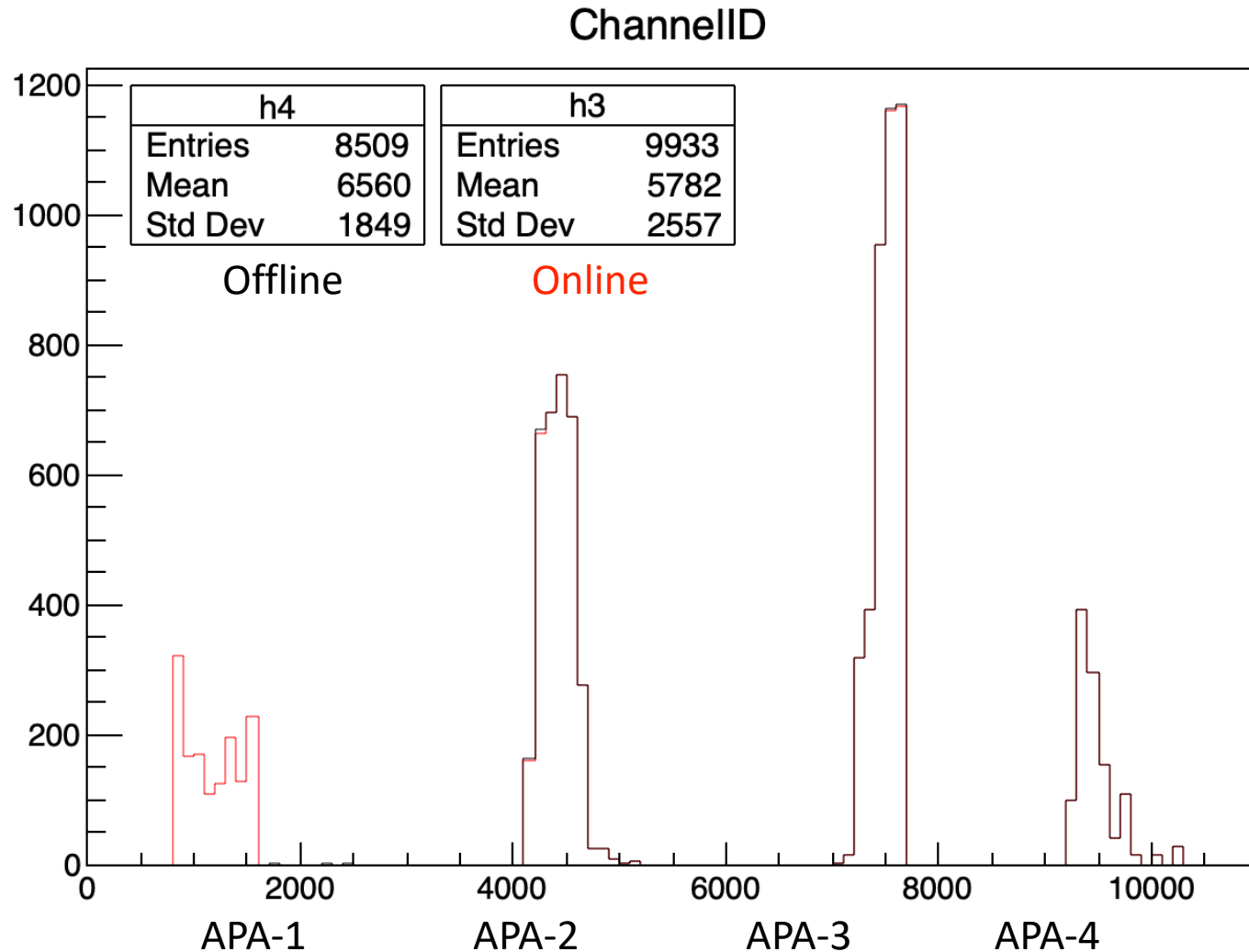
```
tpmakerTPC:
{
  module_type: TriggerPrimitiveMakerTPC
  rawdigit_tag: "tpcrawdecoder:daq"
  tpalg: {
    tool_type: TPAlgTPCSimpleThreshold
    threshold_tpg_plane0: -1
    threshold_tpg_plane1: -1
    threshold_tpg_plane2: 60
    verbosity: 0
  }
  verbosity: 1
}
```

No TPs constructed if -1
Only induction plane used for run028508



```
tamakerTPC:
{
  module_type: TriggerActivityMakerTPC
  tp_tag: "tpmakerTPC"
  taalg: {
    tool_type: TAAlgTPCADCSimpleWindow
    m_adc_threshold: 20000000
    m_window_length: 60000
    verbosity: 1
  }
  verbosity: 1
}
```

Offline vs online performance: TP channel ID

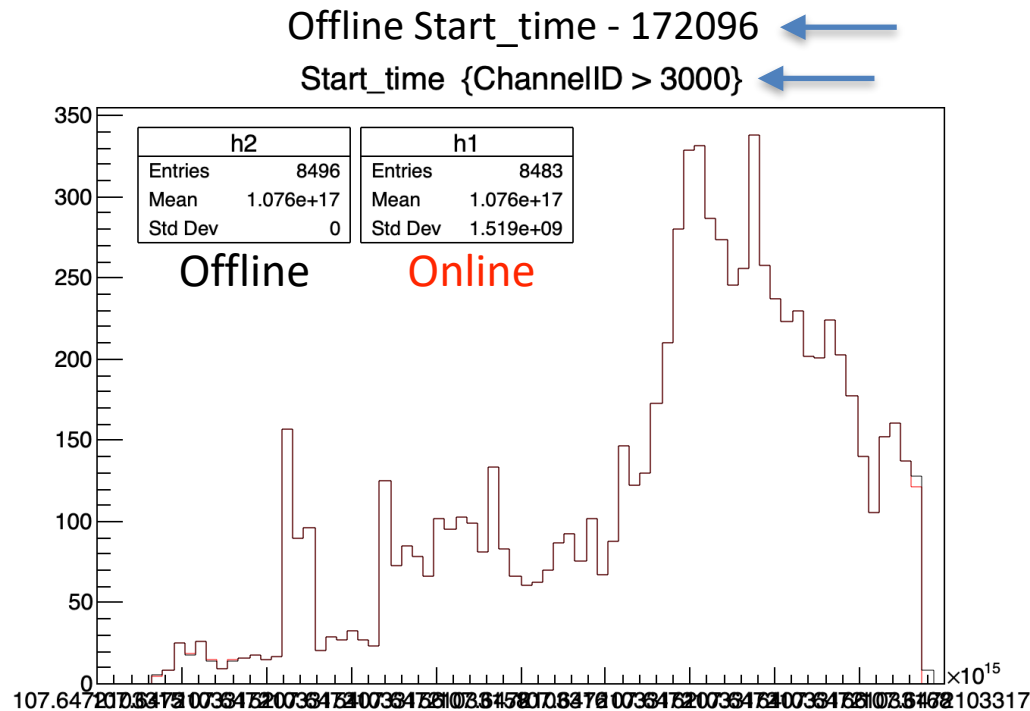


Offline vs online performance: TP

```
192 // Compare offline and online TPs
193 fTPSizeOffline = fTriggerPrimitive.size();
194 fTPSizeOnline = fTriggerPrimitiveDAQ.size();
195 long unsigned int minTPSize = std::min(fTPSizeOffline, fTPSizeOnline);
196 fTPComparison.resize(minTPSize);
197 for (long unsigned int i = 0; i < minTPSize; i++) {
198     bool foundMatch = false; // to check if a match is found
199     for (long unsigned int j = 0; j < fTriggerPrimitiveDAQ.size(); j++) {
200         // Compare TPs and set comparison result
201         if (fTriggerPrimitive[i].channel == fTriggerPrimitiveDAQ[j].channel &&
202             fTriggerPrimitive[i].time_start == fTriggerPrimitiveDAQ[j].time_start &&
203             fTriggerPrimitive[i].time_over_threshold == fTriggerPrimitiveDAQ[j].time_over_threshold &&
204             fTriggerPrimitive[i].time_peak == fTriggerPrimitiveDAQ[j].time_peak &&
205             fTriggerPrimitive[i].adc_integral == fTriggerPrimitiveDAQ[j].adc_integral &&
206             fTriggerPrimitive[i].adc_peak == fTriggerPrimitiveDAQ[j].adc_peak &&
207             fTriggerPrimitive[i].detid == fTriggerPrimitiveDAQ[j].detid &&
208             fTriggerPrimitive[i].type == fTriggerPrimitiveDAQ[j].type &&
209             fTriggerPrimitive[i].algorithm == fTriggerPrimitiveDAQ[j].algorithm) {
210             foundMatch = true;
211             break; // Break the loop if a match is found
212         }
213     }
214
215     fTPComparison[i] = foundMatch; // Set comparison result
216 }
```

Offline vs online performance: TP start time

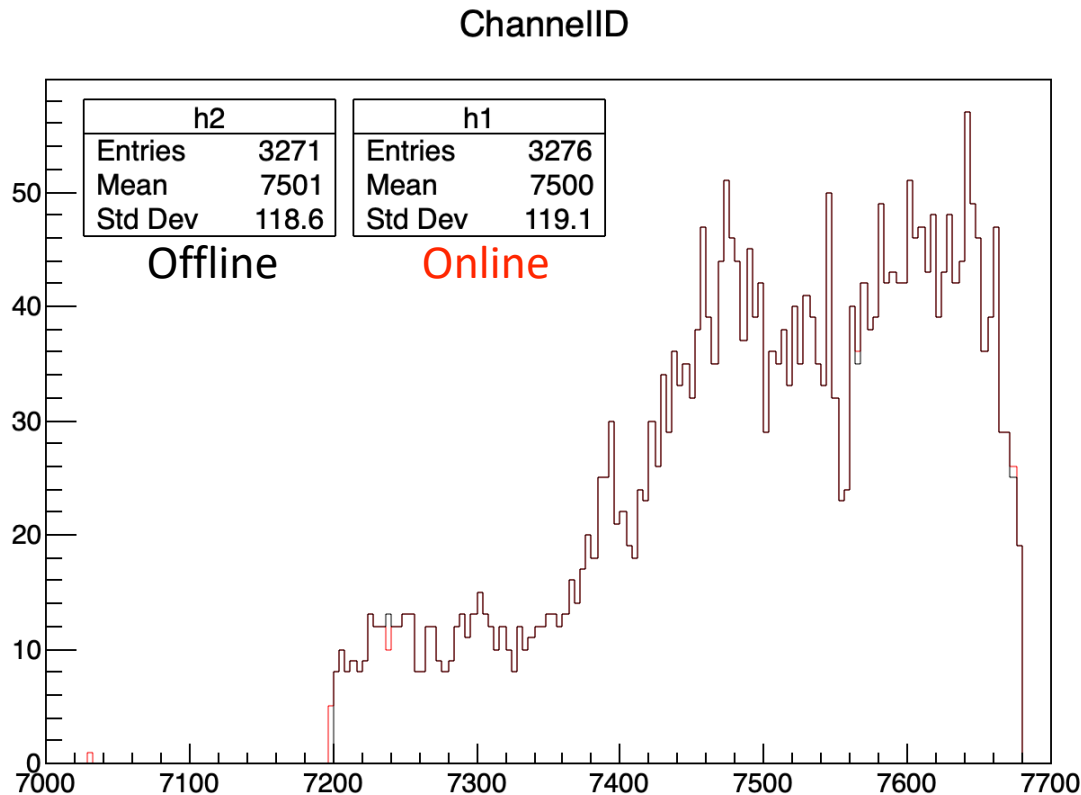
- Not a single offline TP matches to online TPs
- TP `time_start` (and `time_peak`) differ by a constant 172096 det-time ticks



- After correcting: 8107 out of 8496 TPs match to 8483 online TPs

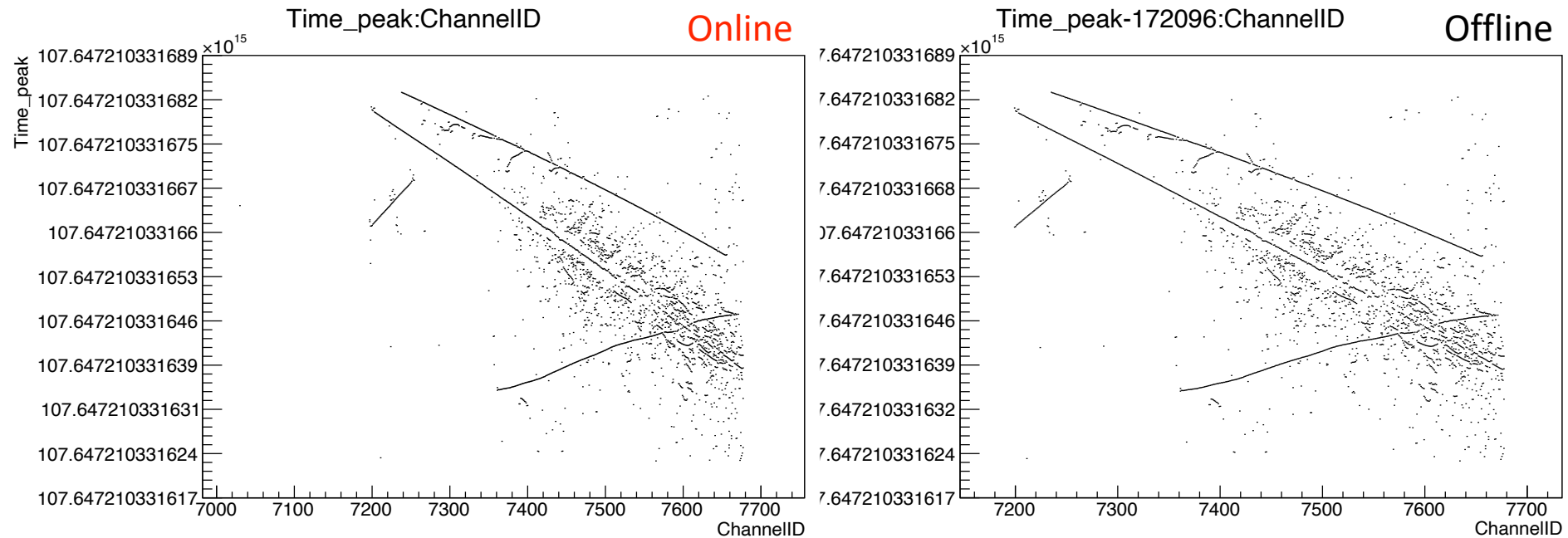
Offline vs online performance: TPs in a TA

- After correcting: same number of TAs constructed of ~same properties
- For a TA (constructed in APA-3)
 - **Online: 3271 TPs**
 - Offline: 3276 TPs



Offline vs online performance: constructed TA

- After correcting: same number of TAs constructed of ~same properties
- For a TA (constructed in APA-3)
 - Online: 3271 TPs
 - Offline: 3276 TPs



Backup

We are using buggy TA maker for PD-2

The screenshot shows a web browser window displaying a GitHub repository file viewer for the file `TriggerActivityMakerADCSimpleWindow.cpp`. The browser's address bar shows the URL `https://github.com/DUNE-DAQ/triggeralgs/blob/patch/fddaq-v4.4.x/src/TriggerActivityMakerADCSimpleWindow.cpp`. The file viewer interface includes a search bar at the top left with the text "Go to file" and a search icon. Below the search bar is a file tree showing the repository structure, with the file `TriggerActivityMakerADCSimpleWindow.cpp` selected. The main content area displays the source code of the file, with line numbers 65 to 106 visible. The code is as follows:

```
65 TriggerActivityMakerADCSimpleWindow::configure(const nlohmann::json &config)
77 }
78
79 TriggerActivity
80 ✓ TriggerActivityMakerADCSimpleWindow::construct_ta() const
81 {
82     TLOG_DEBUG(TLVL_DEBUG_LOW) << "[TAM:ADCSW] I am constructing a trigger activity!";
83     //TLOG_DEBUG(TRACE_NAME) << m_current_window;
84
85     TriggerPrimitive latest_tp_in_window = m_current_window.tp_list.back();
86     // The time_peak, time_activity, channel_* and adc_peak fields of this TA are irrelevant
87     // for the purpose of this trigger alg.
88     TriggerActivity ta;
89     ta.time_start = m_current_window.time_start;
90     ta.time_end = latest_tp_in_window.time_start + latest_tp_in_window.time_over_threshold;
91     ta.time_peak = latest_tp_in_window.time_peak;
92     ta.time_activity = latest_tp_in_window.time_peak;
93     ta.channel_start = latest_tp_in_window.channel;
94     ta.channel_end = latest_tp_in_window.channel;
95     ta.channel_peak = latest_tp_in_window.channel;
96     ta.adc_integral = m_current_window.adc_integral;
97     ta.adc_peak = latest_tp_in_window.adc_peak;
98     ta.detid = latest_tp_in_window.detid;
99     ta.type = TriggerActivity::Type::kTPC;
100    ta.algorithm = TriggerActivity::Algorithm::kADCSimpleWindow;
101    ta.inputs = m_current_window.tp_list;
102    return ta;
103 }
104
105 // Register algo in TA Factory
106 REGISTER_TRIGGER_ACTIVITY_MAKER(TRACE_NAME, TriggerActivityMakerADCSimpleWindow)
```

At the bottom of the browser window, a search bar contains the text "fTime_start_TA". Below the search bar, there are several checkboxes: "Highlight All" (checked), "Match Case", "Match Diacritics", and "Whole Words". To the right of these checkboxes, it says "2 of 2 matches".

It should be

triggeralgs / src / TriggerActivityMakerChannelAdjacency.cpp

Code Blame 245 lines (205 loc) · 8.64 KB

```
115 TriggerActivity
116 TriggerActivityMakerChannelAdjacency::construct_ta(TPWindow win_adj_max) const
117 {
118
119     TriggerActivity ta;
120
121     TriggerPrimitive last_tp = win_adj_max.inputs.back();
122
123     ta.time_start = last_tp.time_start;
124     ta.time_end = last_tp.time_start;
125     ta.time_peak = last_tp.time_peak;
126     ta.time_activity = last_tp.time_peak;
127     ta.channel_start = last_tp.channel;
128     ta.channel_end = last_tp.channel;
129     ta.channel_peak = last_tp.channel;
130     ta.adc_integral = win_adj_max.adc_integral;
131     ta.adc_peak = last_tp.adc_peak;
132     ta.detid = last_tp.detid;
133     ta.type = TriggerActivity::Type::kTPC;
134     ta.algorithm = TriggerActivity::Algorithm::kChannelAdjacency;
135     ta.inputs = win_adj_max.inputs;
136
137     for (const auto& tp : ta.inputs) {
138         ta.time_start = std::min(ta.time_start, tp.time_start);
139         ta.time_end = std::max(ta.time_end, tp.time_start);
140         ta.channel_start = std::min(ta.channel_start, tp.channel);
141         ta.channel_end = std::max(ta.channel_end, tp.channel);
142         if (tp.adc_peak > ta.adc_peak) {
143             ta.time_peak = tp.time_peak;
144             ta.adc_peak = tp.adc_peak;
145             ta.channel_peak = tp.channel;
146         }
147     }
148 }
```

fTime_start_TA

Highlight All Match Case Match Diacritics Whole Words 2 of 2 matches