TDR Readiness for Far-Forward

- The lab/testbeam/prototyping needed;
- The further progress needed for the reconstruction software;
- The verification of the implementation of the detector and detector response in simulation and validation using information from lab/ testbeam exercises or from literature;
- The studies required to demonstrate the detector performance;
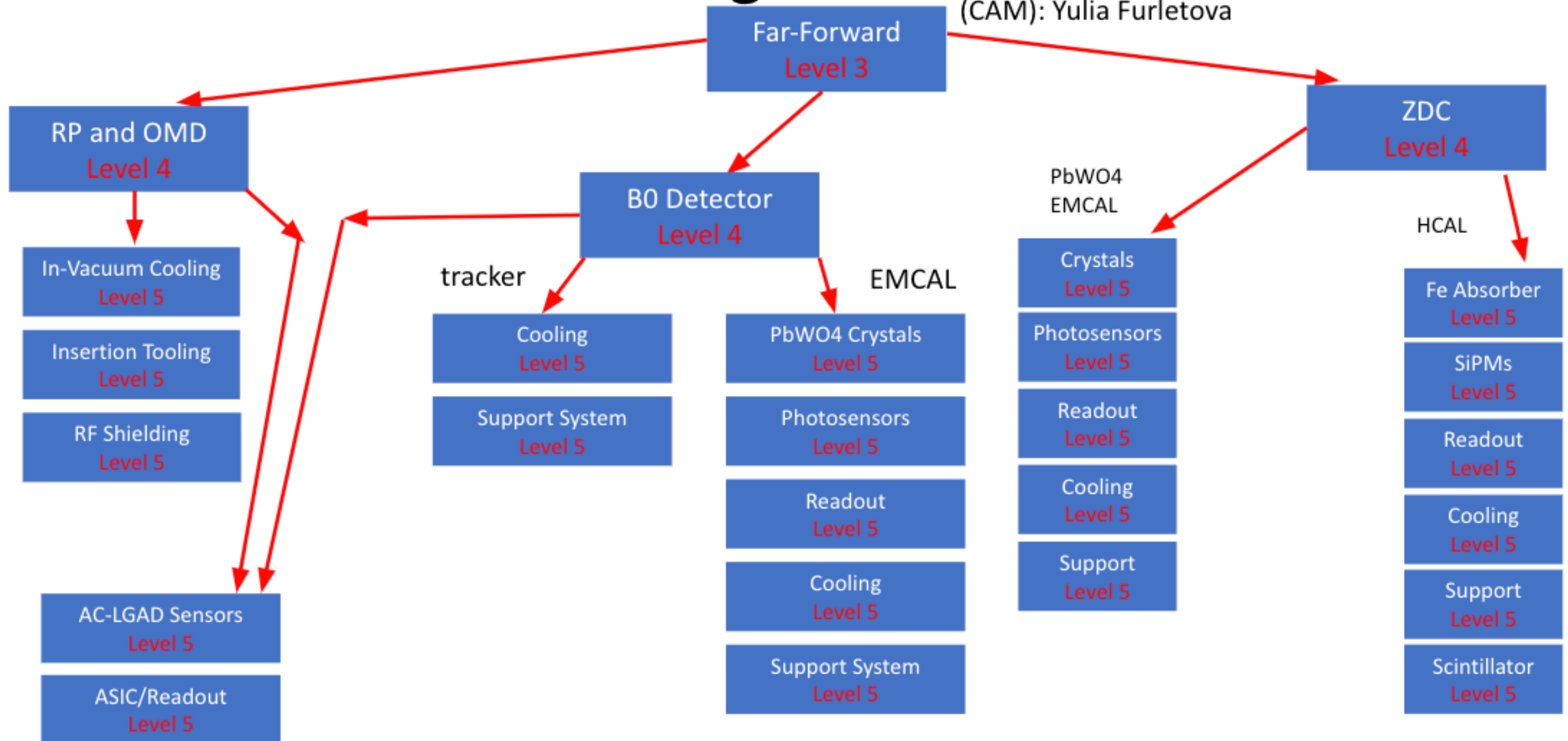- The required engineering design;

The needed resources to achieve 60% (CD-2) and 90% (CD-3) design completion.
The plan should include the time required to draft the text for the pre-TDR (CD-2) and TDR (CD-3).

The plan should present the activities required month by month in order to allow progress to be monitored. The ultimate goal of this exercise should be 90% design completion consistent with the requirements of the TDR and CD-3, indicatively by the end of 2024. We recognize that the available time is limited. Therefore, please make an educated selection of the most essential studies doable within the available time. We understand that a planning exercise like this will identify shortcoming in workforce and resources. Those shortcomings should be clearly identified so everyone is aware and we can work together to address them. The plans will be presented at dedicated CC WG meetings, to be organized by the CC WG conveners over the next few weeks. The CC WG conveners will be asked to report on the status of the planning at the TIC meeting on Monday Feb. 19.

Far-Forward Work Packages

Control Account Manager (CAM): Yulia Furletova

Far-Forward Level 3

RP and OMD Level 4

B0 Detector Level 4

ZDC Level 4

In-Vacuum Cooling Level 5

Insertion Tooling Level 5

RF Shielding Level 5

AC-LGAD Sensors Level 5

ASIC/Readout Level 5

tracker

Cooling Level 5

Support System Level 5

EMCAL

PbWO4 Crystals Level 5

Photosensors Level 5

Readout Level 5

Cooling Level 5

Support System Level 5

PbWO4 EMCAL

Crystals Level 5

Photosensors Level 5

Readout Level 5

Cooling Level 5

Support Level 5

HCAL

Fe Absorber Level 5

SiPMs Level 5

Readout Level 5

Cooling Level 5

Support Level 5

Scintillator Level 5

** means open-questions about technology decision.

Roman pots/OMD

Engineering support needed: cooling, support/insertion system

- The lab/testbeam/prototyping needed.
- The further progress needed for the reconstruction software.
- The verification of the implementation of the detector and detector response in simulation and validation using information from lab/testbeam exercises or from literature.
- The studies required to demonstrate the detector performance.
- The required engineering design.

➢ Test-beam needed for AC-LGAD + EICROC performance validation (10 June to 23 June 2024 @ DESY).

➢ ML algorithm works, working on integration with EICrecon → matrix algorithm exists, troubleshooting problems which arose from some other changes.

➢ To be done in the summer after testbeam data is acquired.

➢ These studies have been documented many times over – will reproduce in DD4HEP.

➢ Still require engineering support for cooling and support/insertion system.
  ➢ Design underway on vacuum system.

B0 Tracking + EMCAL

- The lab/testbeam/prototyping needed.
- The further progress needed for the reconstruction software.
- The verification of the implementation of the detector and detector response in simulation and validation using information from lab/testbeam exercises or from literature.
- The studies required to demonstrate the detector performance.
- The required engineering design.

➢ Test-beam needed for AC-LGAD + EICROC performance validation (June 2024 @ DESY).

➢ Choice of EMCAL crystal.

➢ ACTS used for tracking (truth-seeding) – work to be done to optimize layout of tracking system with EMCAL and field map.

➢ To be done in the summer after testbeam data is acquired.

➢ Further tracking performance studies needed with optimization.
  ➢ Proper implementation of charge sharing in DD4HEP digitization?
  ➢ Effective resolutions for TDR rather than full implementation?

➢ More work needed on demonstration of EMCAL capabilities.

➢ Actual charged particle occupancy in tracking layers from min-bias DIS → important for TDR.

➢ Still require engineering support for cooling and support + **installation concept**.

ZDC EMCAL

- The lab/testbeam/prototyping needed. ⟶ ➤ PbWO4/LYSO testing? Planned readout?
- The further progress needed for the reconstruction software. ⟶ ➤ LYSO tested in positron test beam.
- The verification of the implementation of the detector and detector response in simulation and validation using information from lab/testbeam exercises or from literature.
- The studies required to demonstrate the detector performance.
- The required engineering design.

➤ PbWO4/LYSO testing? Planned readout?
  ➤ LYSO tested in positron test beam.
  ➤ 2nd beam test in Fall 2024 for both LYSO and PbWO4.
  ➤ Irradiation tests for SiPMs and APDs at neutron facility in RIKEN.
  ➤ Temperature dependence for the LYSO crystals also to be tested in Summer 2024 @ Tsukuba.
➤ Is anything in DD4HEP/EICrecon now?
➤ Need input from DSTCs

ZDC HCAL

- The lab/testbeam/prototyping needed.
- The further progress needed for the reconstruction software.
- The verification of the implementation of the detector and detector response in simulation and validation using information from lab/testbeam exercises or from literature.
- The studies required to demonstrate the detector performance.
- The required engineering design.

➢ Initial tests of SiPM-on-Tile setup to run parasitically on east side of STAR

➢ HEXSPLIT algorithm available in DD4HEP, but work needs to be done on setting up the output for users.

➢ Studies to be carried out after collection of data from STAR in the summer.

➢ More work needed on demonstration of HCAL+EMCAL capabilities for E and angular resolution.

➢ Need to work with exclusive PWG to decide on best benchmarks for the performance.

➢ SiPM-on-Tile CAD drawing in the main CAD now. Working on weight calculations to ensure table is strong enough.

➢ Work on cooling/cabling needed. Readout locations?