

Electronics and DAQ WG Meeting: 6/1/2023

- News / status update
- Reports from the EPIC Background group
 - A lot of work has been done (and is being done to understand the EPIC backgrounds, Radiation Levels and rates)
 - There are some resources available
 - We need to organize the effort to convert this into the most useable form for us
- dRICH
 - VTRX+ Atlas production
 - Other questions/status

News / Status

- FELIX
 - Hao has 24x25Gbps firefly FELIX at BNL and tested, but the transfer is still going slowly.
- Timing Subgroup
 - Purchases are being handled by Dave Abbott, but Dev boards arriving or have arrived. We need to distribute them, and begin work on the timing efforts. Update next week from Dave.
 - The timing group is Jo, Tonko, Marius, William, and Pietro. Jo, Tonko, and Marius do not have significant time to allocate till “summer”
 - Goal is to define timing protocols for the RDO and determine reconstructed clock vs dedicate clock for the detectors needing high resolution timing.

William:

1 Silicon Labs clock evaluation board Si5344H-EVB (\$200)
1 Silicon Labs clock evaluation board Si5394A-EVB (\$600)
Several SMA cables (\$200)

Tonko:

2 Xilinx Zync Ultrascale+ eval boards ZCU102 (\$6000)
1 Silicon Labs clock evaluation board Si5394A-EVB (\$600)
Fibers, cables, SFPs, ... (\$500)

Pietro:

1 Xilinx Zync Ultrascale+ eval boards ZCU102 (\$3000)

Jo:

1 Silicon Labs clock evaluation board Si5344H-EVB (\$200)
1 Enclustra Mercury+ ME-ST1-W base board (\$300)
1 Enclustra ME-XU1-15EG-21-D12E-G1, XCZU15-EG Zync Ultrascale+ FPGA board (\$2500)
1 Opal Kelly XEM8320 Artix Ultrascale+ eval board (\$1400)
Various SFP+ (up to 25Gb), fibers, cables ... (\$500)

Marius:

1 Xilinx Zync Ultrascale+ eval boards ZCU102 (\$3000)
1 Silicon Labs clock evaluation board Si5344H-EVB (\$200)

Introduction to the Background Discussion:

1. We have been using the 500kHz nominal rate. But it is important to understand that this rate varies quite a lot depending energies. At lower energies we will **expect** hits to be noise, not signal.

rates in kHz	5x41 GeV	5x100 GeV	10x100 GeV	10x275 GeV	18x275 GeV
DIS ep	12.5 kHz	129 kHz	184 kHz	500 kHz	83 kHz
hadron beam gas	12.2kHz	22.0kHz	31.9kHz	32.6kHz	22.5kHz
electron beam gas	kHz	kHz	3177.25 kHz	3177.25 kHz	316.94 kHz
DIS eA	kHz	kHz	kHz	/	/
hadron beam (Au) gas	kHz	kHz	kHz	/	/

2. Eventually we need to know the data rates per channel. These must account for:

- Translating physics hits to digitized hits including potential charge sharing
- Translating physics hits to digitized hits using appropriate thresholds
- Distribution of the hits by channels / FEB / RDO
- Noise
- Need to make sure we are consistently applying hits/second for all of these numbers

3. We need to organize this work

- Could get a good idea by defining a grid on active areas depending upon (perhaps a general algorithm for fast results?)
- Final numbers will need specific maps of channel / FEB / RDO from detector experts