cherenkov telescope array

NectarCAM

WP Monitoring & Services

NectarCAM F2F Meeting, 10-12 October 2022

WP Monitoring & Services: Agenda

- Power Supply Box (PSB)
- Power Distribution Box (PDB)

Fred Louis (IRFU)

- Embedded Camera Controller (ECC)

Julie Prast (LAPP)

- Progress status
- Production
- CDMR RIX status

cherenkov telescope array

NectarCAM

EMBEDDED CAMERA CONTROLLER

NectarCAM F2F, 10-12 October 2022

Julie Prast for the LAPP team

ECC Status

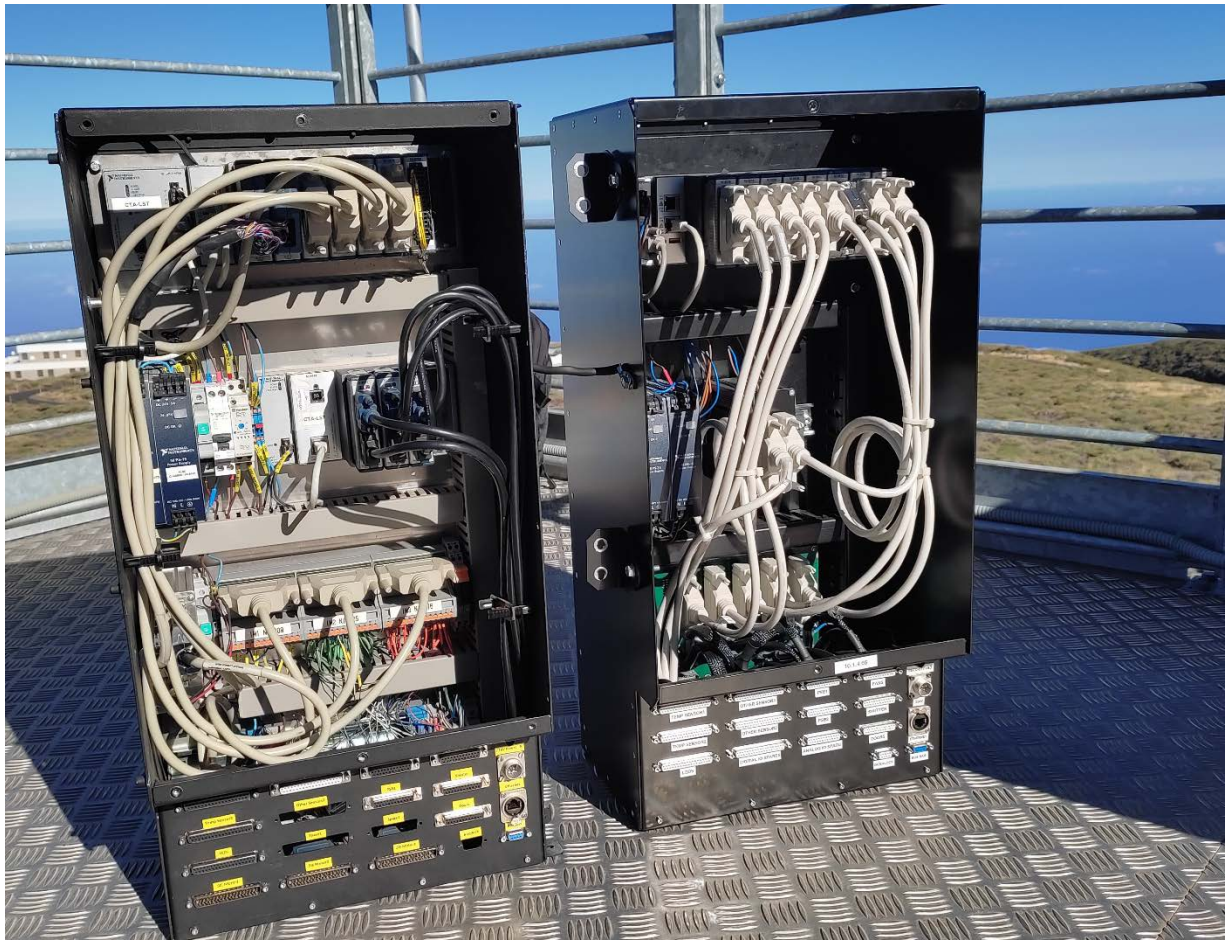
- Common component between NectarCAM and LSTCAM
  - Same hardware
  - Same software with dedicated camera configuration

- Status
  - LST2-4 cabinets + LST engineering model cabinet were delivered in 2021
  - LSTCAM1 ECC has been upgraded in September 2022
  - Old LSTCAM1 ECC will be upgraded to become the LST spare
  - NectarCAM Adlershöf cabinet has been upgraded early 2022
    - Includes new NectarCAM mechanics with mounting on rails to ease cabinet replacement
    - Currently used in NectarCAM1
  - One additional NectarCAM cabinet includes the same electronic, same software, but first version of mechanics
    - Used for the NectarCAM testbench (Tower 66)

- All these 8 ECC have the same electronics and the same software
  - The white target control has been removed (IJClab responsibility in NectarCAM)
  - Any software upgrade (bug correction…) on one side is immediately reverberated on the other camera

Production Hardware

- Optimization of the ECC cabinet for manufacturing
- Development of an Interface Board to replace most of the internal cables
- White Target control removed



Old LST1 (left) versus new LST1 ECC (right) on the LST access tower

NectarCAM Production

- 9 cabinets have to be produced (NectarCAM 2-9 +1 spare)
- A call for tender has been issued in July
  - 5 + 4 cabinets
  - 4 companies made an offer. Comparison is to be done

- The call for tender includes
  - Mechanical cabinet manufacturing (based on Oscar Ferreira's drawings)
  - Purchase of small components and cables
  - Cabinet cabling
  - First level tests

- The call for tender does not include
  - The National Instrument components purchase (long delivery time, ordered in advance)
  - The functional verification
  - The manufacturing of electronics boards (LEDs and Interface Board) which were already produced

Interface Board

LED Controller

NectarCAM Production (2)

- Price is in the order of amount of what was expected
  - NI components ordered for 5 ECC in December 2021
  - NI components ordered for 4 ECC in July 2022: ~ + 50% compared to December 2021 !
- Delay is in the order of 6 months to receive the 5 first units
  - The longest is the manufacturing of the mechanical crate
  - NI components for the 9 units are available
  - Delay for the 4 additional cabinets is ~5 months
- The production can start as soon as the company is selected

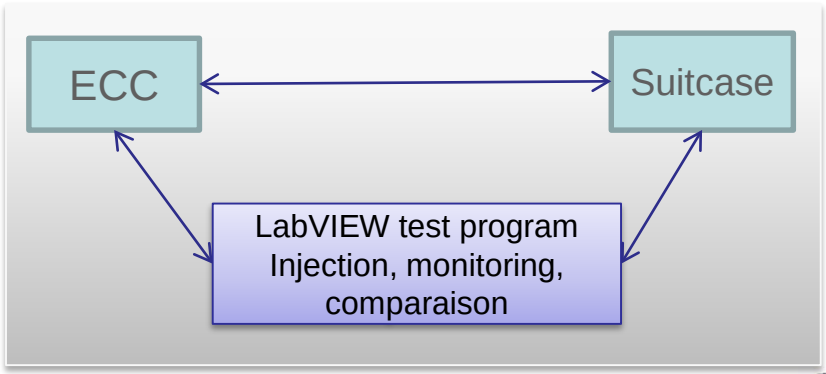
ECC Test and Quality Control

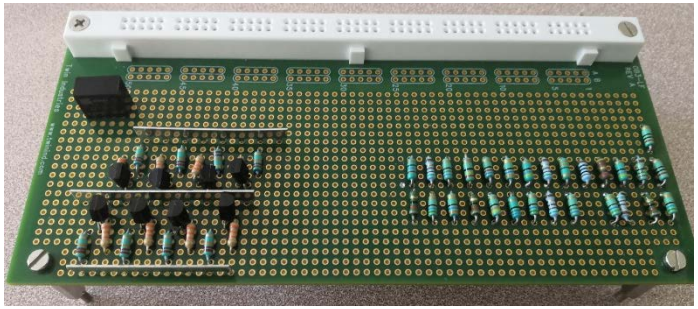
- ECC test procedures have been written
  - MST-CAM-TP-0421-LAPP_ECC_Test_Plan
- ECC test result sheet templates are available
  - LMST-CAM-TR-0422-LAPP_ECC_OPCUA_Method_Test Results_Template
  - LMST-CAM-TR-0423-LAPP_ECC Test Results_Template
- NectarCAM1 production cabinet was delivered with the associated Acceptance Delivery Package thanks to our local quality engineer (she has left since)

- Production test is foreseen with the current testbench equipped with camera sensors & actuators
- If it is ready on time a dedicated testbench will be used
  - It is based on a compact RIO and dedicated I/O modules to simulate camera sensors/actuators
  - Emulated from OPCUA interfaces
  - Errors can be generated
  - Transportable on site thanks to a plane cabin suitcase format

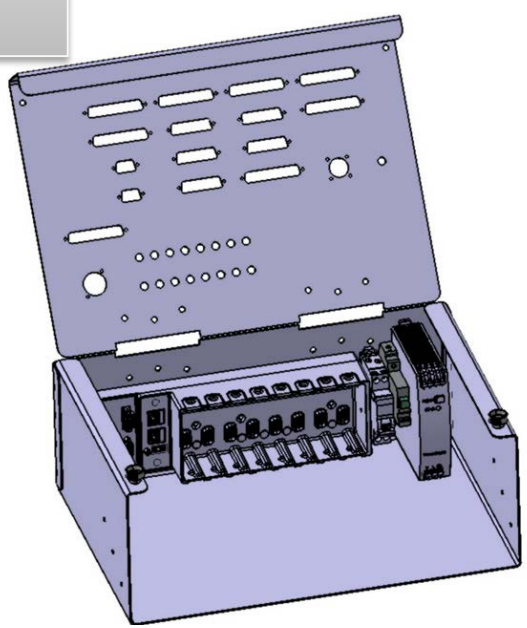
Transportable Testbench

- Hardware developed by the student Maxime Boute in S1 2022
- Software development ongoing (Nadia)





Simulation of PT100 + 5V Fan tachymeters



Monitoring & Control WP RIX Status

- 39 Monitoring & Control RIXes were issued
  - Includes ECC, PSB and PDB matters
  - 36 normal priority + 3 low priority
  - 35 are closed
  - 4 are not closed but assigned to CTAO (2 NW, 1 OS, 1GP)

- Zero non-closed RIX are still assigned to NectarCAM

Questions ?

Finalization of Production Software

- Completely new version of code
  - Based on current validated ECC features
  - New architecture, more compact and better structured
  - Integrates most of the various review recommendations (CTA, LST, NectarCAM, IN2P3, …)
  - Based on LabVIEW 2018

- Additional features:
  - State machine transitions improved
  - Alarm handling & identification improved
  - Additional monitoring info (ongoing methods, CPU load, ECC versions, debug…)
  - Additional parameters accessible in the configuration file
  - Updated chiller & shutter interfaces
  - Additional sensor & actuator interfaces

- Feb 2020: First release installed at IRFU
- Feb 2021 : release of ECC Software V5.0