The Science and Instrumentation of the Second Interaction Region for the EIC
IR2@EIC

Goals of the Workshop

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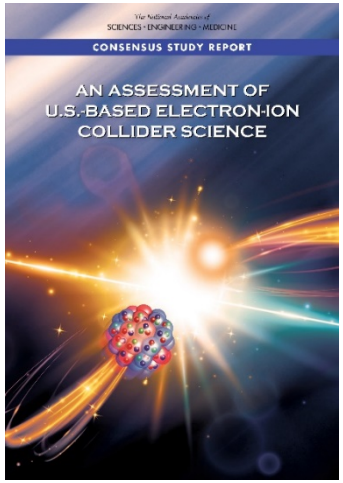
The first IR2@EIC workshop co-hosted by Argonne National Laboratory and the Center for Frontiers in Nuclear Science on March 17-19, 2021

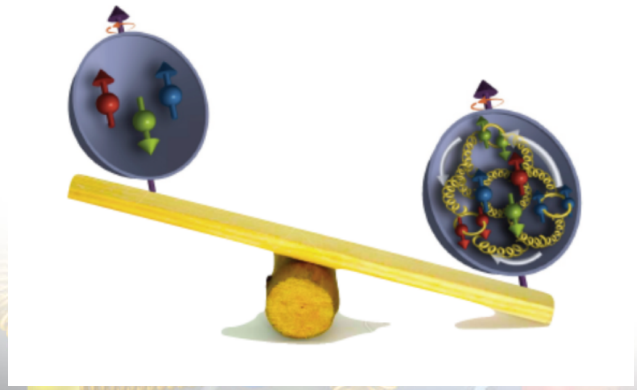
The Next Super High Power, High Energy Microscope: The Electron-Ion Collider

National Academy of Science Report: AN ASSESSMENT OF U.S.-BASED ELECTRON-ION COLLIDER SCIENCE



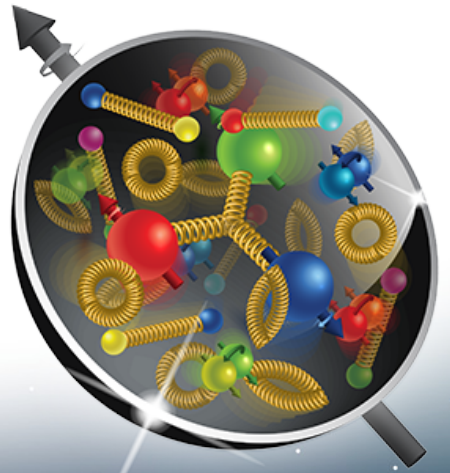
"An EIC can uniquely address three profound questions About nucleons—neutrons and protons—and how they are assembled to form the nuclei of atoms:

- **How does the mass of the nucleon arise?**
- **How does the spin of the nucleon arise?**
- **What are the emergent properties of dense systems of gluons?"**

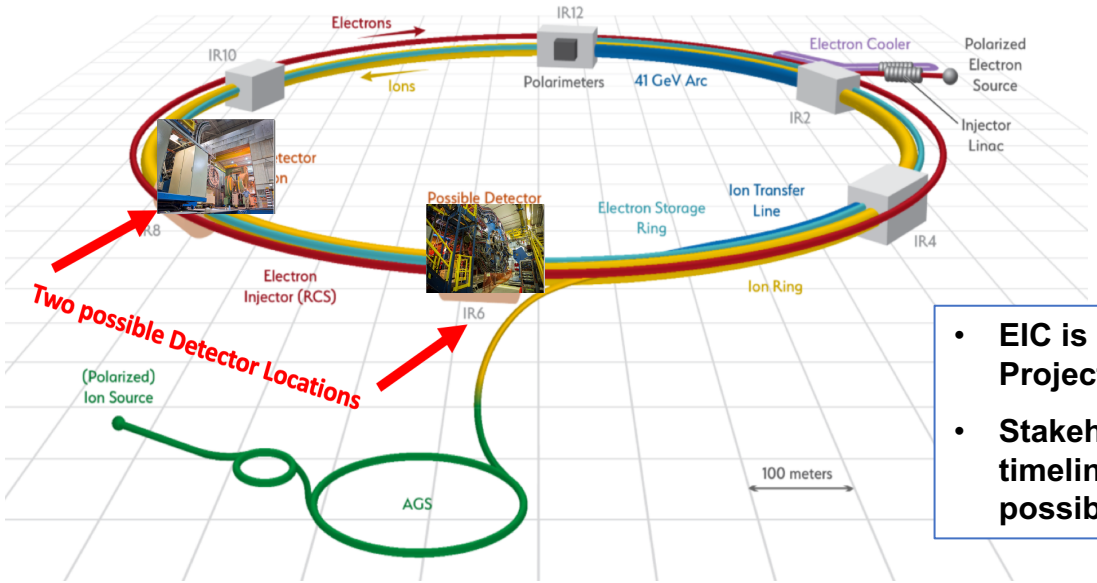


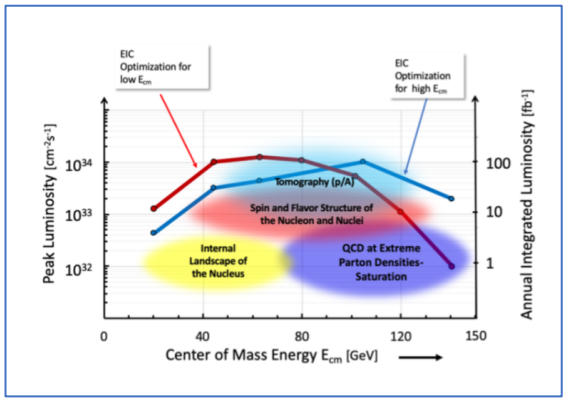
The EIC will be a unique facility on the frontier of nuclear science

The EIC will maintain excellence on the frontier of accelerator science and technology of colliders



EIC Electron & Ion Rings & Interaction Regions





- **EIC is capable of supporting two IRs and detectors. Project funding currently for one IR and one detector.**
- **Stakeholders agree that 2nd IR with detector of similar timeline as EIC is desirable and routes to making this possible are being explored.**

Today's Workshop is a step towards this goal and to further explore complementarity from the different performance of the two IRs (as in graph)

EICUG - Yellow - Report

~400 authors / ~150 institutions / ~900 pages with strong international contributions!

Yellow Report. (https://arxiv.org/abs/2103.05419)

Preparation for Call for Collaboration Proposals for Detectors

- **Detector 1** is within the scope of the EIC project and should be based on the “reference” detector and must address the EIC White Paper and NAS Report science case.

- **Detector 2** should address major parts of the science described in the EIC White Paper and **possibly science beyond that and enable some complementarity to Detector 1.**

Call for Collaboration Proposals for Detectors (https://www.bnl.gov/eic/CFC.php)

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Goals of the IR2@EIC Initiative

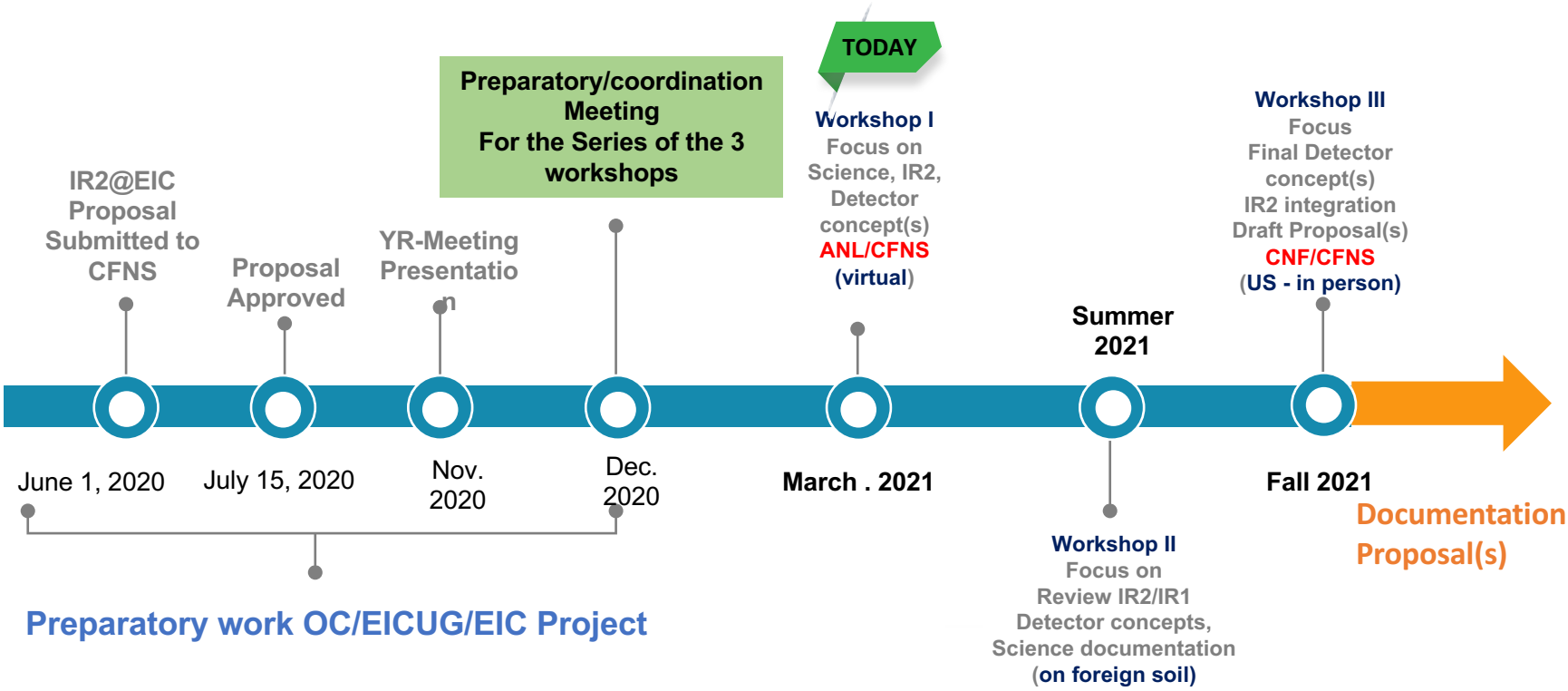
➔ **Optimize the science output and impact of the EIC:**

- **Primary interaction region optimized for high luminosity at CM energies > 80 GeV**
- **Optimize 2nd interaction region to emphasize high luminosity at lower to medium CM energies < 80 GeV**
- **Other ways of optimization may be explored as well**
- **Work with EIC Project and the community to achieve this optimization**

➔ **Scientific Output:**

- **Evaluate the evolving landscape of the EIC science**
- **Review complementary approaches for the overall optimization**
- **Drawing on the results of the Yellow Report initiative and of the EoI results**
- **Prepare White Paper with a detailed discussion of the conclusions reached**

IR2@EIC Series of Workshops - Timeline



Workshop Agenda

- **Science Case for IR2:**
  - Plenary Talks (3/17)
  - Physics Working Groups (3/18-19)
- **Complementarity and Detector Concepts** (3/17)
- **Accelerator and IR** (3/18)
- **Simulations and Software** (3/19)
- **Path forward to a detector concept for IR2** (3/19)

Agenda: https://indico.bnl.gov/event/10677/timetable/

The IR2@EIC workshops are EIC community driven aimed at defining and promoting a scientific program and instrumentation of the EIC with the goal to maximize its science output