



Tracking WG Status Update

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EIC Detector 1 WG Convener Meeting
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Charge to detector WG

- The overall goal of the detector WGs is to optimize the ECCE reference design towards a technical design within the constraints of performance, cost, and risk.
 - In working toward this goal, the Detector WGs should collaborate with existing detector consortia, all detector R&D efforts relevant for Detector-1, and any additional efforts within the EIC community.
- All WGs will work closely with the Global Design & Integration WG and the EIC project toward a technical design that optimizes the global detector performance, taking into account global integration and physics performance.
- It is critical that WG members understand the scientific and technical reasoning behind different design choices before engaging in a discussion of optimization.
- WG conveners will lead discussions identifying any non-trivial differences and/or aspects in need of further optimization.
 - For each non-trivial difference, WGs will then prepare a pro/con list accounting for technical performance, risk, and cost. The resolution of non-trivial differences should be discussed in close consultation with the Global Design & Integration WG, Physics WGs, the EIC project, relevant detector consortia, and R&D efforts.

Timeline for charges to WGs

The goal emphasized by the EIC project is to confirm the reference “**advanced conceptual design**” by the July EICUG meeting (**End of July!**).

- There may be still open issues on important items, but the goal should be to converge by the end of July and raise early on if issues come up and/or more time is needed!

Specific charge for Tracking WG

- **Simulations:**
 - Break down of simulation tasks in <https://docs.google.com/spreadsheets/d/1Jp1-V7MavZFejn2SG185YarbMlpGCBYGfF7yz4Y-Azc/edit?usp=sharing>
- **Technology reviews** (*back up slides*)
 - Complete review of the choice of tracking technologies
 - Identify risks & fallback solutions for each technology
 - Establish the timelines to CD4
 - Close coordination with the detector consortia (EIC-SC, eRD108)
- **EIC Tracking Detector configuration** (*back up slides*)
 - By July EICUG → the baseline configuration “*aka advanced conceptual design*” of the tracking detector is established
 - We know which technology goes where and basic performance expectation
- **Requirements inputs from the physics WGs**
 - List of key tracking requirements such as momentum resolution, vertex and projection spatial resolutions.

Meetings organisation & Information

- The Tracking WG meetings will take place by-weekly on Thursday at 11am EDT.
- Indico category: <https://indico.bnl.gov/category/404/>
- Mailing list: <https://lists.bnl.gov/mailman/listinfo/eic-projdet-tracking-l>
 - Please subscribe if you have not done so yet.
- **Coordination with other WGs - Contact liaison are being identified for**
 - DAQ/Electronics/Readout: Kondo (MPGD), Jo (TBC, Si)
 - Computing & Software/Simulation Production & QA WG: Matt, Nicholas
 - PID: Laura (AC-LGAD), more TBC

Back up

Work ahead

- There are a number of areas in which work is needed:
 - Detector technologies R&D.
 - Simulations of detector performance.
 - CAD drawings.
 - Integration.
- Work on all aspects need to **proceed apace** and each aspect of the development need to **feed into the others**.
 - This meeting will try to facilitate exchanges between people working on different aspects of the detector concept development.
- In the next slides we present aspects in need of optimisation that emerged from the tracking WG kick-off meetings, “General/WG Conveners/Global Detector and Integration” meetings that have taken place so far.

Considerations on the Si vertex and tracker

- Vertex layers
 - The radii need to be adjusted as 5 mm clearance from the beam pipe are needed because of beam pipe backout.
- Tracking layers
 - The material assumed in the ECCE proposal is 0.05% X/X_0 per barrel layer This need to be updated to 0.55% X/X_0 that is what is suggested by the EIC SC.
 - Also, check the impact on performance by switching the sagitta middle layers with the ATHENA design (i.e. smaller radii).
- Disks
 - The last disk on both side in the ECCE design is currently floating and not supported. Service cone needs updating to make the required support connections.
- Hits per track as function of rapidity and p_T /momentum
 - The average number of hits per track in the electron going direction is 3 hits on average.
 - Needs further verification in simulations.

Considerations on the MPGD tracker

- Detectors
 - Redundancy vs number of hits per track
 - Forward: impact of a MPGD layer beyond the dRICH to be studied
 - Barrel: Technology selection (MM, μ RWELL or both)
- Detector thicknesses
 - Redefine the requirements in material thickness for each MPGD layer in the barrel region based on simulation studies and physic needs
 - Do we need low mass 0.5% X/X_0 MPGD behind DIRC or can we relax this requirement to the order of $\sim 1 - 2 \% X/X_0$ instead ?
- FEE, concentrators, DC-DC...
 - Reference design: 280k channels
 - The large number of channels will translate in a large number of FEE cards.
 - Space limitations to be considered
- Services
 - Review number of detector modules
 - Service routing
- Support structures
 - To be studied

Simulation tasks organisation

- We have setup a spreadsheet for people to indicate their availability for simulation tasks.
- Please click on the link below and add your availability as appropriate.

<https://docs.google.com/spreadsheets/d/1Jp1-V7MavZFejn2SG185YarbMlpGCByGfF7yz4Y-Azc/edit?usp=sharing>