NectarCAM

Mechanical System WP

PC Meeting - 2017/11/30

Deliverables to AIV

- **Deliverables to Camera Integration Group**
  - Camera Mechanical Structure - Fully Assembled, including
    - Camera Tubular Structure
    - Camera Mounting Pads (interface with telescope)
    - Cooling System Mechanical Structure
    - Side Panels (camera housing)
    - Rear Doors
    - Main Cable Tray System (DAQ and DT)
    - Features for mechanical assembly of main camera sub-systems
  - Camera Window
    - Acrylic Dome, Camera Shutter, associated mechanical structure
  - Associated Data Package
  - Assembly procedures for the mechanical integration of the main camera sub-systems

  - *Assembly to the extend of currently designed/chosen components*
  - *Different approach from LST requested to minimize manpower and assembly work at Integration Facility*

Other Deliverables

- **Mechanical Parts for Camera Module Assemblies**
  - FEB Aluminum Frames to LPNHE
  - Other Mechanical Parts of camera modules to IRAP
  - Associated ADP and assembly procedures

- **Camera Rear Equipment**
  - ECC Mechanical Box to LAPP
  - PSBs and PDBs Mechanical Boxes to IFAE
  - Rear cooling Boxes to AIV
    - *Mounting features will have to be adapted to QM Tubular Structure, for the rest, same design as the one prepared for LST, unless there are change requests – soon*
  - DAQ System mechanical structure to AIV
    - Design will start once decision is made on the type and configuration of the Switches
    - AIV will add the features required to mount the system to the Camera Structure

Remaining Tasks for AIV

- **Mechanical assembly of the Module Holder inside the Camera structure**
- **Integration of the Fans and Heat Exchangers inside the cooling system mechanical structure**
- **Integration of the Heat Exchangers inside the rear cooling boxes**
- **Tubing work to connect the Heat Exchangers to cooling fluid inlet and outlet**
- **Mechanical Integration of Main camera sub-systems**
  - PDB / PSBs / ECC Boxes
  - Digital Trigger Crate
  - DAQ System Support structure (mounting features to be added)
- **Installation of cables trays other than main system and cable clamps as needed (mounting features to be added)**
- **Installation of camera sensors with mechanical support when needed**
- **Sealing of the Camera Front with the Camera Window**
- **…**

AMC Target / Calibration System

- **Design by IPNO**
- **Agreement between IPNO and AIV to manage the mechanical integration**

Camera Window

- **Existing design available from LST**
  - Same dimensions of mechanical structure
  - Same acrylic dome
  - Same positioning LEDs
  - Compatible size shutter controlled by common ECC

- **Could be simply reproduced for Nectar QM**
  - In house fabrication for LST which still means significant amount of work to sub-contract the fabrication (drawings, specifications and procedures, contract paperwork…)

Camera Window

- **Design is not compatible with opening the Window while the camera is attached to the MST**
- **If it is a requirement, a new design will be prepared for Nectar QM by Mech. WP**
  - Additional amount of work when already understaffed
  - Delay in the completion of the camera design
  - Limited benefit from the “Common” camera design
- **Problem of safely accessing the modules to replace them when the camera is in park position still have to be addressed**

Schedule

- **No schedule available yet for the mechanical WP**
  - Situation is more clear now in terms of deliverables which should make it possible to start preparing a planning

- **Action to submit a mechanical WP planning to PC in January 2018**

- **Project milestones**
  - Camera at DESY in September 2018 is not achievable
  - Camera ready for on site integration in 2019 should be OK

General Remark

- **Nectar QM is a qualification model aiming to validate the design before going to production**
- **Except for some cosmetic updates, there is no plan to modify the mechanical design of the camera between the QM and the first NectarCAM**
- **Of course, issues will have to be addressed if any have been encountered during the fabrication and integration of the QM.**