Summary of a Variables in tsignals Tree

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1 The tsignals Tree

The tree called "tsignals" is stored in outputs/signals.root, which is written by `icemc`. Only events that survive any preselection cuts to reach the Anita trigger are written to this tree. Remember that as with the `passing_events` tree, each event has a weight given by `weight_test/dnutries` to account for earth absorption and selection of the interaction position within the horizon of the payload. This is only filled for the antenna that is closest to the interaction, which is always on the lowest of the three layers of the antennas (there are no drop-downs implemented yet). For all waveforms, there are 512 samples separated by (1/2.6) ns.

Where I refer to the first polarization, I mean LCP for Anita I and vertical polarization for Anita II. And for second polarization I mean RCP for Anita I and horizontal polarization for Anita II.

A channel passes the trigger if the output of the tunnel diode (`timedomain_output_1_inanita[j]` or `timedomain_output_1_inanita[j]`) goes lower than the (negative) threshold within the time window that lies between the 232^{nd} and 284^{th} bins, or between about 89 ns and 109 ns. Notice that this window is centered about 15 ns later than the center of the signal waveforms since under my tunnel diode model it imposes a delay. The thresholds for ANITA I are -1.251E-14 (Lo),-1.13106E-14 (Mid1), -7.98583E-15 (Mid2),-1.40634E-14 (Hi) and -3.55069E-11 (full when used). For ANITA II, they are -1.15638e-14 (Lo), -1.42725e-14 (Mid), -2.20845e-14 (Hi), -2.71869e-14 (Full).

`double dangle`	Viewing angle - Cerenkov angle
`double emfrac`	EM fraction of the shower
`double hadfrac`	Hadronic fraction of the shower
`int inu`	`icemc`'s event number
The event weight is the quotient	`weight_test/dnutries`
`double dnutries`	The number of "tries" for the interaction position across Antarctica before it would have landed within the horizon of the balloon.
`double weight_test`	Weight due to absorption in the earth. Is it the probability that the neutrino would have survived its trip through the earth. When we fill this tree, we haven't stepped through the Earth using the full geographical model to calculate the absorption yet, so instead we just assume the neutrino only traverses ice on its way to the interaction.
`double peak_e_rx`	Peak of the signal waveform at the antenna receiver, first polarization. No RFCM amplification or any attenuation of any sort imposed. Just antenna effective heights imposed on the incident signal.
`double peak_h_rx`	Same as previous, but second polarization.
`double volts_rx_rfcm_lab_e[512]`	Time domain *signal* waveform read by the surf in the first polarization
`double peak_e_rx_rfcm_lab`	Peak of the previous waveform
`double volts_rx_rfcm_lab_h`	Time domain *signal* waveform read by the surf in the second polarization
`double peak_h_rx_rfcm_lab`	Peak of the previous waveform

`double signal_vpol_inanita[5][512]`	Time domain *signal* waveforms (voltage v. time) for each of the five channels and each of the 512 samples in the vertical polarization only, before coverting to LCP, RCP for ANITA I.
`double noise_vpol_inanita[5][512]`	Same as previous, but just the *noise* waveform in the vertical polarization only, with no signal. This is before converting to LCP, RCP for ANITA I.
`double total_vpol_inanita[5][512]`	Sum of the previous two waveforms.
`double total_diodeinput_1_inanita[5][512]`	Waveform that is input to the tunnel diode for the first polarization.
`double total_diodeinput_2_inanita[5][512]`	Waveform that is input to the tunnel diode for the second polarization.
`double peak_e[5]`	Peak voltage of the signal waveform in the first polarization
`double peak_h[5]`	Peak voltage of the noise waveform in the second polarization
`double timedomain_output_1_inanita[5][512]`	Output waveforms of the tunnel diodes for each channel (voltage v. time) for the first polarization
`double timedomain_output_2_inanita[5][512]`	Output waveforms of the tunnel diodes for each channel (voltage v. time) for the second polarization
`int flag_e_inanita[5][512]`	1 when the channel has fired and 0 otherwise, for the first polarization. This flag is held high for a L1 trigger coincidence window of 11.19 ns.
`int flag_h_inanita`	same as previous, but for the second polarization.
`double bwslice_vrms[5]`	RMS noise voltage for each channel
`double ston[5]`	This is the peak signal voltage divided by rms noise voltage for each channel (`peak_e[i]/bwslice_vrms[i]`). Not that this is not what is input to the discriminator, it is just one measure of signal strength.
`int channels_passing_e[5]`	Which channels in the first polarization pass the single-channel trigger at some time. 1 for yes, 0 for no.
`int channels_passing_h[5]/I`	Same as previous, but second polarization.
`int l1_passing`	Whether this antenna passes the L1 trigger. 1 for yes, 0 for no.
`double integral_vmmhz`	Integral of the electric field in V/m/MHz incident on the closest antenna. For the older frequency domain simulation, this was the measure of signal strength.