

Call for FY24 R&D Proposals on May 8, 2023

Dear current and future R&D participants,

It is time to discuss the next steps in our path, i.e., the FY24 projects. We are trying to get the R&D program fully in sync with the FY boundaries.

Proposals

1. Please submit your proposals and progress reports (where applicable) to us by July 7, 2023. We aspire to have a DAC meeting well in time to prepare for contracts at the beginning of FY24.
2. We expect progress report from all ongoing projects eRD101 to eRD113. What milestones were achieved. How did our understanding improve. What is left to do?
3. eRD102, eRD103, eRD104, eRD106, eRD107, eRD108, eRD109, eRD110, eRD111, eRD112, and eRD113 may submit continuation proposals if and only if technical risk milestones remain.

These new proposals should be relatively straightforward to write. Keep them short and concise. List whatever technical risks remain, the milestones, deliverables, and two money matrices showing cost/item and funding/institution to close those remaining risks. Also list the representatives for each institution. List all participating members and institutions on the front page. Please also give, if applicable, an outlook for the years past FY24.

Be aware that R&D should not be mixed with PED. If you are not sure, talk to us. The proposals should concentrate on detector R&D tasks that mitigate project detector technical, risk.

DAC Review Meeting

With the project detector R&D expected to dwindle down at CD-2, we will limit the meeting to a two-day review meeting in the July-August period. The FY24 proposal goals of all continuation projects should be presented as well as a short status report of all FY22/FY23 proposals. More details on this meeting will be announced soon.

Best regards,
Elke, Rolf, and Thomas

AC-LGAD R&D FY23 Deliverables

- Sensor prototype with 30 ps time and spatial resolution match RPs and Tracker;
Sensor prototype with 20 ps time resolution for ToF.
- 1st sensor + ASIC demonstrator for EIC applications and testing with particle beam.
- 2nd ASIC prototype submissions with better performance and extended features.
- ~~Irradiation campaign for sensor and ASIC prototypes.~~
- Design and prototype of flexes, ~~interconnects and off-detector electronics.~~
- Design and prototype of light-weight structure with embedded cooling tubes.

eRD112

- Sensor R&D
 - TCAD simulation
 - BNL, HPK productions
 - Lab/beam/irradiation
- Sensor/ASIC integration
 - Interposer
- Module structure
 - Light-weight structure

eRD109

- Frontend ASICs
 - EICROC
 - FCFD
 - SCIPP (FAST, ASROC, HP-SoC)
- Frontend electronics
 - Low-mass flexible PCB

Project Engineering Design

- Mechanical engineering
 - Mech. support, integration
 - Cooling system
- Electric engineering
 - Clock distribution system
 - Streaming readout
 - Service hybrid

FY23 Report and FY24 Proposal Writing

As discussed last week, I suggest that we follow the same procedure as last year, namely to use overleaf to collect all the inputs, and consolidate into a single document for our FY23 report and FY24 proposal. I have created an overleaf project. Below is the link for viewing

<https://www.overleaf.com/project/646c69b5b97ef76a1d135ed5>

If you would like to contribute to writing (e.g. what your group did in FY23, what you would propose to do in FY24 etc), please let me know your overleaf account. **Please complete the editing before June 20.**

P.S. our proposals from the last two years can be found at

<https://wiki.bnl.gov/conferences/index.php?title=Proposals>

Meeting Agenda – 6/20/2023

eRD112/LGAD Consortium Meeting



Tuesday 20 Jun 2023, 09:00 → 13:15 US/Eastern

Alessandro Tricoli (Brookhaven National Lab) , Wei Li (Rice University) , Zhenyu Ye (University of Illinois at Chicago)

Description This is a joint meeting of the eRD112 and the LGAD Consortium

Zoom Meeting

<https://uic.zoom.us/j/82195681594?pwd=V3JXdHZQbE5vMVIKS045SHphSWdSdz09>

Meeting ID: 821 9568 1594

Passcode: eRD112LGAD

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|--|---------|---|-------|--|
| 09:00 | → 09:10 | News | 🕒 10m | |
| Speakers: Alessandro Tricoli (Brookhaven National Lab), Wei Li (Rice University), Zhenyu Ye (University of Illinois at Chicago) | | | | |
| 09:10 | → 09:30 | First Results on HPK Sensors | 🕒 20m | |
| Speaker: Christopher Madrid | | | | |
| 09:30 | → 09:45 | TCAD Simulation Studies by SCIPP | 🕒 15m | |
| Speaker: Simone Mazza (University of California - Santa Cruz) | | | | |
| 09:45 | → 10:00 | Updates on ASICs by SCIPP | 🕒 15m | |
| Speaker: Jennifer Ott (University of California, Santa Cruz (US)) | | | | |
| 10:00 | → 10:50 | FY23 Report and FY24 Proposal Discussion | 🕒 50m | |
| Speaker: Eric Renner (Los Alamos National Laboratory) | | | | |

Upcoming Reviews

- **Preliminary Design Status Review ePIC PID detectors** **July 5-6, 2023**
- **DAC Meeting(s): R&D (2 days) and technical design review (2 days)** **Late Summer/Fall 2023 (TBD)**
- **Final Design Review for LLPs of Detector** **September 2023**
- **CD-3A Director's Review** **October 10-12, 2023**
- **DOE CD 3A OPA Review** **November 2023**
- **DOE CD 3A ESAAB Approval** **January 2024**
- **Final Design Reviews for all ePIC subsystems** **April – October 2024**
- **DOE CD 2/3 OPA Review and ICR** **January 2025 (TBC)**
- **DOE CD 2/3 ESAAB Approval** **April 2025**

AC-LGAD R&D FY23 Deliverables

- Sensor:
 - prototype with 30 ps time and spatial resolution match RPs and Tracker;
 - prototype with 20 ps time resolution for Forward ToF;
 - prototype with 20 ps time resolution for Barrel ToF.
 - Check the performance of the sensors after irradiation
- ASIC: EICROC FCFD SCIPP
 - 1st sensor + ASIC demonstrator for EIC applications and testing with particle beam;
 - 2nd ASIC prototype submissions with better performance and extended features
- Design and prototype of flexes
- Design and prototype of light-weight structure with embedded cooling tubes.

eRD112

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AC-LGAD R&D FY24 Goals

- Sensor:
 - Optimize strip sensor design for better timing resolution (BNL/HPK)
 - Explore larger pixel size for FTOF (and FF?) for reduced number of channels (BNL/HPK)
 - Double metal layer strip sensor (BNL?)
 - Determine the appropriate sensor size for detector module assembly (HPK)
- ASIC:
 - (Submission and) testing of EICROC0_1, submission of EICROC1 (OMEGA/IJCLab)
 - (Submission and) testing of FCFDv1, submission of FCFDv2 (FNAL)
 - ... (SCIPP)
- Sensor-ASIC integration:
 - How to connect pixelated ASIC with strip sensor, or with pixelated sensor with different pitches
- Flex
 - Produce module size functional prototype for bias sensor and reading out ASICs (ORNL)
- Detector Module
 - BTOF module design and prototype (Purdue/NCKU/...)
 - FTOF module design and prototype (Purdue/NCKU/...)
- Frontend Electronics
 - ... (BNL/ORNL/Rice/...)

Institution	Contact	R&D Interest
Brookhaven National Laboratory	Alessandro/Zhangbu	Sensor prototyping, ASIC testing, Electronics development
Fermi National Accelerator Laboratory	Artur Apresyan	Sensor testing, ASIC prototyping
Los Alamos National Laboratory	Xuan Li	Sensor testing
Rice University	Wei Li	Sensor testing, Electronics development
Oak Ridge National Laboratory	Oskar Hartbrich	Sensor testing, ASIC testing, Electronics development
Ohio State University	Daniel Brandenburg	Electronics testing
Purdue University	Andreas Jung	Mechanical structure and cooling system prototyping
University of California, Santa Cruz	Matthew Gignac	Sensor testing, ASIC testing
University of Illinois at Chicago	Zhenyu Ye	Sensor testing, sensor-ASIC integration, ASIC testing
Hiroshima University	Kenta Shigaki	Sensor prototyping and testing
RIKEN	Yuji Goto	
Shinshu University	Kentaro Kawaide	
University of Tokyo	Taku Gunji	
South China Normal University	Shuai Yang	
Univ of Science and Technology of China	Yanwen Liu	Sensor prototyping, Electronics development
Indian Institute of Technology, Mandi	Prabhakar Palni	Sensor testing
National Inst. of Sci. Education Research	Ganesh Tambave	Sensor prototyping and testing
National Cheng-Kung University	Yi Yang	Mechanical structure prototyping
National Taiwan University	Rong-Shyang Lu	Sensor prototyping, ASIC testing, Electronics testing