

Call for Collaboration Proposals for Detectors at the Electron-Ion Collider

Brookhaven National Laboratory (BNL) and the Thomas Jefferson National Accelerator Facility (JLab) are pleased to announce the Call for Collaboration Proposals for Detectors to be located at the Electron-Ion Collider (EIC). The EIC will have the capacity to host two interaction regions, each with a corresponding detector. It is expected that each of these two detectors would be represented by a Collaboration.

Detector 1 is within the scope of the EIC project and should be based on the “reference” detector described by the EIC User Group (EICUG) in the Yellow Report (YR) and included in the EIC Conceptual Design Report (CDR). This detector must satisfy the requirements of the EIC “mission need” statement based on the EIC community White Paper and the National Academies of Science (NAS) 2018 report. US Federal funds are expected to support most but not all of the acquisition of Detector 1. It is currently planned to be located at Interaction Point 6 (IP6) on the Relativistic Heavy-Ion Collider.

Detector 2 could be a complementary detector that may focus on optimizing particular science topics or address science topics beyond those described in the White Paper and the National Academies of Science (NAS) 2018 report. Detector 2 would reside at a different Interaction Point from Detector 1 and is currently not within the EIC project scope. Routes to make Detector 2 and a second interaction region possible are being explored.

Collaboration proposals made in response to this call could relate to either Detector 1 or Detector 2. Proposals should consider the siting scenario for the detectors described in the CDR. Other options are welcome but proposals that deviate from the CDR will need to address the implications to the EIC project. For reference, proposals should utilize information in the CDR, EICUG YR, and the posted Expressions of Interest as background information. References are listed below.

The separate guidance for each detector is as follows:

- **Detector 1 Collaboration Proposals:** Experiments must address the EIC White Paper and NAS Report science case. The collaboration should propose a system that meets the performance requirements described in the EIC CDR and EICUG YR. The design should be compatible with that of the accelerator and interaction region layout of the CDR. Completion of detector construction must be achieved by Critical Decision (CD)-4A, the start of EIC accelerator operations.
- **Detector 2 Collaboration Proposals:** Experiments should address science goals described in the EIC White Paper and possibly science beyond that and enable some complementarity to Detector 1. The Detector 2 interaction region design should be consistent with the accelerator design as detailed in the CDR, with perhaps some interaction region optimization. The detector design should allow for an estimated construction schedule compatible with achieving detector completion by CD-4 (which

follows CD-4A). Note: Currently, the EIC project scope does not include the construction of Detector 2 or the accelerator components needed for the second interaction region.

The Proposals should include two parts:

- 1) A description of the science addressed and performance estimated through simulation including, but not limited to, e/γ , jets, $\pi/K/p$ separation, vertex, and tracking, and how the simulated performance compares to the requirements detailed in the YR. The realization of the conceptual detector design given the technology choices, the R&D needs, risks, and, if applicable, adoption of emerging new technologies.
- 2) A collaboration roster and structure, timescale and cost (including potential sources of funding sources and assumptions), and potential upgrade paths.

If possible, the proposal should not exceed 60 pages, 40 pages for the first part and 20 for the second.

BNL and JLab will co-organize a scientific-technical committee of renowned and independent subject matter experts to evaluate the proposals. This will include a scientific evaluation, risk, cost, and schedule of the proposed experiment. The EIC Detector Advisory Committee will be asked to provide input on detector technology, design choices, and collaboration strength. Based on the proposals received, this committee will advise BNL, JLab, and the EIC project leadership on how to realize an optimal set of experimental equipment at the EIC.

In coordination with the EIC User Group, the two laboratories and the EIC project will consider convening some workshops and organizational meetings to facilitate discussions and collaborations and provide additional information and support.

The Collaboration proposals should be submitted by December 1, 2021. A link to upload the proposals will be made available at: <https://www.bnl.gov/eic/>. Questions and requests for additional information should be sent to this e-mail list: eic-call-det-proposal-l@lists.bnl.gov.

References:

- 1) Frequently Asked Questions:
<https://indico.bnl.gov/event/10974/contributions/46304/attachments/32994/52822/FAQ.pdf>
- 2) EIC White Paper: <https://arxiv.org/pdf/1212.1701.pdf>
- 3) NSAC Long Range Plan: <https://www.osti.gov/biblio/1296778-reaching-horizon-long-range-plan-nuclear-science>
- 4) NAS Report: <https://www.nap.edu/catalog/25171/an-assessment-of-us-based-electron-ion-collider-science>
- 5) Call for Expressions of Interest: <https://www.bnl.gov/eic/EOI.php>. For the direct link to the received input see <https://indico.bnl.gov/event/8552/>
- 6) EICUG Yellow Report: <http://www.eicug.org/web/documents/public>

- 7) Conceptual Design Report: https://www.bnl.gov/ec/files/EIC_CDR_Final.pdf
- 8) EIC Reference Schedule:
https://indico.bnl.gov/event/10974/contributions/46316/attachments/32970/52789/EI_C.Schedule.pdf