AURA Level 2 Processing

Chris Weaver
March 17, 2010

Available Forms of Data

- From L1
  - Calibrated Waveforms
  - rapcalTimes file
- From L2
  - Waveforms with timing information
  - RadioHitFile file

The rapcalTimes File

- Each line is a trigger, ordered by time

- Available data includes:

  - timestamp

  - mainboard ID

  - associated waveform file

  - RCO correction data

  - Lots of low-level stuff

The RadioHitsFile File

- Also triggers ordered by time

- Has estimated hit times, estimates of baseline and spread, rough total power

- Details at http://icecube.wisc.edu/~cweaver/AURA_L2/
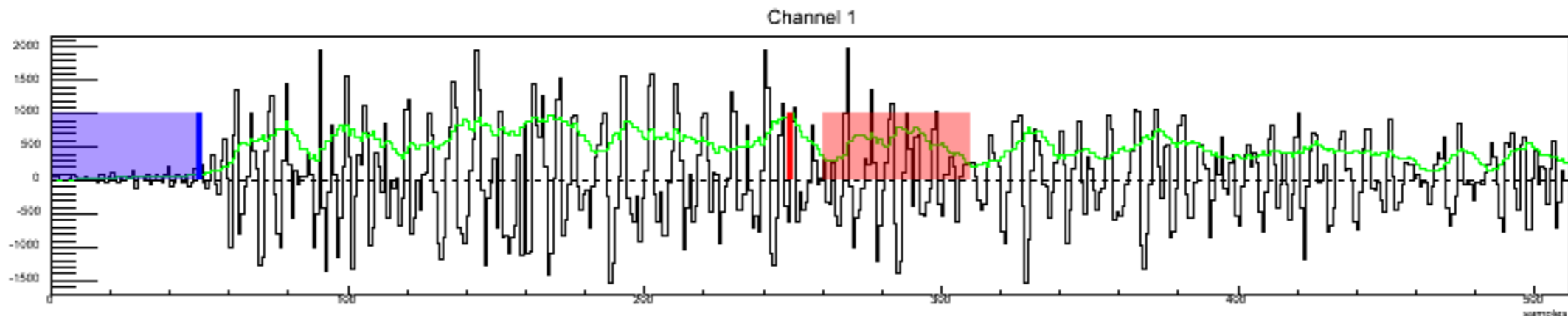
Data Layout in Filesystem

- Run Directory

  - rapcalTimes.txt

  - RadioHitFile.txt

  - gzipped tarball of 'csv' waveform files

    - waveform files

    - symlink to rapcalTimes.txt
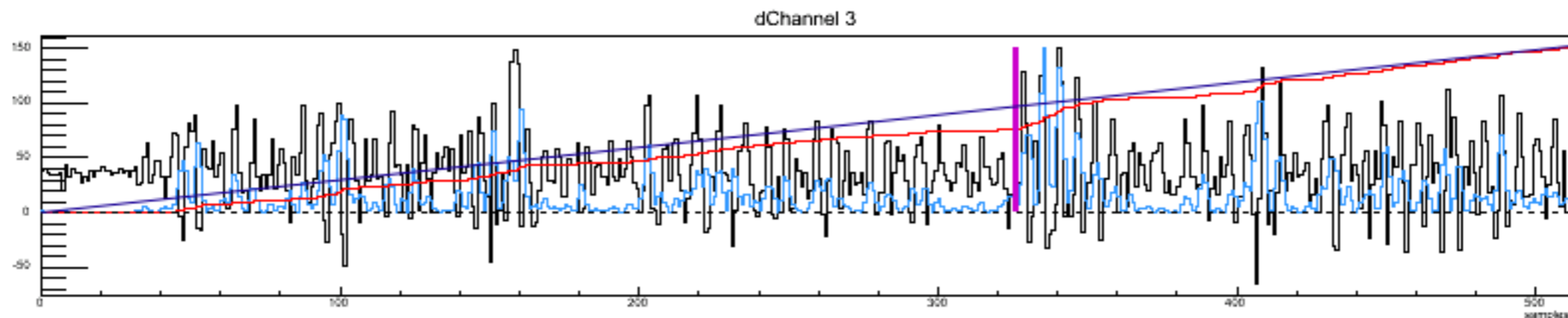
Pulse Detection Algorithms

'HitFinder' Method

- Rectifies (takes the absolute value of) and smooths the input waveform with a moving average

- Tries to find the start of a pulse by picking a point before which the average value is significantly lower than the average shortly after the waveform maximum
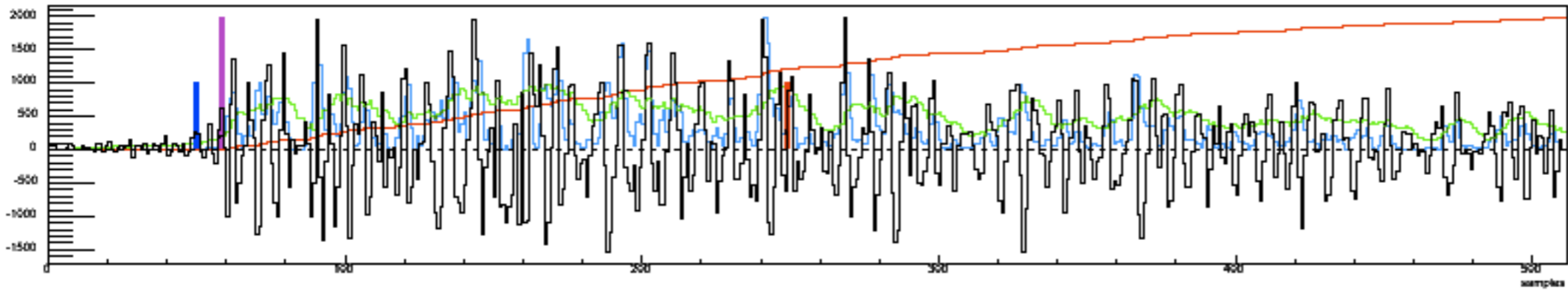

Channel 1
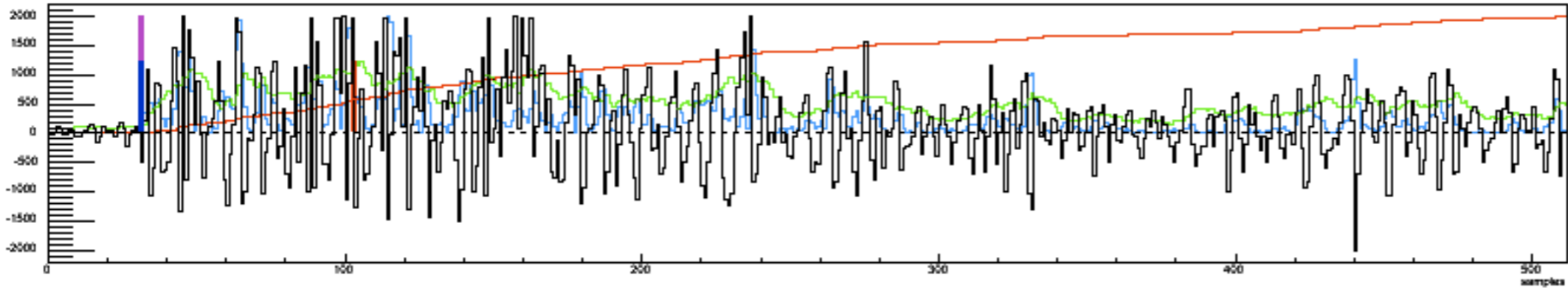
'Maximum Deviation' Method

- Uses some tricks with the FFT to smooth the waveform

- Looks for the point where the integral of the squared waveform deviates most from a straight line
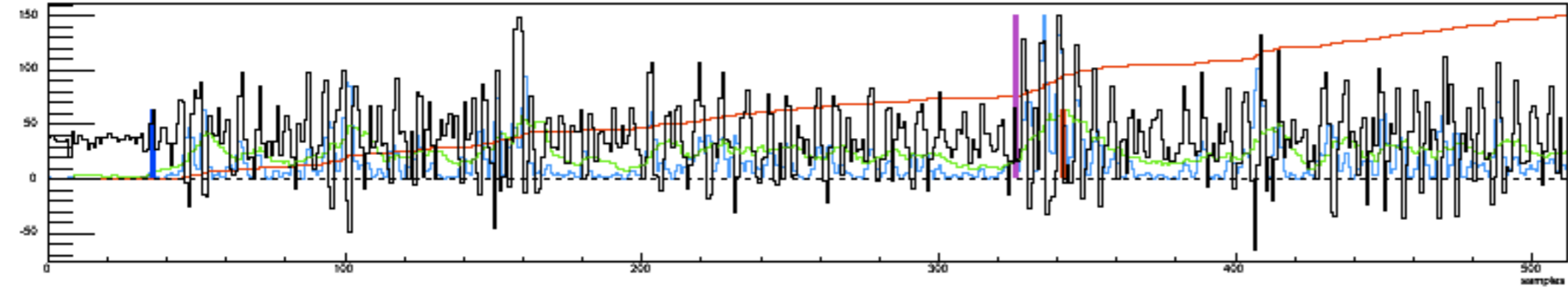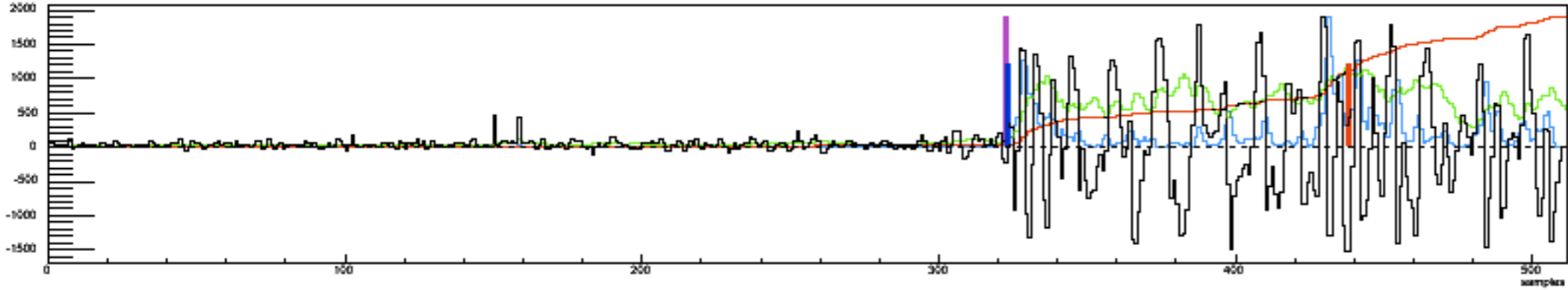
Channel 1

Channel 2

Channel 3

Channel 4

Original Waveform

Moving Average

FFT Smoothed

Squared Integral

HF Maximum

HF Hit Time

MD Hit Start