

# PID WG Update

conveners: Roberto Preghenella (INFN Bologna), Tom Hemmick (SBU), Frank Geurts (Rice Univ.)

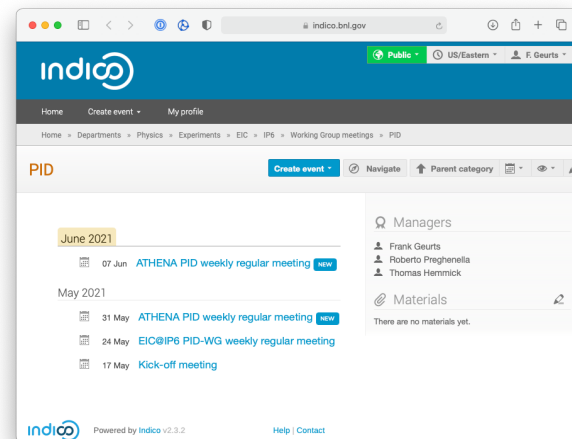
ATHENA Monthly Meeting – June 3, 2021

# Update since last meeting

➤ **PID Working Group has met weekly (May 17 - 31)**

Identified main detector proponents & gathering regular updates

B field impact on forward RICH performance	Chandray Chatterjee (INFN)	Estimate how the field lines of the IP6 proposed magnet affect PID performance in the forward RICH
Low-p TOF	Wenqing Fan (LBNL)	
Low momentum PID at High B-field (GridPix)	Prakhar Garg (SBU)	
mRICH	Murad Sarsour (GSU)	Simulation & performance studies
dRICH	Christopher Dilks (Duke)	Simulation & performance studies
DIRC	Joe Schwiening (GSI) Greg Kalicy (CUA)	Advice on design, simulation, performance issues
DAQ	Alexandre Camsonne (JLab)	Gathering DAQ requirements from PID WG
LGADs for TOF-PID	Wei Li (Rice)	simulation & performance studies, design, cost estimate etc.
SiPM for RICH optical readout	Roberto Preghenella (INFN)	R&D on SiPM as an option for the readout of the forward RICH
Pressurized argon for the gaseous RICH	Francesco Noto (INFN)	mechanical studies and simulations for a pressurized argon vessel for the forward gas RICH



## Kick-off Meeting

[https://docs.google.com/spreadsheets/d/12KuS04oyldH2t\\_LxmPhO9kwqJRWfeHVBjCpKDNXBt8/edit?usp=sharing](https://docs.google.com/spreadsheets/d/12KuS04oyldH2t_LxmPhO9kwqJRWfeHVBjCpKDNXBt8/edit?usp=sharing)

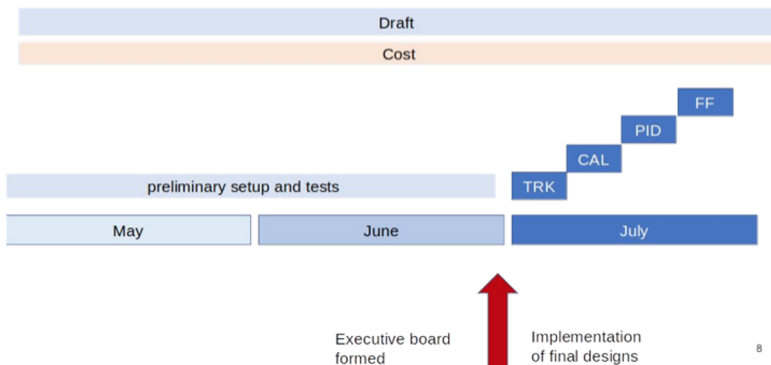
PID detector updates		
DIRC	mRICH	dRICH
GridPIX	TOF	LGAD

technology/implementation updates		
B Field maps	B-field impact on RICH	SiPM for RICH readout
Pressurized Ar	LAPPD	

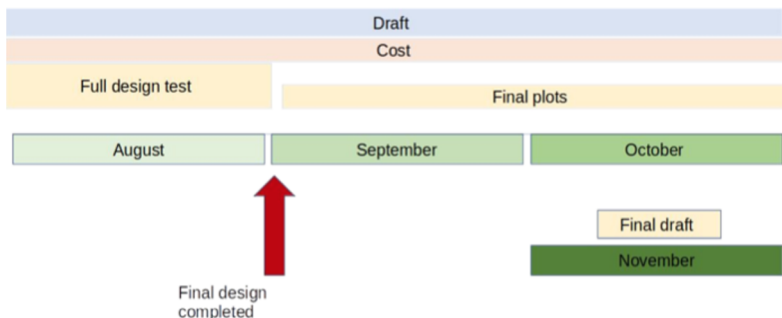
# Current Status & Plans

- weekly “flash” updates from all participants
    - incl. new ideas and developments
      - [GridPix](#), [SiPM](#), [LAPPD](#), [high pressure Ar](#)
    - most have been covered at least once
  - Performance in Magnetic Field
    - B-field maps available
    - impact on forward PID: [dRICH](#)
    - low-p TOF PID ([coordination w/ tracking](#))
    - impact on DIRC [pending more details on placement](#)
  - Software
    - implementations in (standalone) G4 ([DIRC](#), [mRICH](#), [dRICH](#))
    - implementations in fun4all (DIRC, LGAD, mRICH, dRICH); dd4hep ready?
  - DAQ
    - [request to provide #channels, data rates, etc.](#)
- **This month:**
- [converge on implementations of final designs](#)

## Timeline overview



## Timeline overview



# Reminder: PID requirements

## $3\sigma$ $\pi/K/p$ separation

- forward (p/A going): up to 50 GeV/c
- backward (e- going): up to 7 GeV/c
- central region: up to 10 GeV/c

## Challenges

- radiation hardness, B field, timing resolution
- material, integration, services, gaps
- simulation, performance
  - CAD vs. GEANT

## Detector techniques/technologies

- low  $p_T$ 
  - dE/dx (GridPix TPC)
  - TOF (LGAD)
- mid  $p_T$ 
  - quartz Cherenkov (DIRC)
  - aerogel Cherenkov (dRICH, mRICH)
- high  $p_T$ 
  - gas Cherenkov (dRICH)
- photodetectors
  - SiPM
  - LAPDD
  - MCT-PMT