The Electron Ion Collider

The potential to contribute to world-leading science in the next decade – (a) absolutely central.

The scientific foundation for the Electron-Ion Collider (EIC) was built over two decades. The EIC was a concerted effort by the nuclear science community supported by the Long Range Plans of 2002 and 2007, and a top recommendation of the 2015 and recent 2023 plan. The EIC addresses unique and compelling science as evidenced by a 2018 consensus study report of the National Academies of Science, Engineering and Medicine. The EIC, to be built in the United States, will elucidate the origin of visible matter in the universe and significantly advance accelerator science and technology as the first major particle collider to be constructed since the LHC. The EIC will provide unprecedented ability to "x-ray" protons and atomic nuclei and discover how the mass of everyday objects is dynamically generated by the interaction of quark and gluon fields inside protons and neutrons. How their mass and other properties emerge remains deeply mysterious. Understanding this is key to being able to develop a next generation of technology in the quantum world. The EIC will employ and develop the next generation of scientific explorers, engineers, and tech-savvy workers during construction and its many years of operations, all critically needed to address some of our nation's greatest challenges. The advances in accelerator science and technology, detector technology and computing that will come with the EIC are expected to bring strong societal benefits to medicine, national security, manufacturing and studying new materials, computational tools, and more. The EIC is expected to be an end-to-end AI facility from accelerator to detector to data analysis. The EIC is unique and draws large interest all around the world. The EIC Users Group has over 1440 members of which near-half represent 40 countries in six continents. Multiple foreign agencies, including Italy, France, UK, and South Korea are in final proposal phase for EIC in-kind contributions. **The EIC will be a new world leading DOE capability at the forefront of scientific discovery.**

The readiness for construction – (a) ready to initiate construction.

The EIC will be sited at Brookhaven National Lab and constructed in partnership with Thomas Jefferson National Accelerator Facility. Argonne National Lab, Fermilab, Lawrence Berkeley National Lab, Oak Ridge National Lab and SLAC all contribute to its construction, together with US universities and numerous international partners. These institutions are motivated by the EIC's worldwide unique science and technology. The EIC construction project is notionally envisioned to be completed in the first part of the next decade.

EIC construction readiness is demonstrated by the following major milestones:

- The EIC received CD-0 mission-need in **December 2019** and CD-1 in **June 2021**.
- The EIC received $138M of Inflation Reduction Act funding in **September 2022** which must be spent by 2027.
- EIC successfully passed a DOE Independent Project Review for the start of long lead procurements in **November 2023** (Critical Decision 3A) and is ready for construction.
- The State of New York awarded $100M for the construction of EIC support buildings in **February 2024**.
- The construction of the EIC facility is perfectly timed to leverage the existing BNL RHIC infrastructure and highly trained professionals that are immediately available upon the successful conclusion of RHIC operations in **September 2025**.
- The TJNAF radio frequency and cryogenics workforce will become available in **2026** following the completion of work in support of accelerator projects at ORNL and SLAC.

The R&D performed to date confirms the technical feasibility of the facility. Critical Decision 2, Performance Measurement Baseline, is on track for DOE approval in 2025. Formal agreements for international in-kind contributions, notably those confirmed from Canada, Italy and the UK, are in development. Statements of Interest were signed by the DOE and French agencies.