

Potential upgrade paths

The baseline CORE detector has all the subsystems required to execute the full EIC physics program. There are, however, some short- and long-term opportunities for upgrades

- Short term: an LGAD TOF layer can be added behind the last MAPS disk on the hadron side.
- Mid-life upgrade: photosensors used by the DIRC and dRICH are quickly evolving technologies. In the future, it may be possible to improve performance by only replacing the photosensors and electronics. For the DIRC, better timing could improve the momentum reach, and for the dRICH lower noise levels could reduce noise cooling requirements.
- Mid-life upgrade: Si-tracking is another rapidly evolving technology. A future tracker could further reduce the mass, which would improve dp/p at low momenta.
- There are also more speculative upgrade paths. For instance, a breakthrough in the use optical metamaterials as Cherenkov radiators could make it possible to replace the dRICH with a much more compact system, which would enable moving the accelerator magnets even closer to the IP.

The CORE proto-collaboration - structure

- The CORE proto-collaboration currently includes 25 institutions, of which 8 are foreign.
- Since there are three proposals presented for at most two detectors, we expect that a consolidation will occur after the review is completed.
- CORE has thus taken its role as a proto-collaboration seriously, and avoided to set up permanent structures before proposal submission to ensure that both current and future members can participate equally in shaping the collaboration.
 - This consideration would be particularly important for a Detector 2 collaboration, which needs to be as broad as possible.
- The CORE proto-collaboration developed the proposal as a group of interested parties, with a direct participation by all its members, without (as of yet) establishing a formal collaboration structure - although topical working groups naturally emerged.

The CORE proto-collaboration

- An important role the proto-collaboration was also to establish close links with the various technology-focused consortia that the EIC community has self-organized into.
- We also expect that the collaboration will benefit from the support from major laboratories, particularly for major procurements, such as the solenoid magnet and silicon tracker.
- We do not claim that the signatories of this proposal at this time have the resources to alone build the CORE detector, but the proto-collaboration forms a strong basis for a full collaboration and its current members can take the lead in designing and building key components of the detector.
- We believe that our proposal is innovative and contains numerous opportunities for participation in providing the major sub-systems of the experiment. We expect additional support to emerge quickly if CORE receives encouragement from the EIC Detector Proposal Advisory Panel.

Construction

Participation and preliminary commitments to construction.
Potential Source of Support are not committed.

- We have had in-depth discussions with a broad range of people in the “Potential Source of Support” column throughout the preparation of this proposal.

Sub-system	Primary Responsibility	Key Participants	Potential Source of Support
Solenoid	P. Brindza (ODU/JLab)		JLab/BNL Magnet Groups
Silicon tracker	S. Bueltmann (ODU)		EIC Silicon consortium
MPGD	M. Hohlmann (FIT)	K. Gnanvo (JLab)	JLab Detector Group
DIRC	G. Kalicy (CUA)	J. Schwiening (GSI)	PANDA DIRC Group (GSI)
dRICH	K. Joo (UConn)		CFNS @ Stony Brook, PID consortium
LGAD			LGAD consortium
PbWO ₄ EMcal	C. Muñoz Camacho (IJCLab)	C. Hyde (ODU)	Electron Endcap EMcal consortium
W-shashlyk EMcal		LLC Uniplast	
Forward Hcal			Calorimeter consortium
KLM	W. Jacobs (IU)	A. Vossen (Duke)	
Pair spectrometer	M. Dugger (ASU)		
Low-Q ² tagger	L. Guo (FIU)		
ZDC	M. Murray (KU)		
Forward Tracking	M. Murray (KU)		
Electronics	G. Varner (UH)	I. Mostafanezhad (Nalu)	JLab/BNL Electronics Groups

- Some of the “gaps” correspond to topics that are of the natural scale for recruiting University research groups.

Next steps towards a CORE collaboration

Presuming CORE is endorsed by BNL & JLab, as well as the EIC Project as an EIC Detector:

- We expect broad interest in the international EIC community to join CORE.
- We will aggressively recruit in critical areas of expertise and capacity.
- All will be welcome, without distinction to “originals” vs. “newcomers.”
- CORE is ready to move quickly on Long-Lead-Time items.
- We will recruit a Charter committee broadly across all interested parties and move quickly to develop a structure and elect officers consistent with our principles of Diversity & Inclusion.