DAQ point of view

Simon JM Peeters

Background Task Force kick-off

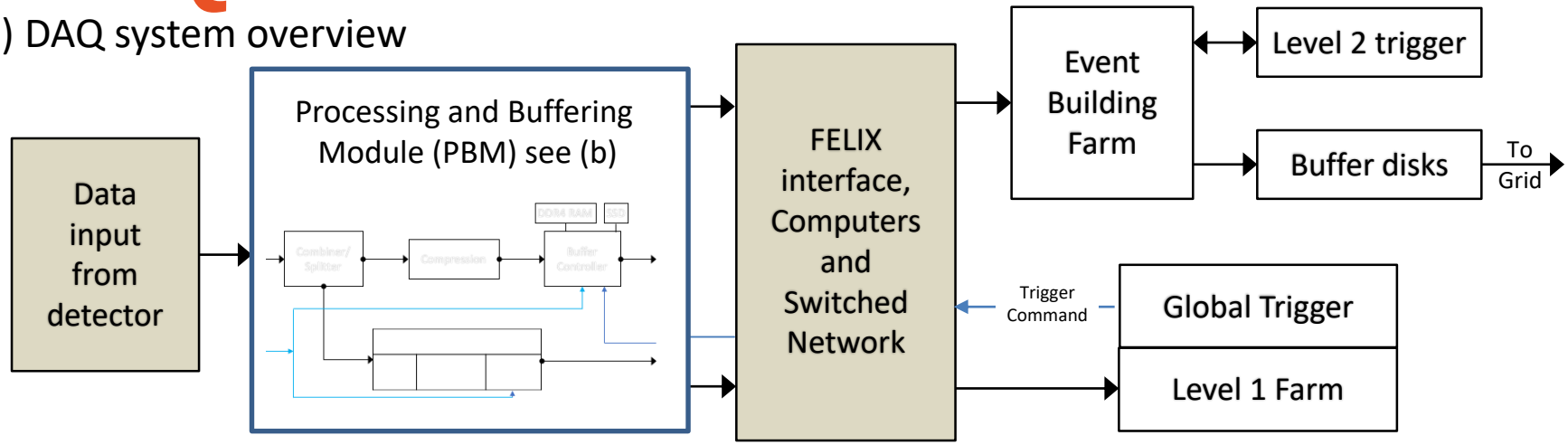
26/10/2018

US UNIVERSITY OF SUSSEX

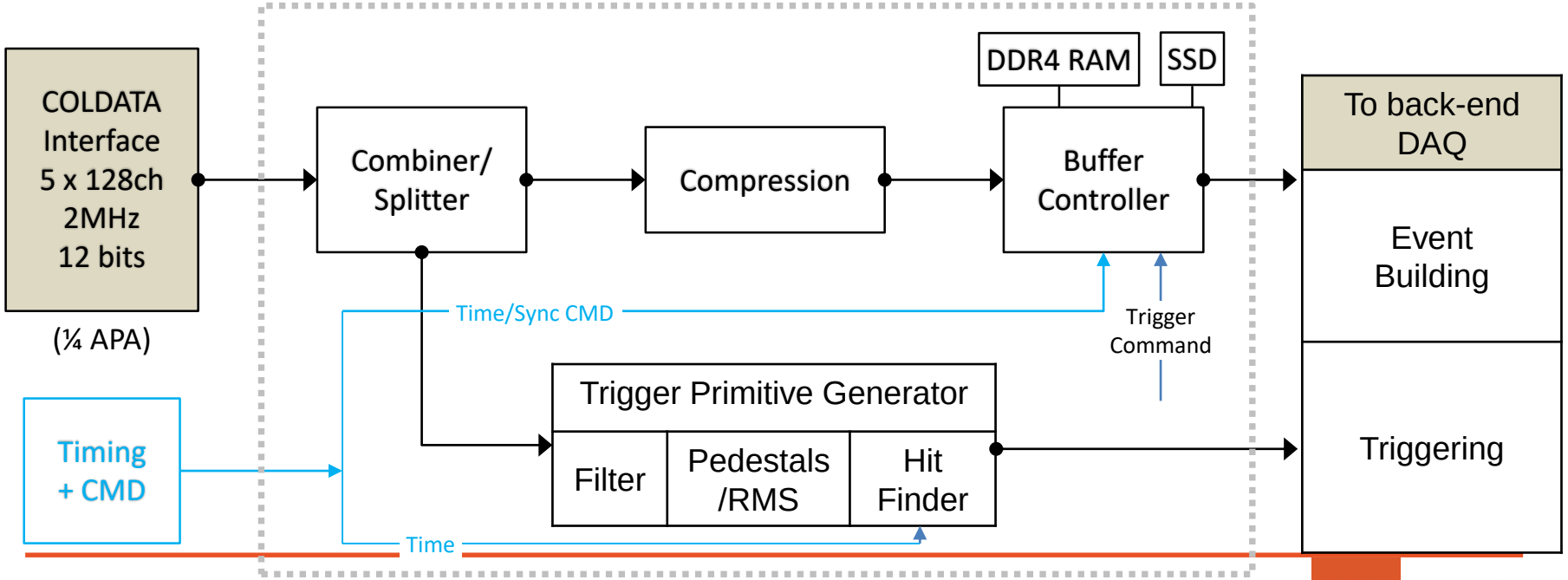
DUNE

DAQ model

(a) DAQ system overview



(b) Processing and Buffering Module (PBM)



Trigger studies

The following steps have been studied
(see Pierre Lasorak's presentation at the last collaboration meeting)

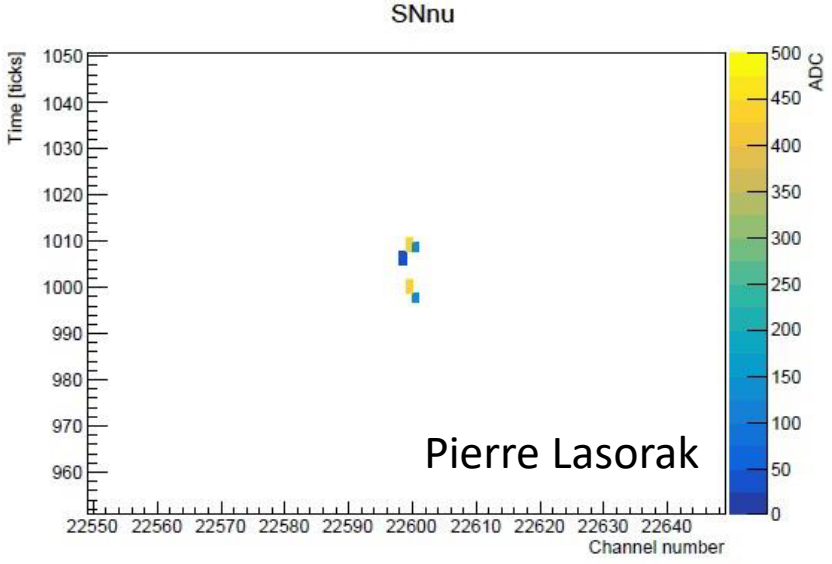
- Hit finding
- Clustering
- Trigger algorithm (burst for SN)

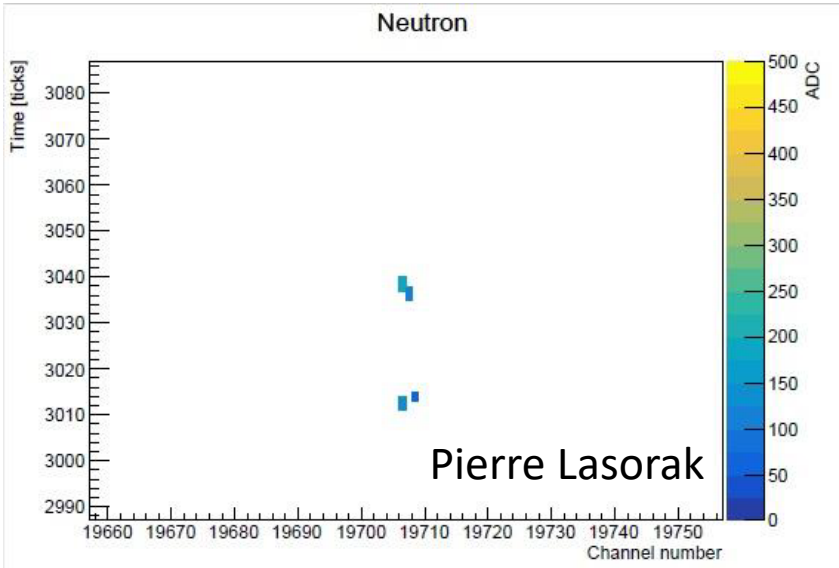
For the overall background and minimal noise levels, there is toolkit and studies have been done for wires & photons. Needs to continue: for example, using different hit finders / clustering.

Most urgently:

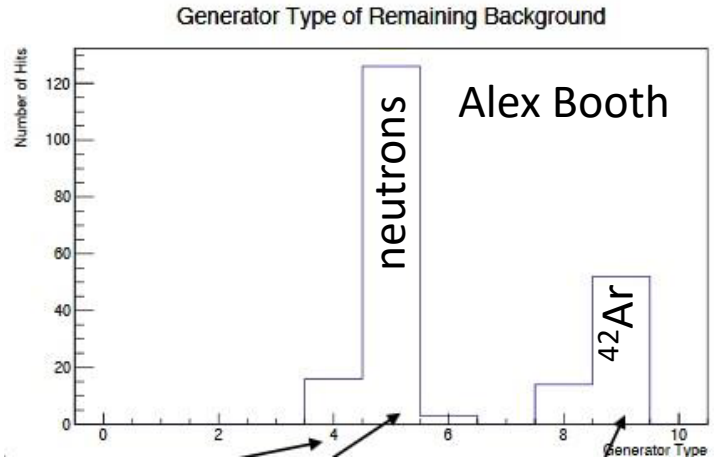
- ^{222}Rn – currently approximated as single alphas (fix: Juergen)
- Neutrons – currently single neutron rate (fix: Aran Borkum) (but large fission comp)

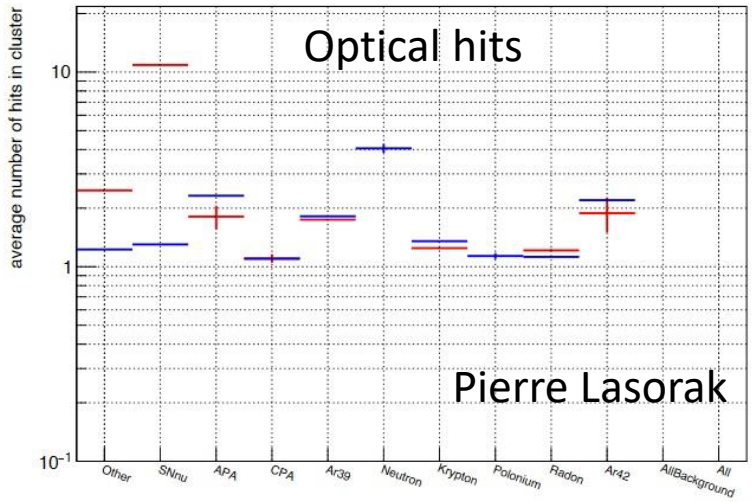
Examples





SN Efficiency: 81.2%, Bkgd: 0.19Hz

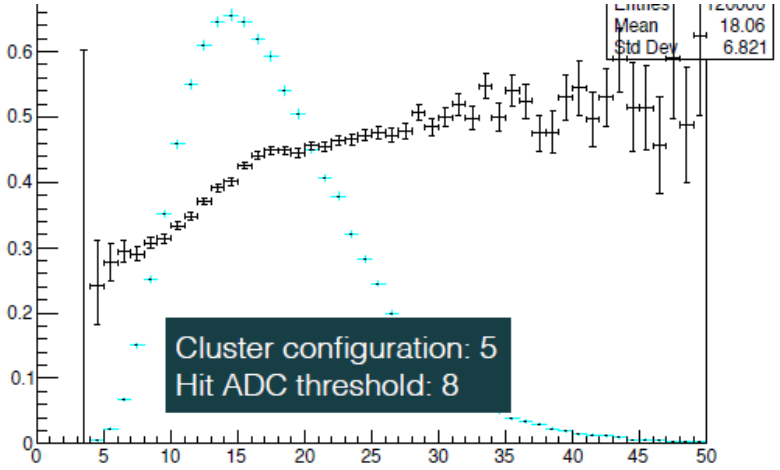




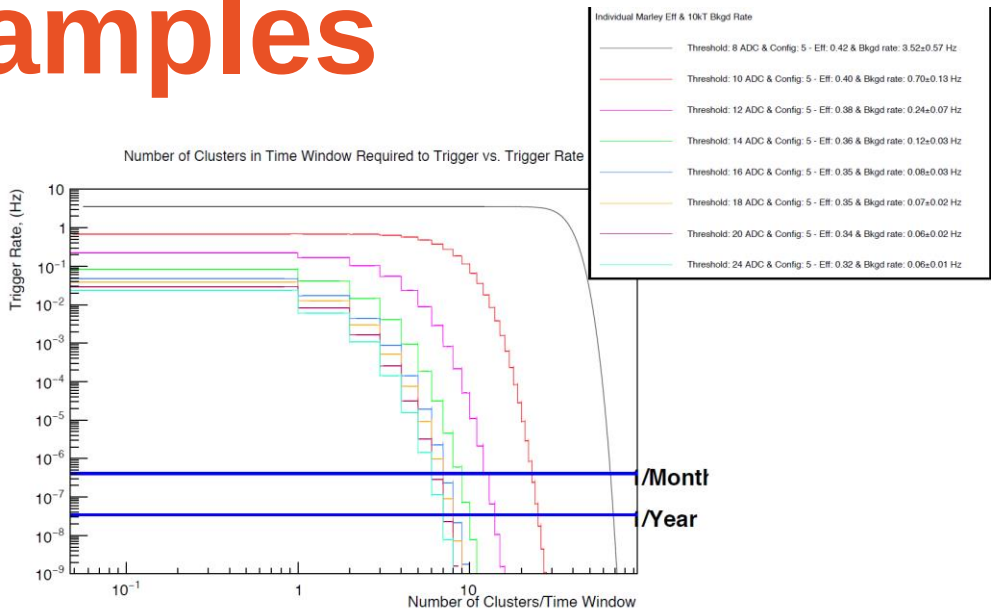
Requirements SN

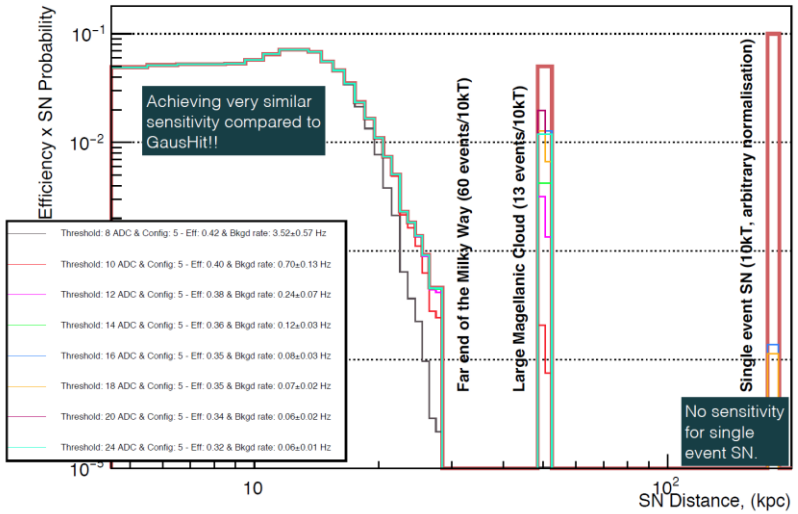
- DocDB9240 (J.R. Klein)
- < 1 fake per month
- Limit on fake supernova triggers: 414 TB/yr uncompressed (assumes 30 / ktonne / day, complete module readout)

Supernova examples



Galactic Neighbourhood Coverage with Fake Trigger Rate 1/Month/10kT

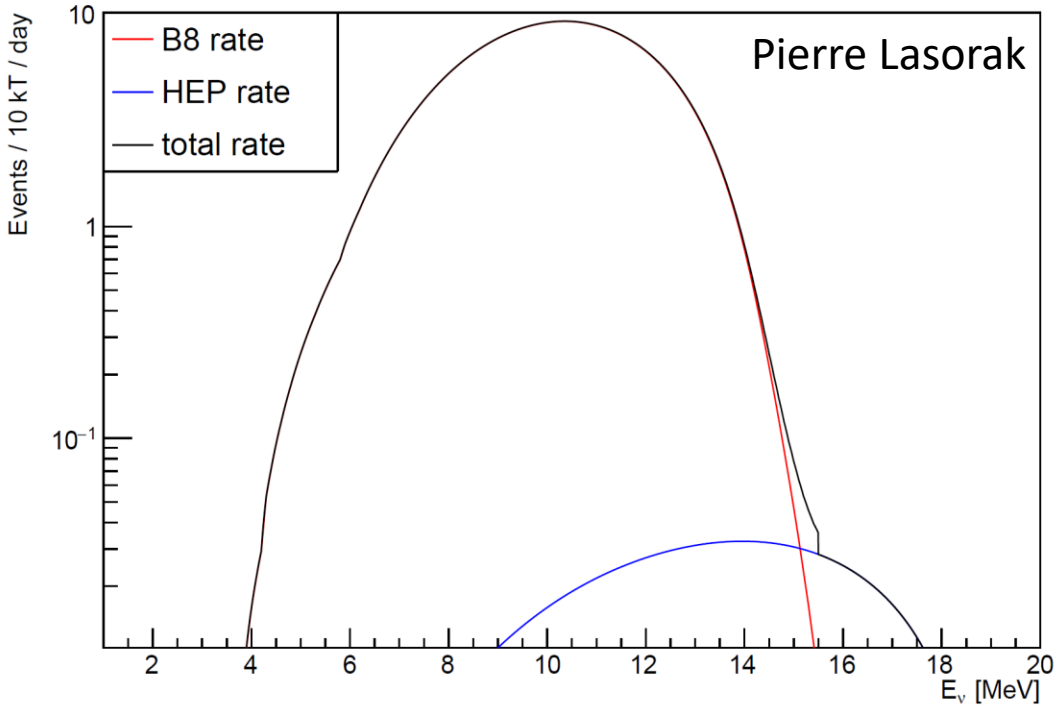




Pierre Lasorak

Requirements solar

- DocDB9240 (J.R. Klein)
- 50% efficiency on 10 MeV electron
- Limit on solar neutrinos: 68 TB/yr uncompressed (assumes 30 / ktonne / day, complete module readout)
- Lowering this will mean more backgrounds



Summary

1. Need studies with consistent toolsets to set requirements and physics impact, ie:
   - What level of backgrounds can we tolerate?
   - What can we achieve within reason to give use the maximum physics?

   for different components
   - Neutron flux
   - ^{222}Rn
2. Is there anything the DAQ can do more (L2?) ?