TIC MEETING COMMUNICATIONS

o Klaus Dehmelt

o Technical and Integration Council Meeting

o May-15-2023

SIMULATION CAMPAIGN

- Re-establish connection between detailed simulations and the evolution of the technical design for the ePIC detector
  - Simulations of detector geometry, design, and performance
  - Detector geometry must be implemented in dd4hep
  - Material for supports and services must be incorporated
  - Simulations must include model for background sources → beam-gas and synchrotron radiation
  - Simulations must include model for detector noise and integration time
  - Basic reconstruction software with known performance characteristics

SIMULATION CAMPAIGN

- **Simulation campaign goals**
  - Evolution of the ePIC tracker design
  - Optimization of forward calorimetry design
  - Optimization of the backwards EMCal acceptance
  - Acceptance in Q^2
  - Integrate PID in full dd4hep simualtions
  - Quantify the effect of cabling and services

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- **DOE OPA Status Review** — October 19-21, 2021(A)
- FPD Status Update at BNL — June 28, 29, 30 2022(A)
- Technical, Cost, and Schedule Scrutiny Meeting — July – Sept 2022 (A)
- Project, Detector & Infrastructure Advisory Meeting — October 2022(A)
- **DOE OPA Status Review** — Jan. 31-Feb 2, 2023(A)
- Project Advisory Meeting — February 22, 23 2023(A)
- Infrastructure Advisory Meeting — March 22, 23 2023(A)
- 1st RRB Meeting — April 4, 5 2023 (A)
- **Begin LLP EVMS (practice 3 months data)** — **July 2023**
- **CD-3A Director's Review** (Co-Chaired by M. Reichanadter / S. Cousineau) — **October 10-12, 2023**
- **DOE CD 3A OPA Review** — **November 2023**
- **DOE CD 3A ESAAB Approval** — **January 2024**
- **Final Design Reviews for all ePIC subsystems** — **April – October 2024**
- DOE CD 2/3 OPA Review and ICR — January 2025 (TBC)
- DOE CD 2/3 ESAAB Approval — April 2025

The project Machine and Detector Advisory Committees will perform design assessments in Late Summer.

REVIEWS REVIEWS REVIEWS REVIEWS

- EIC Project ePIC Engineering Workshop May 10-12, 2023, at BNL/Zoom
- EIC Cost Review-June 26-29, 2023
- EIC AB Meeting- June 29, 2023, virtual
- Preliminary Design Status Review ePIC PID detectors 5&6 or 6&7 of July → 3 reviewers confirmed by now
- PAC Meeting- TBD- Summer 2023
- MAC Meeting- TBD Summer/Fall 2023
- DAC Meeting(s)-TBD Late Summer/Fall 2023 → detector R&D (2 days) and technical design review of entire ePIC detector (2 days)
- September FDRs for LLPs of Detector
- 90% Design Review Solenoid October 5&6
- EIC CD-3A Director's Review- October 10-12, 2023, at BNL
- EIC CD-3A OPA Review- November 14-16, 2023, at BNL
- RRB Meetings
    December 7-8, 2023, at SURA
    April 2024 tentative for Europe/Italy

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PREPARATION FOR REVIEWS

- 23 subsystems in 17 DSCs
- Identified most critical subsystems to start with on an immediate timeline
  - Tracker
  - bECal
- Assign workforce – both on qualitative and quantitative level
- Suggest individual retreat meeting
  - Meet with DSC representatives on a short time scale
- Get DSCs into WBS structure

TODAY/FUTURE TIC MEETINGS

9:00 AM → 9:15 AM **Communication** 🕐 15m

Speaker: Klaus Dehmelt (Stony Brook University)

📄 051523TICcommun...

9:15 AM → 10:00 AM **Simulation Campaign Strategy** 🕐 45m

Speaker: Markus Diefenthaler (Jefferson Lab)

📄 ePIC-SSC-TIC-2023...   🔗 Simulation Producti...   📄 Software Progress (...

10:00 AM → 10:30 AM **Services Layout** 🕐 30m

Speaker: Wouter Deconinck (University of Manitoba)

10:30 AM → 11:00 AM **AOB** 🕐 30m

Speaker: Klaus Dehmelt (Stony Brook University)

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TODAY/FUTURE TIC MEETINGS

- **Cross-Cutting Working Groups**
 - PID → Week 21
  - Tracking → Week 23

DSC UPDATES

- Simple version of geometry is implemented (a few upgrades are needed):
  - 10 layers of 4 cm steel absorber and 10 layers of 4 mm plastic scintillator (polystyrene as Kuraray SCSN-81)
  - Uses STAR EEMC tiles (to be revised): 60 bins in ϕ, 12 bins in $-2 < \eta < -1$ + extension to $\eta = -4$
  - Towers follow projective structure
  - Results of test will be presented during this week's calorimetry meeting
  - Once tested, we will merge it with the main branch (old version in main so far)
  - Detector services not included in geometry yet

Implemented geometry
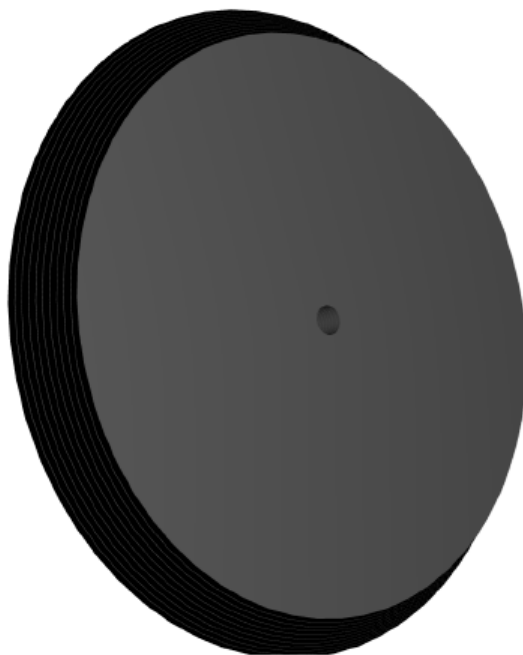
STAR EEMC Layout
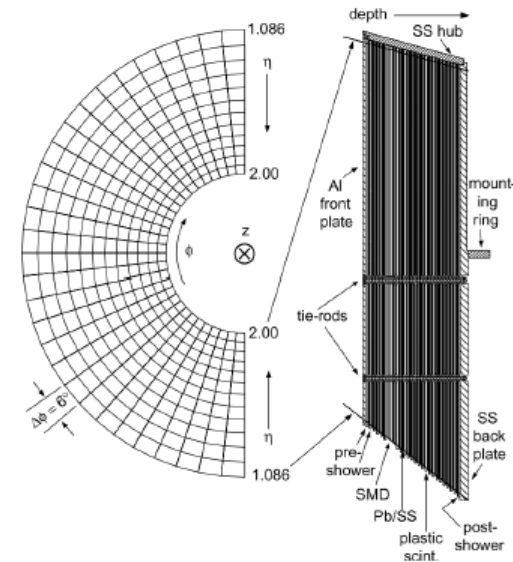
- Hit digitizer needs review and clustering algorithms need to be implemented/copied
  - So far only truth clustering implemented
  - To be done once geometry is tested
  - Clustering algorithms need to take into account the area of each tile (the area varies, between the tiles, so the magnitude of the signal)
  - Because of overlap with barrel EMCal, also barrel EMCal clusters need to be added for reconstruction of showers in $-2 < \eta < -1$

- First tests of material done using ROOT TGeo, but now further tests are underway

- Issues:
  - Lack of manpower is a major issue, but I'm in contact with some people/institutes to help
  - Issue in podio::ROOTFrameReader complicates data access, submitted an issue to podio devs: https://github.com/AIDASoft/podio/issues/411

K. Dehmelt
5/15/2023

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SVT for the upcoming simulation campaign

- Barrels and disks implemented with average material and digitized with 10µm pixel pitch,
- Services in the active area and as average material on the support cones and cylinders,

- Known limitations affecting what will be learned:
  - Circular and centered beam openings in disks, limiting low e.g. Q^2 acceptance,
  - Missing outer support model for disks at largest |z|, limiting fidelity of track projections into PID for ~1.5 < |η| < ~1.8,
  - Missing support/services model between the innermost vertex layers and the inner support cone on the hadron side, limiting track projections for ~1 < η < ~2 (would benefit from conceptual design),

- These will not likely (all) be addressed before the end of May,

- SVT-DSC software contact (TBD) will be main responsible.