

A Large Ion Collider Experiment



Muon Forward Tracker

Planning for commissioning completion

Stefano Matthias PANEBIANCO

Technical Coordination meeting, July 3rd 2020

MFT

Qualification achieved so far

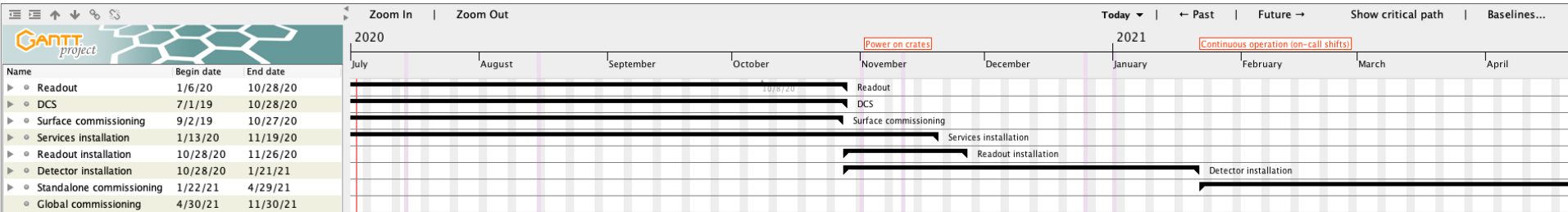
- Power up each individual zone (without PSU) to check for possible shorts or connection issues
- Power up each disk (without PSU) to check for induced voltage drop on adjacent zones
- PRBS test with activity on each chip, ladder by ladder: identification of faulty chips (some disk replacement needed) and determination of PLL margins as a function of the supply voltage (and datalink connection quality!)
- Optimization of Driver and Pre-emphasis PLL parameters per single ladder
- Modification of output voltage for several DCDC before PSU installation in order to increase the PLL margins
- Installation of PSU and reassessment of PLL margins with power from PSU (only on H1), presently Driver=4, Pre-emphasis=10 (comfortable margin available)
- Configuration of chip and RU via ALF-FRED (up to WinCC) from DCS-DB, write/read configuration parameter, pixel masking (single chip and/or common broadcast)
- Readout up to 100 kHz with LTU and STFB data decoding (with minimal QC, old RDH and only up to FLP). Very stable up to 20 kHz (serious encoding/decoding issues higher than 50 kHz, probably FW related)

Disclaimer: all possible tests are limited in duration because of absence of disk and (most important) of RU nominal cooling

What is needed to complete the commissioning

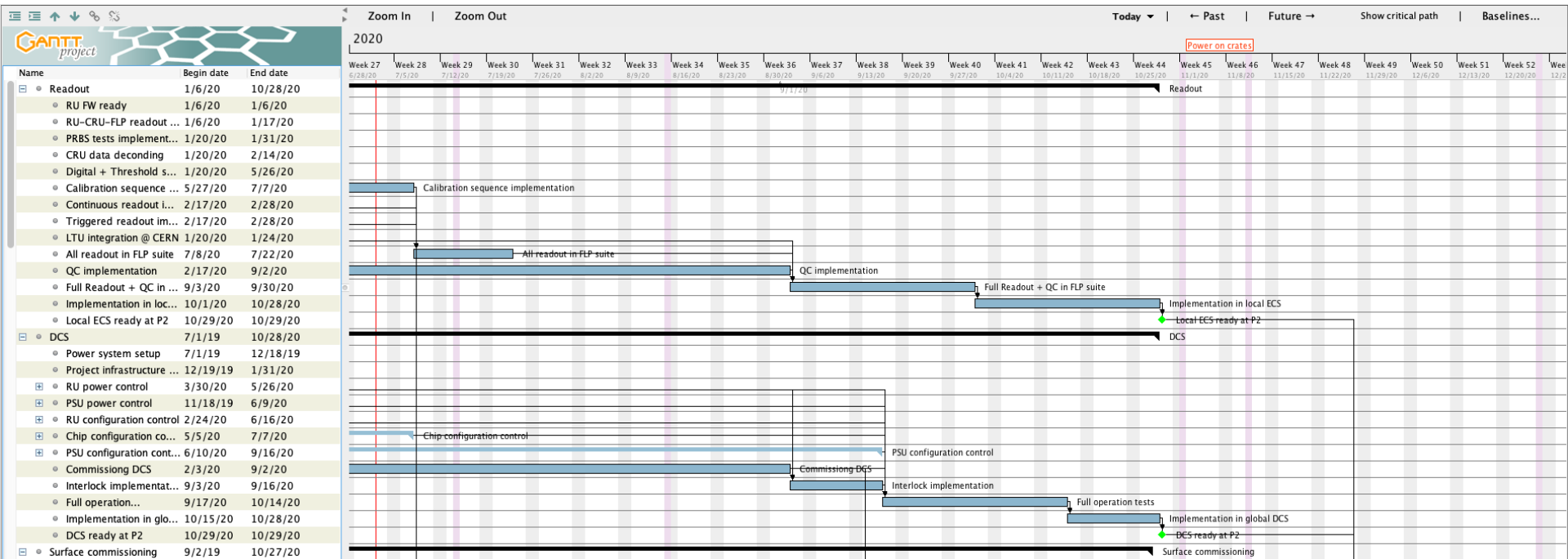
- Few items to be produced, installed and tested
 - PSU Interface
 - New version of PP2
 - Final fixation of filter boards and patch panel closure
 - Handling/transport tool
- Replace disks D0 and D2 on H1 (i.e. top)
- Reassessment of PLL margins with power from PSU on H0 (stopped at confinement)
- Cooling test of all disks after last replacement (check for eventual leaks and chip temperature)
- Test and qualification of calibration sequence
 - Digital scan
 - Threshold scan
 - Noise occupancy (with and without pixel masking)
- “Endurance” test (only half detector at once and limited in duration because of absence of nominal cooling)
 - Sequence of calibrations and data readout (check hot/dead pixel matrix stability)
 - Readout at variable rate (up to 1MHz pp nominal): surely in PRBS mode to stress the system but also in continuous and triggered mode (noise scan)
 - Power on/off the system (with latch-up detection) and readout with final elements up to FLP (PSUI, whole ECS workflow readout from FLP suite, preferably with minimal QC)
- Endurance tests should be performed with upgraded RU FW

Global planning



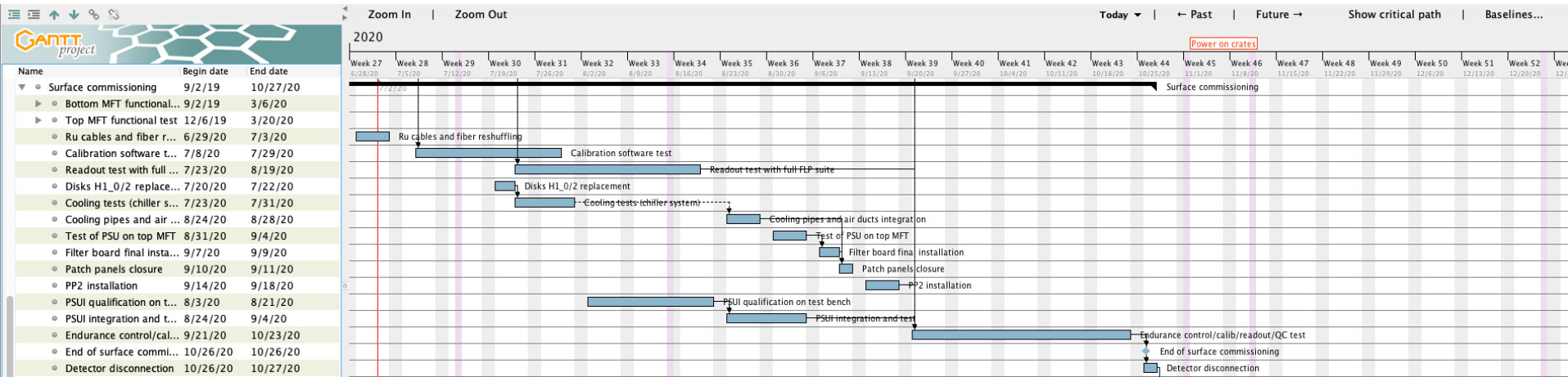
- Actual key dates according to ALICE planning v41:
 - End of surface commissioning: 26/10/2020
 - Detector disconnection and transport to bldg. 167: 26-29/10/2020
 - ITS/MFT insertion tests: 30/10/2020-10/11/2020
 - Transport to P2: 27-29/11/2020
 - MFT installation: 30/11/2020-22/01/2021
 - Standalone commissioning: 22/01/2021-end of April 2021
 - Global commissioning: from beginning of May 2021
- Implications:
 - 5 months to complete the surface commissioning and have full confidence in the detector operation
 - 2 weeks (+2 weeks) for insertion tests and, in the mean time, service preparation at P2
 - 8 weeks for detector installation and functional test before ITS integration
 - 3 months of standalone commissioning (in particular for EPN integration)

Software activities



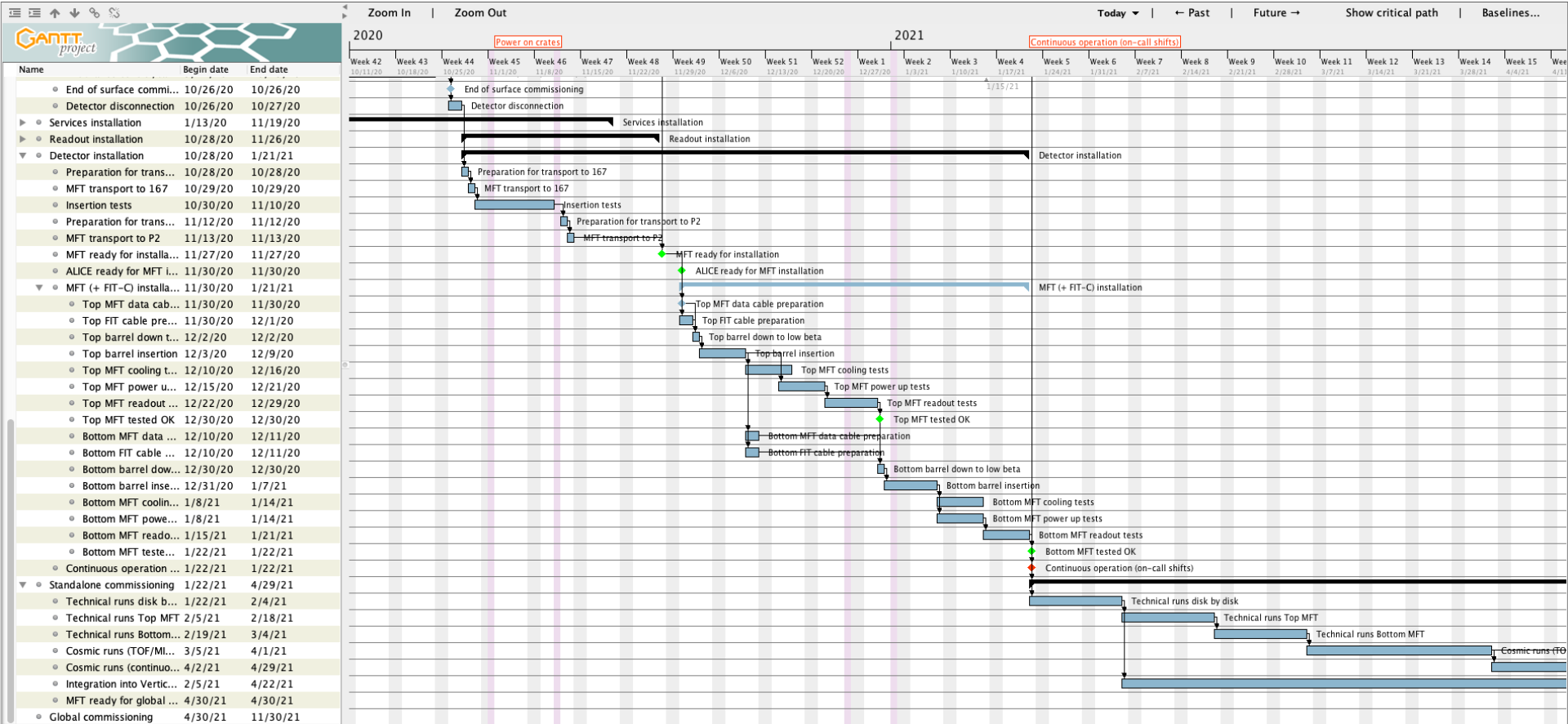
- All these developments are iteratively validated on test benches and on the detector
- To be finalized before starting endurance operation (W39) in bldg. 581:
 - Upgrade of RU firmware (ITS release expected soon)
 - Calibration and QC ported to FLP suite (from homemade scripts)
 - PSU configuration and operation through PSUI-CRU-FPL (presently VLDB instead of PSUI)
- To be finalized before moving the detector to P2:
 - Implementation and test of dedicated FLP suite in local ECS at P2 (no EPN)
 - Implementation of DCS project in central DCS at P2

Surface commissioning activities



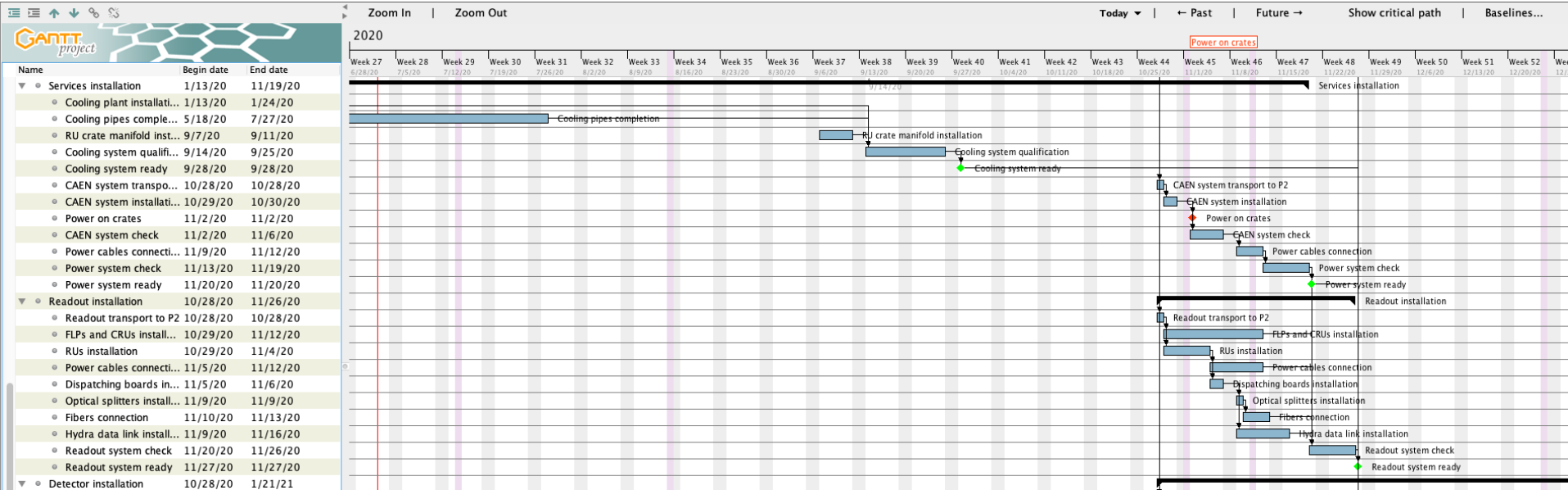
- All these activities are mandatory before disconnecting the detector
- Last elements in production (nothing on the critical path for the moment, all other materials and products are in hand)
 - PSU Interface (PSUI): delivery confirmed W31, qualification at Subatech until W34, at CERN on W35
 - Handling/transport tool: delivery expected on W38 (tbc)
 - PP2: test on mockup required small modification, production expected on W36
- Cooling tests can be easily scheduled at the best convenience in August
- Patch panel closure (W37?) requires the presence of FIT team (delicate operation because of fibers)
- Endurance test: operate the detector at nominal rate with DCS, readout and QC through “official” software for the longest possible time (> 2 (top) + 2 (bottom) weeks). Long term stability limited by the absence of detector and (most important) RU cooling
- One full day during endurance test must be scheduled for survey (contact with EN-SMM)

Installation activities



- Insertion tests: at least 3 days for disconnection and transport preparation, transport process to be defined with EP-AGS, expected 10 working days (2 weeks contingency)
- We need to have several systems fully ready and qualified at P2 before moving in order to keep the installation schedule (in particular for cooling, never experienced in the lab)

Service installation activities



- Systems to be ready before moving the detector to P2 (during insertion tests)
 - Cooling system: piping will be ok, RU crate cooling manifolds will be delivered by W36 and can be installed anytime in September. Need of EN-CV assistance (no DCS will be available), to be discussed and scheduled
 - Power system: cabling ok (but connectors to be mounted on gauge adaptation cables), the 3 weeks can be reduced if we achieve to install half of the power system in September
 - DCS: minimal system to power up the detector PSU and RU
 - O2: FLP suite (ideally controlled from ECS) to perform at least pulsing and PRBS tests. No connection to EPN
- No problem of manpower in principle (not the same people involved in insertion tests) but large access to absorber, PP0, cooling plant, A15 and I24 area will be needed
- One day for survey must be scheduled before ITS insertion