

ePIC Collaboration Status and News

John Lajoie and Silvia Dalla Torre

ePIC General Meeting, September 22, 2023

ePIC General Meeting

Friday 22 Sep 2023, 10:30 → 12:30 US/Eastern

Description **Connection Information:** <https://iastate.zoom.us/j/5671810336?pwd=Q1pwM2Q5NFk0T2xqMjJi>

Recording: <https://youtu.be/ObUZ38vwspQ>

10:30 → 11:00 **General Status and Updates**
Conveners: John Lajoie (Iowa State University), Silvia Dalla Torre (INFN, Trieste)

10:30 **ePIC Collaboration News**
Speakers: John Lajoie (Iowa State University), Silvia Dalla Torre (INFN, Trieste)

10:55 **Discussion**
Speakers: John Lajoie (Iowa State University), Silvia Dalla Torre (INFN, Trieste)

11:00 → 11:20 **Analysis update**
Speakers: Rosi Reed (Lehigh University), Salvatore Fazio (University of Calabria and INFN-Cosenza)

11:25 → 11:45 **Developing a general eA tagging program in ePIC – beginning with Deuterium**
Speaker: Zhoudunming Tu (BNL)

- **Short format taking into account the ongoing**
 - **The ePIC Software & Computing Meeting (9/20-22) ongoing at UIC**
- **Ensure the continuous information flow within ePIC**

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

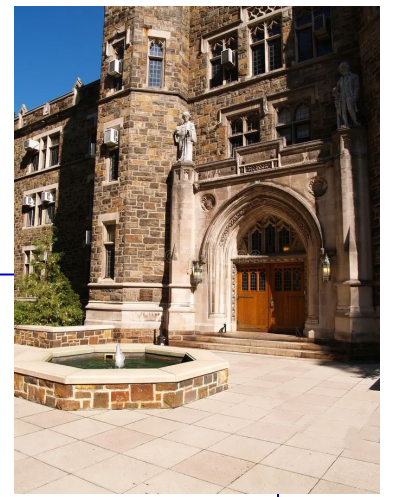
NEXT COLLABORATION MEETING

- Jan 9-13th, 2024 @ ANL
- Planning on 2-3 days of parallel workfests followed by 2-3 days of plenary sessions
- DSC/WG Leadership asked for workfest proposals:
 - Expect discussions w/in DSC's/WG's
 - Due Sept. 22nd
 - Cross-cutting efforts encouraged!
 - ePIC leadership will work with local organizers



Do not miss this opportunity and the related dead-line for your proposals !

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 discussing a model like

- 5 days in total, where:
 - 1 day for early Career Workshop
 - ~ 1 day for US
 - the rest for ePIC
 - We can make it longer for ePIC, in case we would like
- Dates July 23-27 (or 24-28), namely from Tuesday to Saturday
 - A constrain is coming from partial overlap with ICHEP 2024 (Prague, 17-24 July)

All Preliminary!

your active participation needed for setting-up ePIC structure !

Standing Committees

- *REMINDER* Chair and Vice elected for

- DEI Committee

- Megan Connors (GSU) – Chair,

Christine Nattrass (UTK) – Vice Chair

- Membership Committee

- Peter Steinberg (BNL) – Chair,

Pietro Antonioli (INFN-Bologna) – Vice Chair

- Conferences and Talks Committee

- Maria Zurek (ANL) – Chair,

Brian Page (BNL) – Vice Chair

- *Next step* for the elected standing committee members:

- Select members to fill the committees for approval by the CC →

NOMINATION PROCESS

- **DEI:** e-mail on Sep. 18 dead-line on Sep. 25
- **Membership C. :** e-mail on Sep. 11 dead-line on Sep. 23
- **Conf.s and talks C. :** e-mail on Aug. 29 dead-line on Sep. 8

Everyone in the Collaboration is invited to contribute to nominations !

your active participation needed for setting-up ePIC structure !

Executive Board

- The ePIC Election Committee will be holding elections for **three at-large members** (two-year terms) for the Executive Board for the ePIC collaboration
- About the role:
 - EB provides input to the Spokespersons on physics policy, instrumentation choices, and candidate suggestions for leadership positions
 - Select members to fill the committees for approval by the CC → **NOMINATION PROCESS on going**
- **Call for Nominations on-going:**
e-mail on Sep. 12 [dead-line on Sep. 25](#)

Everyone
in the Collaboration
is invited to contribute
to nominations !

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**)
- Ongoing: **Software and Computing Workshop**, Sept. 20-22 @ UIC (<https://indico.bnl.gov/event/20159/>)

reporting at the next
General Meeting
expected

Analysis/physics

- Progress in Efforts in Analysis, PWG meeting, Analysis coordinator meetings (biweekly)
- An update is following just after this news

TIC activity

- In the following slides

NEWS from TIC

October 2023

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

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

August 2023

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

coming

Report at the today General Meeting

Report at the General Meeting on Sep. 7

Report at the General Meeting on Aug. 18


TIC meeting on September 11

FEE (non-HGCROC/EICROC), Cooling (<https://indico.bnl.gov/event/20384/>)


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

09:10 → 09:40 **COOLING, plans and information collection**
Speakers: Dan Cacace (BNL), tim camarda
 COOLING, plans an...

09:45 → 10:00 **dRICH cooling**
Speaker: Roberto Preghenella (INFN Bologna)
 [20230911][ePIC][TI...

10:05 → 10:20 **ITS3 cooling at ePIC**
Speaker: Nicole Apadula
 SVT_Cooling_TIC_S...

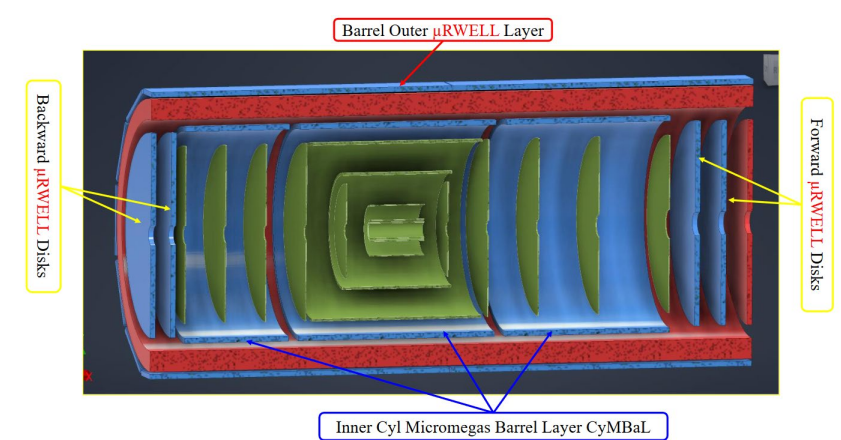
10:25 → 10:40 **ASICs not recently discussed at TIC mtg.s: ALCOR**
Speaker: Fabio Cossio (INFN Torino)

10:40 → 10:55 **ASICs not recently discussed at TIC mtg.s: FCFD**
Speaker: Fernando Barbosa (JLab)
 TIC_FCFD_11Septe...

- **Goal:** start a discussion about **cooling** for ePIC
- **Note:** preliminary assessment at present expected → an opportunity to start more long-term work
- **Points of attention:**
 - The initial proposal by the project to use under-pressure water cooling with Cu pipes has received some warning comments: pipe corrosion, formation of salts in the pipe, material budget (delicate, in particular, for vertexing).
 - Georg Viehhauser has suggested the usage of evaporative cooling.
 - The need of cooling with very light material budget impact for vertexing has been underlined by presenting studies for air cooling.
 - dRICH has presented a preliminary concept for both SiPM cooling and read-out electronic cooling. The need of support for engineering calculation of heat flow studies in the region electronics-SiPMs-radiator gas vessel with quartz windows has been underlined.

- **Goal:** complete the panorama of FEE for ePIC
- **High-lights / Points of attention:**
 - The various number of different versions of the HGCROC/EICROC needed for the ePIC subdetectors remains a concern (requiring workforce to a single group of developers). In this context, the potential use of **FCFD** remains an interesting options. The need to formalize this **potential in-kind contribution from FNAL** has been underlined.
 - ALCOR for SiPm r-o in dRICH
 - v1 already used with Si Pms in test beam, very encouraging performance
 - v2 ready for evaluation
 - v3 (32→ 64 ch.s) to be submitted in 2024

TIC meeting on September 18



Update on MPGD's (<https://indico.bnl.gov/event/20385/>)

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

09:10 → 09:30 **Progress in understanding the space resolution requirements for the barrel gaseous trackers**
Speaker: Matt Posik (Temple University)

TIC_AngleRes_0918...

09:35 → 09:45 **Xenon availability for ePIC MPGDs**
Speaker: Brian Eng

2023-09-18 - MPGD ...

09:50 → 10:10 **Perspectives, status and timelines for thin-gap MPGDs for ePIC**
Speaker: Kondo Gnanvo (Jefferson Lab)

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10:15 → 10:30 **MICROMEGAS news: CAD model**
Speaker: Francesco Bossu (CEA-Saclay)

TIC_meeting_2023_...

- **CONTEXT:** A reference conceptual configuration for MPGDs in ePIC was worked-out in June 2023. The definition of the tracking specifications is work in progress.
- **Open questions:**
 - **Outer MPGD**
There are different ingredients:
 - studies of the MPGD options that can provide very fine space resolution even when the track impinges at large angles; considering this aspect, **thin-gap MPGDs** are proposed (Kondo Gnanvo's report) either using **heavy gasses** where the actual Xe shortage represents a potential problem (Brian Eng' report) or by introducing a **preamplification GEM** layer in front of the microR-WELL detector; **VERY MANY OPTIONS FOR THIN_GAS TRACKERS**
 - the needed space resolution is not yet determined, even if the question is address by on-going simulation studies; the simulation status has been presented (Matt Posik's report); the final outcome of these studies is the key ingredient on which the decision will be made.
 - **Disk MPGD**
Less critical respect to the track angular distribution. The option that will be adopted for the barrel can be assumed also here.
 - **Layout of the cylindrical MICROMEGAS** taking into account integration constrains and construction and assembly challenges. The work is progressing via the study of some different layout arrangements (Francesco Bossu's report).

More about MPGDs

	Standard μ RWELL - 2D strip readout	Thin-gap μ RWELL - 2D strip readout	Hybrid thin-gap GEM- μ RWELL - 2D strip readout - GEM pre-amplification - μ RWELL amplification	Twin (double-sided) hybrid thin-gap GEM- μ RWELL - 2D strip readout - GEM pre-amplification - μ RWELL amplification $\times 2$
Nominal spatial resol. (perpendicular tracks)	Excellent $\sim 70 \mu\text{m}$	Excellent $< 70 \mu\text{m}$	Excellent $< 70 \mu\text{m}$	Excellent $< 70 \mu\text{m}$
Position resol. @ large angle	Really poor	Good, can be limited by S/N	Good	Good
Timing resolution	10 - 20 ns	$< 10 \text{ ns}$	$< 10 \text{ ns}$	$< 10 \text{ ns}$
Detector efficiency	Full efficiency $> 97\%$	<ul style="list-style-type: none"> $\sim 75\%$ with Ar-mixture $\sim 90\%$ with Xe-mixture? 	<ul style="list-style-type: none"> $\sim 85\%$ with Ar-mixture $> 95\%$ with Xe-mixture 	<ul style="list-style-type: none"> 98% 1-hit with Ar mixture 72% 2-hit with Ar mixture
Pros	Simple structure	<ul style="list-style-type: none"> Simple structure Good position resolution possible @ large angle Excellent time resolution 	<ul style="list-style-type: none"> Good position resolution @ large angle Excellent time resolution Robustness & stability 	<ul style="list-style-type: none"> Same as for hybrid thin gap GEM-μRWELL + Full efficiency (Ar mixture) 2-hit capability Compact detector
Con	<ul style="list-style-type: none"> Poor position resol. average time resol. 	<ul style="list-style-type: none"> limited efficiency High gain with single amplification \rightarrow Possible stability issues 	<ul style="list-style-type: none"> limited efficiency (with Ar-based mixture) Complex structure Assembly challenges 	<ul style="list-style-type: none"> Even more complex structure Assembly challenges

Too many options!

Kondo Gnanvo
at Sep. 18 TIC meeting

Following the discussion at a dedicated meeting on Sep. 14 and the Sep. 18 TIC, message from SP-office and PM to MPGD DSC suggesting a path forward via 2 questions:

1. What R&D needs still to be finalized to show that the **Standard μ RWell** provides an option for an MPGD tracker for ePIC even if the hit resolution is inadequate. We would also like to see a time estimate needed to complete this R&D.
2. What additional R&D is needed to make a thin-gap μ RWell an option for an MPGD tracker for ePIC. We want also would like to see a time estimate needed to complete the R&D for a full-size thin-gap μ RWell prototype. Again, we note that this should *assume the availability of heavy noble gases* and the gas should be chose to optimize the stability of the detector. [While the hybrid GEM/ μ RWell may have applications in future detectors, the additional R&D required **is inconsistent with the project timeline and introduces too much risk**. The hybrid designs are not an option for ePIC.]

Also, the continuation of the simulation study should be pursued with the convergence of present approaches and including the Astropix information.