HPS Trigger System Commissioning Outline v1.0

October 17, 2014
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No beam, No Calorimeter
Signal source: signal generator, Trigger source: SSP (pair, single, cosmic)
Manpower: 1 Staff Engineer (Ben Raydo) for 2 weeks, 1 Staff Scientist (Sergey Boyarinov) for 1 week

HPS physics pair trigger	Cluster singles trigger	Cosmic trigger
1) Trigger Latency	1) Trigger latency (for each cluster location – this is a measure of the ADC channel delay)	1) Trigger latency
2) Pair coincidence time window sweep (for a few percent of pair combinations)	2) Hit coincidence time window sweep (for all neighbor combinations on a few percent of cluster centers)	2) Paddle coincidence time window sweep
3) TI event contains cluster pair trigger type tag	3) TI event contains cluster singles trigger type tag	3) TI event contains cosmic trigger type tag
4) Compare SSP event data (trigger data) against FADC event data for agreement on cluster positions, time, #hit, energies, passed cuts	4) Compare SSP event data (trigger data) against FADC event data for agreement on cluster positions, time, #hit, energies, passed cuts	4) Compare SSP event data (trigger data) against FADC event data to confirm ADC hits are captured
5) Various pair pulse combinations to check trigger cut algorithm accept/reject	5) Various pair pulse combinations to check trigger cut algorithm accept/reject	
6) Measure dead-time introduced by trigger as a function of frequency of pairs (both fixed rate and random)	6) Measure dead-time introduced by trigger as a function of frequency of cluster rates (both fixed rate and random)	

No beam, Calorimeter Installed
Signal source: LED pulser, Trigger source LED pulser
Manpower: 1 Staff Engineer (Ben Raydo) for 1 day, 1 Staff Scientist (for data analysis) for 1 day

HPS physics pair trigger	Cluster singles trigger	Cosmic trigger
N/A	1) Channel latency (for each cluster location – this is a measure of the ADC channel delay+Ecal+Led chain) 2) Use LED pulser to fire each channel separately to confirm Ecal -> trigger wire mapping is done properly	N/A

No beam, Calorimeter Installed
Signal source: scintillators/cosmic, Trigger source SSP (cosmic)
Manpower: 1 Staff Engineer (Ben Raydo) for 1 day, 1 Staff Scientist (for data analysis) for 1 day

HPS physics pair trigger	Cluster singles trigger	Cosmic trigger
1) Compare SSP event data (trigger data) against FADC event data for agreement on cluster positions, time, #hit, energies, passed cuts	1) Compare SSP event data (trigger data) against FADC event data for agreement on cluster positions, time, #hit, energies, passed cuts.	1) Trigger latency 2) Determine initial pedestal and gain settings for trigger from cosmic run data

Low current beam, Calorimeter Installed.
Signal source: Ecal/beam, Trigger souce SSP (single)
Manpower: 1 Staff Scientist (for data analysis) for 5 days (note this time is also used for high current testing)

HPS physics pair trigger	Cluster singles trigger	Cosmic trigger
N/A	1) Monitor cluster rates for all crystals using cluster position scalers 2) Compare SSP event data (trigger data) against FADC event data for agreement on cluster positions, time, #hit, energies, passed cuts	N/A

High current beam, Calorimeter Installed.
Signal source: Ecal/beam, Trigger souce SSP (pair) + random
Manpower: shared from low current beam testing

HPS physics pair trigger	Cluster singles trigger	Random trigger
1) Monitor pair rates vs beam current vs expected rates 2) Adjust trigger parameters based on pair cut histograms 3) Compare SSP event data (trigger data) against FADC event data for agreement on cluster positions, time, #hit, energies, passed cuts	N/A	1) Initially: 10kHz random trigger rate to compare SSP event data vs. FADC event data to confirm trigger decisions (pairs and singles) 2) Long term: <1kHz random trigger rate to compare SSP event data vs. FADC event data to confirm trigger decisions (pairs and singles)