

EIC Detector-II and R&D Efforts

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Opportunities With a Second EIC Detector

- The EIC community is strongly in favor of a second detector
- The key arguments are:
 - ▶ Cross-checking
 - ⦿ analysis mistakes, instrumental malfunctions, or inevitable statistical fluctuations
 - ▶ Technology redundancy and mitigating of overall risk
 - ⦿ mitigate risk of reduced performance or failure of any detector sub-component
 - ▶ Cross-calibration
 - ⦿ A good example is offered by the H1 and ZEUS detectors at HERA
 - ▶ Expand the physics program of the facility:
 - ⦿ Physics with double polarized electron: measuring transversity in transverse polarized eD collisions \Rightarrow can provide insight in road of gluons in nuclear binding.
 - ⦿ Physics with positron beams: having both e-p and e+p electro-weak data \Rightarrow enables studies like quark axial and vector couplings and extends the capabilities of exclusive measurements.
 - ⦿ Physics with real photon beams: generating real photon beams through Compton scattering enables the generation of a polarized real photon beam \Rightarrow unique spectroscopy capabilities for new charmed mesons.
 - ⦿ Physics enabled through a 2nd focus integrated in the IR \Rightarrow allows to detect particles down to $p_T \sim 0$, which especially for nuclei can provide new understanding in the structure of nuclei.
 - ⦿ Physics through fixed target integrated into EIC \Rightarrow very high x physics in ep

A Second EIC Detector and R&D

Requires effort to

- strengthen the case for a second EIC detector
- broaden the physics program
- provide a realistic detector concept that is complementary to the current project detector in terms of physics reach, precision, and systematics

A potential 2nd detector is expected to be realized with a 3-5 year delay to the first detector opening new opportunities:

- new technologies that are not mature enough or too risky for the 1st detector can be considered to provide full complementarity
- this needs a well-thought-out R&D program that will be guided and inspired by efforts on Detector-II (also EPIC upgrades)
- making full use of the restarted generic EIC detector program

Detector-II and BNL

- Engagement in EPIC hardware & detector construction does require skilled technician, and hardware oriented scientific staff (that we are short of). This likely requires new hires and investments
- Detector-II offers a continuation of hardware construction past the launch of EIC operation, i.e. the investments and experience of skilled workforce is further exploited
- Opportunities for new and interesting R&D within the generic R&D program

A second detector can be vital to maintain a vibrant and successful program and can go hand in hand with facility upgrades, making the EIC an attractive facility for the decades to come.