

LGAD Consortium for EIC

Alessandro Tricoli (BNL)
Wei Li (Rice)

LGAD Consortium Meeting, February 3rd , 2021

Landscape

- There have been tremendous interests in ultra fast silicon detector and/or LGADs in recent years
- LGADs are being used at the HL-LHC for pileup mitigation, TOF-PID
- Several ideas and proposals have been put forward for detectors that use LGAD-based technologies at EIC and other future projects
- Being the next major collider, the EIC is a stepping stone for establishing a generic consortium to foster the technology for future applications (TOF, 4-D tracking, Roman Pots etc.)
- Comments from EIC Detector Advisory Committee on eRD24,29:
 - *“It would appear natural, and beneficial overall, to see EIC LGAD-based efforts to form a consortium (like silicon tracking with MAPS) sooner rather than later. The Committee would look with approval on such convergences.”*
- LGADs are relatively new and need a collaborative effort to make them ready for use at EIC in a short time scale
- There is a broad spectrum of expertise in HEP, high-and medium energy NP!

The LGAD Consortium Goals

- **Create a collaborative effort to develop EIC detector technologies based on the LGAD sensors**
 - Bring together people with common interest in LGAD-based detectors in HEP and NP communities
 - Share expertise on the common aspects of the underlying technology that transcend any specific detector realisation
 - NB: the consortium does not intend to replace the collaborative effort of a detector project, but supplement it, in order to study common challenges and possibly develop common solutions across different detector projects
- **On a longer term this consortium will be a stepping stone for other, longer-term applications of LGADs**

Participating Institutes and People

- **Submission of EOI for EIC detectors based on LGADs on Oc. 30th, 2020**
 - [LINK](#)
 - 14 Institutes, 33 people
- **Interests in different detector concepts**
 - TOPSiDE
 - 4pi Hybrid LGAD/SOI Tracker
 - Generic 4D Tracker
 - TOF
 - Roman Pots
 - Preshower
- **Interests and expertise in several different areas**
 - Sensors
 - Electronics
 - System Design, Engineering and Construction

Expression of Interest (EOI): Fast timing silicon detectors for EIC detectors

Artur Apresyan^d, Whitney Armstrong^a, Elke-Caroline Aschenauer^b, Mathieu Benoit^b, Carlos Munoz Camacho^f, Janusz J. Chwastowski^e, Olga Evdokimov^m, Salvatore Fazio^b, Frank Geurts^j, Gabriele Giacomini^b, Sylvester Joosten^a, Alexander Kiselev^b, Wei Li (contact)^l, Xuan Li^g, Constantin Loizides^l, Jessica Metcalfe^a, Zein-Eddine Meziani^a, Rachid Nouicer^b, Christophe Royonⁿ, Hartmut Sadrozinski^l, Bruce Schumm^l, Abe Seiden^l, Laurent Serin^f, Rafał Staszewski^e, Stefania Stucci^b, Jacek Świerblewski^e, Christophe de la Taille^c, Daniel Tapia Takakiⁿ, Alessandro Tricoli (contact)^b, Maciej Trzebiński^e, Cinzia Da Via^k, Bolesław Wysłouch^b, and Zhenyu Ye^m

- Argonne National Lab (ANL)
- Brookhaven National Lab (BNL)
- Organisation de Micro-Électronique Générale Avancée (OMEGA), Ecole Polytechnique
- Fermi National Lab (FNAL)
- Institute of Nuclear Physics Polish Academy of Sciences (IFJ PAN)
- Laboratoire de Physique des 2 Infinis Irène Joliot Curie (IJCLAB)
- Los Alamos National Lab (LANL)
- Massachusetts Institute of Technology (MIT)
- Oak Ridge National Lab (ORNL)
- Rice University (Rice)
- Stony Brook University (Stonybrook)
- University of California, Santa Cruz (UCSC)
- University of Illinois, Chicago (UIC)
- University of Kansas (KU)

EIC Timeline Overview

- **The EIC is capable of supporting a science program that includes two detectors and two interaction regions, but Project has only funding for one full IR and one Detector**
 - \$200M on detector project and an assumed \$100M (US accounting) in-kind contributions
- **A second IR and detector within the same timeline is desirable, and will depend on the EoI outcome**
- **General-purpose detector must deliver on the promised EIC science**
 - Design must be able to do the EIC science
 - Detector must be buildable in the EIC Project timeline
 - Detector technologies must have reasonable risk
- **Timeline** (driven by CD schedule - have one detector constructed by CD-4)
 - **March 2021**: Start call for Detector Proposals
 - **September 2021**: Deadline for Detector Proposals
 - **December 2021**: Selection of Detector(s)

Reference: <https://indico.bnl.gov/event/9080/contributions/41435/attachments/30459/47756/Detector.Plans.final.pdf>

This Meeting

Goals of this meeting:

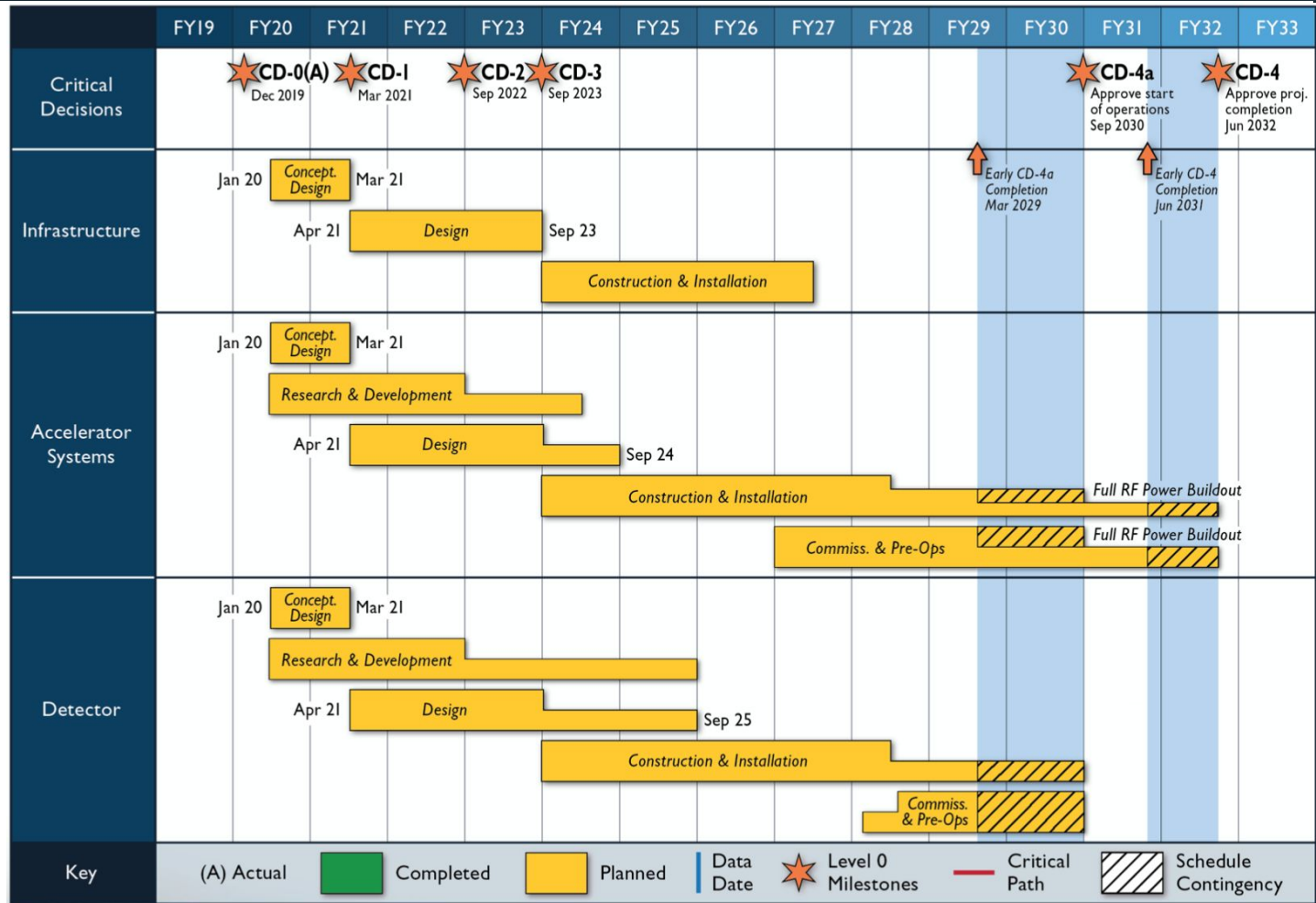
- **Present detector proposals that plan on using LGADs as main sensor technology**
 - Outlines of detector concepts
 - Status of activities
- **Inform about interests and expertise from participating institutes**
 - EIC project interests
 - Relevant areas of interest (sensor R&D, testing, electronics, assembly/integration, mechanical design, others)
 - Equipment available
- **Clarify timeline and upcoming deadlines/milestones for EIC**
- **Prepare future activities, based on specific interests by participating institutes**

Next Steps

- **Based on input and feedback from today's meeting we should plan for closer and stronger collaborations to facilitate activities across the various detector proposals**
- **Arrange discussions focus on specific common aspects**
 - Sensor R&D (ultimate timing performance, space+timing sensors - TI/AC-LGADs, testing)
 - Electronics (test-boards, ASICs, data transmission, clock distribution, offline electronics)
 - System Design and Mechanical Engineering (e.g. mechanical designs, cooling etc.)
- **Intention is not to proliferate meetings, but to create fora for targeted technical discussions bringing together experts and discuss common challenges and possible solutions**

Backup

Timeline



Reference:

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