TIC meeting:

DSCs papers in the NIM-A Special Issue

April 20th 2026

NIM-A Special Issue, reminder of the motivations

- Need to **recognized the efforts of the collaborators**, particularly of young scientists:
  - Publication is an obvious path
- Also, an opportunity to **document the collaboration activity that cannot be included in the preTDR** because of obviously requested text concision
- **Started discussions with NIM Editors** in Feb 2025
  - Elsevier expressed an interest in publishing performance studies for the EIC
- **Goal defined also thanks to conversations within the Collaboration:**
  - A comprehensive issue on the ePIC detector and its capabilities for EIC science, not DSCs only !
  - An available model: the NIM-A Special Issue for RHIC
- **Elsevier editors very encouraging** also respect to the enlarged scope issue:

→ "The ePIC Detector and Science Program at the Electron Ion Collider"

About the ePIC NIM- A Special Issue

- **Title**: "The ePIC Detector and Science Program at the Electron Ion Collider"
- Submissions will be managed by the **ePIC coordinators (acting a guest editors**)
- **All submissions** will be subject to **peer review**

Plan to publish a super-set of the material prepared for the pTDR; **high level perspectives:**

- ePIC Overview Paper

Also useful to skip EIC/ePIC introduction at the beginning of each paper in the special Issue

- Subsystem technical papers (derived from pTDR)

This is what we are going to discuss today

- Streaming Computing Model Paper
- Physics performance paper (derived from pTDR)
- Early Science Whitepaper
- Early Science Physics Appendices
- BSM/EW Physics Performance Paper

DSCs inputs for the ePIC NIM special issue

- Collecting information from the DSCs + El/R-O/DAQ CC WG
  - 16 answers expected (deadline April 10th), 14 received so far (thank you!)

  - Interesting approaches from various DSCs
  - Also several questions have been posed

- On the next slide a table summarizing the inputs received (the material received is added in the backup material for completeness)

- *These slides are followed by an ample time-slot for discussion; please, a part urgent request of clarification, keep your questions for the discussion session*

DSCs inputs

DSC	Global/overview about a SubSystem	Specific about components/technologis /developments	Notes
SVT	Single, long SVT paper		in preparation, goal: NOT split in Inner, Outer, Endcaps
MPGDs	CyMBaL		
	BOT		
	ECT		
pfRICH	pfRICH		
		HRPPD	
hpDIRC	a global paper		
dRICH	dRICH Overview		
		Radiation damage studies and annealing of SiPM (for Cherenkov application)	
		Irradiation of Electronics Components of the ePIC-dRICH Photodetector	
		ePIC dRICH Streaming DAQ Design and Online Data Reduction Integration	
		ePIC dRICH C2F6 Radiator Gas Characterization and Operation	
		Operation of the ePIC dRICH SiPM-based Photodetector Prototype and Beam Test Results	
		ePIC dRICH Simulation Studies	
TOF	a global paper (barrel, forwd.)		
EEEMCAL	Dedicated EEEMCAL paper		alternative: a chapter in a a general ECAL (or ECAL & HCAL) paper
BIC	1 single detailed paper		The paper is intended to provide a general reference for future BIC-related performance
FEMC	1 single paper		similar pre TDR
nHCAL		Lab test of light collection efficiencty by siPMs embedded in large tiles	
		Comparison of wrapped and painting lighting	
		ANAi developments for shower in the nHCAL	
		Testbeam results (timeline depending)	
barrel HCAL	a global paper		
LFHCAL	design and construction of the LFHCAL		
		beam test performance of the first engineering samples of the LFHCAL	
FF	ZDC		
		ZDC testpeam paper (draft available)	
	RP & OMD		
	B0		
LUMI			
low-Q2 taggers			
cross-cutting	Electronics and DAQ		
		AC-LGAD	contributed to by FF and TOF DSCs
TOTAL	**17**	**14**	

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SVT	Single, long SVT paper	
MPGDs	CyMBaL	
	BOT	
	ECT	
pfRICH	pfRICH	
		HRP
hpDIRC	a global paper	
dRICH	dRICH Overview	
		Rad
		Irrad
		ePIC
		ePIC
		Ope
		ePIC
TOF	a global paper (barrel, forwd.)	
EEEMCAL	Dedicated EEEMCAL paper	
BIC	1 single detailed paper	
FEMC	1 single paper	
nHCAL		Lab
		Con
		ANA
		Test
barrel HCAL	a global paper	
LFHCAL	design and construction of the LF	
		bea
FF	ZDC	
		ZDC
	RP & OMD	
	B0	
LUMI		
low-Q2 taggers		
cross-cutting	Electronics and DAQ	
		AC-I
TOTAL	17	

ABOUT OVERVIEW PAPERS

- *All DSCs propose an **overview talk**;*
  - *Exception: nHCAL*
- *All **overview talks are extended texts** with 2 exceptions:*
  - *FEMC: not really extended respect to preTDR to save in effort;*
  - *dRICH: not very extended overview to give more space to the specialized papers*
- *Important to note:*
  - ***FF DSC** includes 4 subsystem → 3 overview papers*
  - ***MPGDs** includes 3 subsystems → 3 overview papers*

→ *An obvious **question for the following discussion**:*

*Do we prefer to insist for **comprehensive overview papers** or a mixed panorama of comprehensive and not comprehensive overviews is fully acceptable?*

DSCs inputs

DSC	Global/overview about a SubSystem	Specific about components/technologis /developments	Notes
SVT	Single, long SVT paper		i
MPGDs	CyMBaL		
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ABOUT SPECIALIZED PAPERS

- *4 documenting important **technology advancements** realized within ePIC*
  - ***HRPPDs, SiPMs for RICHes, AC-LGADs,** operation of a **C2F6 gas system** within the restrictions imposed by environmental considerations*
- *4 documenting **testbeams results:***
  - ***ZDC, nHCAL, LFHCAL, dRICH***
- *6 about **relevant developments for ePIC subsystems***
  - *3 about developments for **dRICH**, 3 about developments for **nHCAL***

QUESTIONS for the discussion session

- **From the analysis of inputs received:**
  - Do we prefer to insist for comprehensive **overview papers** or a mixed panorama of comprehensive and not comprehensive overviews is fully acceptable? For discussion.
  - Request of clarification: 2 inputs received from different colleagues about ZDC test beam papers (@RICH, @ Jlab); does this mean a comprehensive paper or 2 separate ones?
    - A single comprehensive seems to provide a better structured message.
  - There are important synergies in the usage of the same detector technologies, particularly between CD and FDs; how to implement these synergies in the NIM-A Special Issue? For discussion.

- **From the DSCs:**
  - Is there a **page limitation** per manuscript?
    - No: the reviewers and the editors will check that the text length is adequate respect to the relevance of the messages.

QUESTIONS for the discussion session, cont.

- **From the DSCs:**
  - Is there a **defined timeline for the internal submission** of the first draft:
    - No internal submission (a part within the DSCs); submission to NIMA requested by October 2026
  - Survey **ASIC groups** as to whether they wish to add ASIC **specific papers at this time**.
    - A possible option, to be discussed together: Fine when there are specific papers; an overview is in any case needed in the electronics/DAQ overview paper.
  - A **single ECAL paper** with subsections for the various subsystems ?
    - The various technologies are very different and the performance requirement in the various regions are also very different. A single paper would simply result in a more complex management.

NIM-A Specialized Issue

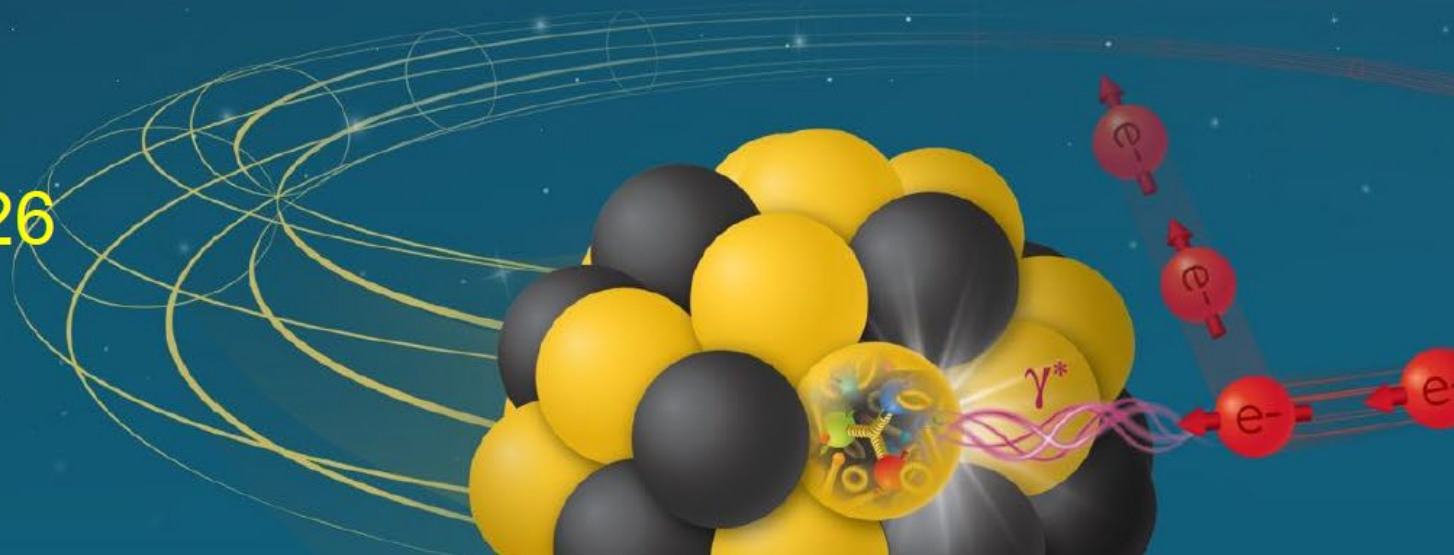
The inputs from the DSC and EI/R-O/DAQ CC WG

ePIC MPGD NIM A Paper Planning

MPGD-BOT – CyMBaL – MPGD-ECT

Kondo Gnanvo, Francesco Bossù, Annalisa. D'Angelo

ePIC TIC Meeting, April 20, 2026



Electron-Ion Collider

ePIC MPGD NIM A paper: draft planning

- We will have individual submission for each sub tracker ➔ 3 NIMA papers
  - All 3 papers will share similar structure as much as possible
- Structure of the manuscript:
  1. Introduction – general overview of ePIC detector and role of the MPGD trackers
  2. Physics requirement & performance expectation from simulation
  3. Subsystem integration into ePIC detector
  4. Past R&D and ongoing PED efforts and performance of test article in beam
  5. Module production, integration and commissioning at BNL

Questions to TIC:

- Is there a page limitation per manuscript?
- Is there a defined timeline for the internal submission of the first draft

pfRICH NIM-A Plans

pfRICH DSC NIM-A Plans

- One paper describing the technical details of the pfRICH
  - Construction, components, reconstruction, simulation, etc
  - Base on CDR and current preTDR
  - B. Page will edit and manage contribution with input from A. Kiselev and subject matter experts (continuation of preTDR process that is already underway)

- One paper providing an overview / summary of recent work on HRPPDs
  - Various groups will independently publish a number of studies on HRPPD performance (QE, gain, timing, aging, B-field, etc)
  - NIM-A special edition article will consolidate results from these papers
  - B. Page and A. Kiselev will lead from the pfRICH DSC but expect significant involvement from other groups

Far-Forward NIM A plans

- All subsystems will have a contribution – single FF section (preTDR), or separate ones for each subsystem?
  - Do not want space limitations based on “single” contribution - each subsystem needs ample space to describe the necessary technical details.
  - ZDC (EMCAL and HCAL)
    - technical aspects well-understood.
    - Mostly preTDR + additional details/studies on performance for the most-challenging final-states.
  - B0 + RP/OMD
    - Specific engineering challenges for these subsystems will be presented in a bit more detail than the preTDR.
    - Details of track reconstruction approach.
    - Timeline for this section is tied to changes in the IR - can only move forward once we know what will change.
- Tentatively planning to have contributions ready for the NIM A article by early August.
  - Will have check-ins on progress during the FF meetings.
- A separate chapter on AC-LGADs which can be referenced for all subsystems would make the most sense for the NIM A article since it will be the first application of this specific silicon technology in an experiment.

Electronics and DAQ NIM paper Plan:

- Use the preTDR section as a starting point, and base the article as much as possible on the text of the Readout Electronics section of the pre-TDR
- Several Changes will be needed:
  - Abstract needed & Introduction needs appropriate changes
  - Add polarimetery to the detector list / channel counts
  - The data rate section in the readout electronics section is obsolete. Plan to change this to maximum supported rates hit rates by detector as discussed in the TIC effort for data rates. Depending on the status of Rate and Noise analysis by detector systems (and in particular Synchrotron Radiation studies) we might reference these and add columns to our tables with estimates for comparison to actual data rates.
  - Updates to reflect further progress on RDO / DAM and GTU.
  - I would expect to remove the QA / Production planning / Schedule and ES&H sections, potentially replacing these with a less detailed section outlining the general order of intended construction and expected high-level milestones
- Survey ASIC groups as to whether they wish to add ASIC specific papers at this time.

Paper planning of the dRICH DSC

dRICH Overview
(assuming pre-TDR is not becoming a peer-reviewed publication in its own)

dRICH contributions in preparation, that may or may not appear in the ePIC special issue depending on the actual timeline and agreed organization:

Radiation damage studies and annealing of SiPM (for Cherenkov application)

Irradiation of Electronics Components of the ePIC-dRICH Photodetector

ePIC dRICH Streaming DAQ Design and Online Data Reduction Integration

ePIC dRICH C_2F_6 Radiator Gas Characterization and Operation

Operation of the ePIC dRICH SiPM-based Photodetector Prototype and Beam Test Results

ePIC dRICH Simulation Studies

Note most of the above are peculiar in ePIC and unprecedented in high-energy experiments

NIM A: feedback from EEEMCal group

Proposal 1: Write a dedicated EEEMCal paper

Proposal 2: Write a section/chapter in a general EMCal (or combined H and EM Cals) paper

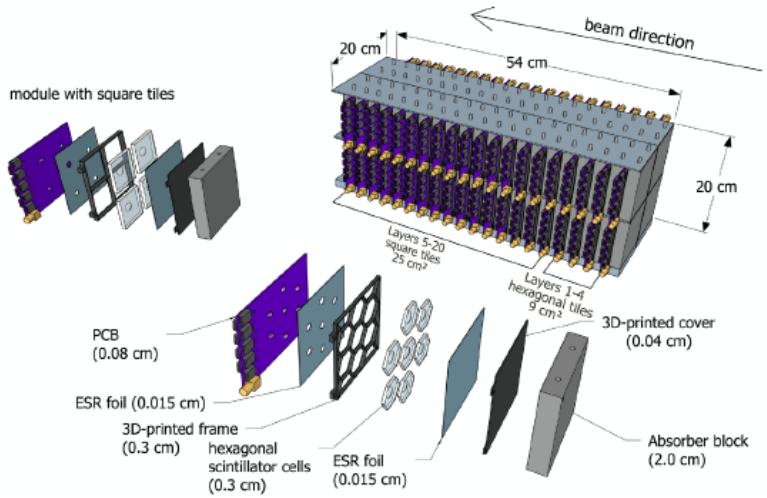
Content:

- Physics reach/motivation
- Technology choices (and physics requirements)
- Design
- Assembly, integration, maintenance
- Calibrations
- Performance (simulations results)
- Test bench and beam test results (if dedicated paper)
- Prototypes (if dedicated paper)

Performance of a SiPM-on-tile calorimeter in 200 GeV AuAu collisions at RHIC: A parasitic test in a high-multiplicity environment

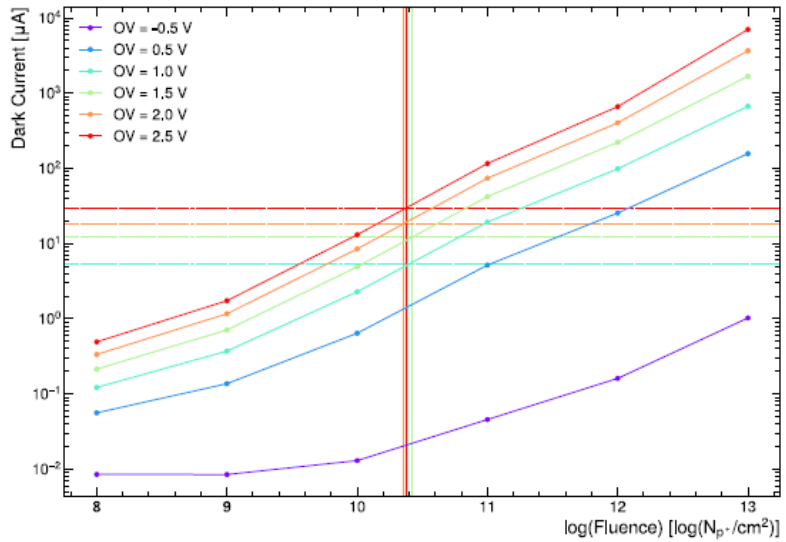
Weibin Zhang, Sean Preins,
Xilin Liang, Miguel Arratia

Setup



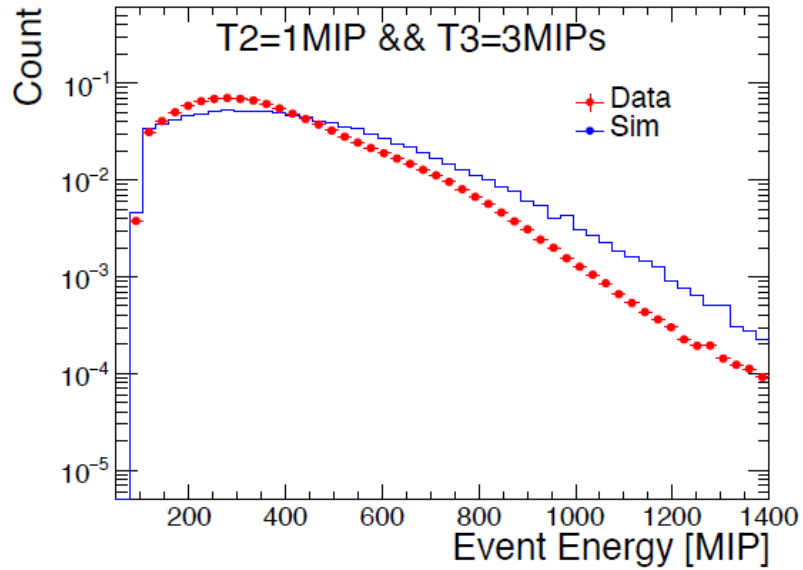
- A SiPM-on-Tile calorimeter
  - 20 sampling layers: 20 x 20 x 54 cm^3
  - Iron block + scintillator + SiPM + PCB
- Installed on the east platform of the STAR detector
  - 8 m away from the IP, EPD in between
  - $3.1 < \eta < 3.4$

Radiation



- Data taking: 25/07/16 – 25/12/08
  - CAEN units + Janus
  - Independent trigger
  - 100M good events
- Highest radiation at $10^{10.4}$ 64-MeV proton/cm^2 ($10^{10.58}$ 1-MeV n_{eq}/cm^2)

Result

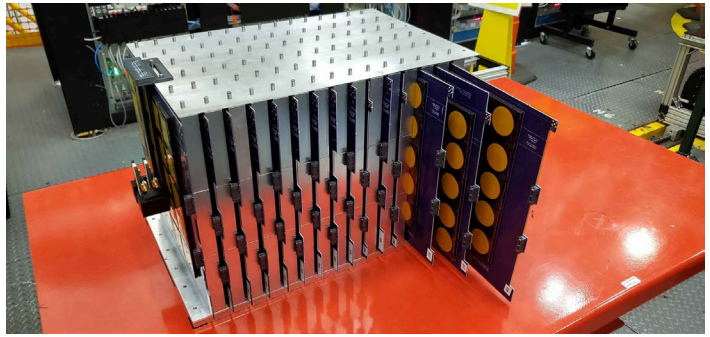


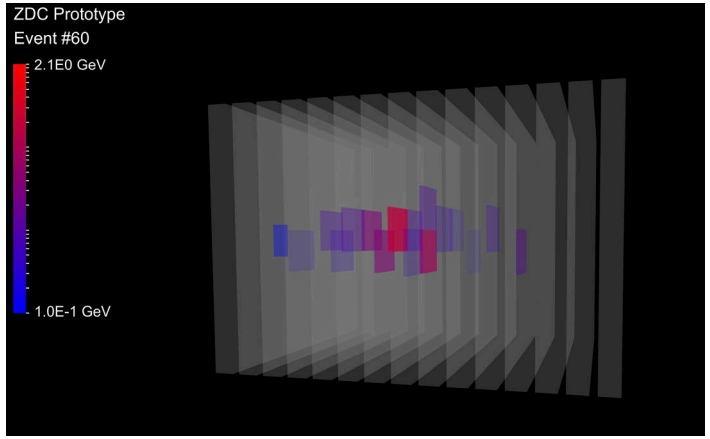
- Simulation: HIJING + dd4hep + eicrecon
- Good match in hit multiplicities, hit energy and event energy
- Extend previous results from 200 GeV PP collisions

Beam Test of a SiPM-on-Tile ZDC Prototype with 5.3 GeV Positrons at Jefferson Laboratory

Sean Preins, Weibin Zhang, Ryan Tsiao, Mia Macias, Brice Saunders, Love Preet, Miguel Arratia

- The prototype is a SiPM-on-tile sampling calorimeter with 370 channels, corresponding to O(10%) of the full ePIC ZDC





- The detector was tested with 5.3 GeV positrons, and key performance traits were evaluated and compared with GEANT4 simulations
- This test provided valuable insight for the optimization of detector design, assembly methods, and calibration procedures for the final ePIC ZDC

UC RIVERSIDE

hpDIRC NIM-A Plans

hpDIRC DSC NIM-A Plans

- A paper describing the technical details and performance of the hpDIRC in line with preTDR
  - Design, components, Mechanical design and integration
  - Simulation, reconstruction, and performance
  - Potential to include subsections dedicated to challenging performance and QA plans
  - G. Kalicy will edit and manage contribution with input from rest of hpDIRC group

Planned BIC contribution

- One primary BIC paper is planned for the NIM A special issue
- The contribution will be based on the BIC pTDR material and expanded into a standalone detector-description article
- The paper will present the BIC system design and expected performance in ePIC
- Performance results will be documented using simulation studies, with support from bench and beam test validation, and with reference, where appropriate, to already published bench and beam test performance studies
- The paper is intended to provide a general reference for future BIC-related performance as a high-level overview of technical and physics documentation
- Goal: draft ready by summer 2026

SVT – NIM-A Special Issue

- Single long SVT writeup is in preparation,
- Longer and separate from the “15 page” short version,
- Single document – incorporating Inner Barrel, Outer Barrel, and Disks – remains the goal,
- However, SVT will adjust to realities if or as needed.

FEMC

From Oleg Tsai

To Silvia Dalla Torre

Subject **Re: NIMA special issue: "The ePIC Detector and Science Program at the Electron Ion Collider"**

Thunderbird thinks this message is spam.

Dear Silvia,

preTDR for FEMC was written with submission to NIM in mind. Essentially it will be cut and copy from preTDR which should not took too much time.

Thanks,

Oleg

LFHCAL

From Hartbrich, Oskar

Reply | Reply All | Forward | Archive | Spam | Delete | More

To Silvia Dalla Torre, Friederike Bock

4/13/2026, 11:36 AM

Subject **Re: [EXTERNAL] Fwd: NIMA special issue: "The ePIC Detector and Science Program at the Electron Ion Collider"**

Ciao Silvia,
In lieu of a definite answer of Fredi, here is at least my very rough understanding of the plans for LFHCAL. Once I get brief feedback from Fredi I can distill this into a slide for you:

LFHCAL will contribute one or two papers to the special issue.

If two papers, one will be "design and construction of the LFHCAL" (needs polishing), focusing on the general design principles and components as well as engineering prototypes and manufacturing techniques and their QC. This should also include the simulated performance expectation for the full system based on the eicsoft simulations which are also e.g. shown in the TDR.

The other one would be "beam test performance of the first engineering samples of the LFHCAL" (needs more polishing) which focuses on beam test campaigns and results vs. simulation expectations as well as calibration stability etc.

Those could be combined into a ginle paper in principle, but the CALICE experience shows it's nice to be able to cite a "design, construction and commissioning" paper while being able to update the "testbeam results paper" with new techniques over time.

Cheers,
Oskar

BHCal planning for NIM A special issue

- our plan is to submit a subsystem technical paper derived from the pTDR for the BHCal, as we have discussed in the 3/13 BHCal meeting

nHCAL

From Brandenburg, Daniel

To Silvia Dalla Torre

Subject **Re: NIMA special issue: "The ePIC Detector and Science Program at the Electron Ion Collider"**

Reply | Forward | Archive | Spam | Delete | More

4/15/2026, 6:48 P

Hi Silvia,

We would be interested in submitting to NIM. We have several items that could make up a manuscript:

- extensive laboratory testing of the light collection efficiency fo various SiPM on tile designs, up to the largest tiles tested in those configurations
- Comparison of wrapped and painted (dipped) light lighting, both in terms of performance and mechanical tolerances.
- AN AI project on developing GAN and embeddings for showers in the nHCAL since they represent a unique corner of response space (in our specific case acting as a tail-catcher)
- Depending on the submission timeline we may or may not have beam test results from the first prototype modules.

Best,

Daniel Brandenburg
Assistant Professor
College of Arts and Sciences
Department of Physics
Ohio State University