



DEEP UNDERGROUND  
**NEUTRINO** EXPERIMENT



The  
University  
Of  
Sheffield.

# The splitter for the 35 ton

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16/10/2015

# Purpose of the splitter

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- ❖ A lot of simulation effort has been centred around 10 drift window events, but when analysing want events centred at  $T=0$ .
  - ❖ Therefore want to split these events, as particles will enter cryostat at random times.
- ❖ The 10 drift windows events to be split are distinct from  $X$  drift window DAQ events provided stitching of DAQ events to make a 10 drift window event is possible.
- ❖ Have ran the splitter on MC and ticker data.
- ❖ Think we want a 3 drift window event after splitting.
  - ❖ 1 before interaction, 1 for interaction and 1 after interaction so can see all particles in the detector in the time around the interaction we are interested in

# What it does

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- ❖ It looks through each the file event by event. It then looks through each event tick by tick. It then looks to see if it can trigger on each tick.
- ❖ If it can trigger, then it goes back through the events until it sees an event with a non-zero number of ADC values and checks if the timestamps match.
- ❖ It then accumulates the determined number of ticks, checking timestamps match for any file it loads with non-zero numbers of ADC values.
- ❖ Once it has gathered enough ticks, it makes an event with the ADC values, counter hits and waveforms between the start and end ticks it gathered.
- ❖ The events it creates are thus a predetermined size, and have no empty headers between events.

# Triggering on events

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- ❖ If we want to identify interactions we need to be able to trigger on them!
- ❖ Have implemented 4 triggers thus far - feel free to suggest more!
  - ❖ Trigger every X ticks - Not hugely useful for data but a good way to check it's working with MC
  - ❖ Trigger on waveforms - If have a particularly large waveform at a given tick value.
  - ❖ Trigger on muon counters - If certain counters are hit then trigger (telescope or horizontal
  - ❖ Trigger on ADC counts - If ADC values for a given number of channels changes by more than a given amount, very useful or tickler data!

# User controls

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- ❖ Many fcl parameters which the user can change.
  - ❖ Trigger levels and which trigger to use are all fcl parameters. (Only uses 1 trigger at a time currently)
  - ❖ Pre trigger and post trigger tick numbers to gather are both fcl parameters.
  - ❖ Converts between nova, ssp, tpc and counter ticks so these values have defaults but can be changed.
- ❖ Splitter can also stitch across events, after checking that the timestamps match.

# Still left to do

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- ❖ Was hoping to show a split event, but the output has an instance name which is incompatible with the event display.
  - ❖ Tingjun submitted a ticket to fix this.
- ❖ Check it works with zero-suppressed data.
  - ❖ Uncompress is called when loads events, but tickler data and MC isn't zero-suppressed so want to check.
- ❖ Write an algorithm to convert from fragments to external triggers for the counters. One already exists for ADCs and SSPs, will use one written by Dom and Mike as a base.
- ❖ Probably something I've forgot, plus any surprises!
  - ❖ Have now got a quick fix for event/tree index not being aligned.