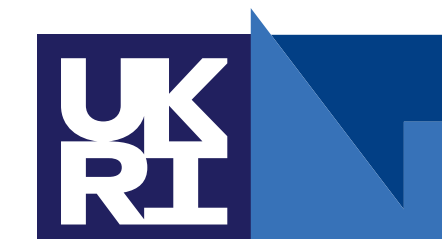


DAQ/SC Requirements

Alessandro Thea, Giovanna Lehmann

DUNE Technical Integration Meeting
26 March 2020



Science and
Technology
Facilities Council

Requirements

- Requirement list revised for the TDR in mid 2019
 - ▶ DAQ and SC separate at the time
 - ▶ DAQ: 5 requirements, 4 specifications
 - ▶ SC: 3 specifications
- Currently consolidating SC structure, will revise the SC requirements at a later stage
 - ▶ No immediate plans to revise the DAQ requirements



High Level Requirements

22	DAQ	Data rate to tape	<30 PB/ year	
23	DAQ	Supernova trigger	> 90\% efficiency for SNB within 100 kpc	Most models of SNB show structure in the neutrino flux for up to 30s and there is potential for interesting measurements to be made up to 100s. 90% triggering efficiency for a typical burst out to 100 kpc provides sensitivity to SNB in our galaxy and several small nearby galaxies.

DAQ Requirements

2314	Requirement	SP DAQ readout throughput	The DAQ shall be able to accept the continuous data stream from the TPC and Photon detector.
2317	Requirement	SP DAQ Calibration trigger	The DAQ shall provide the means to distribute time-synchronous commands to the calibration systems, in order to fire them, at a configurable rate and sequence and at configurable intervals in time. Those commands may be distributed during physics data taking or during special calibration data taking sessions. The DAQ shall trigger and acquire data at a fixed, configurable interval after the distribution of the commands, in order to capture the response of the detector to calibration stimuli.
2318	Requirement	SP DAQ Data record	Corresponding to every trigger, the DAQ shall form a data record to be transferred to offline together with the metadata necessary for validation and processing.
2319	Requirement	SP DAQ Data verification	The DAQ shall check integrity of data at every data transfer step. It shall only delete data from the local storage after confirmation that data have been correctly recorded to permanent storage.
2322	Requirement	SP DAQ deadtime	While taking data within the agreed conditions, the DAQ shall be able to trigger and acquire data without introducing any deadtime.

DAQ Specifications

2315	Specification	SP DAQ storage throughput	The DAQ shall be able to store selected data at an average throughput of 10 Gb/s, with temporary peak throughput of 100 Gb/s.
2316	Specification	SP DAQ readout window	The DAQ shall support storing triggered data of one or more APAs with a variable size readout window, from few microseconds (calibration) to 100 s (SNB), with a typical readout window for triggered interactions of 5.4 ms
2320	Specification	SP DAQ High-energy Trigger	The DAQ shall trigger and acquire data on visible energy deposition >100 MeV. Data acquisition may be limited to the area in which activity was detected.
2321	Specification	SP DAQ Low-energy Trigger	The DAQ shall trigger and acquire data on visible energy deposition > 10 MeV of single neutrino interactions. Those triggers will normally be fired using a pre-scaling factor, in order to limit the data volume.

SC specifications

2330	Specification	SP CISC Slow control alarm rate	The total number of alarms/day seen by operators need to be less than 150.
2331	Specification	SP CISC Total No. of variables	This is the total number of variables monitored by slow controls from all subsystems of the detector.
2332	Specification	SP CISC archiving rate	Slow control quantities will need to archived at a rate that ranges from 0.02 Hz to 1 per few minutes, depending on the slow controls quantity.

specs to drop

