

# Next Steps in Planning for the experimental equipment

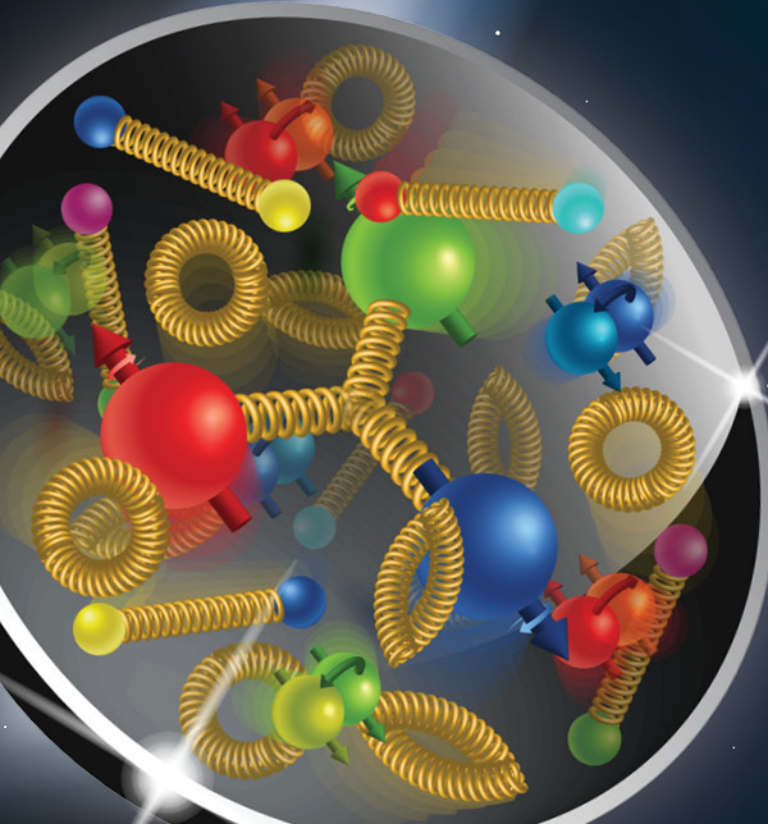
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Experimental Program

EIC-UG 4<sup>th</sup> YR Meeting

## Electron Ion Collider



# Expression of Interest

- Information of the call is online
- since end of May 2020 <https://www.bnl.gov/eic/EOI.php>
- **Deadline for EOI: November 1<sup>st</sup> 2020**

## What comes after:

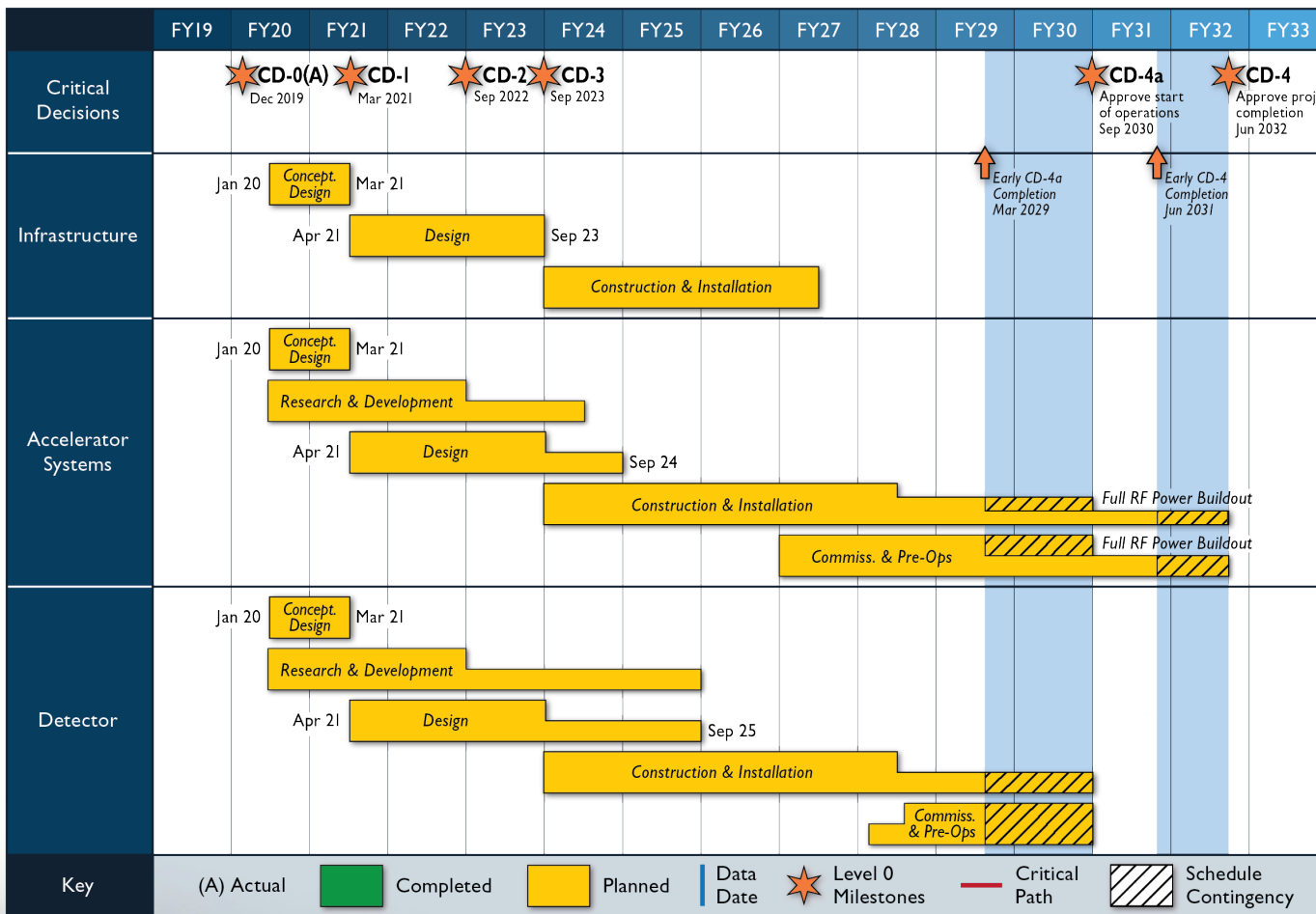
- Status report at 4<sup>th</sup> Yellow Report meeting at UCB/LBL Nov. 19-21 2020
- Assess EOI and inform Call for Detector Proposal(s) < February 2021
  - Evaluation by a team composed from:
    - Project management team
    - Members of the User Group, working with EICUG SC on how to do this
    - Advise from Detector Advisory Committee

## Remember:

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, with for the latter \$200M on project and an assumed \$100M (US accounting) in kind.
- this general-purpose detector must deliver on the promised EIC science.

# Timeline beyond Expression of Interest

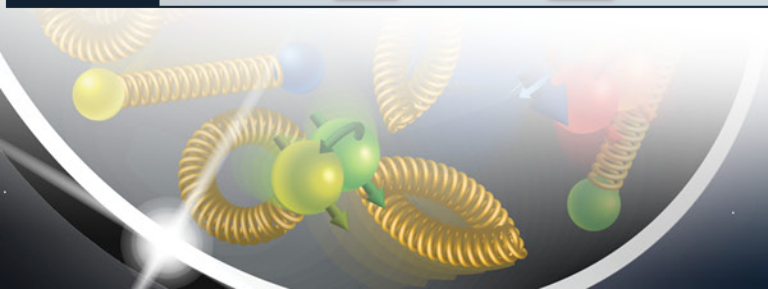


**March 2021:**  
Issue Call for Detector Proposals

**September 2021:**  
Deadline for Proposals

**December 2021:**  
Selection of Detector(s)

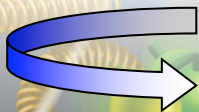
**Timeline driven by CD schedule**  
→ **have one detector constructed by CD-4**  
(and ready by CD-4a for early ops)



# Evaluation of Detector Proposals



- ❑ Currently collecting information from different facilities on what procedure they followed
  - CERN (LHC), RHIC, Tevatron, DESY, .....
  - take from every model the best
- ❑ Evaluation criteria
  - Design must be able to do the EIC science
  - Detector must be buildable in the EIC Project timeline
  - Detector technologies must have reasonable risk
  - .....
- ❑ Evaluation Committee
  - committee will likely be as follows
    - JLab and BNL Management
    - the EIC Project
    - Advise from Independent Science and Detector experts → equivalent to members on a PAC/DAC
    - members of the EICUG → working with EICUG SC on how to do this



**Will give regular updates to EICUG and ask for input following the approach for the EoI**

# Further detector (and IR!) planning

The **EIC** is capable of supporting a science program that includes **two detectors and two interaction regions**.

Dedicated Meetings: Dedicated session(s) on 2nd IR during YR Meeting November 2020

Topical week-long workshop on 2nd IR concepts early February 2021

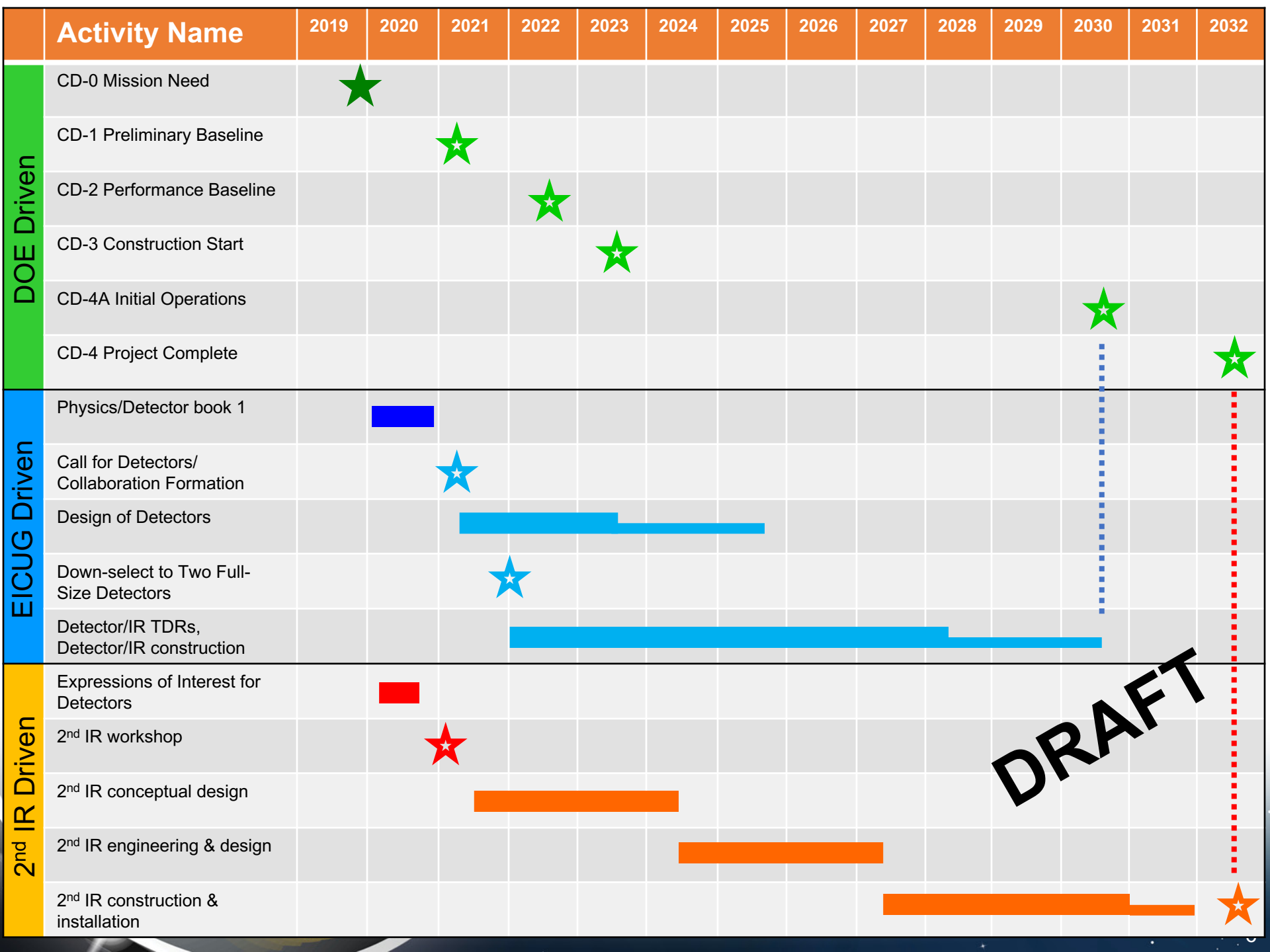
## Ground rules:

- A deliverable of the EIC is the possibility for a 2nd Interaction Region (IR) and detector.
- Present EIC plans and budgets support only one IR and detector.
- All stakeholders agree that a second IR and detector within the same timeline is desirable. Routes to make this possible are being explored.
- The topic of the second detector is investigated by the US/DOE and EIC project in cooperation with the EICUG and may be handled as a separate project.

## Ansatz:

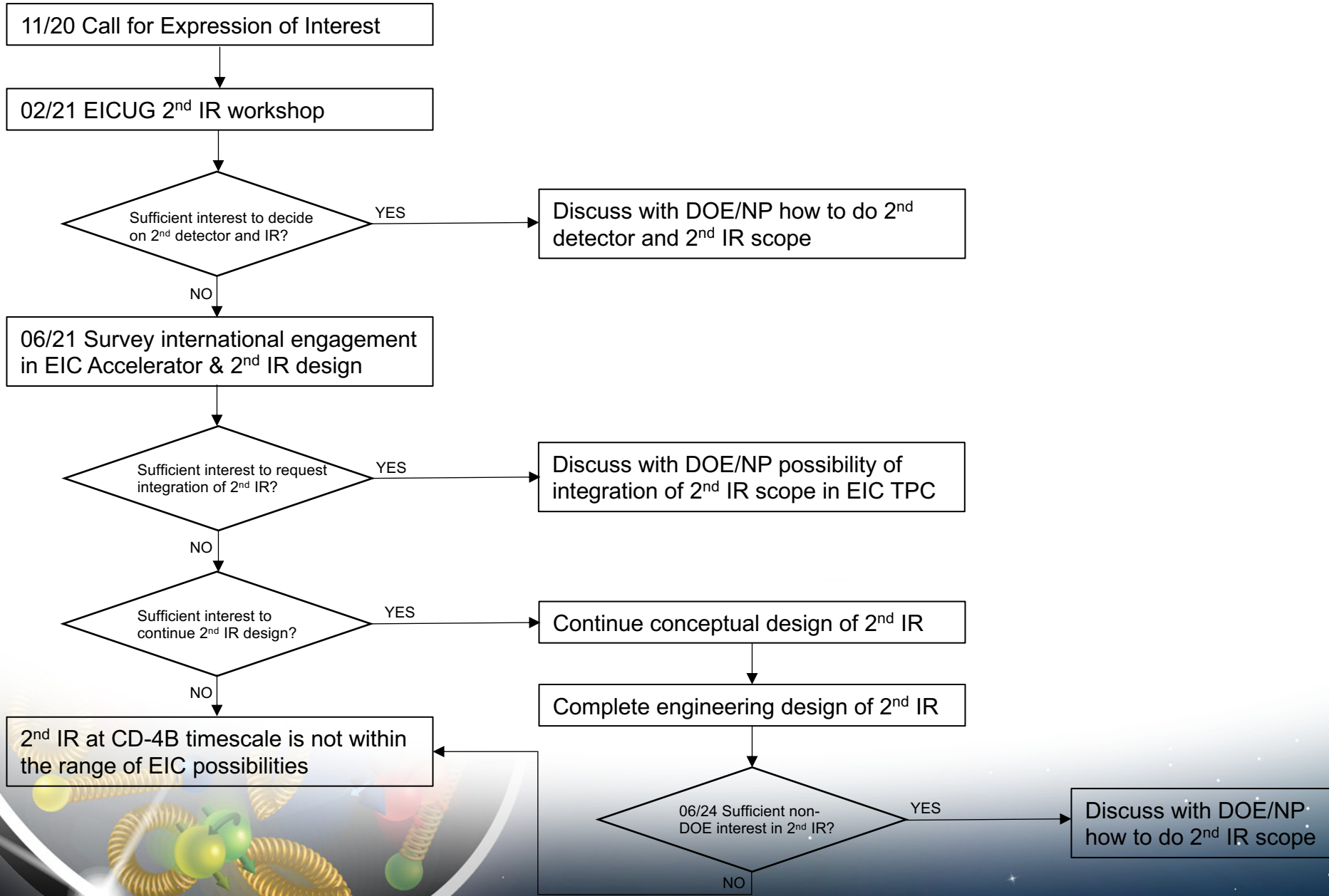
Goals and schedule are driven by keeping open a possibility of a 2nd IR from day-one, and how it can be integrated into the EIC Project. If the realization of a 2nd IR would shift to a later time, a time-line to account for this would need to be developed. At this moment it seems the best strategy is to assume realization of the 2nd IR, be it significantly different or similar to the 1st IR, consistent with the EIC project schedule and to revisit the situation in a year from now.





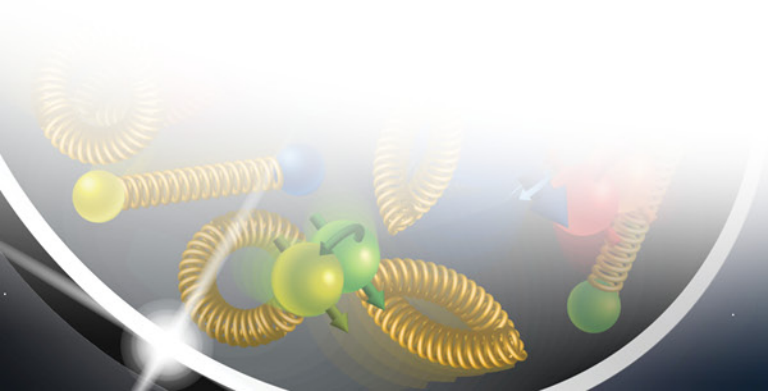
**DRAFT**

# 2<sup>nd</sup> IR Flowchart



# Next Steps for Detectors (and IRs)

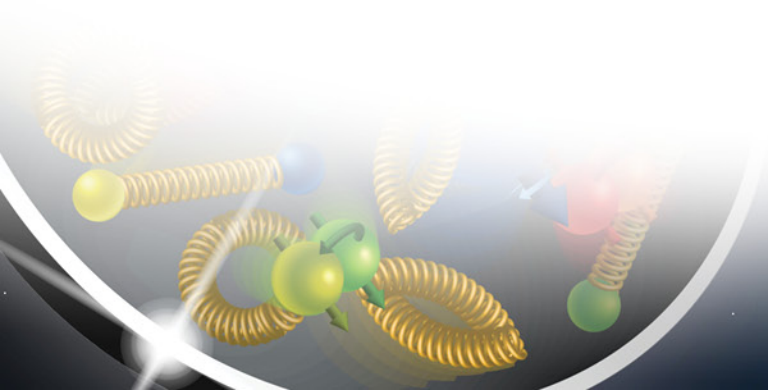
- The DOE-NP supported EIC Project includes one detector and one IR
- The DOE and the EIC Project need to mitigate risk such that EIC is a successful project and, once completed, is ready to do the NSAC/NAS Report science.
- Based on the technical-driven EIC schedule and the EIC risk assessment, the starting point for the included EIC project detector is in IP6.
- The included detector is ~70% scope as carried by the US-DOE EIC Project and ~30% international or in-kind scope.
- **The EoI call is crucial** - we rely on the EICUG community for a successful EIC (1<sup>st</sup>) detector!
- Ultimately, the EIC community will be very influential in determining the trajectory of **both** detectors and interaction regions. Again, the call for expression of interest is a crucial step to get guidance on the possibility of two EIC detectors.
  - A second detector without a second IR does not help...





# Next Steps for Detectors (and IRs)

- Many bi-lateral meetings with potential partners underway to discuss opportunities in accelerator and experimental areas
  - Accelerator Partnership Activities: Workshop planned for October 7-9 – Promoting Collaboration on the Electron-Ion Collider
  - Possible contributions to the EIC accelerator could include the full range of accelerator design and hardware
- We do have a little more time for a 2<sup>nd</sup> EIC detector and IR – we drafted a first flowchart on what a timeline could be to be ready by CD-4 (not CD-4a as required for the detector in the project)



# Governance Structure



- Started discussion on “Management Approach to Detectors” with DOE/NP since May 2020, first by canvassing existing models (CERN, DESY, DUNE, KEK).
- **Defined EIC overarching guidelines**
  - The EIC is a US-based Project
  - The EIC is at the technological and scientific forefront and is of international interest
  - With two possible detectors, we should treat both experimental collaborations equal
  - We should be welcoming and inclusive to new interested partners
- **Defined EIC principles and an initial EIC model**
  - US pays for all costs to run the accelerator which sets weeks of operations & schedule
  - DOE and non-DOE participation in the governance (financing and oversight) of the experimental program including construction, maintenance and operations (M&O), and distributed software and computing.
    - The US convenes an international governing body for the oversight
    - The governing body meets once per year
  - US partially pays for detector M&O and computing costs, as follows:
    - M&O for incremental detector systems or detector upgrades to be supported by DOE and non-DOE, discussed at annual governing body meetings
    - Common Fund pays M&O for experimental equipment operations.
    - DOE and non-DOE support for distributed software and computing.

# Governance Structure – Agency Oversight

- The governing body meets annually for at least one day and hears the following presentations:
  - DOE/NP introduction
  - Financial oversight presentation, includes overview of use and need for shared M&O support (new detector subsystems, common fund, distributed computing)
  - EIC presentations
    - In Project phase: EIC presentations on project performance and management view (EIC team including BNL and JLab Lab managers)
    - in Operations phase: EIC presentations on accelerator performance and management view (BNL directorate including JLab Lab manager)
  - Spokesperson of the scientific collaboration(s) presentations
    - In Project phase: collaboration status and status to provide scope to project
    - In Operations phase: status and science operations strategy
  - Project Manager/Technical Coordinator presentations
    - In Project phase: Project Manager presentation(s) to discuss status of key topics
    - In Operations phase: Technical Coordinator presentation(s) (to discuss possible upgrades, reliability, etc)
  - DAC/PAC Chair presentations
    - In Project phase: DAC chair presentation on the recommendations and evaluation of detector design and construction progress
    - in Operations phase: PAC chair presentation on the recommendations and evaluation of the science program
  - Much of the afternoon is discussion





# Questions received from EICUG SC

**Naming: EIC project scope detector = IR1 detector, in contrast to the IR2 detector.**

(1) When will IR1 and IR2 be defined? It seems from the discussion on Wednesday afternoon that IR1 would be an IR region for high-luminosity operation at high CME, whereas IR2 is for an IR region for high-luminosity operation at lower CME.

(2) Will the open call for detector proposals in March 2021 concern only the IR1 detector? Will the open call be restricted to accept only a fixed, pre-defined number of proposals?

(3) If the open call also includes an IR2 detector, will the open call be restricted to accept only a fixed, pre-defined number of proposals?

(4) Who, i.e., which committee, will review detector proposals for an IR1 detector? How is the down-select process going to be organized following the review process?

(5) Assuming there is an open call for an IR2 detector, who, i.e., which committee, will review detector proposals for an IR2 detector? How is the down-select process going to be organized following the review process?

(6) What strategy does the EIC project team have in mind to engage the EICUG through the Steering Committee in assembling the detector review committee(s) and in general concerning timelines and procedures impacting the EICUG

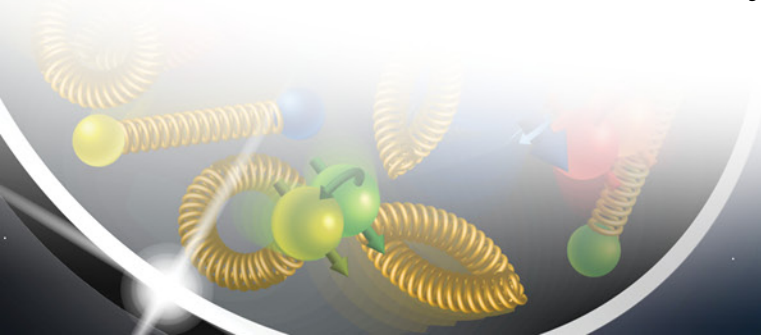
(1) When will IR1 and IR2 be defined? It seems from the discussion on Wednesday afternoon that IR1 would be an IR region for high-luminosity operation at high CME, whereas IR2 is for an IR region for high-luminosity operation at lower CME.

The DOE and the EIC Project need to mitigate risk such that EIC is a successful project and, once completed, is ready to do the NSAC/NAS Report science.

Based on the technical-driven EIC schedule and the EIC risk assessment, the starting point for the included EIC project detector is in IP6.

So IR1 = IP6, and has to deliver on the promised NSAC/NAS EIC science.

However, we need to ensure with TWO DETECTORS that both are treated equally, and that BOTH detectors/IRs can do our desired EIC science, and together can do more (= be complementary). We urge the EIC User Community to think about this as one entity and not segregate.



(2) Will the open call for detector proposals in March 2021 concern only the IR1 detector? Will the open call be restricted to accept only a fixed, pre-defined number of proposals?

This depends on the response to the call for EoI, and also on the success of the ongoing Accelerator Partnership Activities **as a 2<sup>nd</sup> detector without a 2<sup>nd</sup> IR does not help.**

The open call for detector proposals must always involve the IR1 detector, as we need to ensure EIC is a successful project and, once completed, is ready to do the NSAC/NAS Report science.

Our hope is that the signs for non-DOE engagement are sufficiently positive that we can do the call for two **general-purpose** EIC detectors.

**The open call will not be restricted.**

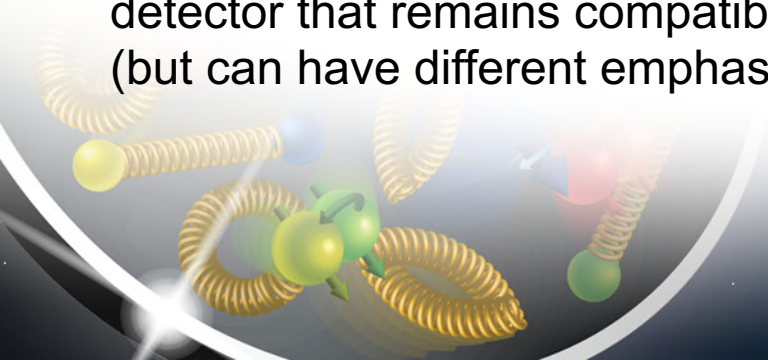
Our sincere hope is that the EICUG together converges on two excellent complementary EIC detectors to help all our EIC community science case and interest.

(3) If the open call also includes an IR2 detector, will the open call be restricted to accept only a fixed, pre-defined number of proposals?

See the answer on the previous question.

- Our hope (wishful thinking?) is that we as community can gather enough positive signs that there is sufficient interest to fold into the March 2021 call directly two detectors.
- But pending the assessment of the EoI and the Accelerator Partnership Activities, it may be that we need to do the call in two stages. If there is a call in two stages, the EoI will give important information what steps are needed to realize a 2<sup>nd</sup> detector
- We drafted a possible timeline/flowchart, and will work with the EICUG to refine.
- IF a separate second call is required:

The open call will **not be restricted**. We will ask for a general-purpose EIC detector that remains compatible with operationality over the full energy range (but can have different emphasis).





#### (4) Who, i.e., which committee, will review detector proposals for an IR1 detector? How is the down-select process going to be organized following the review process?

We will give regular updates to EICUG SC and ask for input → current thinking

#### Who:

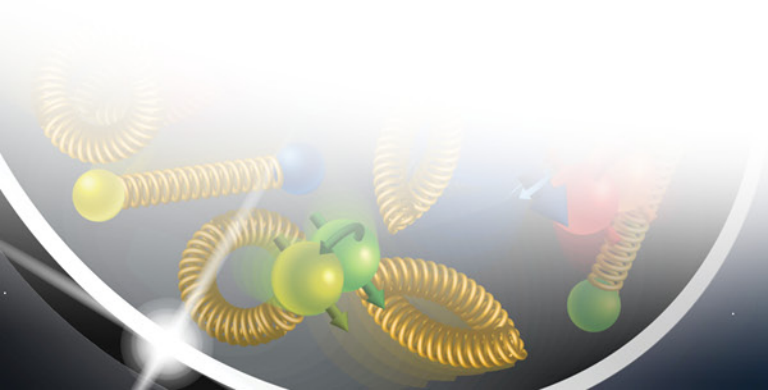
- JLab and BNL Management
- the EIC Project
- Advice from Independent Science and Detector experts → equivalent to members on a PAC/DAC
- members of the EICUG → working with EICUG SC on how to do this

#### How:

- Currently collecting information from different facilities on what procedure they followed
  - CERN (LHC), RHIC, Tevatron, DESY, .....
  - take from every model the best
- Evaluation criteria
  - Design must be able to do the EIC science
  - Detector must be buildable in the EIC Project timeline
  - Detector technologies must have reasonable risk
  - ...
- Committee will conduct a transparent open review validating the proposals against pre-defined criteria in the call

(5) Assuming there is an open call for an IR2 detector, who, i.e., which committee, will review detector proposals for an IR2 detector? How is the down-select process going to be organized following the review process?

See the answers to Q2-Q4. The current plan is exactly the same process.



(6) What strategy does the EIC project team have in mind to engage the EICUG through the Steering Committee in assembling the detector review committee(s) and in general concerning timelines and procedures impacting the EICUG

After clarification, what was meant is:

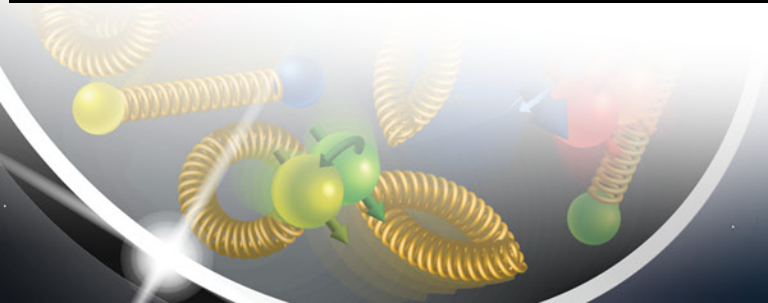
(6) What would be the EICUG (SC)'s role and involvement in the planning and execution of milestones on the detector front ? That includes evaluation of EoI , evaluation of future detector proposals and possible down selects.

We plan to do exactly the same and work through our meetings with the EICUG SC to engage some of (or a representation of) them in these processes. E.g., the EICUG was mentioned already as part of the evaluation committee for the EoI and Detector Call.

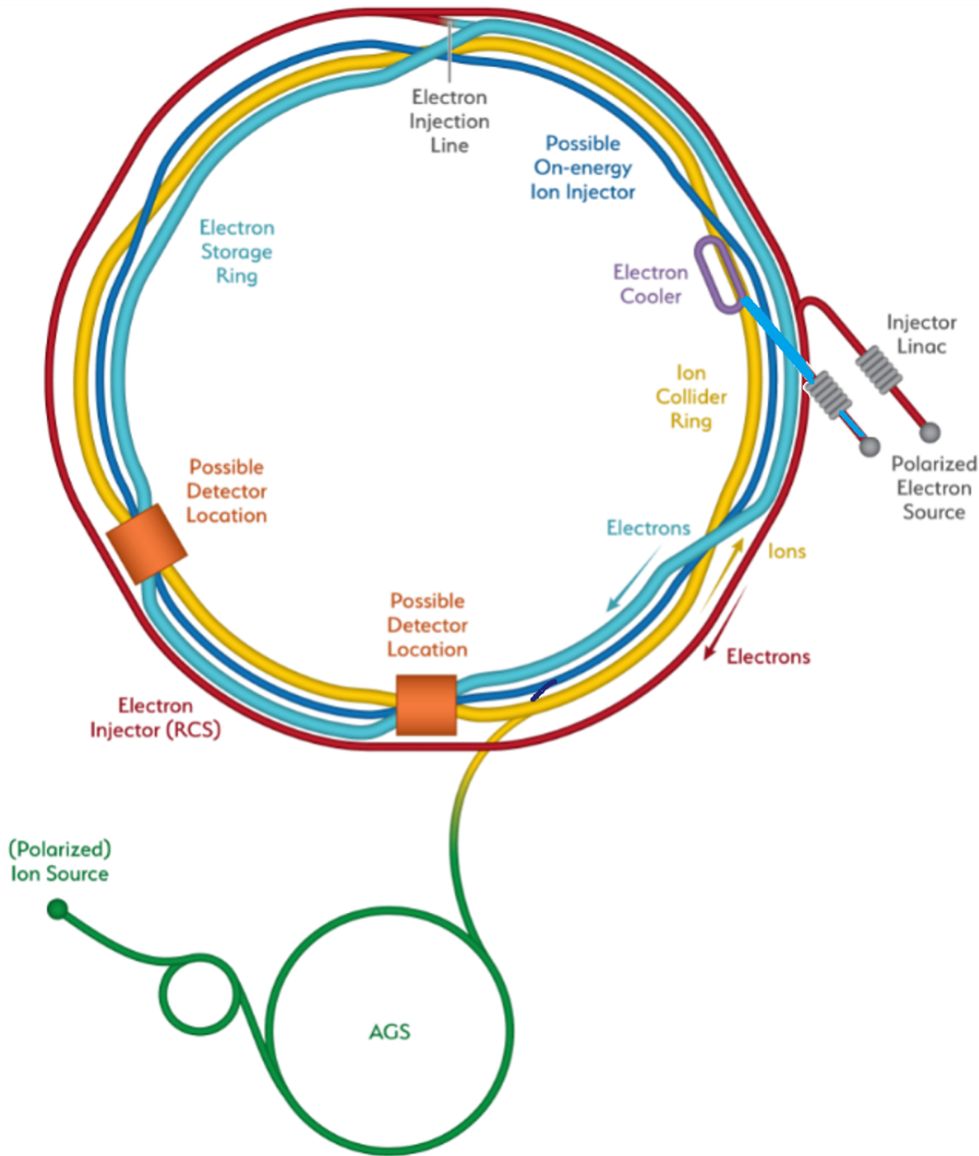
*Note that we also presented a plan of members of the EIC user community can be integrated in the EIC detector project(s) as point of contacts, owners, or even cost account managers at various levels for individual subsystems (see slides 12-14 in J. Yeck's talk @ Miami meeting -<https://indico.bnl.gov/event/7352/timetable/>).*



**BACK UP**



# Detector Location Assumption



Two assumed detectors and Interaction Regions – IP6 and IP8

Assumption: based on technical-driven EIC schedule and present risk assessment, IP6 is “default” EIC detector location.

Existing IP6 and IP8 Hall, doors, and situation are different which can lead to complications to use or reuse equipment.

- Hadron Storage Ring
- Electron Storage Ring
- Electron Injector Synchrotron
- Possible on-energy Hadron injector ring
- Hadron injector complex