

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).

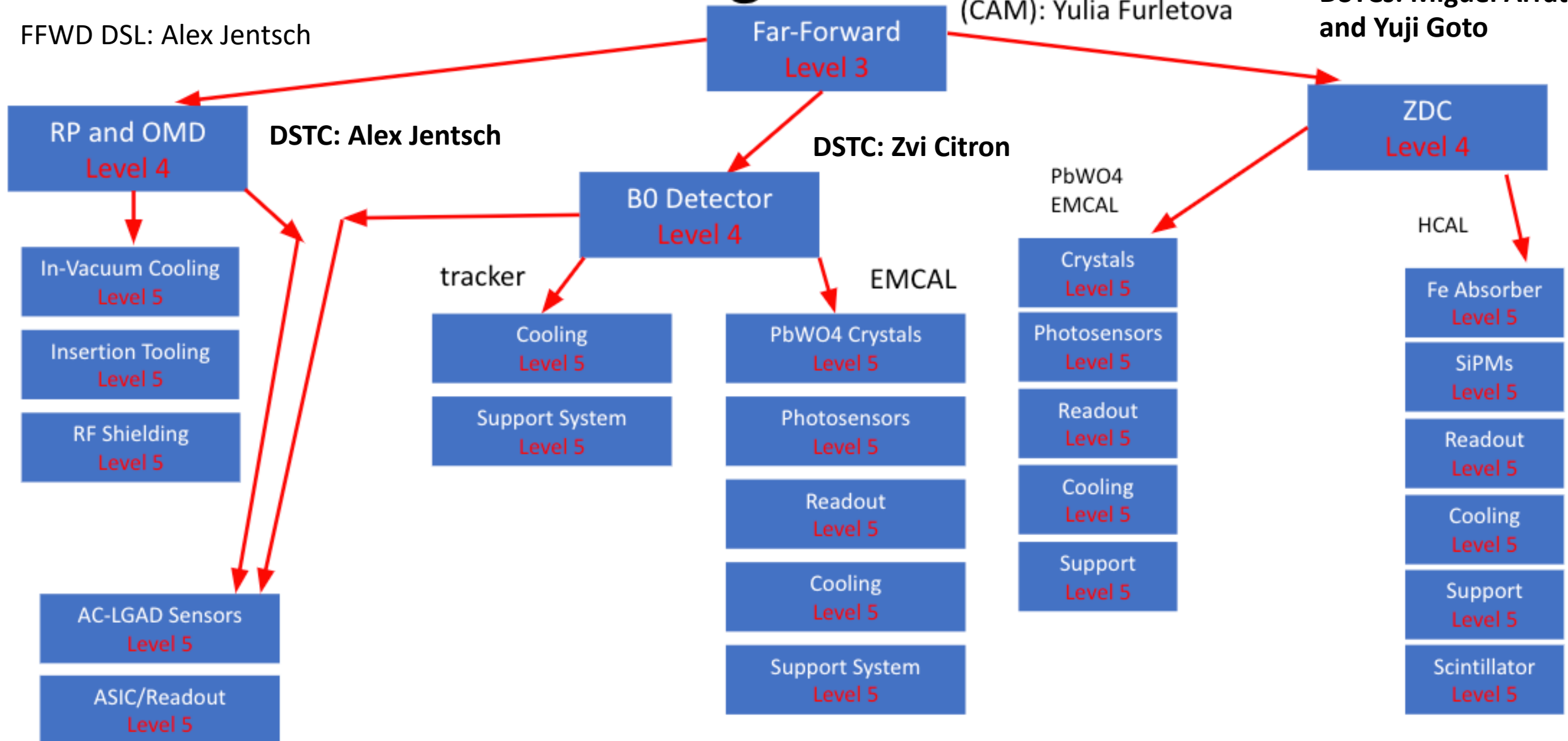
The plan should present the activities required month by month in order to allow progress to be monitored. **The ultimate goal of this exercise should be 90% design completion consistent with the requirements of the TDR and CD-3, indicatively by the end of 2024.** We recognize that the available time 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

FFWD DSL: Alex Jentsch

Control Account Manager
(CAM): Yulia Furletova

DSTCs: Miguel Arratia
and Yuji Goto



Some editing and adding of work packages will be worked out in the next two weeks to reflect some potential synergies with other groups.

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Lab/testbeam/prototyping needed.

- ASIC – EICROC0 → EICROC0A/1 (**Expected Fall 2024**)
 - Solve issues with ADC, address coupling issue which makes reading multiple pixels from AC-LGAD to EICROC impossible.
 - Possible issue with wire-bonding → bump-bonded sensor + ASIC to testboard in-progress.
 - Testbeam campaign to follow arrival and bench testing of EICROC0A/1.
- Need to understand operating temperature, especially if issues arise with charge sharing due to irradiation.
 - Will we need to run at lower than room temperature at some point to ?
 - Need to know operating temperature.

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Further progress needed for the reconstruction software.

- Working on global solution to handle beam effects and crossing angle in analysis → major effect on FF observables. (Initial conversation has begun with S&C, solution being testing now)
- Roman pots reconstruction working okay using static matrix method →
 - Solution in EICrecon now for handling variable beam energy from input → correct matrices should be applied now for the various beam energies. **Please let me know if you still see something strange in the campaign output.**
 - In-process of integrating machine learning method into EICrecon, especially important for off-momentum detectors (May 2024).

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The verification of the implementation of the detector and detector response in simulation and validation using information from lab/testbeam exercises or from literature.

- Won't have testbeam data on the timescale for the summer.
- Working on implementing realistic digitization for AC-LGADs into EICrecon with the AC-LGAD TOF group (Summer 2024).
 - Less-crucial for the RP/OMD where we don't bank on charge sharing.

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The studies required to demonstrate the detector performance.

- Many items have been completed already and are documented.
 - With handling of beam effects, need to make sure we understand integrated impact of beam + detector effects on observables (different implementation of beam effects than in previous studies).
- Primary issue is tracking changes to the geometry and lattice and iterating on performance to see if any major impact are observed.

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The required engineering design.

- **Vacuum system and detector moving stages**
 - Brazilian group has completed a first version of the vacuum system design and motor/rail system for the insertion of the RP/OMD detector packages.
 - De-featured version fully implemented in DD4HEP now → matrices updated to reflect the shift of the RP detectors.
 - Expecting CAD STP files soon to begin assessing.
 - Iteration expected with group after initial testing and assessment.
- **Cooling system design**
 - Some engineers have been identified and we are working on a concept.
 - Need to know what operating temperature we will want to use + power consumption of the subsystems → depends on final ASIC design, what we have now is only a ballpark estimate.
- Assembly plan and logistics will be worked out upon receipt of STP files so we can see how everything fits together.

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Final comments

- There are obvious synergies with the many subsystems using AC-LGADs.
 - Work packages will be updated soon to reflect this.
- We are working with TOF, far-backward, and the EIC project to identify common design concepts (e.g. PCBs) in the same spirit as above, so some additional adjustments may be made to account for this in the WBS.
- We will need to work with the EIC project and the machine group on any ES&H issues related to implementation of the vacuum-based detectors.
- Right now, we expect many of the items, other than the ASICs, to be converging by Summer's end.