Summary: EIC Yellow Report - Accelerator Section Org

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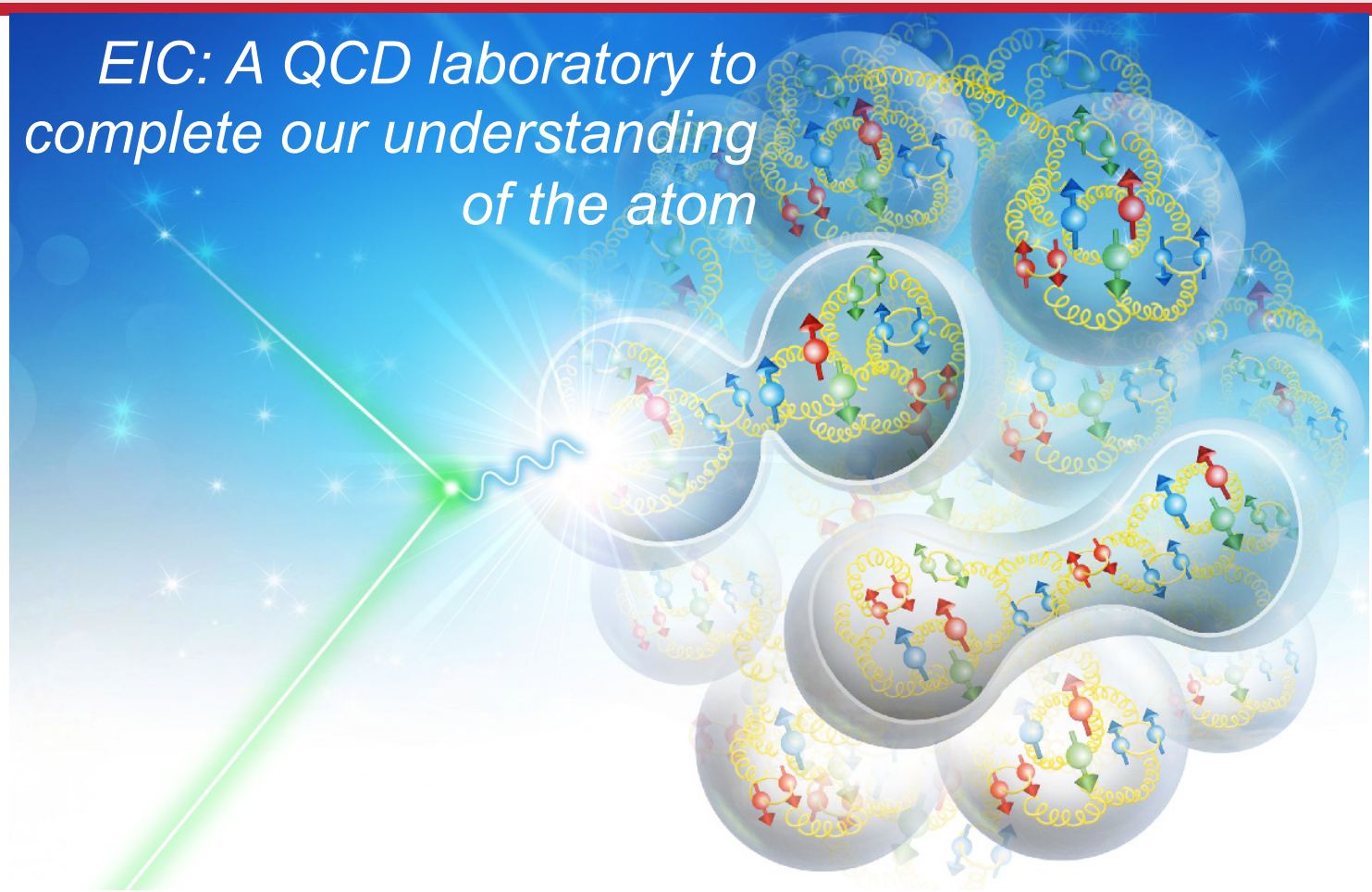

Summary

- As we described yesterday, we plan to use the activity on Yellow Report accelerator section to broaden the engagement of wider accelerator community into EIC
- Therefore, we have contacted:
  - The organizers and WG leaders of the GARD Strategic Roadmap Workshop
  - The Chair of ICFA Beam Dynamics Panel, and ICFA BD Editor of Newsline issue on EIC
- Sergei Nagaitsev (who represents the organizers of GARD Strategic Roadmap workshops) called us and participated in the discussion
  - EIC was mentioned in almost every talk at Dec 9-10 GARD workshop
  - EIC teams will be strongly participating in the next GARD strategic workshop
- EIC acc experiments can feed to design/operations of future machines, e.g. FCC: ee, pp, eh
- EIC, with its cooling and polarization, can contribute to creation of beams with quantum degeneracy – applications much beyond accelerator science
- IOTA list of experiments – check what can be much better done at EIC
- EIC for EDM measurements

Next steps

- More detailed discussion with HEP GARD workshops organizers
- Discussion with ICFA
  - And also engage with ECFA and ACFA
- BES accelerator community engagement
- Small accelerator labs – engagement

- Organization of the wider team for putting together EIC Yellow Report Acc Section will be happening over next several months

Defining the acronyms

- HEP GARD: High Energy Physics General Accelerator R&D
- ICFA: International Committee for Future Accelerators
- ECFA: European Committee for Future Accelerators
- ACFA: Asian Committee for Future Accelerators
- BES: Basic Energy Science
- EDM: Electric Dipole Moment
- FCC: Future Circular Collider
- IOTA: Integrable Optics Test Accelerator

Backup slides – presented at the introduction

The Charge to Accelerator section, paraphrased

- This EIC Yellow Report will be produced in about a year, will have sections on EIC physics and detector, but will also have a section on accelerator science, focusing in particular on accelerator science experiments that can be done at EIC beyond its main mission of nuclear physics, i.e. describing possible experiments/studies that can advance accelerator science in general
- Charge to the Acc Section leaders: organize working group to put together this section

Our assumptions

- It is both
- the right thing to do
- and the opportunity
- to use the activity on Yellow Report accelerator section to broaden the engagement of wider accelerator community into EIC

- Therefore, we have contacted:

  – The organizers and WG leaders of the GARD Strategic Roadmap Workshop

  – The Chair of ICFA Beam Dynamics Panel, and ICFA BD Editor of Newsline issue on EIC

GARD Strategic Roadmap Workshops – Grand Challenges

- Grand challenge #1 (beam intensity): How do we increase beam intensities by orders of magnitude?
- Grand challenge #2 (beam quality): How do we increase beam phase-space density by orders of magnitude, towards quantum degeneracy limit?
- Grand challenge #3 (beam control): How do we control the beam distribution down to the level of individual particles?
- Grand challenge #4 (beam prediction): How do we develop predictive “virtual particle accelerators”?

- In addition to these grand challenges, other equally important ABP missions are associated with the overall DOE HEP missions:
  - Advance the physics of accelerators and beams to enable future accelerators.
  - Develop conventional and advanced accelerator concepts and tools to disrupt existing costly technology paradigms in coordination with other GARD thrusts.
  - Guide and help to fully exploit science at the HEP GARD beam facilities and operational accelerators.
  - Educate and train future accelerator physicists.

GARD Strategic Workshops WGs

- Workshop #1 (LBNL, Dec. 9-10, 2019):
  - (WG1) Single-particle dynamics, including nonlinearities, and spin dynamics.
  - (WG2) High-brightness beam generation (including polarized beams), transport, manipulation and cooling.
  - (WG3) Mitigation and control of collective phenomena: instabilities, space charge, beam-beam, beam-ion effects, wakefields, and coherent synchrotron radiation.
  - (WG4) Connections to other GARD roadmaps (cross-cutting WG1-3)
- Workshop #2 (Chicago area, March 2020):
  - (WG1) Advanced accelerator instrumentation and controls.
  - (WG2) Modeling and simulation tools (including energy deposition); fundamental theory and applied math.
  - (WG3) Early conceptual integration and optimization, maturity evaluation
  - (WG4) Connections to other GARD roadmaps; synergies with non-HEP

GARD Workshop #1

https://conferences.lbl.gov/event/279/

HEP GARD Accelerator and Beam Physics: Community-driven Strategic Roadmap Workshop #1

9-10 December 2019
Lawrence Berkeley National Laboratory

- **Workshop #1 (LBNL, Dec. 9-10, 2019):**
  - **(WG1) Single-particle dynamics, including nonlinearities, and spin dynamics.** [Conveners: S. Nagaitsev, L. Spentzouris, Y. Cai]
  - **(WG2) High-brightness beam generation (including polarized beams), transport, manipulation and cooling.** [Conveners: J. Rosenzweig, P. Piot, A. Valishev]
  - **(WG3) Mitigation and control of collective phenomena: instabilities, space charge, beam-beam, beam-ion effects, wakefields, and coherent synchrotron radiation.** [Conveners: J. Power, Z. Huang, S. Cousineau]
  - **(WG4) Connections to other GARD roadmaps (cross-cutting WG1-3)** [Conveners: J.-L. Vay, M. Conde, M. Hogan]

Zhirong Huang (SLAC/Stanford), **Sergei Nagaitsev** (Fermilab/UChicago), **Philippe Piot** (NIU), **John Power** (ANL), **James Rosenzweig** (UCLA), **Linda Spentzouris** (IIT), and **Jean-Luc Vay** (LBNL)

ICFA Beam Dynamics Panel

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Marica Biagini
John Byrd
Yunhai Cai
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Ajay Ghodke
Eliana Gianfelice-Wendt
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Mark Palmer
Chris Prior
Ji Qiang
Yuri Shatunov
Yoshihiro Shobuda
Jiu-Qing Wang
Rainer Wanzenberg
Zhentang Zhao

Timeline and next steps

- Organization of the wider team for putting together EIC Yellow Report Acc Section will be happening over next several months