



Electron Injection Line

E I C

Charting a course to the 2nd Detector and Interaction Region

July 28, 2022

Possible Detector Location

Possible Detector Location

Electron Injector

Reminder of last quarterly meeting.....

Comments from the DPAP report

- “A strong case for *two complementary general-purpose detectors* has been made during the panel review”
- “...requires a *well-chosen balance between optimization as general-purpose detector versus partial specialization* and the ability to cross check the other detector for a broad range of measurements. The design of a second detector should be chosen with these criteria in mind.”
- “The time required for its design and construction may offer *opportunities for benefiting from technological progress.*”
- “As laid out in the section 2.1 on physics performance, *an IR with a secondary focus can significantly broaden the physics scope and output of the EIC.*”

Summary slide from March Quarterly Meeting

- The case for complementarity for Detector II can only be fully developed as the project detector comes into focus – need to allow some time for what is now EPIC to come into focus.
- Plan to resume 2nd detector discussions in full at summer EICUG meeting



Path forward for Detector II/IP8

With a clear mandate from DPAP and the EICUG to support and organize a Detector II/IP8 effort, the SC held discussions with Project, Detector I and CORE leadership. We agreed to form a dedicated working group that would address the following charge:

1. Engage the broader community, **including theorists, accelerator physicists and Detector I experimentalists**, to fully develop projections for the portfolio of measurements that are complementary to the Detector I physics program, including those that capitalize on the implementation of the secondary focus.
2. Work with the EICUG Steering Committee and Project to **recruit new institutions** and establish a diverse and vibrant 2nd Detector working group.
3. Utilize the extended design period for Detector 2 to identify groups that will focus on **R&D for emerging technologies** that could provide another aspect of complementarity to Detector 1.
4. Facilitate the development of a **unified concept** for a general-purpose detector at IR8. In particular, the 2nd detector should be complementary to the project detector at IR6 and may capitalize on the possibility of a secondary focus at IR8.

Path forward for Detector II/IP8

Who should convene this group?

- Highly motivated people who are dedicated to the Detector II/IP8 effort
→ **call for volunteers**
- Conveners should represent the interested parties CORE, labs and those involved in "Precision Studies of QCD in the Low Energy Domain of the EIC" initiative
→ **goal is one unified concept**
- Conveners should represent the people we want (need!) to engage in the broader effort, including theorists, accelerator physicist and experimentalists from across the EICUG
→ **conveners need to build the community that realizes this effort**
- Draw on experience from Yellow report working group – balance experienced, established conveners with the energy and focused expertise of early career physicists.

Detector II/ IP8 Working Group Conveners

- Sangbaek Lee *ANL/MIT*
- Simonetta Liuti *University of Virginia*
- Pawel Nadel-Turonski *Stony Brook University*
- Thomas Ullrich *BNL/Yale*
- Anselm Vossen *Duke*
- Walter Wittmer *JLAB*



2nd Detector + IR Workshop Series

- Several proposals were submitted to CFNS for workshops related to the 2nd IR and Detector
- One of the first tasks of the Detector II WG will be to work with CNFS and the proposers to consolidate and organize a single workshop series.
- These workshops should:
 - Explore the complementarity between the EIC Project Detector and a 2nd Detector at IR8.
 - Promote use of the generic R&D fund to explore and develop new and detector technologies for Detector II
- Stay tuned: <https://www.stonybrook.edu/cfns/activities/conferences>

2nd Detector and IR Brochure

The Electron-Ion Collider – The Benefits of Two Detectors

The Electron-Ion Collider's Golden Opportunity for Two Detectors

- Taking Advantage of the RHIC/EIC Collider Layout
- Detector Redundancy and Complementarity
- Lessons from History

Sidebar on how science discovery relies on independent experimental confirmation

A Gateway to Innovation and International Collaboration

- Two Detectors are More than 1+1
- The Path to New Ideas

Sidebar on Radiation Therapy – Pushing the Envelope of Nuclear Physics Technology

- A Long-Term Investment in a Country's Vitality

Brochure is eight pages, folds in input from 10 external readers from around the globe, some with ties to international agencies, as well as BNL and JLAB media departments. Copyrights have been obtained for all figures and final printed version is being distributed to international points-of-contact.



The Electron-Ion Collider (EIC) is a transformational and unique accelerator that will enable studies of nuclear matter with unprecedented precision. The EIC is required to address fundamental open questions in physics, such as the origin of mass and spin of protons and neutrons, the details of the "glue" that binds them, and the nature of very dense gluon systems in nuclei. This ambitious collider could

not deliver physics results without powerful "cameras" capable of taking the most detailed snapshots of the collisions produced at the EIC. Novel particle detectors must be designed and constructed to capitalize on the investment made on the accelerator side, so that the deepest secrets of the building blocks of matter in our visible universe may be unlocked.

Moving forward

- A new working group, focused on the development of a 2nd Detector and IR8 has been formed.
- The conveners of this group are starting to organize. Meeting times and agendas will be made public soon.
- Stay tuned for the announcement of a workshop series dedicated to the 2nd Detector and IR.
- Ask your IB rep for a pdf of the 2nd Detector and IR Brochure. Follow up with the point-of-contact at your funding agency for further discussions about support for this effort.