MicroBooNE Electronics Simulation Update

LArSoft Meeting
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CalWireMicroBooNE Normalization Issue

- Status of updated CalWireMicroBooNE was reported at last LArSoft meeting on Dec. 21.
  - Short version: deconvolution kernel is now calculated on the fly by SignalShapingServiceMicroBooNE without the need to read data from files (also includes hard-coded parameterizations of field response and electronics response).
- As reported on Dec. 21, one open issue was how to normalize the deconvolution kernel.
  - Initial version of SignalShapingServiceMicroBooNE only included “eyeball normalization” of deconvolution kernel.
- After the meeting, I modified SignalShapingServiceMicroBooNE to give deconvoluted signals a definite normalization.

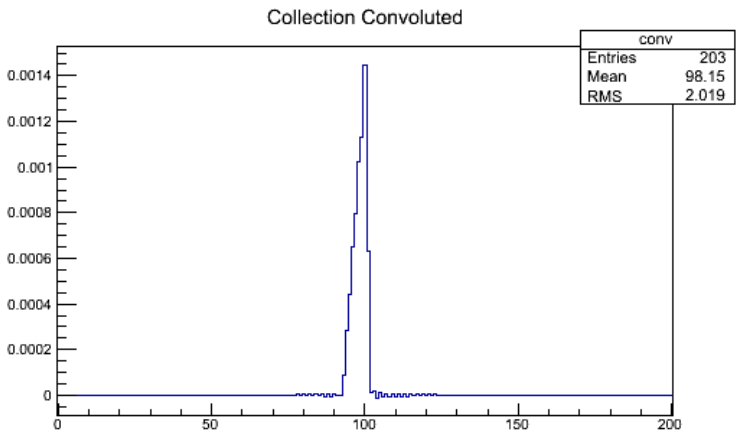
CalWireMicroBooNE Normalization

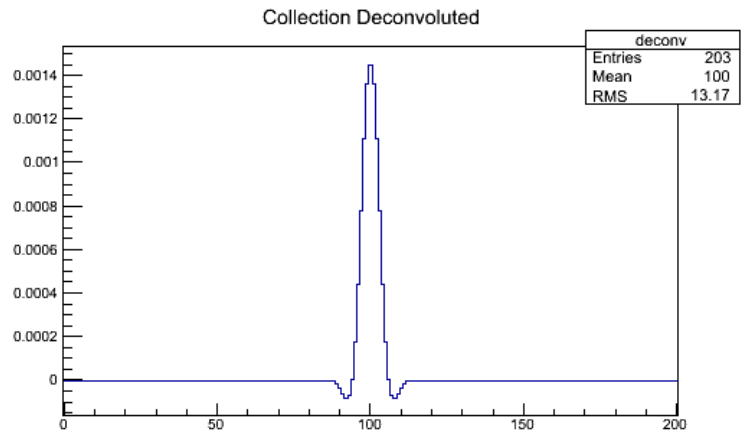
- CalWireMicroBooNE normalization is now fixed such that deconvoluted signals have the same peak height as raw signals.

Raw signal

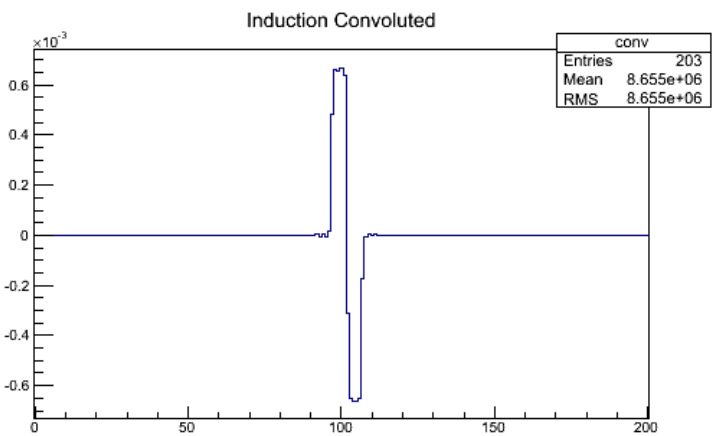
Shaped signal

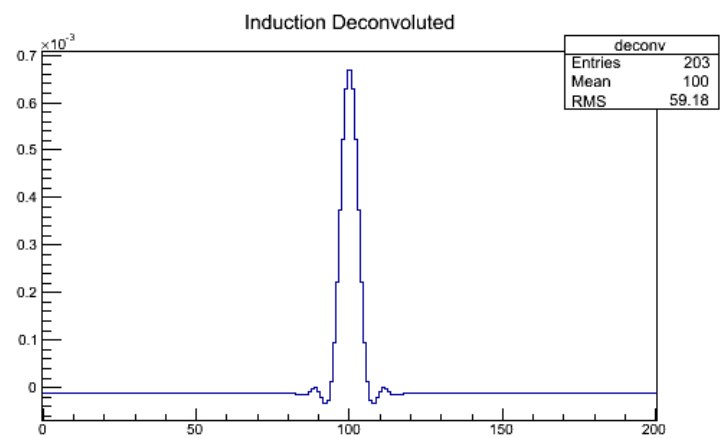
Collection Wires





Induction Wires





CalWireMicroBooNE Normalization

- There are no free parameters to tune that affect the normalization currently.
- I'm not 100% sure that this is the correct normalization principle, but this choice of normalization has the following advantageous properties.
  - Shaped signals can be used more or less interchangeably with raw signals.
  - Works reasonably with current hit finding thresholds.
    - Induction signals are about half of collection signals, consistent with current FFTHitFinder fcl parameters.
  - Was within a factor of two of my original eyeball normalization.

SimWireMicroBooNE Status

- Georgia has modified SimWireMicroBooNE to obtain the convolution kernel from SignalShapingServiceMicroBooNE.
  - Guarantees that SimWireMicroBooNE and CalWireMicroBooNE are using the same response functions.
  - Response functions did not change.
- MicroBooNE field response functions and noise simulation still need improvement.