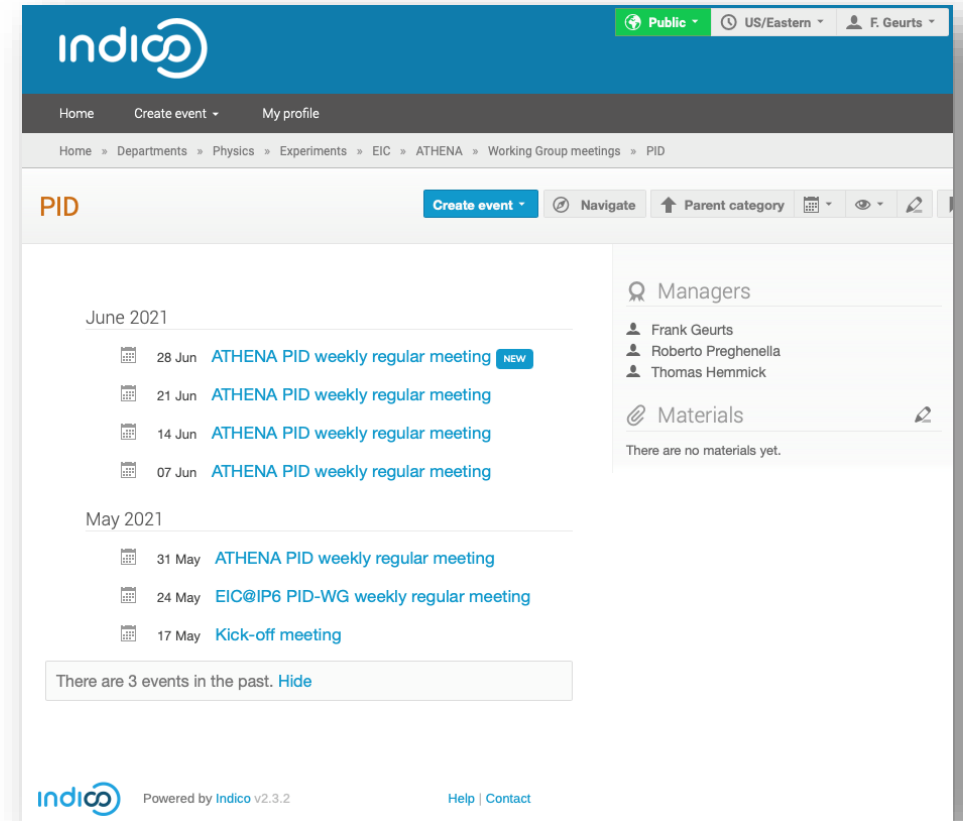


PID WG Update

- PID Working Group assigned contacts
 - cost :: Roberto Preghenella
 - integration :: Frank Geurts
 - drafting :: Thomas Hemmick
 - software contact :: Zhenyu Ye
 - DAQ contact :: TBA
- Reminders:
 - we meet each Monday at 12h - 1 pm EDT
 - tagged a short software meeting past 1pm
 - Slack: <https://eicip6.slack.com/archives/C02133BCQLV>
 - Mailing list archive: <https://lists.bnl.gov/mailman/listinfo/eic-ip6-det-pid-l>
 - Indico: <https://indico.bnl.gov/category/369/>

Conveners



Hardware I

- TOF at the ECal: imaging calorimeter with timing layer

[Maria Zurek, ANL]

- Simulations of LGAD inside all-Si tracker

[Rey Cruz-Torres, LBNL]

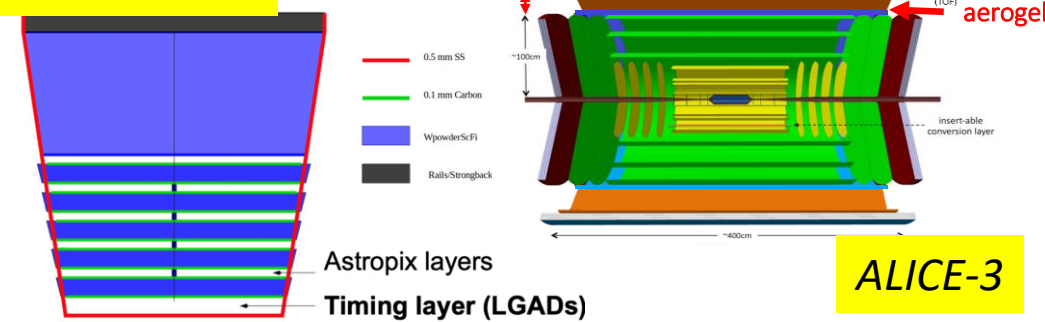
- most impact on dp/p when placed near central layers
- for smaller radii: significant at smaller low momentum

- Aerogel RICH in the barrel

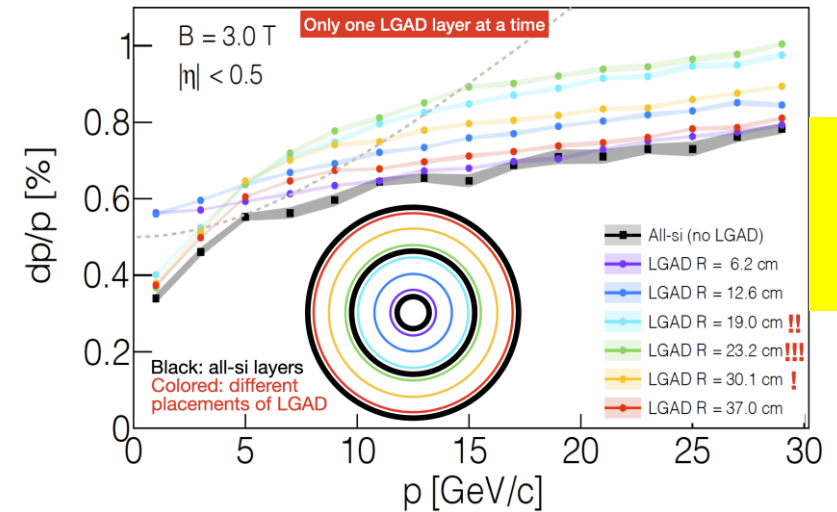
[Antonello Di Mauro, CERN]

- proposal for ALICE 3: increase radial space of TOF layer by $\sim 20\text{cm}$ to insert aerogel radiator and cherenkov expansion gap
- potential for synergy with CERN on aerogel (Chiba Univ.)

ECal module



ALICE-3

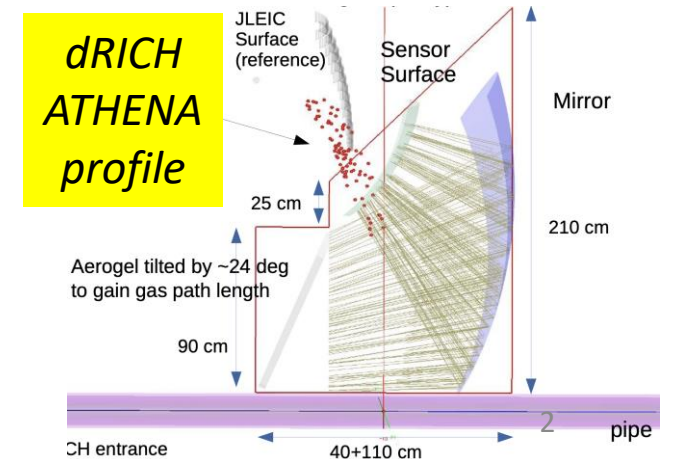
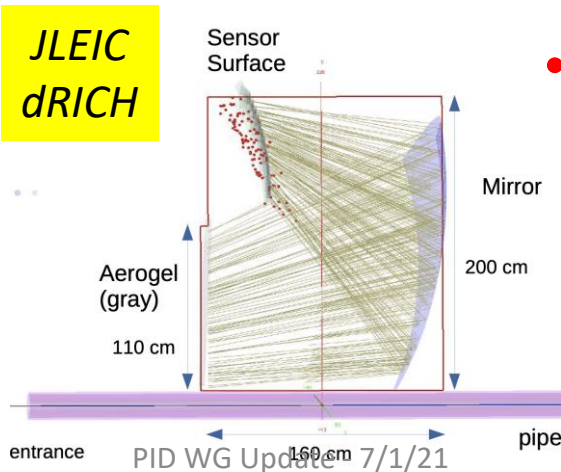


LGAD
inside
tracker

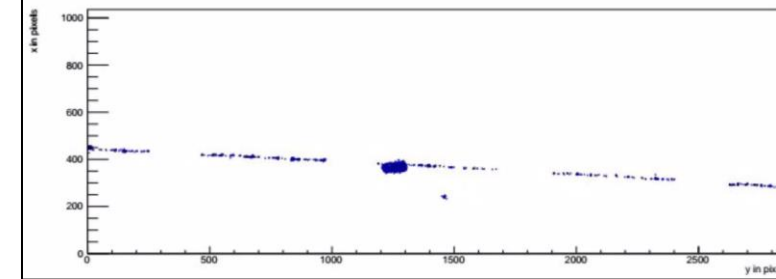
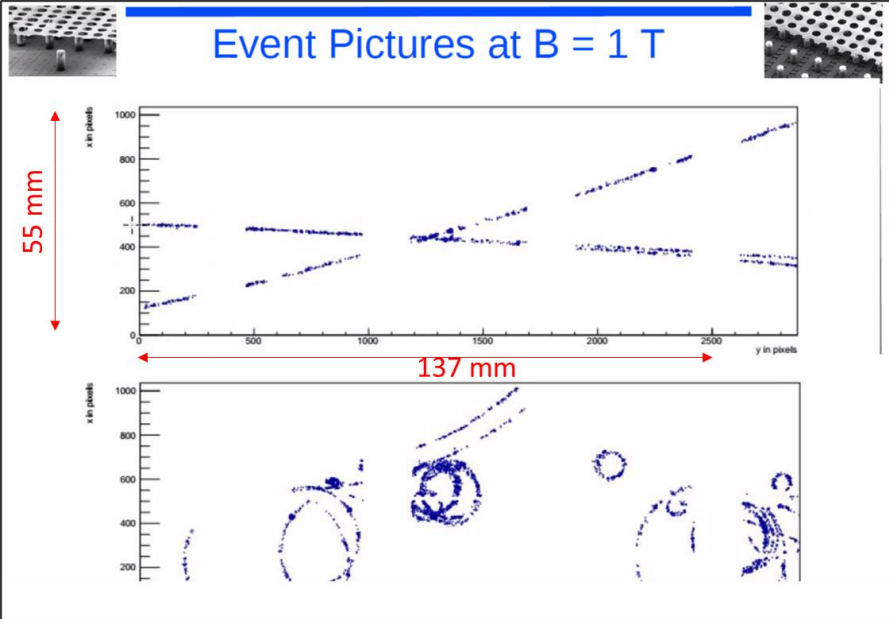
- dRICH: a first very tentative porting of the geometry into ATHENA

[Evaristo Cisbani, INFN/RM]

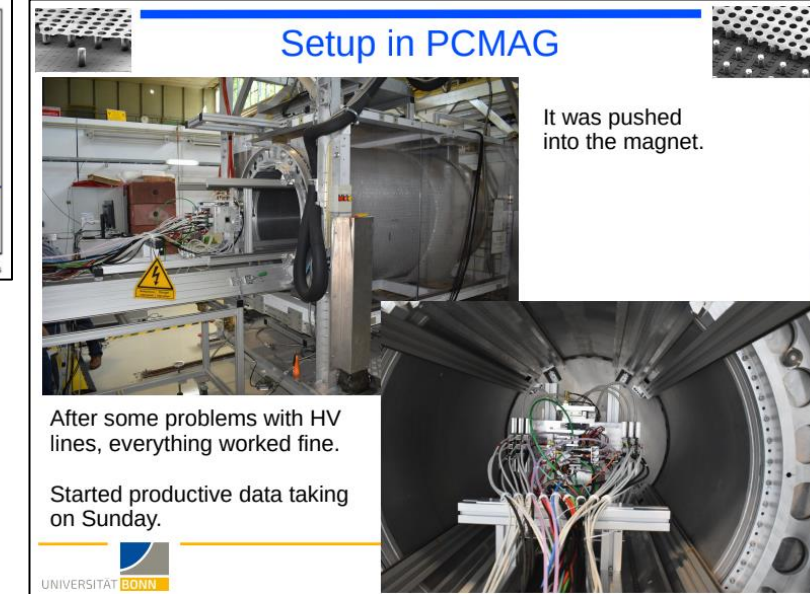
- decrease in both longitudinal and transverse size
- challenge to adapt sensor surface to focal region within ATHENA's vessel profile



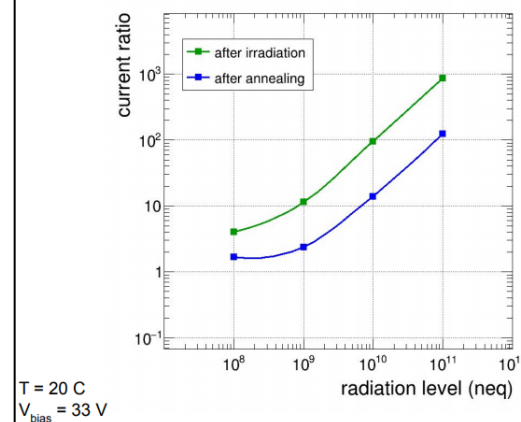
Hardware II: Test Beam GridPIX & SiPM Rad. Damage



- Beam enters through magnet
- Interactions make for busy events
- 3rd Generation Chips in test beam
- ATHENA choice: 3rd or 4th Generation



[NUV-HD-RH] 1 week of annealing at T = 125 C



annealing reduced dark current by a factor of ~5-10, in line with expectations

SiPM irradiated up to 10¹¹ now behave like if they were irradiated by 10¹⁰

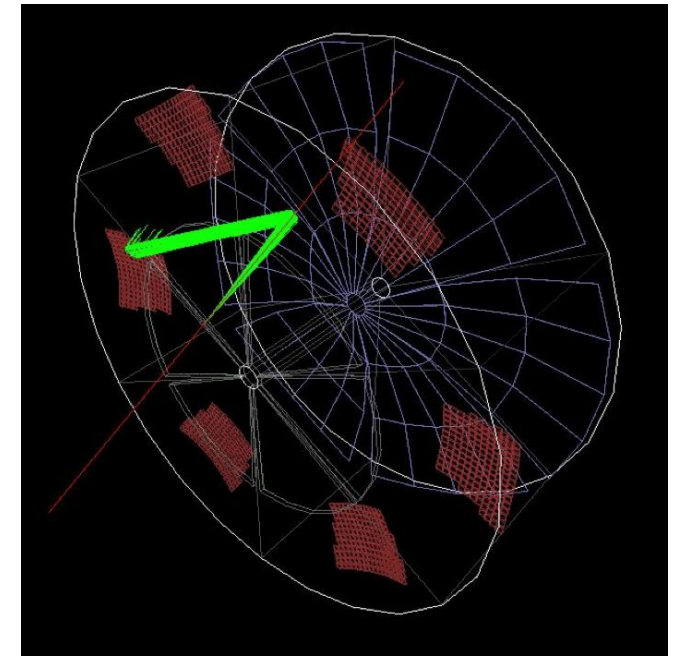
for the time being we stop here with FBK sensors, or perhaps we extend annealing at T = 125 C for another 2 weeks (expecting no improvements)

issue with FBK carriers related to the solder paste used during assembly, unfortunately we have used low-T (138 C) solder paste which does not allow to reach the ultimate annealing temperature of T = 175 → needs reworking of the carriers → will be done after test beam

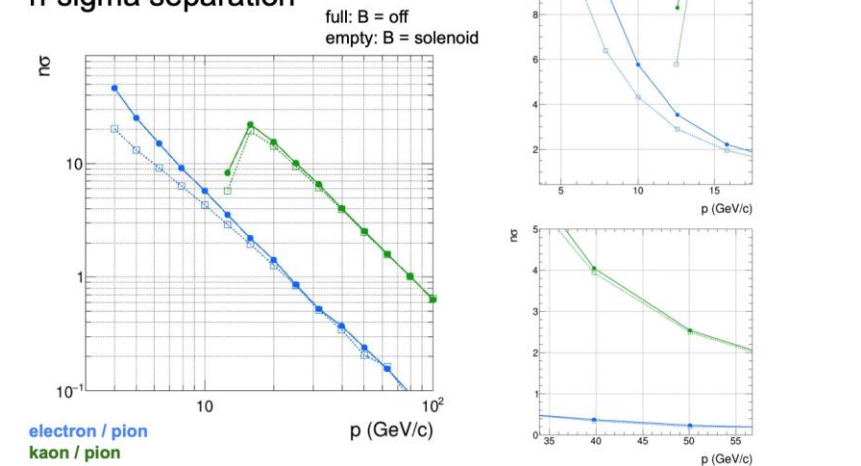
- Dark Rate drops ~1 order of magnitude following annealing
 - 138° anneal limited by solder.
 - High annealing temp in the future.
- Basic Concept:
 - Cooling system (e.g. fluid) doubles as heater.

Magnetic Field updates

- **Forward RICH: new Helmholtz field map bares no improvement in performance**
 - Chandrodoy Chatterjee, INFN Trieste
- new: first look into dRICH geometry and optical description class; still need to do full phase space and include uncertainties from tracking
- Tracking group studying angular resolution of tracks as those enter PID detectors
 - Matt Posik, Francesco Bossu, *et al.*
 - get best estimate of angles while traversing a radiator is important for RICH
 - see next Tracker WG update



n-sigma separation



Chandrodoy Chatterjee (June 28)

Software

➤ First meeting on implementation of PID detectors in dd4hep - June 28

- Zhenyu Ye (coordinator for PID WG)

1. Implement PID detectors in ATHENA DD4HEP

- Dual RICH: Chao Peng put in dRICH model in DD4HEP
 - work with Chris Dilks and Sylvester Joosten to get full model for ATHENA in
- DIRC: Dmitry Romanov will first implement a simple model in DD4HEP
 - work with Grzeg Kalicy to get the full model in.
- mRICH: Whit Armstrong will first implement a simple model in DD4HEP
 - work with Murad Sarsour to get the full model in.
- TOF: Zhenyu Ye has implemented a model in DD4HEP.
- GridPix: Sanghwa Park and Prakhar Garg working with Software WG.

2. Estimate of Computing Resources

- Each PID detector group asked to look at the estimates from other WG.
- Zhenyu will aggregate and update PID estimates for computing resources.

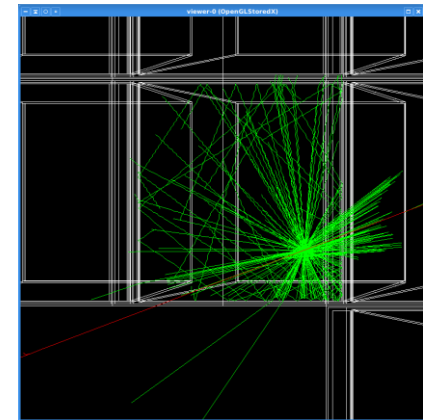
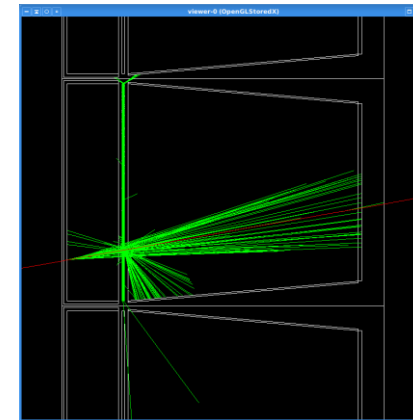
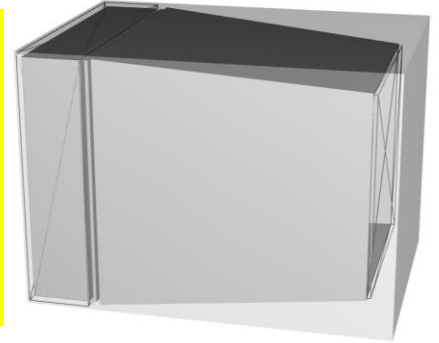
3. Platform for communications

- Status updates on software for each PID detector are encouraged to be presented at PID meeting.
- Technical discussions with software experts will be done by private communications or take place at the software meeting

➤ DAQ Contact: TBD

Example:
mRICH implementation
is near completion
Whit Armstrong

<https://eicweb.phy.anl.gov/EIC/detectors/athena/-/issues/31>



Example: DIRC

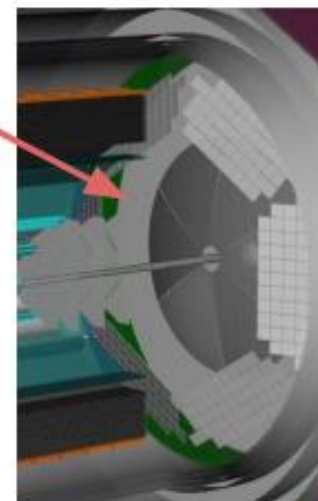
<https://eicweb.phy.anl.gov/EIC/detectors/athena/-/issues/32>

DD4HEP Minimal Implementation

PID WG

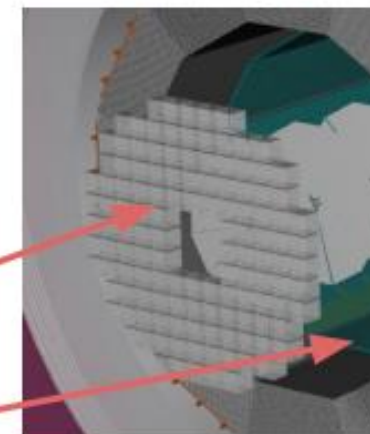
- dRICH (Christopher Dilks, Chao Peng)
 -  functioning fuzzy-K ring-clustering
 -  geometry being adjusted by Christopher
 -  have field maps for both magnet setups
- mRICH (Murad Sarsour, Whitney Armstrong)
 -  received baseline realistic geometry (implemented in fun4All) from Murad
 -  implement realistic detector in DD4hep (90% complete)
- DIRC (Grzegorz Kalicy, Dmitry Romanov)
 -  simplified geometry
 -  implement realistic detector in DD4hep
- TOF (Zhenyu Ye)
 -  LGAD implementation with realistic services

gas-RICH starting
point for dRICH
implementation



LGAD
implementation
ongoing (Zhenyu)

mRICH geometry
changing quickly



DIRC needs the
most work

PID delegate: Zhenyu Ye
S&C WG contact: Dmitry Romanov

5

Backups

Spec Sheet Progress

	Contact	Email Specs	Wiki Specs
mRICH	Murad Sarsour	YES	Soon
dRICH	...TBD...		Soon
DIRC	Greg Kalicy/Jo Schwiening	Developing	Soon
TOF	Wei Li	Developing	Soon