

Work in progress – 10/17/2022

- **R&D**
 - FY22 Report and FY23 Proposal <https://wiki.bnl.gov/conferences/index.php/ProjectRandDFY23>
 - DAC Meeting Oct 19-21, 2022 <https://indico.bnl.gov/event/17159>
 - Oct 19: EIC project update 9:30-10:15am EDT, Update on EPIC 10:15-11:15am EDT
 - Oct 20: **eRD112 10:10-10:40am EDT**
 - Oct 21: **eRD109 10:00-10:30am EDT**, Close-Out on Oct 21 12:30-13:15pm EDT
- **Project Engineering and Design (PED)**
 - Prepare the request <https://www.overleaf.com/read/vftxyvjtjrjrp>
- **Integration**
 - First meeting on Sep 30 with project office and engineer team: <https://indico.bnl.gov/event/17336/>
 - Define TOF services (p3-5) https://wiki.bnl.gov/EPIC/index.php?title=Project_Information#Documents%3A
- **Simulation and Reconstruction**
 - Update TOF geometry in DD4HEP
 - Detailed Barrel and simplified Endcap TOFs (8%X₀ Silicon) by Zhenyu
 - Detailed Forward TOF done by Nicholas
 - Include TOF in tracker assembly in DD4HEP
 - Detailed Barrel and simplified Endcap TOFs by Zhenyu [#154](#)
 - Problem arises when including the detailed Forward TOF from Nicholas – to be investigated [#191](#)
 - Include TOF hits in EICrecon tracking
 - Done with the help of Dmitry Ramonov [#173](#)
 - Create TOF PID reconstruction
 - In progress with the help of Dmitry [#201](#)

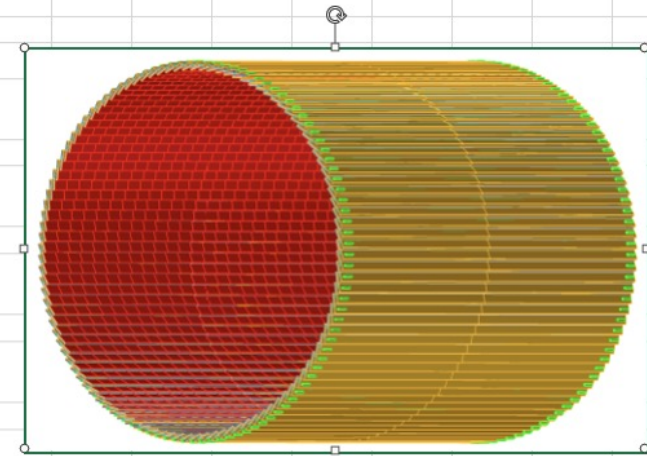
Barrel AC LGAD Services

Details can be found at <https://indico.bnl.gov/event/17336/>

Assume 0.5*10 mm² strips

Cables, Fibers, etc.

Item	Description	Quantity	Diameter	Estimated Length	Notes	Tray Rated? (Y/N)	Cable Rating	Responsibility
LV	FEE low voltage	288*2	TBD	TBD	Low voltage from FEE to Rack	Y	--	--
HV	Sensor bias voltage	288*2	TBD	TBD	High voltage from sensor to Rack	Y	--	--
Fibre	Readout I/O	144*2	TBD	TBD	Optical link from FEE to Rack	Y	--	--



Cooling, etc.

Item	Description	Quantity	Diameter	Estimated Length	Notes	Tray Rated? (Y/N)	Cable Rating	Responsibility
Cooling tube	Aluminum	144*2	0.5 cm	TBD	between cooling manifold and detector module	--	--	--
Cooling tube	Stainless Steel	4*2	TBD	TBD	between cooling manifold and cooling system	--	--	--

Electron Side AC-LGAD ToF Services

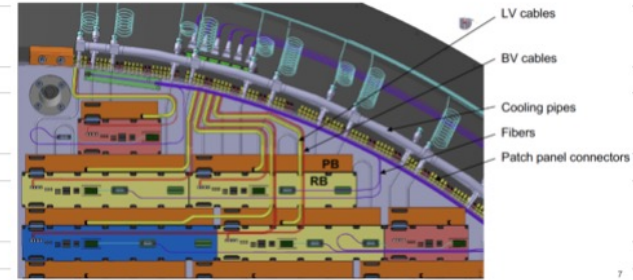
Details can be found at <https://indico.bnl.gov/event/17336/>

Assume 0.5*0.5 mm² pixels

Cables, Fibers, etc.

Item	Description	Quantity	Diameter	Estimated Length	Notes	Tray Rated? (Y/N)	Cable Rating	Responsibility
LV	FEE low voltage	248	TBD	TBD	Supply+Return LV from FEE to Rack	Y	--	--
HV	Sensor bias voltage	248	TBD	TBD	Supply+Return HV from sensor to Rack	Y	--	--
Fibre	Readout I/O	124	TBD	TBD	Optical link from FEE to Rack	Y	--	--

Service routing in CMS ETL



Cooling, etc.

Item	Description	Quantity	Diameter	Estimated Length	Notes	Tray Rated? (Y/N)	Cable Rating	Responsibility
Cooling tube	Stainless Steel	8	TBD	TBD	between disk and cooling system	--	--	--

Hadron Side AC-LGAD ToF Services

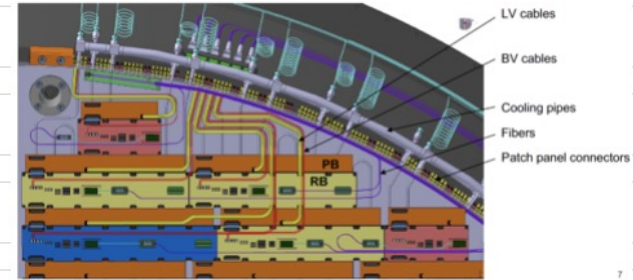
Details can be found at <https://indico.bnl.gov/event/17336/>

Assume 0.5*0.5 mm² pixels

Cables, Fibers, etc.

Item	Description	Quantity	Diameter	Estimated Length	Notes	Tray Rated? (Y/N)	Cable Rating	Responsibility
LV	FEE low voltage	424	TBD	TBD	Supply+Return LV from FEE to Rack	Y	--	--
HV	Sensor bias voltage	424	TBD	TBD	Supply+Return HV from sensor to Rack	Y	--	--
Fibre	Readout I/O	212	TBD	TBD	Optical link from FEE to Rack	Y	--	--

Service routing in CMS ETL



Cooling, etc.

Item	Description	Quantity	Diameter	Estimated Length	Notes	Tray Rated? (Y/N)	Cable Rating	Responsibility
Cooling tube	Stainless Steel	4*2	TBD	TBD	between disk and cooling system	--	--	--

FY23 Planning

[1] <https://wiki.bnl.gov/EPIC/index.php?title=TOFPID>

[2] <https://wiki.bnl.gov/conferences/index.php/ProjectRandDFY23>

Simulation [1]

- DD4HEP geometry, digitization, reconstruction
- Spatial resolution requirement
- Timing resolution requirement
- Material budget requirement

Project Engineering and Design (PED) - TBD

- Mechanical engineering
 - Endcap TOF
 - Barrel TOF
 - Cooling system
- Electric engineering
 - Precision clock distribution (<5 ps)
 - Prototype readout board, cable

eRD112 [2]

- Sensor (382k\$)
 - BNL, HPK/FBK productions
 - Lab/beam test, Irradiation
- Sensor/ASIC integration (45k\$)
 - Interposer
- Mechanical structure (\$35k)
 - Low-density mechanical structure

eRD109 [2]

- ASIC (148k\$)
 - EICROC1, FCFD1, SCIPP
- Frontend electronics (119k\$)
 - Timing chips and streaming readout
 - Barrel/Endcap TOF Hybrids