

TOAD Status Update

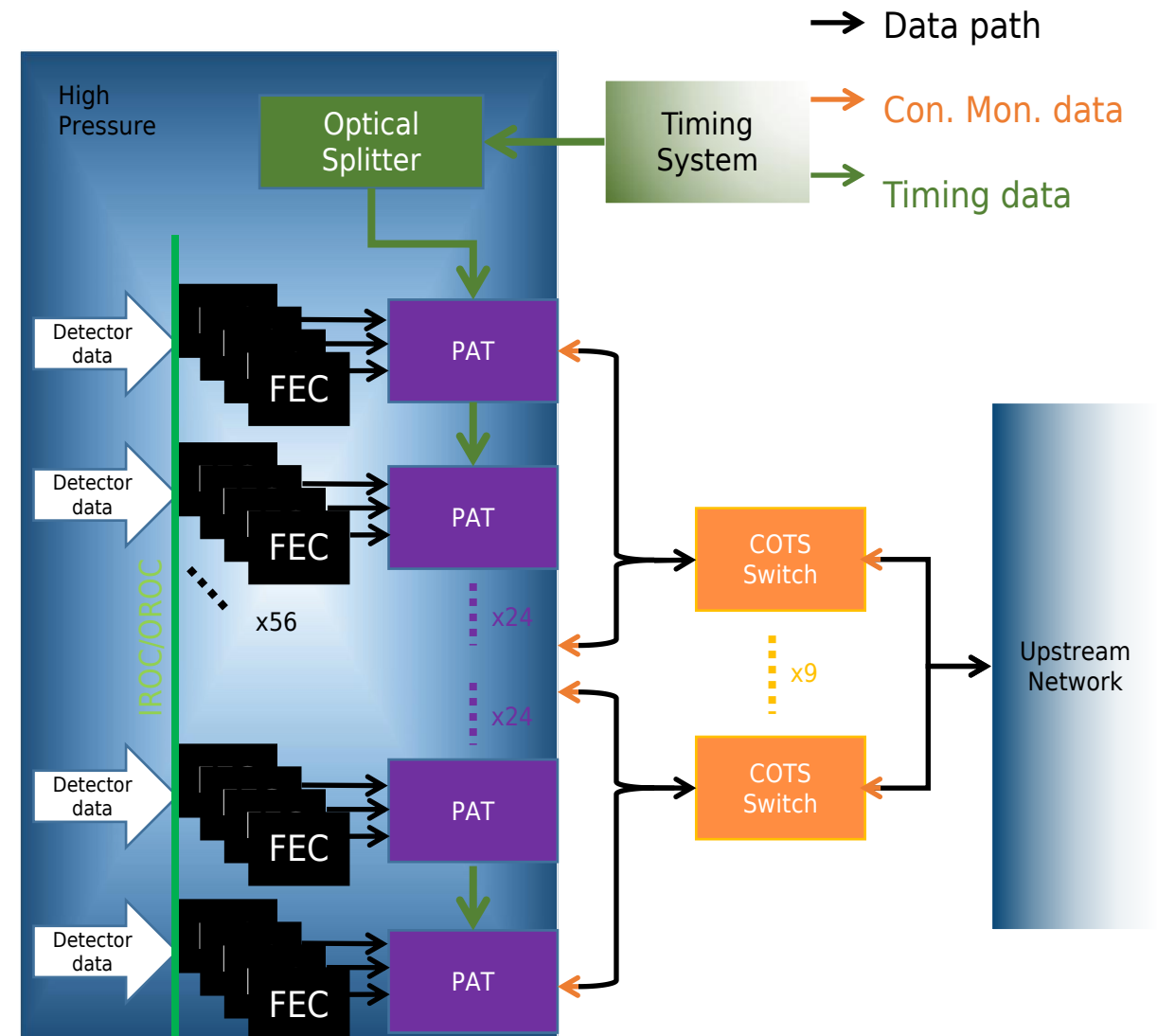
- I. Xiotidis on behalf of the TOAD group
- Meeting: ND-GAr
- Date: 26-April-2024

Since last update from TOAD

- TOAD finished operations end of the 2023 beam year at FNAL
 - Electronics and vessel have been successfully approved with FNAL standards (ORC)
 - Vessel was put in a safe state before summer beam break
 - All DAQ electronics have been returned in the UK
- For 22/23 TOAD was very much integrated with current DUNE developments
 - Utilises the Proto-DUNE timing system (provided by Bristol)
 - Readout integrated into DUNE-DAQ software (v3.2.0 - frozen)
- Various concerns/issues discovered with DAQ electronics triggered a DAQ board re-design
 - All FECs proved to be functional so no alternations
 - Extensive testing procedure at Imperial yielded to a re-structure of readout scheme
 - Second stage backend board (e.g. TIP card) has been removed from readout path making a simpler readout path to software

New TOAD readout - Reminder

- Two main advantages of current readout design allows for an easy solution
 - TIP and Aggregator layout is identical (same PCB)
 - TOAD vessel provides some extra un-used feedthroughs
- New readout is conceptually simpler
 - No TIP cards needed anymore
 - Aggregators (renamed as PAT) can absorb functionality and feed data directly to COTS switch
 - Requirement: 2x extra feedthroughs (timing, power)



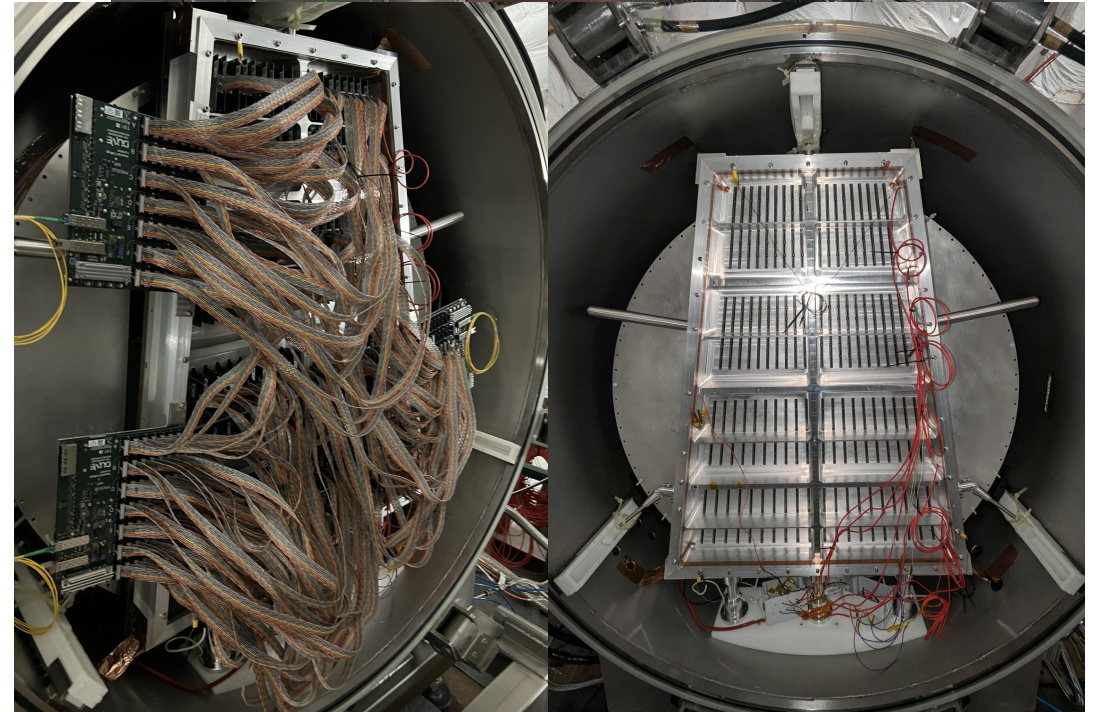
Targets for this years beam

- Post FNAL safety approvals process beam at FTBF is expected around early May (1-2 weeks from now)
 - We want to utilise as much as possible from the available beam!
- TOAD new electronics have been tested at Imperial by using the 22/23 experience
- Imperial group moved back to FTBF on 15th of April for setting up TOAD
- Important goal to maintain all commitments from 22/23 (e.g. DUNE-DAQ integration, etc.)



Current status

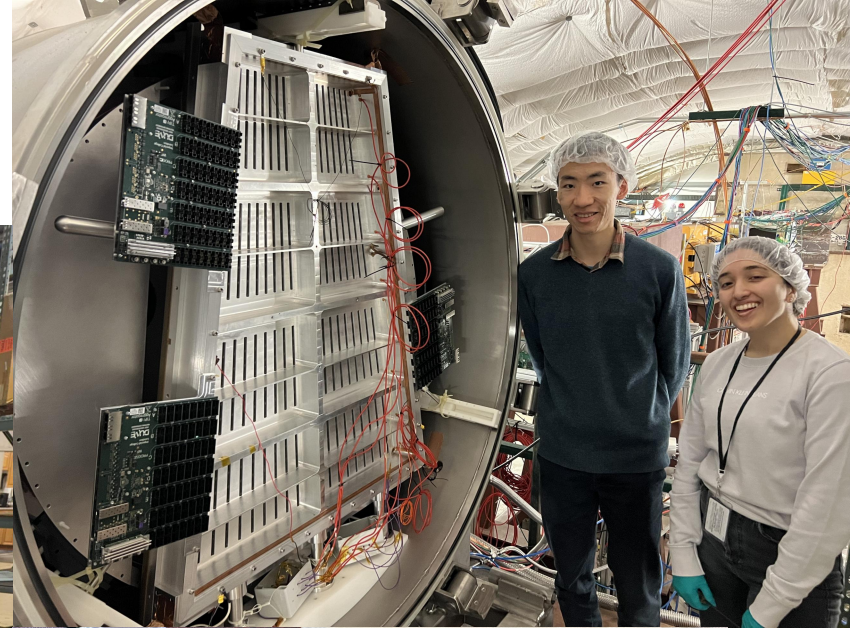
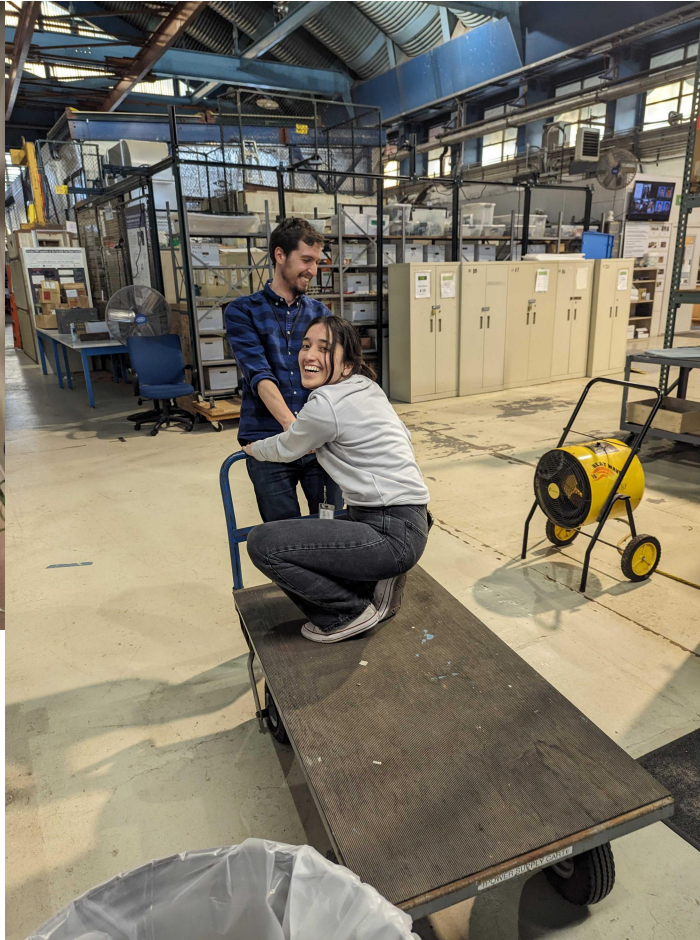
- Detector reconnected with all peripheral components
 - Gas cart for filling/venting to external gas bottles
 - Electrical components (e.g. manometer, remote valve control, etc.)
- Electronics rack powered up and fully connected
- Readout electronics re-installed in the detector
 - Awaiting for ORC re-approval for operation
- New readout scheme integrated with DUNE-DAQ
 - Discussions to get it into nddaq-v4.4.0 release
- TOAD slow control developments for DAQ electronics
 - Enhanced telemetry and variability on operational modes
 - Hoping to get this into DUNE-DAQ as well



Summary

- TOAD is being actively prepared for taking beam data
- Detector, electronics and gas cart are connected and largely tested
- Plan for upcoming weeks
 - Power up in-detector electronics, OROC and Cathode
 - Read noise from FECs to determine noise levels of readout chamber
 - Detector calibration with radiative source
 - Beam operations (when beam is available, noise is under control)
- Overall developments are continuing according to plan
 - Experience from 22/23 was very valuable
- Please please... get in touch for contributions as we would need shifters in the upcoming future
 - And because...

Test-beams are fun!!



* if everything works...