Control software status & tests

NectarCam progress meeting, April 2021

Patrick Sizun

CDMR & control software

- CDMR underlined the non-readiness of the camera control software and software documentation

- Panel recommendations:
  - *Improve software design documentation (#42340)*
  - *Demonstrate negligible technical risk in proceeding with hardware procurement before the development of the control software* (#42335)
  - *Deliver a Software Development Plan, a Software Maintenance Plan, Software level-C Requirement Specification, and Software Verification and Validation Plans* (#42451).

- Need more developers
  - Open position at Irfu
  - Contributions from other labs?

Control architecture
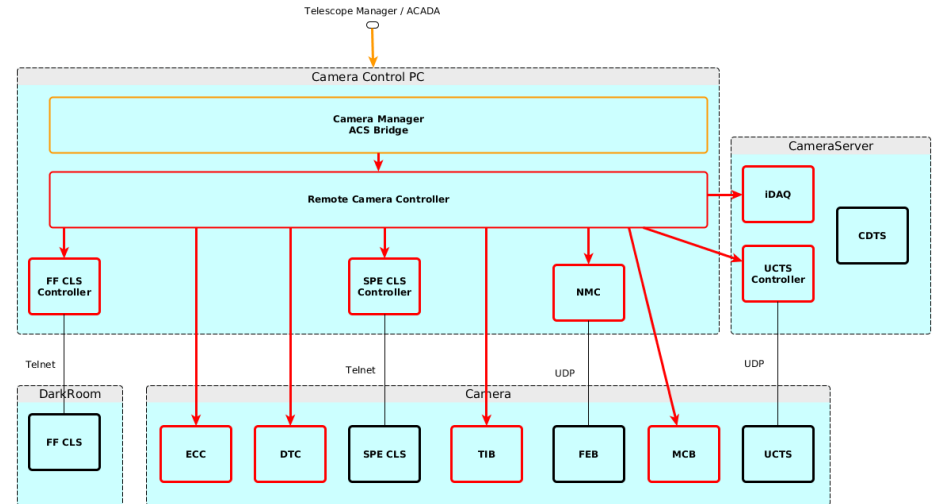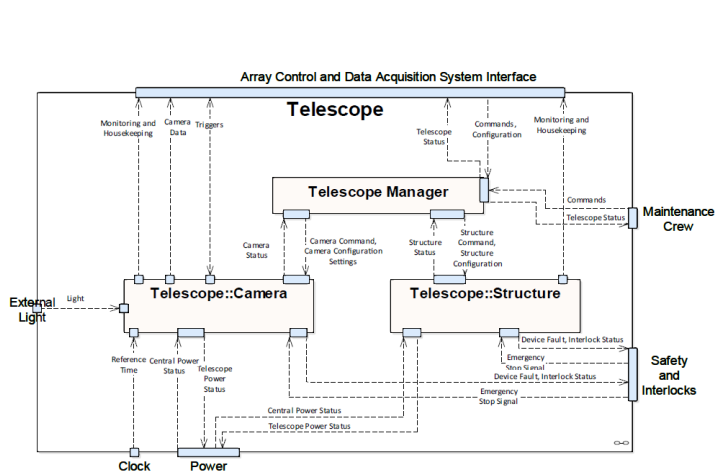
- Remote Camera Controller to be interfaced
  with both Telescope Manager and camera device controllers
- Separation between ACS and OPC UA environments not fully decided.

Software external ICDs

- **ACADA**
  - **Telescope Control ICD & state machine**
  - **Monitoring ICD**
  - **Logging ICD**
    - Open for comments. Focused on ACS.
  - R1/Event Data Model
  - Telescope Camera Event and Trigger Data ICD
    - Under discussion, meeting on April 15th
  - No configuration ICD

- **No MST structure/camera software ICD**
  - Still no allocation of MST IP adresses

Camera state machine

- LST change request:
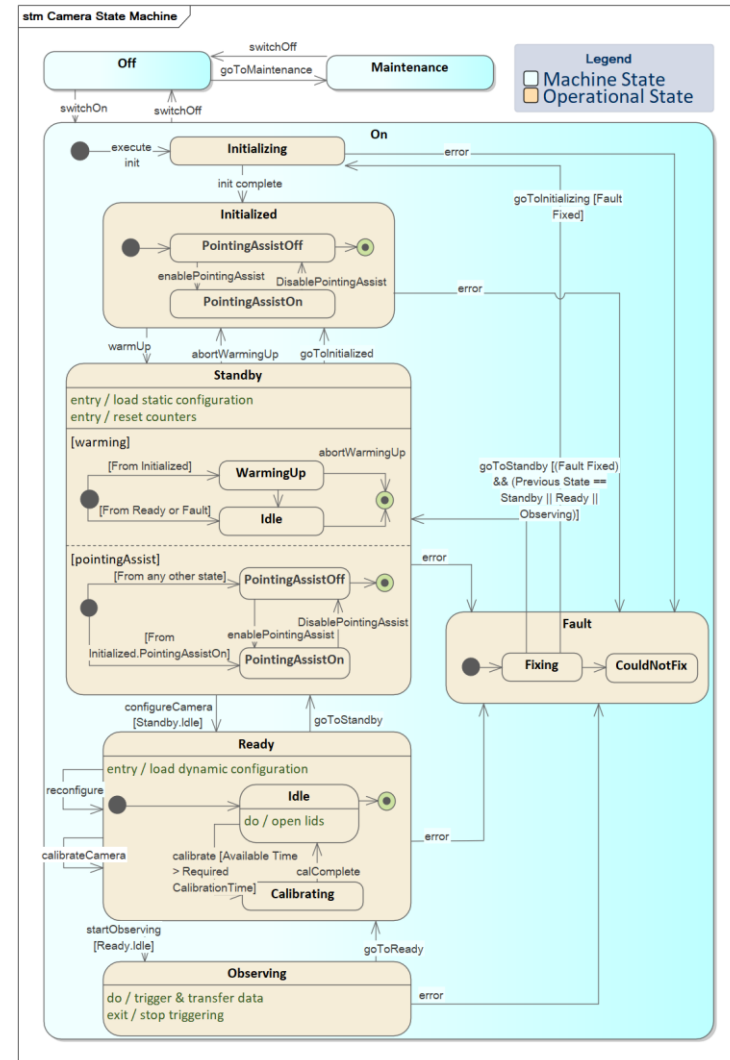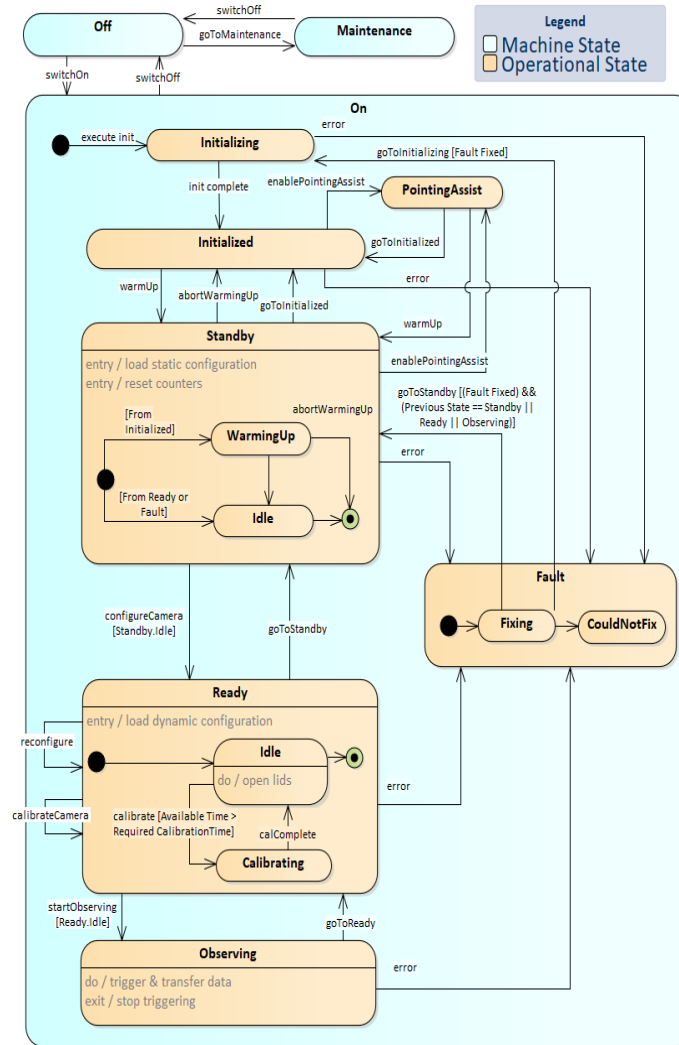
Monitoring

- Multiple possible architectures
  - Directly through OPC UA or through ACS bridge
  - Via RCC or not
- Difficulties
  - Behaviour when device is off
    - Should not prevent from starting ACS components
    - Expected return values/errors?
  - Limitation to 1000 datapoints per camera
    - Need to group module- and pixel-wise properties
    - Handling of missing modules (NMC)
- ACS bridge generation
  - In contact with LAPP, bridge for ECC under test
  - Need to revisit some ICDs

Missing first trigger

- **Issue**
  - the first L1A trigger of the « first run » is not seen by the modules
  - results in event numbering offset between modules and UCTS/TIB during whole run
- **History**
  - An old issue: once suspected backplanes, DTB firmware installed before Adlershof tests was a fix attempt
  - Still not clear where along the trigger chain the L1A signal is lost
  - Powering the TIB off and on is enough to cause the issue in the next run
- **Next steps**
  - Live with it?
  - Any possible measurements at the TIB or L2CB level?
  - L1A counters still not accessible in FEB and DTB (or L2CB)

Software integration & tests

- Switched test bench to new server
  - Issue with control of Lauda chiller
- Optimized speed of Nectar DACL adjustment
- Tested TIB optical threshold with FFCLS
- Prepared MCB emulator and MCB client
- Tested control of FPM with IB firmware v3, star transit mode
- Installed OPC UA interface for DTC
  - Smooth transition, but not tested all functionalities yet (L1 delay)
  - Behaviour in border cases to be discussed (crate not populated with all CTDB boards, CTDB board with unused channels)
- Made some small ACS (bridge) tests
- Tested FPMs before and after bright illumination
- Tested slow control switch new low T° SFP+ receiver
- Tested FEB v6 prototype boards
  - Ping-pong mode (new FEB firmwares); keep synchro info in iDAQ?
  - Common clock (new DTB, CTDB and L2CB firmwares)

Next « software » integration steps

- Install new PDB
    - Set IP address
- Install new ECC
    - Switch to ECC software 5.0 (set IP, review settings)
- Install new FPMs
    - Final switch to IB firmware 3
- Install all modules
    - Test of NMC with 265 modules
    - Upgrade firmware of all DTB, CTDB, L2CB boards
    - Test of iDAQ and switches with 265 modules
- Install XY table
    - Switch from MCB emulator to actual MCB
- Control the new camera cooling unit
- Monitor dark room temperature and additional camera temperatures (temperature mapping of the front window compartment)
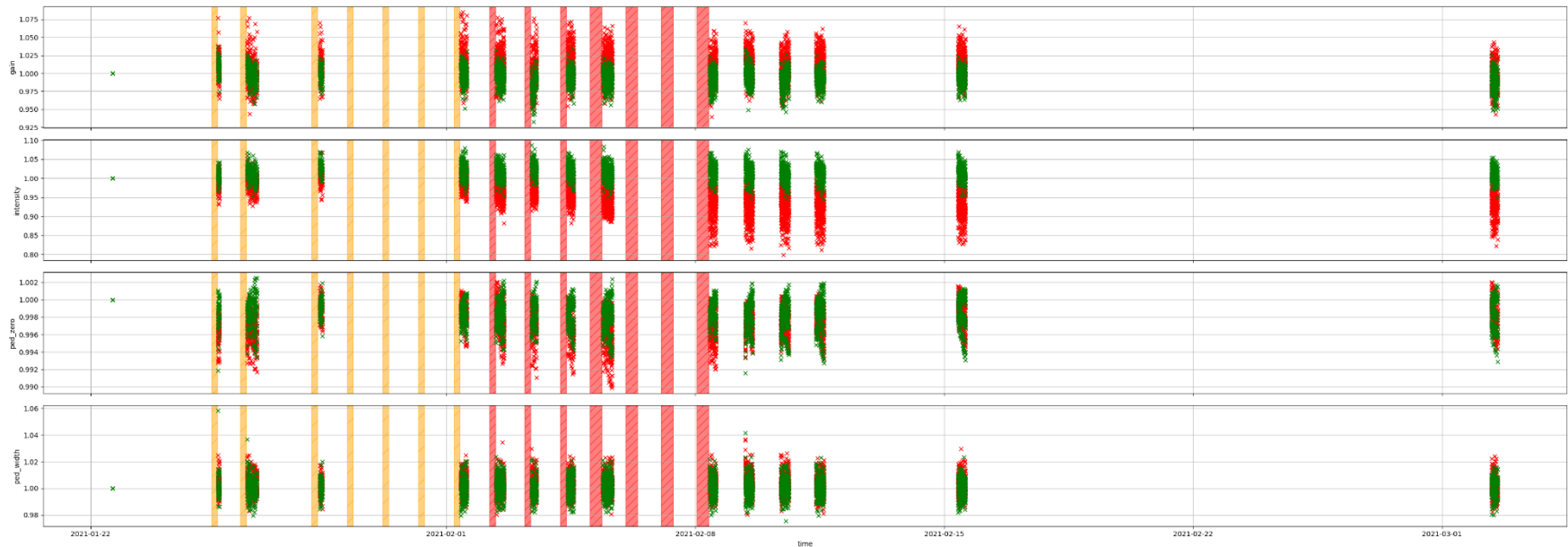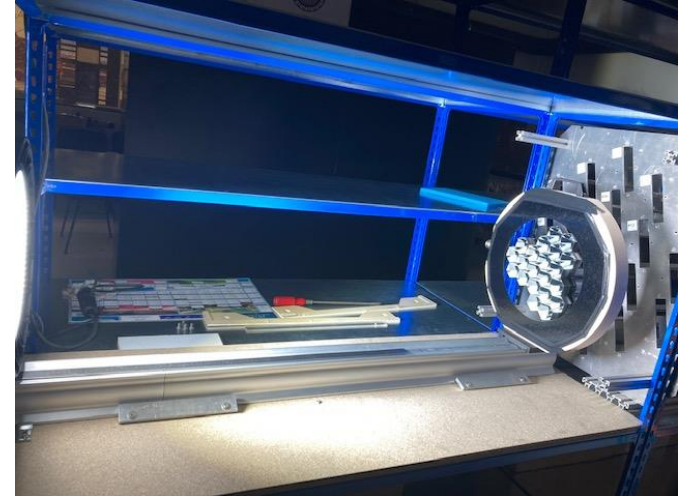- Control, monitor the future laser light source

Extra slides
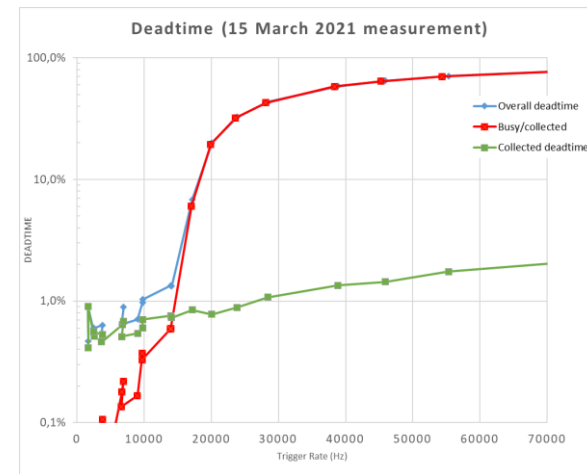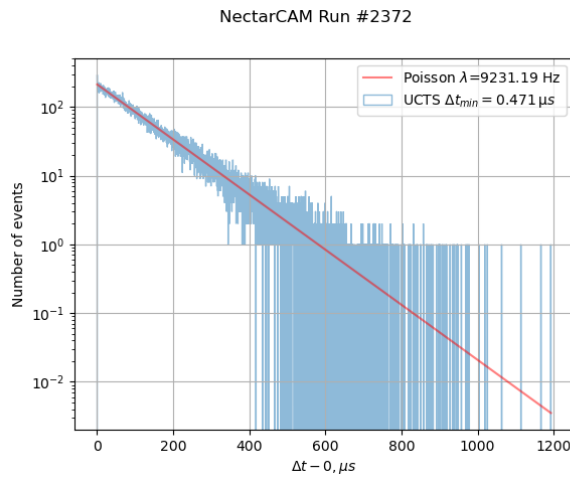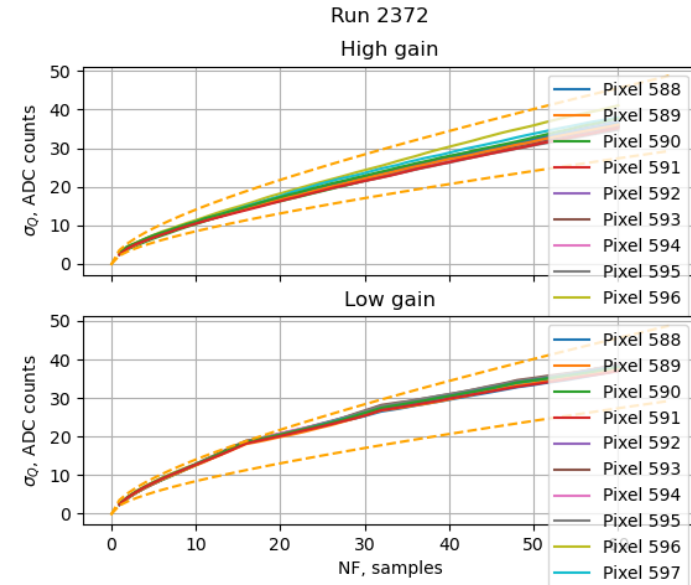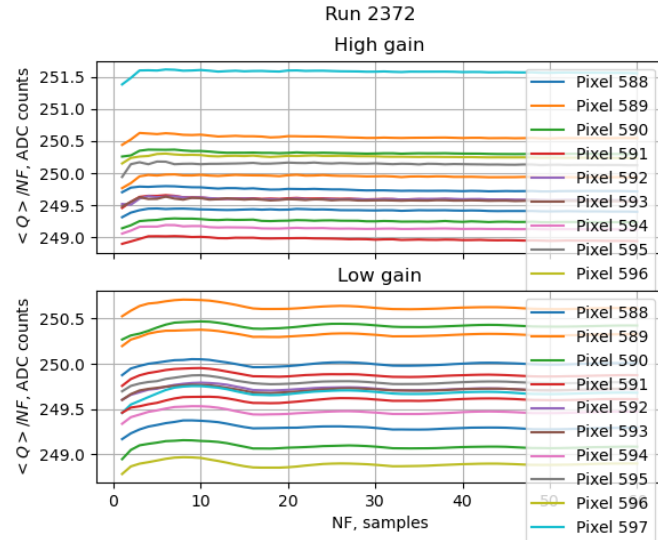
Link reminders

- [Data logbook](#)

- Computing
  - [Gitlab](#) , [svn](#)
  - [Mailing list](#)
  - [Developer seminars](#)

FPM illumination tests

- Illuminated 3 power-off modules at increasing intensities and durations
- Took pedestal, flat-field and SPE data after each exposure
- Compared with 2 reference modules

Tests of FEB v6

■ Dead time depends on FEB busy delay, which should not be too low

Test of IB firmware v3