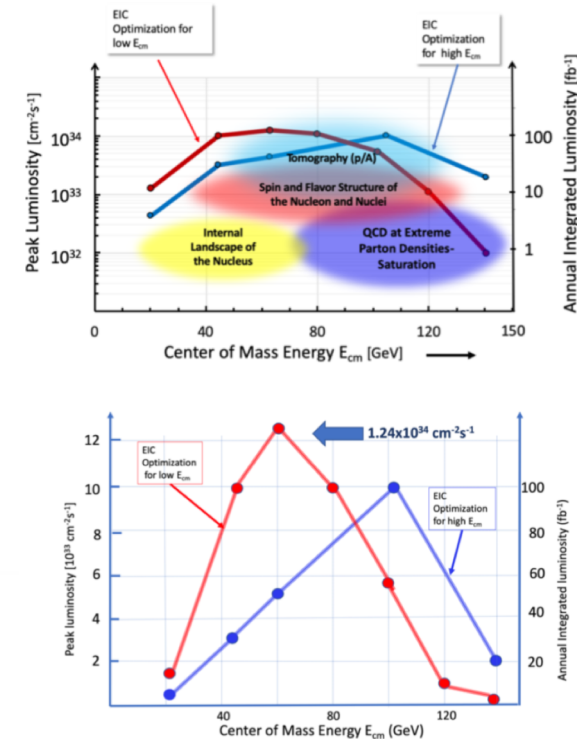# CFNS Workshop Series on IR2 & Detector EIC

- **The Proposal**

- **The EIC project and IR2 @ EIC**

- **Organization, activities and milestones**

- **Strategies & workshops**

- **Summary**

Proposal to CFNS

Co-PI's: V. Burkert (JLab), L. Elouadrhiri (JLab)

OC: M. Contalbrigo (Ferrara), A. Deshpande (Stony Brook), H. Gao (Duke), B. Jacak (LBL), R. Milner (MIT), F. Sabatie (Saclay/CEA), T. Satogata (JLab), B. Surrow (Temple)
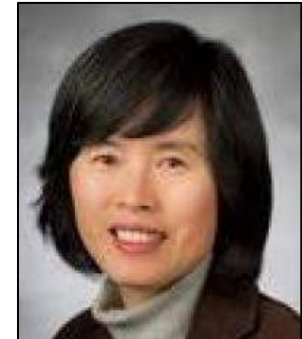
Volker Burkert	Marco Contalbrigo	Abhay Deshpande	Latifa Elouadrhiri	Haiyan Gao
Barbara Jacak	Richard Milner	Franck Sabatie	Todd Satogata	Bernd Surrow

Proposal to CFNS

Motivation: Optimize the science output and impact of the EIC Facility. Work with the EICUG/YR and the EIC Project to achieve this optimization as the ideas for the IR1/Detector are clarified.

Performance of the EIC when operating two differently optimized interaction regions and detectors in terms of scientific impact and its timely delivery?

- The EIC is designed to have two interaction regions that are suitable for the installation of large-scale detector systems for breakthrough nuclear physics experiments.

- Primary interaction region optimized for high luminosity operation at high center-of-mass energy (> 80GeV). Significantly lower luminosity in the medium and low energy range (< 80 GeV).

- A second interaction region can be optimized to operate in modes that emphasize high interaction rates and high luminosities at the lower center-of-mass energies.

Scientific Output:

- Evaluate the evolving landscape of the science underlying the need for the EIC.

- Review complementary approaches towards the overall optimization and the execution of the science program.

- Assess required performance of detection systems by drawing on the results of the Yellow Report initiative and of the EoI results.

- Prepare summary report with a detailed discussion of the conclusions reached.

Proposal to CFNS
Community & Project expertise

- **List of potentially invited speakers at workshops (58+)**
  - **Theory (10)**
  - **Science & Computing (21)**
  - **Detector technologies (17)**
  - **Accelerator/IR (5)**
  - **Background modelling (3)**
  - **Software development (2)**

- **Many of the speakers will be YR WG leaders and other members of the EICUG (including theorists and accelerator/IR scientists)**

- **This initiative cannot be decoupled from the EIC Project**
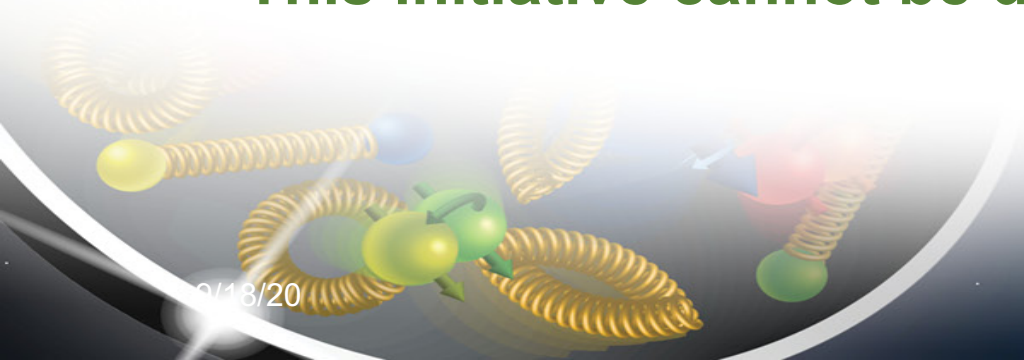
Major Design Activities Interaction Region Design

F. Willecke
EIC Users
meeting
July 15, 2020

- **The EIC IR design is quite mature:**
  - IR beam optics with the desired strong focusing is integrated into the two accelerator lattices,
  - conceptual design of IR magnets and vacuum system are well underway,
  - IR synchrotron radiation and impedance are optimized and manageable, mask and collimation systems is in progress
  - Forward detector acceptance of collision events made good progress and look quite satisfactory

- **2nd IR and 2nd detector are not in the project scope but we unanimously agree that the EIC should have 2 detectors (and IR s)**

The layout of a second IR is being studied under the assumption that more luminosity can be achieved at lower center of mass energy (60GeV) if more bunches are used in collisions.

First promising results => V.S. Morozov on Wednesday

Remaining challenges => V. Ptitsyn on Wednesday

> ➢ **Design of IR2 and its detector must be done in the context of the IR1 design and detector so that the major scientific goals of EIC are accomplished. It is part of our initiative to support these goals.**

Timeline next 6 months

Jim Yeck
EIC Users meeting
July 15, 2020

Milestones
relevant for
this proposal

Deadline for Detector EoI	**November 1, 2020**
Conceptual Design Review	November tbd, 2020
PAC Meeting	November 19, 2020
Post Material for Director's Review	November 23, 2020
NEPA Process Complete	November 30, 2020
CD-1 Director's Review	December 8-10, 2020
Freeze data for DOE CD-1 Review	December 15, 2020
½ Day Briefing with NP and OPA	January 7, 2021
Final CDR Complete	January 12, 2021
Post Material for CD-1 Review	January 12, 2021
DOE CD-1 Review	**January 26-28,2021**
Evaluate EoI & Draft Call for Detector Proposals	February 2021
Initial Plan for Call for Detectors Proposals	**March 2021**
Goal for CD-1 Approval	March 31, 2021

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Reference Schedule
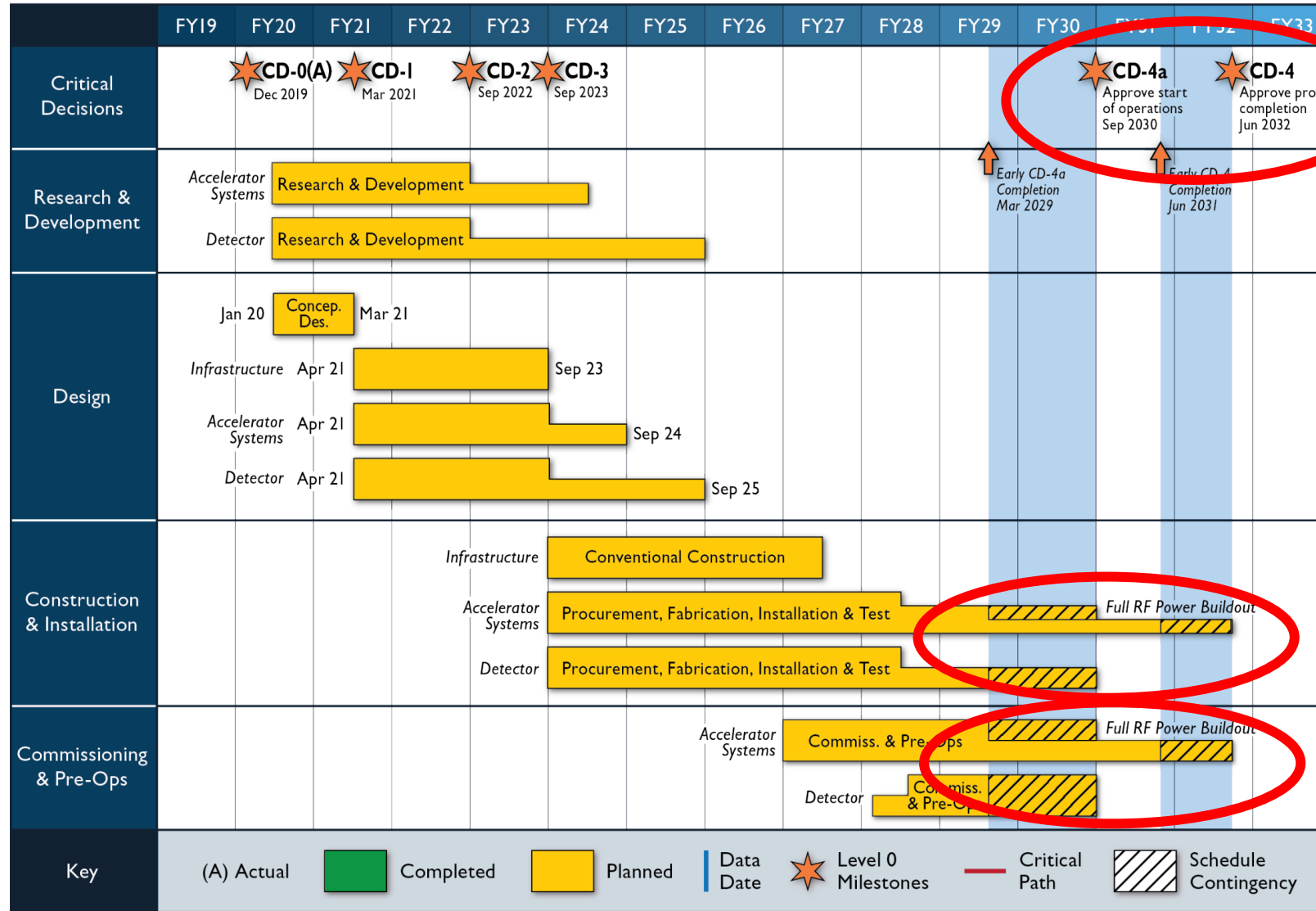
Jim Yeck
EIC Users meeting
9/16/20 EICUG-YR

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Success of this initiative requires

- **Drawing on the EICUG and EIC project activities and initiatives such as:**

  - **Results and conclusion of the Yellow Report initiative (to be completed end of 2020)**
  - **Results of the EoI initiative (November 2020)**
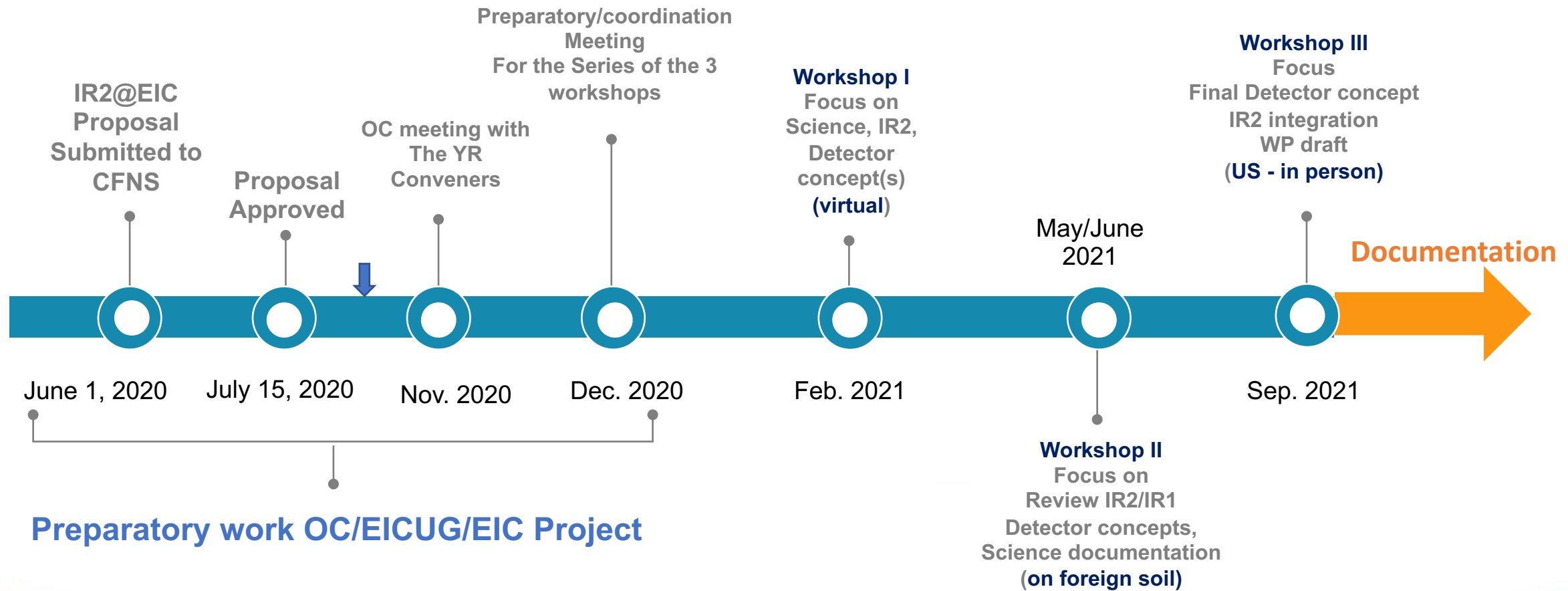 - **Software development and simulations/reconstruction tools**
  - **R&D work plan**

- **Drawing on development and advancement of science within CFNS, INT, CNF, …**

- **Taking into account the project milestones**

  ➡ **This perspective sets a timescale when these workshops should get underway, the dates, goals and the preparatory work needed.**

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IR2@EIC Series of Workshops - Timeline

Preparatory/coordination Meeting For the Series of the 3 workshops

IR2@EIC Proposal Submitted to CFNS

Proposal Approved

OC meeting with The YR Conveners

Workshop I Focus on Science, IR2, Detector concept(s) (virtual)

Workshop III Focus Final Detector concept IR2 integration WP draft (US - in person)

May/June 2021

Documentation

June 1, 2020   July 15, 2020   Nov. 2020   Dec. 2020   Feb. 2021   Sep. 2021

Preparatory work OC/EICUG/EIC Project

Workshop II Focus on Review IR2/IR1 Detector concepts, Science documentation (on foreign soil)

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Organizational Plan IR2@EIC

- **Meeting of OC with YR conveners & UG reps – November 2020**

- **Preparatory Meeting for Workshop series- December 2020**

- **Day 1 – Broad reviews of**
  - **IR1@EIC science focus and reference detector plans**
  - **YR results and analysis**
  - **EoI results and analysis**
  - What is new and emerging in Science for the EIC
  - Status of IR2@EIC design and expected performance

- **Day 2 – summary of what was learned on Day-1**
  - **Goals and schedules of the series of 3 workshops**
  - **Strategic planning – dates and venues of workshops, documentation, final report, reviews**
  - Finalize circular and draft agenda for WS-1 of the series

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Summary

- **Proposal aimed at defining and promoting a scientific program and instrumentation of the EIC with the goal to maximize its science output.**

- **Optimization for luminosity vs. CM energy implies significant tradeoffs, and could be an important guiding principle for design of the two experiments and IR's.**

- **The community engagement is essential to the success of this initiative. The series of workshops of IR2@EIC is also intended to attract new interests and collaborators to the EIC project.**

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