# DAQ planning

Bastian / Haik

# DAQ 2024

- I will be leaving GSI at the end of 2023, effectively end of November.

- How to deal with the situation?
- Planning for 2024 and the future.

# DAQ task force

- Purpose:
  - **Main priority on experiments in 2024, other developments on hold**
  - Appoint / approach people to take over critical tasks
  - Prioritize tasks so that preparations can continue with highest efficiency
- Core DAQ team:
  - **intermediate:** Philipp, Andrea, Manuel, Wei, Matt, (Martin)
- Software maintenance:
  - Hans, Håkan
  - via mailing list, first responders: core DAQ team
- Data quality:
  - Valerii

# DAQ Detector specific

- Appoint / approach people
  - **Spokespeople are searching for help**
  - FRS agreed to have Martin partially support us
  - Asking detector experts
- Current detector DAQ caretakers:
  - LOS/ROLU: Andrea -> TBA
  - Fiber: Deniz (+ Andrea)
  - S2: Audrey + Martin
  - MUSIC + MWPC: Audrey
  - TTT10: Matt, Wei (+ Audrey)
  - CALIFA: Philipp + Leyla + Lukas P.
  - ALPIDE: Luke
  - FOOT: Valerii
  - TOFD: Michael
  - NEULAND: Igor
- General On-site support:
  - **intermediate:** Philipp, Andrea, Manuel, Wei, Matt, (Martin)
- Analysis / unpacker side
  - Valerii

# DAQ system status

From https://wiki.r3b-nustar.de/experiments/S091/overview

- Main DAQ + triggers: OK, pending analysis
- S2: Not OK
- S8: needed?
- Bus DAQ (timestamped):
  - LOS: OK, pending analysis
  - ROLU: OK, pending analysis
  - Fibers: standalone OK, but not on bus yet, pending analysis
  - Tofd: standalone OK, but not on bus yet, pending analysis
  - Neuland: standalone OK, but not on bus yet, pending analysis
- MWPC/MUSIC: timestamped DAQ OK, pending analysis
- CALIFA: DAQ like 2022, not set up yet
- ALPIDE: timestamped DAQ runs, no sync check
- FOOT: timestamped DAQ OK, pending analysis
- RPC: timestamped DAQ OK, pending analysis
- TTT10: Copy of MUSIC DAQ, not fully tested

**Håkan thinks, this using the triggerbus is a bad idea.**

# Future planning

- Job offer for replacement (subject to full directorates' approval)

- DAQ operation by experienced core team
  (proposal: 1 position at GSI + 1 via collaboration funds, on-site)
  - overview & planning of complete experiment DAQ system
  - quick intervention capability
  - maintain / grow system knowledge
  - DAQ training and support for detector groups
  - system critical task

- Control system maintenance
  - looking for engineer / physicist with EPICS background, e.g. accelerator context
  - can be done off-site

# Ongoing work

- Since announcement two weeks ago
  - Controls / EPICS training with large audience / interest
  - Continuous DAQ training
  - intermediate team established
  - DAQ system status improving

**DAQ Systems**

| System/detector | Readout hardware | Assembly status | Time sync * | Random trigger at high/maximum rate * (rate taken) | Sync check values test (DAQ monitor) * | UCESB unpacker * | Online analysis R3BRoot * | Sync check values (by online) * | Slow control GUI/TUI + save values * | Responsible contact/reporter |
|---|---|---|---|---|---|---|---|---|---|---|
| Global clock/Timestamps/T0 | EXPLODER + NIM electronics | All electronics in place | n/a | n/a | n/a | n/a | | | n/a | Intermediate: Philipp, Andrea, Manuel (Martin) |
| Main DAQ + Triggers | RIO4 + VULOM | DAQ is running | working, 250 h (since Oct 9 2023) | 1 MHz (87 kHz taken), 250 h (since Oct 9 2023) | 1 h (since Oct 19 2023) | OK | x | x | x | Intermediate: Philipp, Andrea, Manuel (Martin) |
| S2 | MVLC + VETAR + VFTX-10ps or RIO4 + VULOM4/TRLOii + VFTX-10ps | Not possible before January, we need to send through the clean lines: trg1, trg3 (10Hz), clean Tref to VFTX. Synch to VFTX and S2 dead time back to Main DAQ at Cave C | x | x | x | existing | existing without synch check | x | x | Julien T. for detector side, Audrey C. (with the help of Martin) to set up the DAQ, Audrey C. to unpack the data. |
| S8 | RIO4 + VFTX (same as experiment 2022) | x | x | x | x | existing | existing | x | x | x |
| LOS | RIO4 + MCFD + VFTX + FQT + TAMEX (same as experiment 2022) | VFTX and TAMEX running with pulser | x | ?? (56 kHz taken) with all 8 channels pulsed for +48 hrs | x | existing, standalone tested +24 hours | running in port 8899 | x | x | Andrea J. ... (TBA) |
| Proton start | RIO4 + CFD PS + VFTX-7ps (3 spare channels in the bus DAQ) | Scintillator 1cm ordered. Need a mechanical structure to handle the plastic in front of the PMTs? | x | x | x | x | x | x | x | Julien T. for detector/PMT, for the DAQ, Audrey C. can help whoever is working on the busDAQ |
| Rolu | RIO4 + TAMEX + MCFD + Vulom (same as experiment 2022) | TAMEX read out with pulser input | x | ?? (55 kHz taken) with all 4 channels pulsed for +48 hrs | x | existing, standalone tested +24 hours | running in port 8899 (with LOS) | x | x | Andrea J. ... (TBA) |
| TwinMusic | RIO4 + MDPP-16 (same as experiment 2022) | DAQ is running in standalone mode, connected to the time sorter, get and read the timestamp. Detector biased and flushing, not in the beam line (attention, it lies on the floor) | working, 4x7 hs, 1 h (since Oct 19 2023) | 350 kHz (25 kHz taken), 1 h (since Oct 19 2023) | ~100% good, 1 h (since Oct 19 2023) | existing | existing | x | Twin-MUSIC biased through WhatsUp/SOFIA/MPOD | Julien T. (detector, PA) Audrey C. (DAQ setup+unpacker) |
| Califa (2 PC version) | FEBEX (with 2 x Pexaria) | Assembled electronics were used before | x | ?? (50 kHz taken) | to be added to haecksler | existing + standalone | existing | to be added | x | Roman, Philipp, Leyla, Lukas |
| Califa (4 PC upgrade) | FEBEX (with 4 x Pexaria) | All electronics in house, setup due date 30.09.23 | x | TBD | to be added to haecksler | needs adding | needs adding more channels | to be added | x | Roman, Philipp, Leyla, Lukas |
| ALPIDE | MOSAIC | FPC not assembled | x | 40kHz random pulser 24us dt and 100hz offspill ran stable for 3 days with FPC(4 sensors) | x | existing | x | x | x | Oleg and Luke R. |
| FOOT | FOOT-ADC board + DE10 + Arduino (same as experiment 2022) | All 8 x de10nano are ready and running with common DAQ | Working, 5x10 hs, (since Oct 20 2023) | 30 kHz from common DAQ (<2 kHz taken due to deadtime) running stable since 30 Oct | ~100% good on krpc003 (~18% in main TO due to deadtime at 30 kHz trigger) | existing | running on lxir136:8886 | implemented, PR submitted | x | Valerii, Martin |
| MWPCs | RIO4 + VMMR-8 (same as experiment 2022) | DAQ is running when MMR64 are powered. MWPC2 mounted at the entrance of cave C. <color white/red>MWPC1 at Onsay should be shipped back. MWPC0 in its box at GSI. Holder structure is missing for MWPC1 and MWPC0. New gas bottles should be ordered. | x | x | x | existing | existing | x | x | detector and mapping ? Audrey C. (setup the DAQ) |
| TTT10 | RIO4 + MDPP-32 + VULOM4 | Detector test ongoing at York | x | x | x | starting | starting | x | x | Matt, Wei (+ Audrey) |
| Fibers | PADI + KILOM2, (same as experiment 2022) | DAQ configured and tested with KILOM pulser for rate | x | x | x | existing | existing | x | x | Deniz (+ Andrea) |
| TofD | TAMEX + FQT (same as experiment 2022) | All electronics in place | x | ?? (46 kHz taken) with 2 channels for each plane and 24 h so far | x | existing | existing | x | x | Michael |
| Neuland | TAMEX + FQT (same as experiment 2022) | 13 dp's (2600 ch ) in place | x | x | x | existing | existing | x | x | Igor/Konstanze ? |
| RPC | TRB (same as experiment 2022) | All electronics in place | working, 9x7 hs, (since Oct 20 2023) | 30 kHz from common DAQ running "stable" since 20 Oct | ~100% good, investigating spurious events(since Oct 20 2023) | existing and tested using S522 unpacker | existing and tested using S522 unpacker | implemented, PR submitted | existing | Daniel G./ Manuel |

# Ongoing work

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**Until Dec 1 (DAQ system freeze)**
**Concentrate effort on remaining red/orange/yellow spots**
**Document all changes (ELOG/git)**

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