

ePIC Collaboration Status and News

John Lajoie and Silvia Dalla Torre

ePIC General Meeting, October 5, 2023

19:30 → 20:20

General Status and Updates**Conveners:** John Lajoie (Iowa State University), Silvia Dalla Torre (INFN, Trieste)

19:30

ePIC Collaboration News**Speakers:** John Lajoie (Iowa State University), Silvia Dalla Torre (INFN, Trieste)

19:50

EIC Project Update**Speakers:** E. C. Aschenauer (BNL), Rolf Ent (Jefferson Lab)

20:10

Discussion**Speakers:** John Lajoie (Iowa State University), Silvia Dalla Torre (INFN, Trieste)

20:20 → 20:40

Report from ePIC Streaming Computing Model WG Meetings**Speakers:** Jin Huang (Brookhaven National Lab), Marco Battaglieri (Jefferson Lab)

20:45 → 21:05

Report about the recent ePIC Software & Computing Meeting at UIC.

21:10 → 21:30

Electron finding and DIS Implications**Speaker:** Tyler Kutz (MIT)

- **Focus on software/computing**
 - **important appointments in recent and coming days**

A DENSE REVIEW CALENDAR

- ~~▪ April 3 + 4: 1st Resource Review Board meeting @ SBU & BNL~~
- ~~▪ July 5 + 6: Particle Id Detectors Interim Design Review~~
- ~~▪ July 21: Final Design Review of the PbWO4 Crystals
for the ePIC Backward EM Calorimeter~~
- ~~▪ August 28 + August 31: DAC Review of Detector R&D

 - FY23 progress and FY24 continuation requests~~
- ~~▪ August 29 + 30: DOE CD-3A Design Review by DAC~~
- ~~▪ September 13: Final Design Review of the SciFi for bECal & fECal~~
- ~~▪ September 14: Final Design Review of the SiPMs for ECals, HCals & dRICH~~
- ~~▪ September 25: Final Design Review of the forward HCal W & steel~~
- October 5 + 6: Final Design Review of Magnet (MARCO)
- October 10-12: DOE CD-3A Director's Review
 - Folds in Design Review reports of DAC, MAC, Infrastructure Committee;
 - Concentrates on CD-3A Long Lead Procurement Items and progress towards CD2/3
- October 19-20: ePIC Computing Model Review
- November 14-16: DOE CD-3A Independent Project Review
- December 7 + 8: 2nd Resource Review Board meeting @ Washington
- Dec23/Jan24 (TBD): Preliminary Design Review of Far-Forward/Far-Backward Detectors



ePIC Software & Computing Meeting at UIC

In view of the Computing model review

Computer model to be presented at the December RRB

NEXT COLLABORATION MEETING

Jan 9-13, 2024 @ ANL

- 3 days of parallel sessions and workfests
- followed by 2 days of plenary sessions
- DSC/WG leadership had been invited to submit proposals for the workfests with deadline on Sept. 22nd
 - Great feedback from the collaboration: (10 + 1) proposals



NEXT COLLABORATION MEETING

Parallel sessions and Workfests, proposals received

Proposal	Proponents
Barrel ECAL DSC	Maria Zurek, Sylvester Joosten
SVT DSC	Laura Gonella, Ernst Sichtermann
Tracking	Ernst Sichtermann, Matt Posik
Jets & HF (Particle Flow)	Brian Page, Olga Evdokimov, Derek Anderson
Jets & HF (Vertex)	Brian Page, Olga Evdokimov, Shujie Li, Barak Schmookler
Streaming Computing Model, electronics and DAQ	Fernando Barbosa, Jin Huang, Jeff Landgraf, Marco Battaglieri, Markus Diefenthaler
FFWD, FBKWD & Exclusive, Diffractive and Tagging, eA	Raphael Dupre, Rachel Montgomery, Alex Jentsch, Kong Tu, Simon Gardner, Nathaly Santiesteban, Dhevan Gangadharan, Nick Zachariou
Backgrounds	Kolja Kauder, Elke-Caroline, Aschenauer, Shujie Li
AC-LGAD TOF DSC	Alessandro Tricoli, Alexander Jentsch, Wei Li, Zhenyu Ye
Common PID	Thomas Ullrich, Oskar Hartbrich

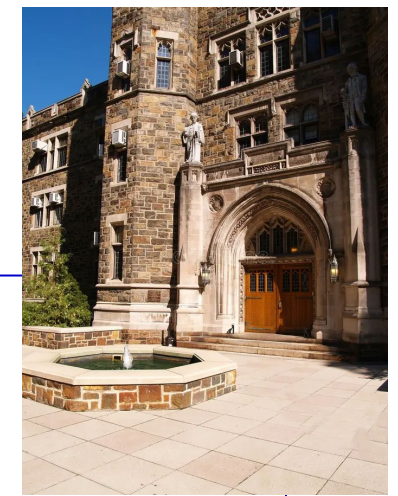
+

- software and simulation readiness for the TDR
- Tutorials ?



Work ongoing to identify synergies (when appropriate) and elaborate an agenda to house the rich proposal panorama coming from the collaboration

NEXT-to-NEXT COLLABORATION MEETING



July 2024

- EICUG annual meeting will be at Lehigh U.
- SP-Office and CC-chair and vice-Chair are favorable about having, in 2024, the July ePIC meeting still coupled in space and time to the EICUG meeting

EICUG-SC is model

- Monday, July 22: Early Career meeting
- Tuesday, July 23, and morning of Wednesday, July 24: Users Group meeting
- afternoon of Wednesday, July 24, till Saturday, July 27: ePIC meeting.

The organizers of the ePIC meeting will directly contact Rosi if there is need to extend their meeting to Sunday, July 28

- A constrain is coming from partial overlap with ICHEP 2024 (Prague, 17-24 July)
- Summarizing: **July 22-27/28, 2024**

Now
Consolidated

2023 NSAC-LRP recommadations made public yesterday

Recommendation 1

The highest priority of the nuclear science community is **to capitalize on the extraordinary opportunities for scientific discovery** made possible by the substantial and sustained investments of the United States. We must **draw on the talents** of all in the nation to achieve this goal.

RECOMMENDATIONS 2 and 3

Next, we reaffirm the exceptionally high priority of the following two investments in new capabilities for nuclear physics. The [Electron-Ion Collider \(EIC\)](#), to be built in the United States, will elucidate the origin of visible matter in the universe and significantly advance accelerator technology as the first new particle collider to be constructed since the LHC. [Neutrinoless double beta decay experiments](#) have the potential to dramatically change our understanding of the physical laws governing the universe.

Recommendation 2

As the **highest priority for new experiment construction**, we recommend that the United States **lead an international consortium that will undertake a neutrinoless double beta decay campaign**, featuring the expeditious construction of ton-scale experiments, using different isotopes and complementary techniques.

Recommendation 3

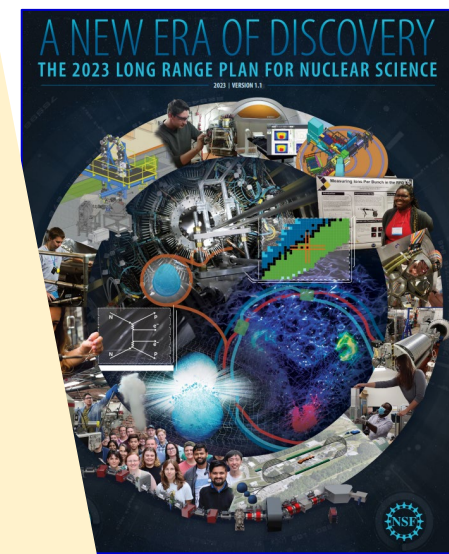
We recommend the **expeditious completion of the EIC** as the **highest priority for facility construction**.

Recommendation 4

We recommend capitalizing on the unique ways in which nuclear physics can **advance discovery science and applications for society** by investing in additional projects and new strategic opportunities.



From NSAC Meeting
October 4, 2023
Gail Dodge, NSAC Chair



Recommendation 1

The highest priority of the nuclear physics program is to achieve the maximum possible by the end of the program's goal.

At present, this is mere information, no discussion today

- The community needs time to digest it and understand implications
- For example, via dedicated meetings at Jlab and BNL in the coming days

Recommendation 2

As the highest priority, we recommend that the consortium that will lead the decay campaign, for scale experiments, and techniques.

Recommendation 3

We recommend the unique ways in which nuclear physics can advance discovery science and applicat... by investing in additional projects and new strategic opportunities.

NSAC Meeting
1, 2023
NSAC Chair

From our 3 main scientific branches

Software and Computing, Intense ongoing activity:

- Regular **simulation** “campaigns” established, upgraded at each cycle
- **AI Town Hall Meeting** Aug 30th : <https://indico.bnl.gov/event/20374>
- **Streaming Model/DAQ WG’s** fully active (5 joint meetings in preparation for the **October review of the ePIC Software and Computing**) → Report today
- **Software and Computing Workshop**, Sept. 20-22 @ UIC → Report today
(<https://indico.bnl.gov/event/20159/>)
- Preparation for the Review of ePIC software and computing (October 19-20)

From our 3 main scientific branches, cont.

In the context of the preparation for the Review of ePIC software and computing (Oct. 19-20)

- A document in preparation for the *Review of ePIC software and computing*:
"ePIC Streaming Computing Model"
 - Document by the whole collaboration
 - Main editors Markus Diefenthaler and Torre Wenaus (thank you !)
 - Later the document will become a publication
- **Agenda** towards the Review
 - Oct. 10 Final ePIC Streaming Computing WG meeting prior to the review.
 - Oct. 11 Dry run from 8:00 – 11:00 a.m. (EDT)
 - Oct. 11 Draft for report on the ePIC Streaming Computing Model being shared.
 - Oct. 13 Deadline for immediate feedback on the draft report.
 - Oct. 31 Deadline for detailed feedback on the draft report.

From our 3 main scientific branches, cont.

About the Review of ePIC software and computing (October 19-20)

- *4 ePIC talks:*
 - Introducing the ePIC Experiment: Exploring Use Cases and Workflows
 - ePIC Software Stack: Status and Plans
 - The ePIC Computing Model
 - International Data Facilities Perspective on the Computing Model
 - *Talks by ECSJI (EIC Computing and Software Joint Institute)*
 - Organizational Structure of ECSJI
 - The EIC Computing Organization

From our 3 main scientific branches, cont.

Analysis/physics

- Progress in Efforts in Analysis, PWG meeting, Analysis coordinator meetings (biweekly)
- A specific report today about one of the ongoing analysis/physics efforts:
 - Electron finding and DIS implications (Tyler Kutz)

TIC activity

- In the following slides

NEWS from TIC

Being considered for the following meetings:

- Review Cherenkov PID
- Update about mechanics and integration

October 2023

- 16 Oct TIC meeting - Far backward: comparison from IP6 and present assessment; more manageable scenarios?
- 09 Oct TIC meeting - ZDC
- 02 Oct TIC meeting - barrel ECal

coming

September 2023

- 25 Sep TIC meeting - status of RO/DAQ information from DSCs; Feedback from recent DAC reviews
- 18 Sep TIC meeting - Update on MPGD's
- 11 Sep TIC meeting - FEE (non-HGCROC/EICROC), Cooling
- 07 Sep TIC meeting - Backgrounds

Report at the today General Meeting

Report at the General Meeting on Sep. 22

Report at the General Meeting on Sep. 7

August 2023

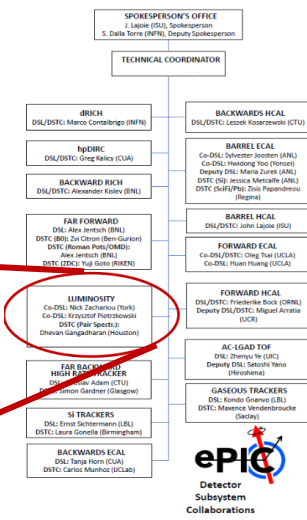
- 21 Aug TIC meeting - Far Backward Detectors and Integration
- 14 Aug TIC meeting - gaseous trackers
- 07 Aug TIC meeting - ASIC Discussion

Report at the General Meeting on Aug. 18

TIC meeting on September 25

Status of RO/DAQ information from DSCs; Feedback from recent DAC reviews

(<https://indico.bnl.gov/event/20549/>)



LUMINOSITY
Co-DSL: Nick Zachariou (York)
Co-DSL: Krzysztof Piotrkowski
DSTC (Pair Spectr.):
Dhevan Gangadharan (Houston)

- **COMMUNICATION:** the two DSCs dedicated to Luminosity Measurements are now merged in a single one, **the Luminosity DSC, co-lead by**

- **Comprehensive report about the status of the information collection**
- **Various reactions and interventions following the report**
 - Various DSCs (Si Tracking, Imaging calorimeter, hpDIRC) are going to contact the DAQ / Electronics / Readout team to update the information related to their subsystems
- **Discussion about the optical transceiver VTRx+ → next slide**

- **Next-to next slide**

09:00 → 09:05 **Communications**
Speaker: Silvia Dalla Torre (INFN, Trieste)
TIC_20230925_SDT...

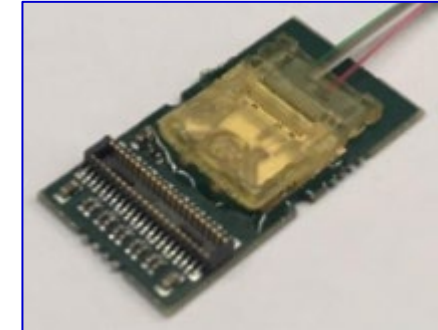
09:05 → 09:25 **Status of RO/DAQ Information from DSCs**
Speaker: Jeff Landgraf (Brookhaven National Laboratory)
230925_TIC.pptx

09:30 → 10:00 **Feedback from recent DAC reviews**
Speaker: Silvia Dalla Torre (INFN, Trieste)
TIC_20230925_SDT...

VTRx+ (from TIC mtg on 9/25 and DAQ mtg on 9/28)

From TIC meeting:

- The radiation-hard optical transceiver VTRx+ designed at CERN for LHC upgrade is considered in some/several ePIC subsystem read-out chains
 - CERN is launching a single-shot production with dead-line to subscribe at the end of 2023
 - Different opinions expressed about the need/urgency of a decision
- Deeper understanding needed
- The DAQ / Electronics / Readout CC WG organizing a dedicated meeting to specifically address this matter



The DAQ / Electronics / Readout CC WG promptly organized (<https://indico.bnl.gov/event/20459/>)

Messages from the meeting and following actions

1. VTRx+ are most likely needed for MAPS (they are used in both the two options for the r-o schemes, ref. to in Joe's slide no. 15); ~ 1000 pieces mentioned in Joe's report: only vertex or the whole Si tracking?
2. dRICH is seriously considering VTRx+, even if they do not want to commit before testing (Pietro's slides); in case, ~ 1500 pieces would be needed (spares included)
3. no news (so far) about the need of this optical transceivers for other ePIC subsystems; DAQ conveners are going to collect information about;
4. VTRx+ cost is O(100 EU) per unit;
5. the request from CERN to have a commitment about buying VTRx+ by the end of 2023 is firm;
6. purchasing administrative matter can be heavy and long; Elke investigating about .

09:05	→ 09:25	vTRX+ Speakers: Pietro Antonioli (INFN - sezione di Bologna), Pietro Antonioli (INFN - Bologna) 20230928-DAQ.pdf
09:25	→ 09:45	Readout considerations for MAPS SVT Speaker: Joachim Schambach (Oak Ridge National Laboratory) SVT_Readout_2023...

TIC meeting on September 25, cont.

Feedback from the comprehensive detector review

- **Comments and recommendations from the DOE CD-3A Design Review by DAC (Aug. 29-30) presented, organized by subsystems**
 - From close-out slides (final report was not yet available)

- *The main indications from DAC*

- **Amazing progress** in the last two years
- Design of the **detector integration and installation are developing well**; the interaction of project engineering staff with detector groups appeared excellent
- Projected **timelines** are aggressive, but appear feasible
 - *Primary risk in delays of*
 - *Magnet*
 - *Si tracker*
 - *Also iterated in the report* : “The magnet and SVT remain high risk items”
- **All central detector technologies have been chosen and appear appropriate.**
- Several technologies still **require significant further R&D, prototyping/production cycles** in order to confirm that they will provide the required performance
(also with reference to test beam difficulties in the next years)
 - *Silicon Tracker*
 - *μRWELL tracker*
 - *Imaging Sci/Fi tracking calorimeter*
 - *AC-LGAD Tracker*
 - *pfRICH prototype*
- **less advanced systems**, which we nonetheless feel can be ready for CD2/3 are:
 - *the electron polarimeters*
 - *the dual RICH*
 - *the far forward and backward detectors*
 - *the TOF detectors.*

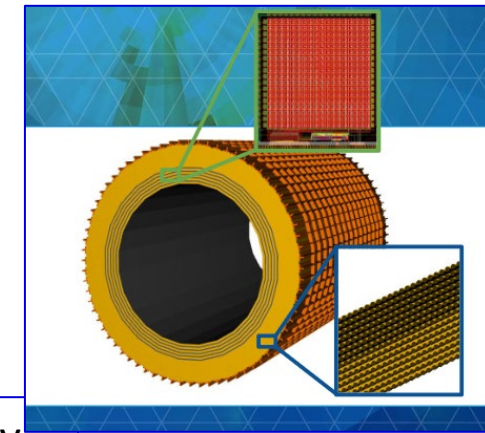
Warnings
for ePIC

Warnings
for ePIC

REMARKS

- *All the items indicated by DAC as deserving particular attention are correctly identified*
- *Not all critical aspects in ePIC considered by DAC*
- *TIC planning will make good use of the indications by DAC*
- *Every subsystem invited to analyze and react to the indications by DAC*

TIC meeting on October 2



barrel Ecal (BIC) (<https://indico.bnl.gov/event/20550/>)

- 09:00** → 09:05 **Communications**
Speaker: Silvia Dalla Torre (INFN, Trieste)
- 09:10** → 09:20 **Introduction and Status**
Speaker: Sylvester Joosten (Argonne National Laboratory)
[2023-10-02 - TIC - B...](#)
- 09:25** → 09:35 **Astropix**
Speaker: Manoj Bhanudas Jadhav (Argonne National Laboratory)
[AstroPix_BarrelECA...](#)
- 09:40** → 09:50 **SciFI and SIPM**
Speaker: Zisis Papandreou (University of Regina)
[BIC-TIC-Meeting-20...](#)
- 09:55** → 10:05 **AstroPix v3 Bench Test**
Speaker: Amanda Steinhebel
[steinhebel_astropix...](#)
- 10:10** → 10:20 **R&D Status and FY24 plans**
Speaker: Henry Klest
[BIC FNAL Test Bea...](#)
- 10:25** → 10:35 **Timeline and schedule**
Speaker: Maria Zurek (Argonne National Laboratory)
[2023-10-02 - TIC - B...](#)

- **CONTEXT:** follow-up about a major project, which is inserted by DAC in the critical path according to its challenging timelines
- **Messages from this meeting:**
 - **Large progress and increased number of contributing Institutes**
 - In particular, **larger team at work for Astropix**
 - The consolidation of the **mechanical model** (self-supporting version) is urgent and should go via verification of its robustness and stability (engineering effort together with Project)
 - The first test **merging together the imaging component and the sampling** one while represent a major step forward
 - The **reduced availability of test beam opportunities at FNAL in 2024** will impact the advancement; replacing these tests with cosmics is more complex and can present limits (the test beam availability is a concern beyond BIC only)
 - Which r-o electronics should be used for the sampling component while **waiting for H2GCROC?**
 - The presented timeline clearly shows a difficulty in 2025 to pass from pre-production to full production; it is recognized that this is related to the overall EIC project timelines and not specific to BIC; need of strategies to overcome this limitations for BIC and several other detectors
 - Timeline with finer granularity needed at next iteration